



THE COMPARISON OF REACTION TIMES OF KARATE ATHLETES ACCORDING TO AGE, GENDER AND STATUS

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Abstract

Aim. Reaction time is the elapsed time between a stimulus and the first corresponding response. The purpose of this study was to compare reaction times of karate athletes according to the age categories, gender and status (competing on national or international level).

Method. The groups of children (age: 10-12, n:73), cadets (age: 13-15, n: 77), juniors (age:16-17, n: 34) and seniors (age 18 and over, n:43) were chosen from 3rd International Sakarya Karate Tournament. A total of 227 athletes were participated voluntarily. They were performed simple, choice and auditory reaction time tests. 1 trial and afterward 4 measurements were taken for each tests from all subjects. The best value of the 4 measurements was recorded as milliseconds. All measurements were taken from dominant hand.

Results. The auditory reaction time scores were found significantly higher in 10-12-year athletes ($p<0.001$). There was a significant difference between children and, juniors and seniors according to both simple ($p<0.001$) and choice reaction time ($p<0.01$) tests. Athletes competing on international level showed significantly shorter reaction time in auditory test ($p<0.05$), and choice reaction time scores were found significantly shorter in male athletes ($p<0.01$).

Conclusion. According to the results of reaction time in different age groups, the best reaction time scores were found in 16-17-year karate athletes. Therefore, it was thought that reaction time speed is well developed at the age of 16-17 years. Also, it was concluded that reaction time and rapid decision-making are better in male athletes, and can be improved by practice.

Key words: Karate athlete, auditory reaction time, visual reaction time.

Introduction

Karate is a kind of martial art developed in Japan. It involves kihon, kata and kumite training. Kihon consists of basic karate techniques and, kata and kumite are the two forms performed in competitions. Kata is composed of prespecified series of defensive and offensive techniques and, kumite is a real fighting between two athletes without contact in accord with rules (Doria et al., 2009, Chaabène, Hachana, Attia, Mkaouer, Chaabouni, & Chamari, 2012).

Reaction time is the elapsed time between a stimulus and the first corresponding response (Sevim, 2007). It involves firstly the perception and analysis of a stimulus, then the evaluation and implementation of a required movement. There are two types of reaction time mostly stated in the researches. Simple reaction time (SRT) requires just one response to a single stimulus. In the choice reaction time (CRT), there is an alternative stimulus and the subject gives a particular response for the presented one (Simonek, 2011).

In general, fitness and skill characteristics are measured as physiological qualities of athletes. Endurance, cardiorespiratory function, muscular strength, flexibility, body composition are examined to determine the athletes' fitness characteristics. Agility,

power balance, speed, coordination and reaction time are the skill-related characteristics' of athletes to be tested. However, though reaction time is a crucial component in martial arts especially karate by requiring high level performance of explosive techniques, researches related to reaction time in this field are rare. Furthermore, the existing literature related to simple and choice reaction time in martial arts is contradictory (Chaabène, Hachana, Franchini, Mkaouer, & Chamari, 2012). Therefore, testing the simple and choice reaction time is aimed in the present study to compare reaction times of karate athletes according to the age categories, gender and status (competing on national or international level).

Material and Methods

Subjects

Kata and kumite competitors in 3rd International Sakarya Karate Tournament participated in the study. All volunteer athletes were tested from children (age: 10-12, n: 73), cadet (age: 13-15, n: 77), junior (age:16-17, n: 34), senior (age 18 and over, n: 43) categories of the tournament and a total of 227 athletes were participated voluntarily. Athletes were informed before testing. Informed consent was provided from the athletes above 18 years of age and from the parents for

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under 18-year old.

Experimental protocol

In this study, auditory and visual reaction time tests were performed in order to test the simple and choice reaction time. Newtest 1000 (Finland) was used to determine all reaction time measurements of the athletes. Two different test protocols of the device were used for SRT and CRT to determine them separately. Attention was shown the place where the measurements were taken to measure in euphotic and silent environment. 1 trial and afterward 4 measurements were taken to determine auditory and visual reaction time scores. All measurements were taken from dominant hand for both light and sound stimuli from each athlete. The best value of the 4 measurements was written as milliseconds as the score of the athletes (Orhan, 2013). Athletes were informed about the method of measurement, but for CRT

measurement they were not informed about the order which they choose, the stimuli was given randomly and they chose by him/herself. Lastly, auditory reaction time score was determined with the same device by taking the respond after hearing sound. All measurements were taken during the competition for 3 days.

Data Analysis

The data distribution was tested with the Kolmogorov-Smirnov test. The statistics of variables were briefly reported by using mean and standard deviation. The groups were compared with one-way analysis of variance (ANOVA) and to determine the source of the differences Tukey HSD test was conducted since the variances were homogeneous. An independent samples t-test was used for two-group comparisons. Significance level was taken as 0.05.

Results

Table 1. Comparison of Reaction Time Scores According to Age Categories.

Variable	Category	n	X±SD	F	p
Auditory Reaction Time(ms)	Children	73	0.152±0.034 ^a	7.326	0.001***
	Cadet	77	0.134±0.031 ^b		
	Junior	34	0.126±0.032 ^b		
	Senior	43	0.132±0.029 ^b		
Simple Reaction Time (ms)	Children	73	0.160±0.037 ^a	7.111	0.001***
	Cadet	77	0.144±0.035 ^{ab}		
	Junior	34	0.138±0.039 ^b		
	Senior	43	0.130±0.032 ^b		
Choice Reaction Time (ms)	Children	73	0.363±0.078 ^a	4.045	0.008**
	Cadet	77	0.349±0.055 ^{ab}		
	Junior	34	0.327±0.060 ^b		
	Senior	43	0.328±0.050 ^b		

Ab - No significant difference between the groups which have the same letter and in the same column. **p<0.01
 ***p<0.001

There was a significant difference in auditory (p<0.001), simple (p<0.001) and choice (p<0.01) reaction time among the age groups. A significant difference was found in auditory reaction time between children and all other group. While there was a

significant difference in both simple and choice reaction time between children and the groups of junior and senior, no significant difference was found between children and cadets (p>0.05).

Table 2. Comparison of Reaction Time Scores According to Status

Reaction Time	Status	n	X±SD	t	p
Simple Reaction Time (ms)	National	100	0.150±0.039	1.583	0.115
	International	127	0.142±0.035		
Choice Reaction Time (ms)	National	100	0.351±0.066	0.993	0.322
	International	127	0.343±0.064		
Auditory Reaction Time (ms)	National	100	0.144±0.033	2.342	0.020*
	International	127	0.134±0.033		

**p<0.05



In the comparison of reaction time between the groups of national and international level athletes, the auditory reaction time of international level athletes were found shorter than national level athletes and the difference

was statistically significant ($p < 0.05$). No significant difference was detected in the simple and choice reaction time scores between the groups ($p > 0.05$).

Table 3. Comparison of Reaction Time Scores According to Gender

<i>Reaction Time</i>	<i>Gender</i>	<i>n</i>	<i>X±SD</i>	<i>t</i>	<i>p</i>
Simple Reaction Time (ms)	Female	74	0.146±0.042	0.202	0.841
	Male	153	0.145±0.035		
Choice Reaction Time (ms)	Female	74	0.364±0.053	2.916	0.004**
	Male	153	0.338±0.068		
Auditory Reaction Time (ms)	Female	74	0.139±0.037	0.164	0.870
	Male	153	0.138±0.031		

** $p < 0.01$

In the comparison of the reaction time between the groups of male and female, the choice reaction time of male athletes were found shorter than female athletes and the difference was statistically significant ($p < 0.01$). There was no significant difference in the comparisons of simple and auditory reaction time ($p > 0.05$).

Discussion

In this study, simple and choice reaction time were tested to compare reaction times of karate athletes according to the age categories, status (competing on national or international level) and gender. Reaction time is affected by some elements such as age, gender, number of stimuli and expertise. Age is one of these important factors influencing the reaction time and it is known that reaction time decreases with age and also it is minimum at 20 to 30 years of age. However, the amount of this decrease in time is not known, in other words, it is not clear whether the decrease in time occurs at an equal rate or not (Surnina & Lebedeva, 2001). On the other hand, the improvement of reaction time is slight between the ages of 7-12 compared to the other stages (Güzel, Gökmen, Sönmez, Yüктаşır, Konukman, & Demirel, 2005). In accordance with this knowledge, the present study found a significant difference in auditory reaction time between children and all other groups. As for the simple and choice reaction time, there was a significant difference between children and the groups of junior and senior, and the longest reaction time scores were measured in children group, between the ages of 10 and 12. In another study made on 8-year old children to find out the effects of arousal level on reaction time in karate, no significant difference was found in auditory reaction time, but low level of arousal made a positive effect on visual reaction time (Güzel et al., 2005). In the present study, junior group (age:16-17 years) is the fastest group for auditory and choice reaction time, and the senior group (age:18 and over years) is the fastest group for the simple reaction time. Like karate, in a study conducted on international level and recreational taekwondo players, for the hip reaction time the adult

male national team members (age:18 and over) were found the fastest and the slowest reaction time was found in the male taekwondo players below 18 years (Vieten, Scholz, Kilani & Kohloeffel, 2007). In competitive high-level sports, the ability to perceive information quickly and properly simplifies decision making and provides more time for implementation of motor behaviour. Karate is a kind of competitive high-level sports requiring fast reactions (Mori, Ohtani & Imanaka, 2002). Also, high-level performance is based on especially explosive power of the karate techniques (Chaabène, Hachana, Franchini, Mkaouer, & Chamari, 2012). Therefore, reaction time is a crucial factor in karate, and there are so many studies in the literature about the level of expertise in karate. Some of them support great differences between experts and novices, some report little or no difference (Mori et al., 2002, Donovan, Cheung, Catley, McGregor & Strutton, 2006, Silverman, 2006). In the present study, the auditory reaction time of international level athletes were found significantly shorter than national level athletes. As for the simple and choice reaction time, no significant difference was detected between international and national level athletes. Likely, in a study made on high level martial artists and sedentary individuals, no significant difference was found in simple and choice reaction time between the martial artists and the sedentary individuals (Donovan et al., 2006). In another study comparing reaction times of karate athletes, it was found that regardless of the protocol, experts were quicker to react than novices and they showed significantly shorter reaction times with or without the information and consistently generated fast reaction times (Tanaka, Hasegawa, Kataoka & Katz, 2010). On the contrary, Fontani et al. (2006) found that high-experienced karate athletes, having 3rd and 4rd dan black belt, reacted significantly faster than low-experienced karate athletes, having 1st and 2nd dan black belt, on the simple reaction time test (Fontani, Lodi, Felici, Migliorini, & Corradeschi, 2006). Also, in a review reporting the important



physical and physiological characteristics of karate athletes, it was stated that a significant difference in the choice reaction time between high-level and novice karatekas occurred (Chaabène, Hachana, Franchini, Mkaouer, & Chamari, 2012). In another study measuring the reaction time and anticipatory skills of karate athletes, results indicated that there was a significant difference in the choice reaction time, while no significant difference was found in the simple reaction time between karate athletes and the novices (Mori et al., 2002). This discrepancy between the present study and previous ones may be due to differences of expertise level because there are two groups consisting of international level athletes, who can be named expert, and national level athletes, who are not completely novice or sedantary, in the study. According to the literature, there are so many studies supporting that men have faster reaction time than women (Silverman, 2006, Dykiert, Der, Starr & Deary, 2012). As for the present study, the choice reaction time of male athletes were significantly found shorter than female athletes, but no significant difference was found in the comparisons of simple visual and auditory reaction time. Likely, in a study investigating the gender differences in choice reaction time, results showed a near-significant overall reaction time advantage for male participants and they tended to show faster reaction times than females (Adam, 1999). On the other hand, in a study conducted on taekwondo players to find reaction time differences depending on the skill level, age and gender, it was found that the adult male national team members are the fastest followed by the adult female national team members (Vieten et al., 2007). In a different study made on reaction time assessments of gender differences in visual-spatial performance, it was found that women were slower on the choice task, like the present study result, but more accurate (Blough & Slavin, 1987). In another study comparing values of force, precision, and reaction time of Kung Fu practitioners, women showed, on average, lower values of reaction time, but higher values of precision than men (Neto, Pacheco, Bolander & Bir, 2009). According to the results of reaction time in different age groups, the best reaction time scores were found in 16-17-year karate athletes. Therefore, it was thought that reaction time speed is well developed at the age of 16-17 years for this research sample.

Conclusions. It was concluded that reaction time and rapid decision-making are better in male athletes because significant difference was found just in choice reaction time in the gender comparison, and choice reaction time is the shortest interval to respond to a stimulus that is given as an alternative to a number of other stimuli (Donovan et al., 2006) and requires also perceptual ability. Lastly, it can be said that reaction time can be improved by practice because two different groups (international and national level) in the study consist of trained athletes who have participated at least in one national competition, so the results of

simple and choice reaction time of these two groups were found similar (not significantly different).

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Original article

COMPARISON OF FLEXIBILITY AND SPEED CHARACTERISTICS OF THE 11-14 AGE CHILDREN WHO DO NOT ACTIVELY PARTICIPATED IN SPORTS

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Abstract

Purpose. The purpose of this study was to compare some biometric characteristics of the 11-14 age children who do not actively participated in sports.

Methods. 280 boys and 221 girls (Boys; age: 12,8 years, height: 158,1 cm, weight: 50,2 kg and Girls; age: 12,7 years, height: 155,6 cm, weight: 48,7 kg) volunteered to participate in this study. Flexibility and speed of the children were measured. Independent sample t test was used to, flexibility and of the boys and girls. One way ANOVA was conducted to evaluate the effects of age groups.

Results. Test results show that flexibility and speed of the girls significantly higher than boys ($p < 0,05$).

Conclusions. There were significant differences found for flexibility and speed between age groups ($p < 0,05$).

Keywords: Flexibility, Speed, Age, Gender.

Introduction

One of the indicators of physical strength that can be made an appearance by humankind himself is speed feature. Speed in terms of sports requiring explosive strength is determiner of performance. (Açıkada, Ergen, 1990) Speed performance is highly dependent on the relative muscle strength. Speed is a performance set forth result of the motoric activities. It is also indicative of anaerobic muscle metabolism. Nearly all the muscles of the body work to improve speed in the circumstances which are short distances at maximal intensity. Meanwhile, respiratory muscles do more work in order to meet the increased pulmonary function (Günay, 1998). Different components of the speed depend on level of coordination and produced muscle strength. Development of the strength always causes the increase of moving speed (Açıkada, Ergen, 1990). Speed can also show different developmental characteristics according to different age groups. In the preschool period, movements occur slowly and they are general ones. But between 5-7 ages, an improvement is seen in the general movement speed. In the primary school children period (between 6-9 ages) development of movement speed makes the biggest progress. In the secondary school children period (between 10-14 ages) speed of reaction reaches almost adult values. Movement speed also shows continuous increase. In the first and second adolescence period (between 14-18 ages), speed characteristics

which are connected to mobility of neural processes reach maximum values and completes the development (Muratlı, 1997). Tabatschink, speed ability in many sports determining the efficiency is an important motoric feature. Neurophysiological factors belonging to speed have been quite determined in a genetic way, in other words, they have a qualification bearing a limited variability. Flexibility defined as maximal capacity to move a joint during the specific movement is a required and important factor for physical performance (Ersöz, Gürsel, Gündüz, Sunay, Müniroğlu, Oygulu, Balcı, Eroğlu, 1994). For this reason, flexibility is not only in sports competitions for success, but also it is essential in terms of protection from injuries (Doğan, Zorba, 1991). Flexibility can be defines in different ways. The main definition of flexibility is described as optimal mobility enabled by connective and muscular tissue. Because it includes not only quantity of flexibility, but also distance and angular degrees of optimal motion width (Zorba, 1999). In some conducted studies; to determine the importance of flexibility in terms of physical suitability, 6 fitness test was applied to 6 children from American kids and positive effects of flexibility of 44 % rate on other fitness tests were found (Zorba, 1999). Some studies have been revealed that ages 11-14 are the most suitable age in order to improve the flexibility of spine, shoulder circle, hip joint. Thus, the last development stage of flexibility that can be practiced

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in a provable way is the secondary school children period. After that, however, it is only possible to maintain the level reached (Doyle, 1998). Human's basic biometric characteristics are the sum of a person's body power, ability and the complex nature. Strength is the ability of performing the movements as speed, strength, mobility, flexibility and coordination. They can be changeable according to the degree of adaptability and efficiency. These feature are in essence and can not be learned, but can be improved in several studies (Sevim, 1995). It has been seen that children's flexibility and speed characteristics can help them to participate in sports branches based on information in the literature. In the light of these information, the aim of this study is to compare the flexibility and speed characteristics of sedentary children between 11-14 years old according to age and sex.

Methods. Research Group: 280 boy and 221 girl between the ages of 11-14 who do not sport (for men age:12.8 years, height:158.1 cm, weight: 50.2 kg; Ladies' age:12.7 years, height:155,6 cm, weight: 48.7kg) participated voluntarily in the study. **Physical tests applied to an athlete:** Sit and reach test for flexibility; box meeting the Eurofit test battery and criteria, 35 cm length, 45 cm width, and sit-lie tool, top surface 55 cm long, 45 cm wide and 15 cm from the front where the feet are leaned, were used. The subject is seated on flat surface in a tight position without bending during the implementation of flexibility test. His arms in a tight way is requested to push the flexibility measurement board to a point as far as the subject can reach. Each test measurement was made 3 times and 30 seconds break was given between the each attempt. The highest value of 3 measurements was recorded as the measurement results. Casio HS-30W-

1W stopwatch was used to determine the speed strength. Speed test was carried out in a gym with hardwood floors.

To perform the test, start and finish points were marked with 2 colourful funnels. The best way to run 20 m distance was provided to the subject in the horizontal starting position with the whistle command. Each test measurement was performed 3 times and 2 minutes break was given between the each attempt. The highest value of 3 measurements was recorded as the measurement results.

Data analysis: Descriptive statistics belonging to all variables were calculated as arithmetic mean () and standard deviation (SD) and showed in the table like (X ± SS). In order to determine whether the difference between age variable according to flexibility and speed characteristics is meaningful or not at the level of $\alpha=0.05$ one-way ANOVA test was performed. When the difference was found in the result of variance analysis, Tukey test was performed in order to determine the difference from which age group resulted. In order to determine the difference between flexibility and speed skills of the subjects participated in the study is meaningful or not according to gender, t test was used in the independent groups; according to the age variable one-way ANOVA test was used.

All statistical procedures were performed in the statistical software package SPSS 20 for Windows and the error level of $p<0,05$ was used.

Findings. Physical characteristics of the subject participating in the study were shown in the table 1. The average age of men 12.8 years, mean height 158.1 cm, mean weight 50.2 kg, the average age of women 12.7 years, mean height 155.6 cm, mean weight was 48.7 kg, respectively (see table 1).

Variables	Gender	N	X	±	SS
Age	Boy	280	12,8		1,02
	Girl	221	12,7		1,01
Height	Boy	280	158,1		9,6
	Girl	221	155,6		7,6
Weight	Boy	280	50,2		12,3
	Girl	221	48,7		12,1

Table 1:Physical characteristics of the subjects participating in the study.

T test was performed at the level of $\alpha=0.05$ in order to determine whether the difference between the values of flexibility and speed skills of men and women participating the study was significant.

Table 2: According to the gender of the subjects participating in the study flexibility and speed characteristics.

Variables	Gender	N	X ±	S.S.	t
Flexibility	Boy	280	17,38	6,68	-4,351*
	Girl	221	20,004		
Speed	Boy	280	4,28	0,48	-10,647*
	Girl	221	4,82	0,63	

P<0,05*

The test result of girls who participated in the study skills, flexibility and speed values significantly higher than those of boys have been observed (P <0.05).

Table 3: flexibility and speed characteristics according to the age of the subjects participating in the study.

Variables	Gender	Mean	SS	F
Flexibility	11	18,69	6,85	2.700*
	12	16,70	6,72	
	13	18,27	6,77	
	14	20,14	6,59	
Speed	11	4,34	0,25	7,256*
	12	4,57	0,35	
	13	4,61	0,68	
	14	4,37	0,60	

P<0,05*

The test result of the subjects participating in the study of the flexibility and speed skills levels showed a significant difference (p <0.05). Tukey test result, 12 of the distance values of the age group of 14 years from the group of flexibility, the flexibility of the age group from 13 to 14 fatty group value was found to be significantly higher. 11 age group, the value of the speed of skills between the ages of 12 and 13, 14 of the age group between the ages of 12 and 13 speed skill values were found to be significantly higher (p <0.05).

Discussion. The students studying in primary school in the province of Kütahya; 280 boys and 221 girls who do not exercise participated in this study; the average height of the male students (158.1 ± 9.6 cm), the average body weight (50.2 ± 12.3 kg), the average elasticity (17.38 ± 6.68 cm), the average speed (4.28 ± 0.48 sec.) and the average height of girls (155.6 ± 7.6 cm), the average body weight (48.7 ± 12.1 kg), the average flexibility (20.004 ± 6.7cm.) the average speed (4.82 ± 0.63 sec.) have been determined.

Examined according to gender; while boys' height and speed values were noticeably higher; the distance values of flexibility for female students were

significantly higher than male students (p <0.05), there was no significant difference between the two groups in body weight. When analysed according age A significant difference was found between the values: flexibility within subjects (F = 2.70, 2.700, P <0.05), speed rate (F = 7.256, P <0.05). TUKEY test was used as a second test to identify which group differences that result from in terms of flexibility distance and speed rate. According to the test results, it was identified that the flexibility of distance rates in the age group of 12 were significantly higher than in the age group of 14 and the flexibility of distance rates were in the age group of 13 significantly higher than in the age group of 14.; the rates of speed skills of 11 age group were significantly higher than that of 12-13 age groups and the rates of speed skills of 14 age group were significantly higher than that of 12-12 age groups. (p<0,05). It was found that the average distance of the flexibility of girl students (32.11 ± 3.05 cm) was more than the average elasticity of boy (29.45 ± 4.92 cm) in the study conducted by Tinazcı C.¹⁰ (T.05; 1.49 P <0.05). In the same study, boy sprint speed rates (23.88 ± 2.45) were found higher than that of girls sprint speed rates (25.52 ± 3.38). This research shows parallelism with our research. Because it was observed



that there is not a significant difference between values and the reason of this is comparison of 11 years old girls and boys. It was found that the average rates of flexibility of girls ($16,67 \pm 5,30$ cm) are higher than that of boys ($8,41 \pm 5,40$ cm) in the study conducted by Gürsoy R.¹¹ ($p < 0,05$). This conducted study shows parallelism with our research. It was found that the average speed of boys ($3,309 \pm 0,1651$ sec.) were higher than that of girls ($4,055 \pm 0,3066$ sec.) in the study conducted by Yüksel O. and et al.¹² ($t.05$; $1,816$; $P < 0,01$). In the same study conducted by them, it was found that the average flexibility of girls ($18,875 \pm 0,1651$ sec.) were higher than that of boys ($15,944 \pm 6,0335$ cm) and significant difference was found between the rates ($t.05$; $2,761$, $P < 0,05$). This study support the one that conducted by us. It was found that average speed of boys ($3,94 \pm 0,31$ sec.) were higher than that of girls ($4,31 \pm 0,28$ sec.) in the study conducted by Kalkavan A. and et al.¹³ and there was a significant difference between them. ($F=15,132$; $P < 0,00$). In the same study there was a significant difference in the distance of flexibility between the rates of girls and boys. ($F=3,867$; $P < 0,05$). These studies conducted by them supports our one.⁽¹³⁾. M. Günay and et al. have found in the study they carried out that girl students have more flexibility averages ($18,30 \pm 5,07$) than the flexibility averages of the male students ($15,67 \pm 4,70$). They have found a remarkable difference between the values ($p < 0,05$)⁽¹⁴⁾. H. Yorulmaz has found in the study he carried out that the speed averages of the men ($7,64 \pm 0,32$ sec.) are more than the speed averages of the women ($9,45 \pm 0,45$ sn). A significant difference has been observed between the values. A.E. Pekel and et al. have found in the study they carried out that the speed averages of the men ($5,03 \pm 0,26$ sec.) are more than the speed averages of women ($5,24 \pm 0,35$ sec.) and there is a significant difference between the values. ($t.05$; $-3,22$; $P < 0,001$). They In the same study, they have found that the flexibility averages of the women ($25,04 \pm 5,01$ cm) are more than the flexibility averages of the men ($21,03 \pm 6,0$) and there is an important difference between the values ($t.05$; $-3,59$; $P < 0,01$). Güler D. and et al. have found in the study they carried out that in the measurement of flexibility values, the eight age group is ($22,42 \pm 4,91$), ninth age group is ($22,35 \pm 5,31$) but tenth age group is ($22,71 \pm 5,19$) and they have failed to find a remarkable difference between the values.

This study doesn't support our work. This is because levels of development of children aged between 8 and 10 are believed to be close to each other. CJ Jones et al.

have found in the study they carried out that the flexibility averages of the women are ($24,31 \pm 11,57$ cm.), the flexibility averages of the men are ($20,84 \pm 12,81$ cm.) and there is a significant difference between the values ($t.05$; $5,48$; $P < 0,01$).

Erden S. et al. have found in the study they carried out that the flexibility distances of the women ($19,11 \pm 4,86$ cm.) are more than the flexibility averages of the men ($18,14 \pm 5,01$); ($P < 0,01$). In the same study, the average speeds of men ($4,33 \pm 0,15$ cm.) are more than the average speed of the girls ($4,99 \pm 0,22$ cm.); ($P < 0,05$). This study doesn't support our work. Agaoglu S.A et al. have found in the study they carried out that the flexibility averages of the age group of 13 and 14 ($26,19 \pm 5,29$ cm.) are higher than the averages of the age group of 11 and 12 ($23,89 \pm 4,83$ cm.), but they have failed to find a remarkable difference ($P=0,094$; $0,05$). This study doesn't support our work. In the same study the speed rates of the age group of 13 and 14 ($5,41 \pm 0,29$ sn.) are higher than the rates of the age group of 11 and 12 ($5,41 \pm 0,29$ sn.) and there is a remarkable difference between the values ($P=0,003$; $P < 0,05$).

Conclusions. This study doesn't support our work because the measurement values of the age groups of 11-12 and 13-14 were analyzed together. R. Arabacı et al. have found in the study they carried out that in the flexibility averages age group of 7-8 is (6,1 cm), age group of 11-12 is (4,5 cm) and there is a significant difference between the values ($F=2,190$; $P < 0,05$). This study doesn't support our work.

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Original article

EVALUATING MAXIMUM OXYGEN UPTAKE OF MALE SOCCER PLAYERS WITH BRUCE PROTOCOL

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Abstract

Purpose. Maximal oxygen consumption (VO max) is defined as the ability to transfer and consume oxygen during exhausted work and is associated with cardiorespiratory fitness. The main purpose of this research is to measure and analyze the VO₂max of eleven soccer players who compete in regional soccer league in Los Angeles. Additionally, secondary purpose of this study is to determine the relationship between VO₂max values and heart rate, ventilation, RER, and V_O2, and CO₂.

Methods. Study participants included 11 male soccer players who competed in Los Angeles recreational regional league. All subjects performed a maximal exercise test using a treadmill with Bruce protocol. The tests starting at speed 2,74km/hr and grade of 10% and, gradually more increased at every 3 minutes until exhaustion. The following parameters were recorded from the cardiorespiratory exercise test: VCO₂ /VO₂ values, the duration of the test, the maximal pulmonary ventilation (VE), the maximal heart rate (HR), and the respiratory exchange ratio (RER). Descriptive statistics included calculation of mean values for subjects VO₂ max, VCO₂ /VO₂ values, the duration of the test, the maximal pulmonary ventilation (VE), the maximal heart rate (HR), and the respiratory exchange ratio (RER). Correlation coefficients were also calculated to evaluate the relationships for each value.

Results. The subjects reached VO₂max because they meet at least 3 criteria's for reaching VO₂max and VO₂ strongly correlated with all other variables.

Conclusion. As expected VO₂ values of eleven soccer players was closely related with heart rate, ventilation, RER, and V_O2, and CO₂ of the subjects.

Key words: Bruce protocol, maximum oxygen consumption, RER.

Introduction

Maximal oxygen consumption (VO max) is defined as the ability to transfer and consume oxygen during exhausted work and is associated with cardiorespiratory fitness. (American College of Sports Medicine 2006). There are several exercise treadmill protocols for the prediction of VO max (Astorino, 2011). The most common maximal GXT for the treadmill is the Bruce protocol that provides outstanding correctness and a consistent testing procedure for all participants. It requires all participants to progress from one stage to the next at the same speed and grade making it comparable between participants based on the same exercise intensity requirements. Also, total exercise time can be used to precisely categorize participants according to cardiorespiratory fitness or cardiovascular risk (Glass, Gregory, 2007. George, Paul, 2009).

The presentation of ventilatory expired gas analysis into traditional stress test procedures led to the direct

measurement of VO₂. There are not many studies using the Bruce protocol in respect to relationship of Vo₂ with its other parameters in a specific population such as soccer. Thus, the main purpose of this research is to measure and analyze the VO₂max of eleven soccer players who compete in regional soccer league in Los Angeles. Additionally, secondary purpose of this study is to determine the relationship between VO₂max values and heart rate, ventilation, RER, and V_O2, and CO₂ values. We predict that VO₂max values will be positively related to heart rate, ventilation, RER, and V_O2, and CO₂ values.

Methods

Subjects. Study participants included 11 male soccer players who competed in Los Angeles recreational regional league. The physical and anthropometric characteristics of the subjects are listed in Table I. Before the study, subjects provided informed consent for their participation.

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Table 1: Subject Characteristics

Number Of Subjects	Mean Age (Y)	Mean Weight (kg)	Years of playing soccer(Mean)
11	24.94 ± 5.05	73.84 ± 22.16	9

Testing Procedures

All subjects underwent health screening before exercise testing to make sure they are free of any cardiovascular or any kind of risks. All subjects performed a maximal exercise test using a treadmill. The treadmill was calibrated in order to make sure the accuracy of grade and speed. Expiratory gas analyzer Oxycon Pro of Jaeger (Viasys) were used to analyses gases. The tests starting at speed 2,74km/hr and grade of 10% and, gradually more increased at every 3 minutes until exhaustion (R.A. Bruce, 1949). Additionally, heart rates of the subjects were measured by Polar Vantage NV heart rate monitors (Polar Electro Oy, Kempele, Finland). The players were informed not to take part in any vigorous training 48 hours prior to the measurements to get out of any possible side effects. Also, the following parameters were recorded from the cardiorespiratory exercise test: VCO /VO values, the

duration of the test, the maximal pulmonary ventilation (VE), the maximal heart rate (HR), and the respiratory exchange ratio (RER).The following exercise test criteria were used for the attainment of VO max:

1. Respiratory exchange ratio (VCO /VO) superior than 1.10 (Virtual Exercise Physiology Laboratory 2004).
2. Leveling off (plateau) of oxygen uptake with an increase of work rate (N. Koutlianos, et al. 2004).
3. Attainment of 90% of the age-adjusted estimation of maximal heart rate (T.M. Gibson, et al. 1979).

Data Analysis.Descriptive statistics included calculation of mean values for subjects VO2 max, VCO /VO values, the duration of the test, the maximal pulmonary ventilation (VE), the maximal heart rate (HR), and the respiratory exchange ratio (RER). Correlation coefficients were also calculated to evaluate the relationships for each value.

Results.The subjects reached VO2max because they meet at least three out of the five criteria's for reaching VO2 max.

At the end of the subjects' heart rate reached to estimated MaxHR. At the end of the subjects had an RER greater than 1.10 and they had a plateau in VO2.

Table 2: VO2 and related parameters

Stage	VO2(Mean)(ml/kg/min)	Heart Rate (Mean) (bpm)	RER (Mean)	VCO2 (Mean) (ml/kg/min)	VO2 (Mean) (L/min)	Ve (Mean) (L/min)
1	17	122	0.75	12.75	1.36	35.9
2	21.9	141	0.94	20.5	1.75	52.58
3	38.9	171	0.96	37.3	3.11	85.17
4	48.7	186	1.09	53.25	3.9	124.18
5	52.3	197	1.17	61.3	4.19	154.37

All parameters are increased as VO2 increases.

Table 3: Correlation table

R(Correlations)	Heart Rate (Mean) (bpm)	RER (Mean)	VCO2 (Mean) (ml/kg/min)	Ve (Mean) (L/min)
VO2(Mean)(ml/0.	0.99	0.92	0.99	0.97

All parameters are correlated with VO2.(p<0.05)

Discussion

As expected VO values of eleven soccer players was closely related with heart rate, ventilation,

RER, and $\dot{V}O_2$, and $\dot{V}CO_2$ of the subjects

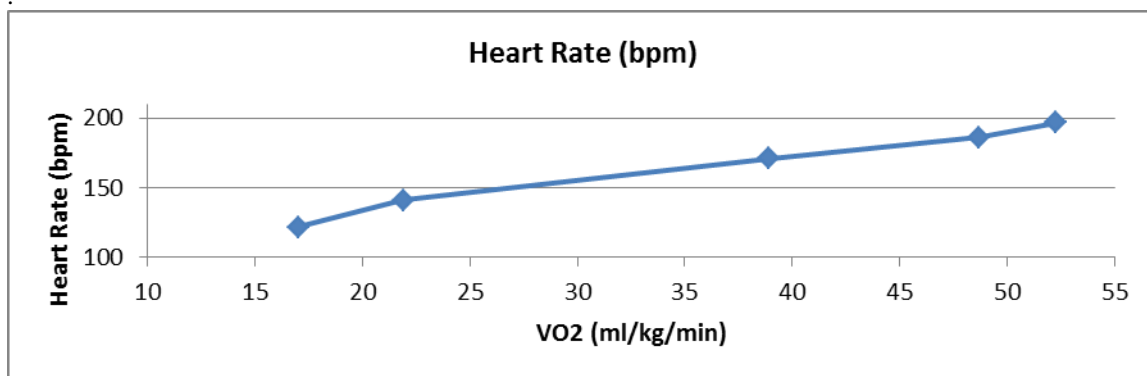


Fig. 1: Heart rate vs. VO₂

This graph shows a linear increase in heart rate as intensity increases. As intensity and duration increases heart rate needs to increase to meet the increase demand of oxygen to do the working skeletal muscles. The observed heart rate response indicates that with an increase in intensity, there is an increase need for blood flow. The increase in heart rate is caused mainly by two mechanisms. One mechanism is the withdrawal from the vagus nerve, meaning a decrease in the neurotransmitter acetylcholine. A decrease in this neurotransmitter from the decrease in innervations from the vagus nerve results in an increase in heart rate. However, this is only the means to increase heart rate up to 100 beats per minute, therefore this was only the physiological basis for the raise in heart rate between stage one and stage 2. After heart rate reaches 100 beats per minute, input of plasma epinephrine is responsible for the increase in heart rate. This means, as intensity increases, the plasma levels of epinephrine increase and uptake by the Beta 1 cells, which causes an increase in heart rate as needed, per exercise intensity (American College of Sports Medicine 2006).

Muscle blood during exercise will have a greater A-vo₂ to V-vo₂ difference as exercise intensity increases. What this means is oxygen uptake by the muscle cells from the blood is increased with exercise intensity. Therefore the venous muscle blood will have less O₂ in it during exercise than at rest. The muscle cells themselves will receive greater blood flow. This is due to a decrease in splanchnic blood flow, due to vasoconstriction caused by increased plasma epinephrine levels to alpha-1 receptors. The other contributing factor is vasodilatation of the blood vessels at the exercising muscle due to increased

plasma epinephrine levels and up take at the Beta 2 receptors (American College of Sports Medicine 2006). As exercise intensity increases, plasma epinephrine levels increase. When these come across alpha-receptors of the splanchnic region, it causes vasoconstriction. This vasoconstriction decreases blood flow to the splanchnic region (American College of Sports Medicine 2006., American College of Sports Medicine, 2010). The autonomic nervous system aids in blood flow redistribution by release of the neurotransmitters norepinephrine and epinephrine. As exercise intensity increases, the ratio of plasma epinephrine to norepinephrine becomes greater than 1. The effect this has on blood flow is that these neurotransmitters in these proportions are what is needed to stimulate the aforementioned changes in blood flow when received by both beta and alpha receptors of the appropriate tissue (American College of Sports Medicine 2006., American College of Sports Medicine 2010., Virtual Exercise Physiology Laboratory, 2004). NO (Nitrous Oxide) is a powerful vasodilator. It is also a waste product of protein metabolism during exercise. Carbon dioxide is a waste product of aerobic metabolism, as well as glycolysis. An increase in carbon dioxide yields an increase in Hydrogen ion concentration in the blood, through the carbonic acid buffering system. This decrease in blood pH may overpower the effects of catecholamine's, due to inhibition of metabolic enzymes. Furthermore, circulating nitrous oxide may cause vasodilatation in areas the catecholamine's would have signaled vasoconstriction (American College of Sports Medicine, 2006).

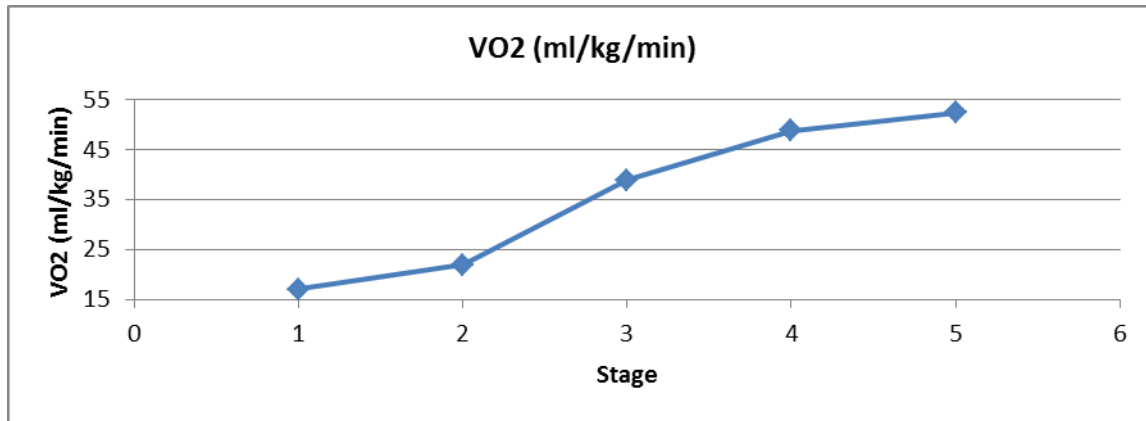


Fig. 2: Stage vs. VO2.

This graph shows a linear increase in Oxygen consumption as intensity and duration of the test increases. This increase in O₂ consumption is caused by the increase need of oxygen to working muscles. Based on VO₂max values, the subjects are in excellent cardiovascular shape because he has a VO₂ greater than 51. As exercise intensity increases, oxygen consumption increases. This is because the more ATP needs to be produced to meet the new exercise intensity. Since more ATP is needed, aerobic ATP production becomes the prime bioenergetics pathway.

This is because the amount of ATP yielded during oxidative phosphorylation is greater than the amount of ATP being used during anaerobic ATP production. Furthermore, since more ATP is needed with greater intensity, more ATP is being produced, thus more oxygen is needed to help produce it by aerobic means. For this reason oxygen consumption increases with an increase in exercise intensity (American College of Sports Medicine, 2006., American College of Sports Medicine, 2010)

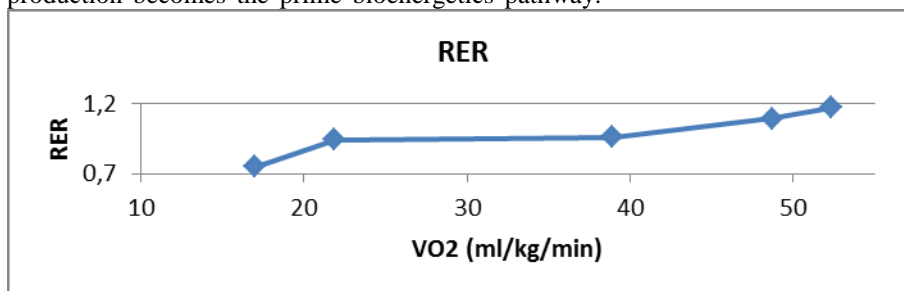


Fig. 3: RER vs. VO2.

This graph shows a curvilinear increase in RER. At a Vo₂ intensity of 21.9 ml/kg/min RER plateau until reaching a Vo₂ intensity of 38.9 ml/kg/min. As the respiratory exchange ratio increases, it means glucose (carbohydrates) rather than fat is starting to be used as a fuel source. By the time the RER reaches 1, it means glucose (carbohydrates) are the only fuel source, not fat. The reason RER would increase is that as exercise intensity increases, the cells start to need more energy, and this energy comes in the form of ATP. The quickest way to get energy aerobically is by breaking down glucose as a fuel source as opposed to fat. For this reason, if the intensity is high enough, only glucose will be used as a fuel source. What the RER of the subjects show here on the graph is that through stage 4, fat was being used as a fuel source, however it was being used less with each stage. This means at each level of intensity, less fat and more glucose was being used for fuel. After stage 4, the RER reached 1.00. This means only glucose was being used as fuel for the aerobic means of ATP production after stage

4(American College of Sports Medicine 2006., American College of Sports Medicine 2010).

As exercise intensity increases, the demand to produce Adenosine Tri Phosphate (ATP) increases. Exercise intensity can increase to a point where all fuel being consumed is glucose for the purpose of producing ATP aerobically. This would be at RER 1.00. At this point, if exercise intensity is increased even further, since ATP is already being produced as quickly as it can be aerobically, the only way to produce enough ATP to provide energy for the new, higher intensity exercise is to also start using anaerobic bioenergetics pathways along with aerobic energetic pathways to produce ATP. The main anaerobic bioenergetics pathway is glycolysis. Glycolysis produces a waste product of carbon dioxide. When glucose is being used as the only fuel source for aerobic ATP production, the waste product carbon dioxide is produced in a 1:1 ratio of the oxygen consumed to produce it. However, at exercise intensity high enough that glucose metabolism must be coupled

with glycolysis to produce enough ATP for the needed exercise, the carbon dioxide produced from glycolysis must be added to the carbon dioxide produced from aerobic metabolism. Aerobically produced carbon dioxide plus anaerobically produced carbon dioxide yields greater carbon dioxide than the amount of oxygen brought in for aerobic metabolism (American College of Sports Medicine, 2006). For this reason, there is now more carbon dioxide being produced, and going out, than there is oxygen being brought in. Therefore, the ratio of VCO_2/VO_2 will be greater than 1. As pyruvate is produced, lactate as a result will be produced. This lactate, which circulates in the blood is normally taken up by the liver and converted back into glucose in what is known as the Cori cycle. However, as exercise intensity increases, the demand for pyruvate increases, due to the increase in ATP production. The increase in pyruvate will also yield an increase in lactate. Eventually this increase in lactate occurs to a point where lactate is being produced faster than the liver can remove it. Therefore, the lactate starts to accumulate in blood. As exercise intensity increases,

ATP production increases, which means lactate increases. At the exercise intensity where the lactate production in blood exceeds the liver's ability to uptake all of it a point is reached known as lactate threshold. Lactate threshold is the point where blood lactate begins to rise exponentially with exercise intensity. Therefore, the amount of lactate in the blood can be used to determine the intensity of the exercise. During graded exercise then, at each stage blood lactate should be increasing in an exponential fashion for each stage (American College of Sports Medicine 2006, Virtual Exercise Physiology Laboratory, 2004). As exercise intensity increases, plasma epinephrine increases. This increase in plasma epinephrine causes an increase in metabolism. An increase in metabolism means an increase in lactate, which is a waste product of metabolism. Therefore, as epinephrine increases, blood lactate should increase linearly until the point of lactate threshold. At lactate threshold, the increase will no longer be linear, but exponential for an increase in blood lactate to blood epinephrine.

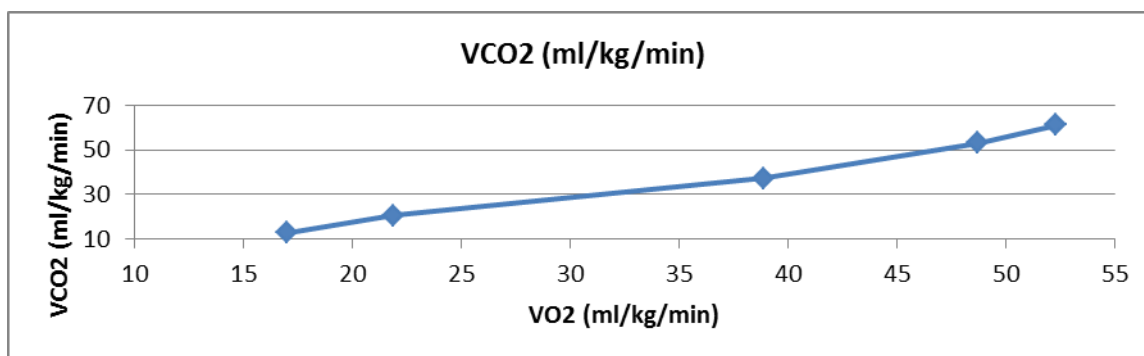


Fig. 4: VCO₂ vs. VO₂.

This graph shows a linear increase in VCO₂ with an increase in intensity. The VCO₂ breakpoint is seen at a Vo₂ of 38.9ml/kg/min. The increase in VCO₂ during this stage is due to the body's increase reliance on glycolysis. As exercise intensity increases, VCO₂ will increase. This is because more carbon dioxide is produced when glucose is metabolized than when fat is metabolized, and the shift to glucose metabolism increases as exercise intensity increases. Furthermore,

if the intensity is high enough, glycolysis may contribute to energy production, which yields carbon dioxide (American College of Sports Medicine 2006., American College of Sports Medicine 2010., Virtual Exercise Physiology Laboratory. 2004). This was demonstrated in the graph. As the exercise intensity increased, the subjects VCO₂ increased in a near linear fashion, or 1:1 ratio.

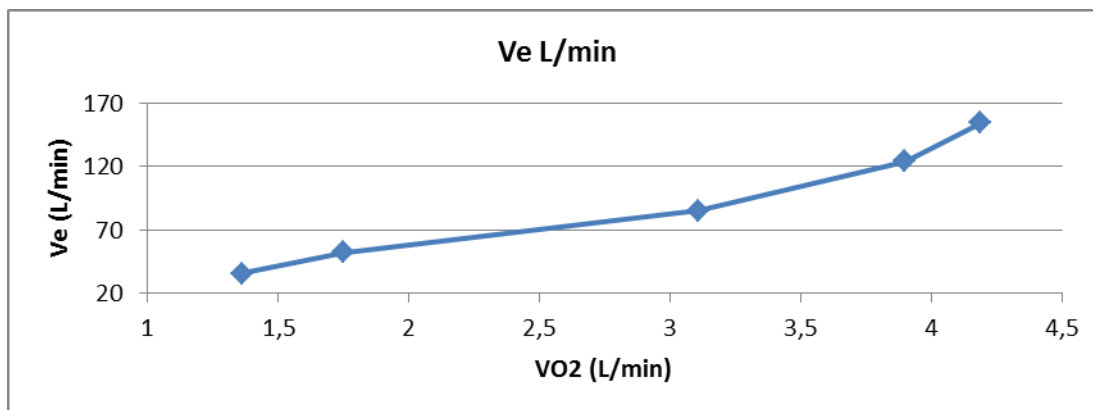


Fig. 5: VE vs. VO2.

This graph shows a linear increase in Ventilation with an increase in intensity. Ventilation breakpoint was seen at a VO2 of 3.11 l/min. The ventilation breakpoint was caused by the body's increase need to sent O2 to the working muscles. As exercise intensity increases, ventilation rate increases. This is because there is both a greater demand for oxygen, as well as an increased production of carbon dioxide, as exercise

intensity increases (American College of Sports Medicine, 2006).

Conclusions. To conclude, there is strong relationship between VO2 and its other parameters (VCO₂ /VO₂ values, the duration of the test, the maximal pulmonary ventilation (VE), the maximal heart rate (HR), and the respiratory exchange ratio) of male soccer players who competed in regional soccer league.

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THE RELATIONSHIP BETWEEN HEALTH-RELATED PHYSICAL AND BMI, COMPUTER GAMES, AND PHYSICAL ACTIVITY AMONG 7-YEAR-OLD CHILDREN FROM POLAND

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Abstract

Purpose. The objective of the study was determination of the effect of individual variables: physical activity, BMI, as well as the most popular form of inactive leisure – computer games, on the level of fitness approached according to the Health-Related Fitness (H-RF) concept in 7- year-old children from Polish rural areas.

Methods. A cross-sectional study was conducted 14773 children aged 7 year old including 7268 girls and 7505 boys from Poland. Measurements were performed of body weight and height, and the BMI calculated. Using the selected tests (Eurofit), trunk muscle strength, explosive leg power, arms and shoulder girdle strength, and flexibility were evaluated. Parents were asked to complete a questionnaire form, which included items concerning time devoted to computer games (CG), daily spontaneous physical activity (Spont.PA) and organized, adapted physical activity during the week (Add.PA). The effect of the time devoted to computer games, spontaneous PA and additional PA was assessed using analysis of covariance.

Results. The negative effect of time devoted to computer games was observed in the case of flexibility ($p=.002$) and trunk strength ($p=.021$), and positive for arm movement speed ($p=.003$). A positive effect of spontaneous physical activity (SPA) was noted in the case of flexibility ($p=.032$) and explosive strength of lower limb ($p=.012$). Additional physical activity were associated with higher level of trunk strength ($p=.001$). The significant interaction between CG and spontaneous PA were observed for flexibility ($p=.007$), between additional PA and spontaneous PA for: flexibility ($p=.020$), arms strength ($p=.043$).

Conclusions. This relationship between H-RF, and PA, and CG could be important to the health of children, particularly in obesity prevention.

Key words: Health-Related Fitness, preschool children, physical activity, sedentary behaviours.

Introduction

Health-Related Physical Fitness involves human ability to be active during the day. It enables participation in duties related to learning and professional work, self-service operations, as well as the implementation of various forms of active recreation. There are tangible benefits of being efficient. First of all, the efficiency seen as one of the elements of health in a holistic approach shares responsibility for well-being. This is confirmed by numerous studies looking for links between efficiency and other elements of human health (Janssen, et al. 2010). In addition, maintaining an optimum fitness level allows the maintenance of specific immunity to certain diseases. In crisis situations, it helps to overcome stressors (Fogelholm, 2010). Thus, studies important for development of the theory of efficiency in terms of health emphasize the importance of strength, endurance, cardio- respiratory endurance, flexibility and body composition. Speed and coordination are important (Huang and Malina, 2007). Recent studies highlight its morphological and metabolic components, thanks to which it became possible to estimate the risk of becoming overweight and obese in populations of children, adolescents and adults (Osiński, 2003, Król et al. 2009).

Physical fitness is conditioned by many factors: genetic, morphological, and environmental. Physical activity (PA) is the main source of body motion produced by skeletal muscles and it requires energy consumption. In most children it takes the form of organized or spontaneous activity. In contrast, sedentary behavior (SB) is characterized by low energy expenditure of 1.5 Met or less (Owen et al. 2000). Huge technological advances that have taken place over the past few decades, helped to popularize a wide range of media, a priori forcing sedentary behavior. The most popular include watching television, electronic games, computer or reading. In economically developed countries, in nearly 98% of households with small children, there is at least one television set. 80 % of families have access to computers, while almost 50% have access to electronic games consoles (Vandewater et al. 2007). Such a large popularity of media has made upsetting ratio in terms of time spent on physical activity and sedentary behaviors. Recommendations of pediatric societies and the WHO on pointing time limit spent on moderate activity and/or intense activity of at least one hour a day and conscious limitation of daily participation related to the use of the media to a maximum of two hours are not met (Hagan et al. 2008). Definitely more time children spend on inactive forms of recreation, and physical activity is on average

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lower than expected (Tremblay et al. 2011). American studies show that more than one third of preschool children significantly exceeds permitted time limits on media use (Harrison et al. 2011) Canadian research indicates, however, that children aged 6-10 spend about 500 minutes a day on inactive forms of recreation, with fulfilled requirements in terms of physical activity in boys group (Carson et al. 2013). Such unfavorable ratio since early age expose children to health consequences in various spheres of development. The most common include excessive aggression, lack of confidence, lack of concentration, back pain and especially children's exposure to overweight and obesity in the future, leading to a number of metabolic syndromes, which may result in early death (Ferreira et al., 2005).

Mutual relations between efficiency and physical activity and sedentary behaviors and BMI are already observed in childhood (Wrotniak et al. 2006). Higher level of efficiency generally involves high level of physical activity, organized and spontaneous (Williams et al. 2008, Tanaka et al. 2012). In addition, a longer time spent on physical activity limits sedentary behaviors (Hofferth, 2009). In contrast, low level of physical activity and the reported preference for media use (in addition to inadequate nutrition) impact on increasing the preferences of children and adolescents with overweight and obesity. Therefore, it is thought that physically inactive children, significantly exceeding the time limit for media use, an example of which are computer games, as well as those that show overweight and obesity will have a low potential for physical fitness in terms of strength, speed, agility and coordination (Martínez-Vizcaíno, Sánchez-López, 2008, Sacchetti et al. 2012).

There are not many modern publications raising issues mentioned above which apply to preschool-aged children (Graf et al. 2004, Niederer et al. 2012, Fitzpatrick et al. 2013). A diverse research methodology does not allow identification of the border, where the disruption of proper relations between PA, BM and SB leads to negative consequences in terms of effectiveness and starts the negative spiral of mutual interdependence. There is a lack of such research on Polish territory. The implemented research program for the diagnosis of children on the threshold of school on a random sample allows for a broader analysis of the selected problem.

The aim of the study is to estimate the mutual interdependence between the PF and PA (organized and spontaneous), SB and BMI in 7-year-old children from Poland. It should be emphasized that so far there has not been such a development for children aged seven from the rural Polish environment. It has been assumed that physical activity occurs along with higher level of physical fitness, whereas the time devoted to computer games significantly decreases physical fitness.

Methods

The research material are the results of 14773 children aged 7 years: 7268 girls and 7505 boys from Polish rural areas. The research program was carried out in 2006 in the months of April - June and September - November. The sample was representative for the areas of the country. The researchers took into account the division into regions, which was expressed by province, type of institution to which the child attends (kindergarten - school), and the place of residence, including the structure in division into villages and towns. Stratified sample without replacement on the basis provided by the SIO (Education Information System) and updated by GUS (Central Statistical Office) was used.

For anthropometric and physical fitness measurements a battery of EUROFIT tests was applied. For the analysis only those components were chosen, which related to the concept of Health Related Fitness (AAHPERD, 1984). Body height and weight were evaluated using the Martin instrumentation. Body building was based on BMI (body mass/height²). Using the European test of Physical Fitness "Eurofit" the following were evaluated: abdominal muscle strength by sit-ups test in 30 seconds, lower limb explosive strength by jump out of place test, the strength of the shoulder girdle and arm by overhang on the bar. In assessing the morphological component flexibility test was done (Sit and Reach trial). To evaluate the motor components running speed and agility 10x5m shuttle run test was used. In the case of arms and shoulders strength a simplified version of the test was used: a straight arm hang trial.

The tests were conducted by previously trained physical education teachers. The test procedure required them to give prior notification of the list of institutions in which the research was conducted. Parents completed a questionnaire survey. Using the categories: not at all a few minutes a day, an hour a day, more than an hour a day, they assessed the involvement of children in computer games. Spontaneous motor activity was assessed using the categories: physically inactive, physically active for up to an hour a day, active all the time. Organized activity was determined based on the following description categories: does not participate in the organized activities, participates 1-2 times a week and participates more than twice a week. These categories were the basis for the division into the respective groups in the course of further statistical analysis. In selected by independent variables groups, basic statistical characteristics were calculated (arithmetic means, standard deviations, 95%CI). Analysis of covariance implemented. The Generalised Linear Model that was used to assess the effect of PA and CG category on each of the parameters, controlling for body size (BMI) separately for each parameter. Additionally, the model included effects of two second order interactions: between PA spontaneous and



additional and CG. Significant interactions were presented on graphs.

Results

Table 1 shows physical fitness characteristics of seven year old children from rural areas. Differences between boys and girls turned out to be statistically significant. Boys compared to girls developed higher

level of speed components such as the speed of limb movement ($p=0.046$) and running speed ($p=0.000$), as well as strength components such as static arm strength ($p=0.000$), abdominal muscles strength ($p=0.000$) and explosive leg power ($p=0.000$). In terms of flexibility ($p=0.000$) and balance ($p=0.000$) girls demonstrated significantly higher level than boys.

Table 1. H-RF characteristics among 7-year-old children

Physical Fitness	Boys			Girls			t	p
	$\bar{x} \pm sd$	M	95%CI	$\bar{x} \pm sd$	M	95%CI		
Total balance [n/min]	15.37±7.39	15.00	15.15-15.58	14.28±7.41	14.00	14.07-14.48	-7.1818	0.000
Arm speed movement [sec]	25.17±6.13	25.02	25.03-25.30	25.36±5.90	25.17	25.23-25.49	1.9920	0.046
Flexibility [cm]	15.36±5.37	15.00	15.24-15.47	16.78±5.20	17.00	15.66-16.89	16.7926	0.000
Explosive strength of lower limb [cm]	100.11±20.3	101.0	99.67-100.56	92.66±18.35	93.00	92.25-93.08	-23.9948	0.000
Trunk strength [n/30sec]	10.39±4.47	10.00	10.29-10.50	9.89±4.37	10.00	9.78-9.99	-6.6294	0.000
Arm's strength [sec]	31.41±22.65	26.10	30.91-31.91	27.22±20.28	21.94	26.76-27.68	-12.1156	0.000
Running speed and agility [sec]	27.15±4.21	26.57	26.06-27.24	27.82±4.04	27.38	27.73-27.91	10.1592	0.000

The analysis of covariance revealed that the level of physical fitness components (Table 2, Figures 1-10) was not always notably influenced by independent variables, but models (except for general balance) proved to be statistically significant: the speed of arm movement: $F(12; 9560)=4.0189$, $p=0.000$, flexibility: $F(12;9591)= 3.3627$; $p=0.000$, explosive leg power ($12;9591$)= 10.1701 ; $p=0.000$, abdominal muscles strength: $F(12;8351)=4,1766$, running speed $F(12;9574)=3.0132$; $p=0.000$, and static arm strength: $F(12;9518)=25.7572$, $p=0.000$. However, the coefficient R^2 (ranging from: 0.030 for abdominal muscles strength to: 0.002 for flexibility) is relatively low, which means that both predictors, excluding BMI impact, to a certain degree determine proportion of integer variable for specific H-RF components.

The time devoted to computer games turned out to be an important factor influencing abdominal muscles strength ($p=0.0216$), flexibility ($p=0.0024$) and the speed of arm movement ($p=0.0038$) – (graphs 1-2,7). Longer exposure to a computer screen notably increases the speed of arm movement. Computer games variable for flexibility and abdominal muscles strength seems to be a negative predictor as it

significantly weakens abdominal muscles and decreases the average results of sit and reach, which is to measure flexibility in lumbar region.

Spontaneous physical activity became important for achieving high average results in flexibility ($p=0.0328$) and explosive leg power tests ($p=0.0126$) - (graphs 3,6). Children described by their parents as “active all the time” proved lower level of flexibility but on average produced better results of standing broad jump which measures leg muscles strength. Additional physical activity appeared to be a significant predictor for abdominal muscles strength ($p=0.0012$) - graph 8.

Interaction between the time that children devoted to computer games and spontaneous physical activity proved statistical significance in one case only, and it was related to flexibility ($p=0.0079$). Spontaneous physical activity, even in case of children playing computer games, determined better results in flexibility tests. On the other hand, lack of spontaneous activity notably decreases flexibility, which is particularly visible in physically non-active children and those who devote more than one hour to sedentary behaviours.

Flexibility ($p=0.0206$) and static arm strength ($p=0.0433$)-(graph 5,9) are determined by spontaneous



and additional physical activity. In children who did not attend additional physical activities, better average results arose from increased spontaneous activity. In children who regularly took part in arranged physical activities high level of spontaneous activity did not determine better results in both H-RF components.

Discussion

Based on representative sample, the research which involves correlation between specific components of physical fitness and physical activity as well as the time devoted to computer games proves previous observations related to the influence of both predictors on motor potential of pre-school children (Williams et al. 2008). However, R^2 calculated and corrected for each model indicates that variability of physical fitness components results from environmental, biological or genetic factors. In terms of quality and quantity, motor abilities of pre-school children are changing dynamically. Gaining experience by pre-school children which is essential for a good start at school seems to be determined by optimum level of motor abilities (Hardy et al. 2009). According to some researchers, family environment, including SES and communication abilities, are important factors which determine physical fitness, (Okely, Booth, 2004). However, physical activity and sedentary behaviours tend to play a very important role (Williams et al. 2008). Physical fitness contributes to the level of low-to-moderate physical activity in subsequent stages of development (Telama et al. 2005) and physical activity limits the time devoted to sedentary behaviours.

The research proves that in seven year old children computer games determine only 3 out of 7 physical fitness components such as flexibility, abdominal muscles strength and the speed of arm movement. What is more, a significant interaction between computer games and spontaneous physical activity was proved only for flexibility. The comparative analysis of the research results seems to be difficult because there are not many publications which discuss the issue of

correlation between the use of computer and physical fitness. Additionally, various methods of data collection (questionnaire, parental time use diary, accelerometer etc.) as well as the age of children, statistical methods and environmental factors such as living conditions do not allow research findings to be fully interpreted. What is more, existing research provides contradictory conclusions. Armstrong et al. (1998) suggested significant relationship between watching TV (children reports) and the results of 1 mile run/walk, whereas for muscular strength/endurance and flexibility similar relationship was not found. Similarly, Cliff et al. (2009) in their research did not prove any relationships. However, the research of Fitzpatrick et al. (2013) reveals that each hour spent in front of the TV in early childhood may later result in weakening the strength of lower limbs measured by standing broad jump test by approximately 3 cm. This leads to the conclusion that in the perspective of several years long-lasting exposure to the use of media has negative impact on physical fitness, which is proved by the research conducted among older children (Tucker et al. 2013). Daily engagement in sedentary behaviours for more than 2 hours tends to decrease the level of physical fitness in young people including flexibility in the lower spine which may lead to the higher frequency of low back pain (Calvo-Muñoz et al. 2013). Although the observations involved young people, it may be assumed that patterns related to the correct posture when using a computer are typically developed in early childhood. Therefore, habitual, improper position while sitting at a computer will result in serious health problems, the first symptom of which may be low level of flexibility in the lower back region.

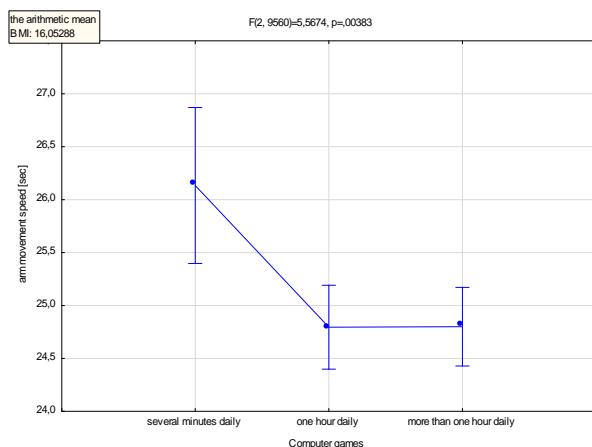
The time devoted to computer games is not only associated with negative influence on health-related fitness components. It also increases the speed of arm movement. It is possible that repeated use of a computer mouse improves not only

Table 2. Results of analysis of covariance physical fitness parameters (separately).

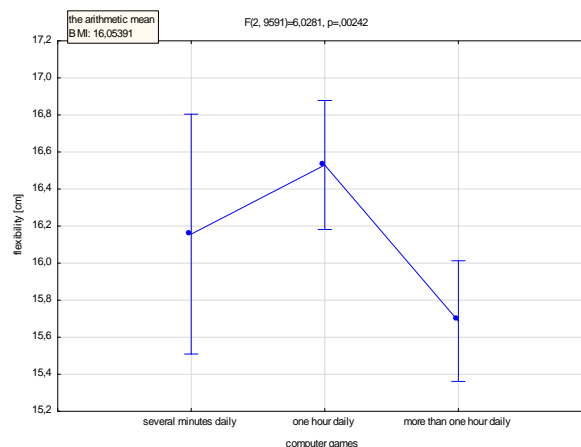
	df	F	p
Total balance			
BMI	1	1,2445	0,2646
Computer games	2	2,4692	0,0847
Spontaneous physical activity	1	0,8408	0,3592
Additional physical activity	1	0,1939	0,6597
CG x PAspont.	2	2,7210	0,0658
CG x PAad.	2	1,0511	0,3496
PAspont x PAad	1	0,0127	0,9102
Arm movement speed			
BMI	1	13,038	0,0003
Computer games	2	5,567	0,0038
Spontaneous physical activity	1	0,064	0,8006
Additional physical activity	1	1,569	0,2103
CG x PAspont.	2	0,381	0,6829



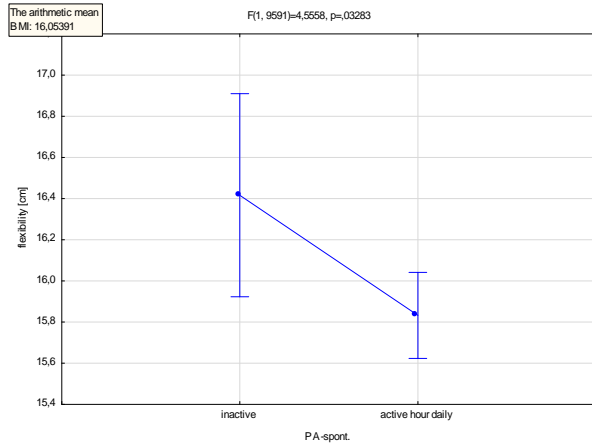
CG x PAad.	2	2,833	0,0588
PAspont x PAad	1	1,566	0,2108
Flexibility			
BMI	1	11,844	0,0005
Computer games	2	6,028	0,0024
Spontaneous physical activity	1	4,556	0,0328
Additional physical activity	1	1,687	0,1940
CG x PAspont.	2	4,833	0,0079
CG x PAad.	2	0,986	0,3729
PAspont x PAad	1	5,359	0,0206
Explosive strength of lower limb			
BMI	1	150,391	0,0000
Computer games	2	0,727	0,4835
Spontaneous physical activity	1	6,213	0,0126
Additional physical activity	1	1,048	0,3058
CG x PAspont.	2	0,825	0,4380
CG x PAad.	2	1,677	0,1869
PAspont x PAad	1	0,004	0,9481
Trunk strength			
BMI	1	9,1476	0,0024
Computer games	2	3,8351	0,0216
Spontaneous physical activity	1	0,6095	0,4349
Additional physical activity	1	10,4633	0,0012
CG x PAspont.	2	1,0785	0,3401
CG x PAad.	2	1,9182	0,1469
PAspont x PAad	1	0,1276	0,7209
Arm's strength			
BMI	1	298,264	0,0000
Computer games	2	0,711	0,4913
Spontaneous physical activity	1	1,353	0,2447
Additional physical activity	1	0,234	0,6282
CG x PAspont.	2	0,869	0,4192
CG x PAad.	2	0,064	0,9380
PAspont. x PAad.	1	4,081	0,0433
Running speed and agility			
BMI	1	55,817	0,0000
Computer games	2	2,025	0,1319
Spontaneous physical activity	1	0,247	0,6192
Additional physical activity	1	2,397	0,1216
CG x PAspont.	2	1,415	0,2428
CG x PAad.	2	0,045	0,9560
PAspont x PAad	1	2,378	0,1231



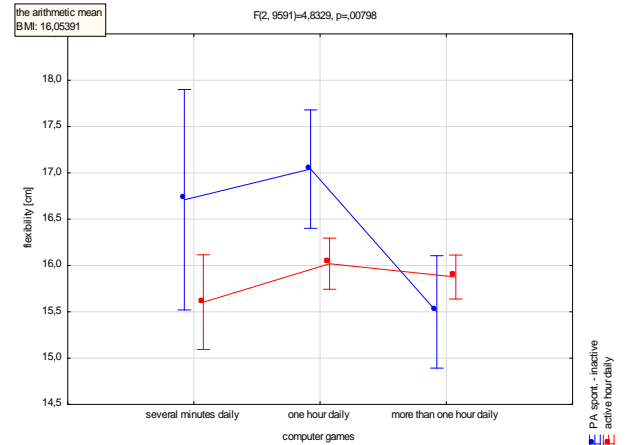
Graph. 1. Arm movement speed and CG



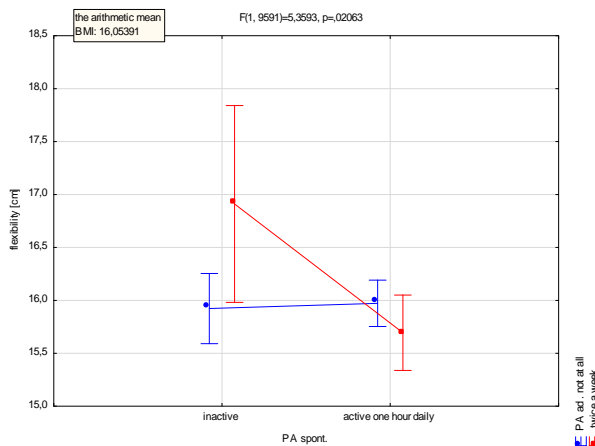
Graph. 2. Flexibility and CG



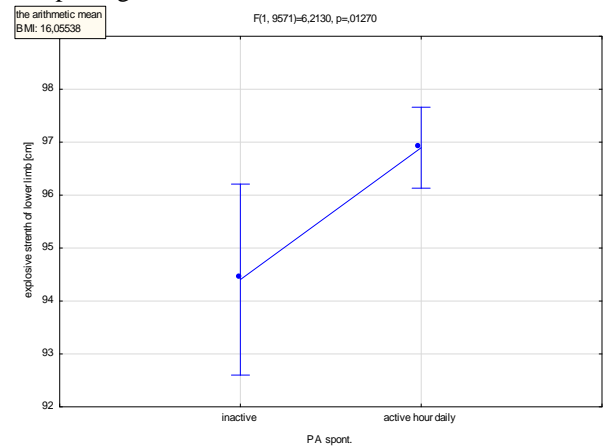
Graph. 3. Flexibility and PA (spont.)



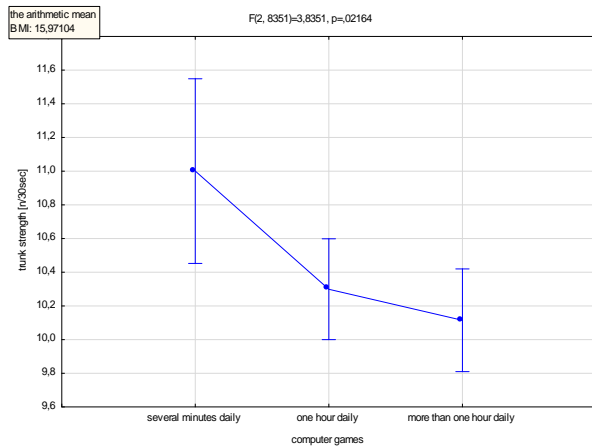
Graph. 4. Flexibility: interaction between PA(spont.) x computer games



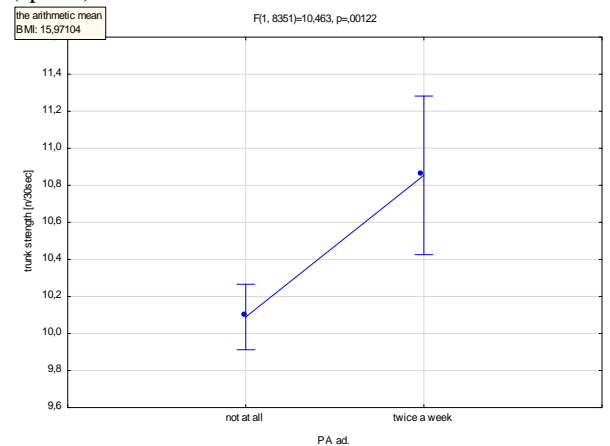
5. Flexibility and interaction between PA (spont.) x PA (ad.)



Graph. 6. Explosive strength of lower limb and PA (spont.)

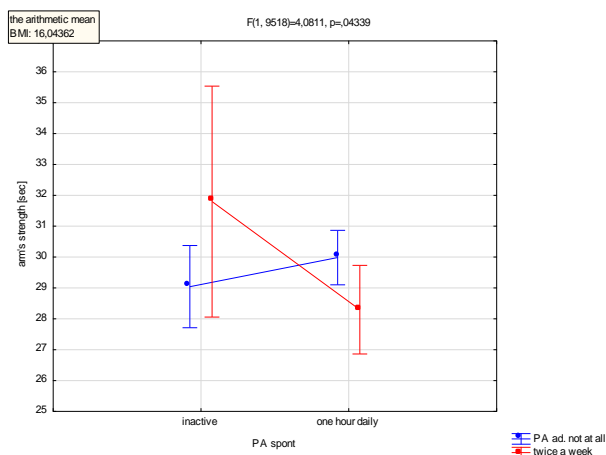


Trunk strength and CG



Graph. 8. Trunk strength and PA (ad.)

Graph. 7.



Graph. 9. Arm's strength and interaction between PA (spont.) x PA (ad.)

CG-computer games; PA (spont.)- spontaneous physical activity; PA (ad.)-additional physical activity

preciseness and accuracy, but also eye-hand coordination which is essential in plate tapping test to measure speed of arm movement (Donker, Reitsma, 2007).

There is a common view that pre-school age is characterised by natural physical activity and optimum age remain unanswered.

The research revealed that physical activity reported by parents, including daily spontaneous activity and weekly prior arrangements for physical activity, significantly determine four H-RF components: abdominal muscles power, shoulder girdle strength, explosive power of lower limbs and flexibility. Physical activity arrangements play an important role in increasing the level of abdominal muscles strength, whereas spontaneous physical activity, even excluding the influence of body size factor, tends to develop explosive power of lower limbs and flexibility.

In terms of flexibility and arm strength -related potential of physical fitness (Nyquyen et al. 2011). Obviously, it is difficult to establish a cause and effect association between physical activity and physical fitness. Hence, the question arises whether children are more active due to the high natural motor abilities or they are more physically fit because of the high level of spontaneous physical activity. These concerns significant interactions were noticed between spontaneous and arranged physical activity. Spontaneous physical activity is based on numerous essential motor skills (Hardy et al. 2010), including locomotor skills along with jumps as well as stability skills such as sit-ups/bends. Probably, due to the common occurrence of these tasks in games and other activities, even seven year old children who enjoy playing more than other kids are able to develop high level of the above-mentioned skills. The influence of length proportions factor cannot be excluded, too (Szopa et al. 1996). It is also worth noticing that both motor tasks have been included in numerous tests which measure children's fundamental motor skills and health-related fitness (Cools et al., 2009). Other motor

tasks e.g. sit-ups to measure abdominal muscles power and arm hang require training to be mastered. Moreover, strength is important to perform these tasks. Hence, additional physical activity may help perform these tasks properly.

The research findings related to seven year old children do not have points of reference in publications. That is because accelerators were mostly used to identify the level of physical activity. Additionally, pre-school children were tested to measure fundamental motor skills. The methods and point scales used for assessment may be compared with the results of author's research, but interpretation of the research data should be considered as a source of information. The analysis of research related to Polish children seems to prove similar findings to the research which involves foreign children. The results of the research into the impact of physical activity on the level of motor abilities confirm previous observations related to associations of physical activity with motor abilities in prepubertal children. The research conducted by Williams et al. (2008) proved correlation between motor abilities and physical activity. Physically fit children tend to be more often engaged in physical activity. High level of locomotor skills motivates pre-school children for taking up moderate-to-vigorous physical activity. Wrotniak et al. (2006) also noticed associations between low physical activity and high BMI along with low physical fitness in children.

According to Cliff et al. (2009), there is a strong correlation between moderate-to-vigorous physical activity and motor abilities of pre-school children. Boys are reported positive while girls negative correlation. Also in older, 8-9 year old children significant relationship was observed between participation in additional sports activities and daily physical activity. It turned out that significant correlation between arranged and spontaneous physical activity was proved for flexibility (boys and girls), arm strength as well as explosive power of lower limbs (only boys) (Sacchetti et al. 2012).



Interactions between spontaneous and arranged, additional physical activity reported by parents seem to be difficult to interpret as well as their correlation with flexibility and arm strength. It is commonly known that regardless the type, physical activity should be a positive predictor of physical fitness irrespective of age. The only point of reference may become the research conducted by Cliff et al. (2009) in which negative correlation between motor abilities and girls' physical activity was reported. As mentioned above, due to different research methods, it is difficult to interpret these findings properly. However, it is probable that this finding could be the consequence of multiple correlations, which may have created alpha inflation and resulted in Type 1 error. What is more, data interpretation does not consider associations between BMI and physical activity. On the other hand, it may be assumed that too high level of physical activity may cause stress for a child, manifested by lower average results in these tests.

Conclusion

The research which involved seven year old children partially proved assumptions.

1. Positive influence of physical activity on strength components was noticed.
2. The time devoted to computer games proved negative correlations only with flexibility and abdominal muscles strength, whereas positive correlations were found for the speed of arm movement.

To sum up, it should be claimed that since early childhood a particular attention should be paid to the issue of developing physical fitness in children since it leads to the sense of health. It also allows children to participate fully in school activities as well as in various forms of sports and recreation. It is pre-school age when children tend to be very sensitive, they also gain experience and learn proper patterns of behaviour. Therefore, it is important to take up actions among children aimed at promoting active leisure and limiting sedentary behaviours associated with the use of media, which will result in lower frequency of overweight and obese children.

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Original article

EVALUATION OF EMPATHIC TENDENCY LEVELS OF ACTIVE FOOTBALL REFEREES OF ANKARA REGION

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Abstract

Objective: The study was designed in survey model in order to investigate empathic tendency levels of the individual who were active football referees of Ankara region.

Methods: The sample of the study were composed of 49 football referees (8 female referees and 41 male referees) who were football referees in Ankara region for the last one year, were recruited using random sampling method, whose mean age was 23 ± 3.64 years. As the data collection tool; Empathic Tendency Scale (ETS) developed by Dökmen (1988) Scale was used. Empathic Tendency Scale (ETS) was developed to measure individuals' potentials to empathize in daily life. The lowest score to be obtained from the scale is 20 while the highest score is 100. High scores indicate high level of empathic tendency while low scores indicate low level of empathic tendency. For the statistical analyses of the data; arithmetic means, standard deviations, Mann-Whitney U and Kruskal Wallis tests were used. Significance level was .05.

Results: In the study findings; no statistically significant correlation was detected between gender variable and Empathic Tendency Level. But, there was statistically significant correlation between referee degree and refereeing-year, and Empathic Tendency Level. In light of the study results;

Conclusions. Although no statistically significant correlation existed in Empathic Levels in terms of gender, it was seen that those who refereed for ≥ 7 years had higher Empathic Levels than those who refereed for ≤ 6 years and that those who were regional referees had higher Empathic Levels than those who were HIF (Football For Everyone) referees.

Keywords: Football, Football Referee, Empathy.

Introduction

Man is a social creature constantly advancing in his relationship associated with environment. In the daily lives of individuals learning to be respectful and be tolerant of other individuals' views and ideas is very important in terms of creating a democratic society (Cüceloğlu, 1993). Communication is one of the most significant aspects of living together and it is hardly possible to think of a world without it (Balçık, 2000). Communicating is an inevitable activity of men's daily, private, social and organizational lives (Tutar, 2001). In order to communicate in a healthy way, human should also have necessary communication skills. In the studies, it is realised that among the communication skills, being respectful, clear, concrete and empathic to others is very important for well interpersonal relationships. In interpersonal relationships, it is acknowledged that empathic ability is a substantial part of general communication skills (Barnett, 1990; Cüceloğlu, 1994; Voltan-Acar,

1994). With the most general terms, empathy is one's process of seeing from different point of view by stepping into someone's shoes and understanding and feeling other person's emotions and ideas and reflecting this situation to him (Rogers 1983). In the process of empathy, it is very important to be able to understand in a good way and correctly the emotions and ideas of the person with whom you communicate as well as reflecting correctly the perception existing in the person showing empathy (Redmond, 1989; Albiero et al., 2009). High empathic abilities help you to understand others better (Barr, 2011). Empathy is identified with two sides as Empathic Tendency (ET) and Empathic Ability (EA). ET states individual's potential ability to show empathy and can be also considered as the ability of understanding clients feelings and being affected with their emotional experiences and desire to help. The people with high empathic tendency are said to reflect their helping behaviour much more. Obtaining empathic tendency determining the helping level of an individual in daily life requires extended period of time. On the other hand ET is a process in

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which a person steps into the others' shoes and understands his feelings and ideas correctly and reflects this situation to the others correctly. If a person really has ability of showing empathy, he has to listen to client actively, to consider what he has heard and to evaluate what client has said in a certain sense of reality and accuracy. The people with high empathique ability and tendency have high level of communication with their environment. For this reason, empathy has a key position in practice (Yigitbas et al. 2013). Empathique behaviors of individuals have a key position in sportive activities as well as in social life. Empathy affects communication ability level of sportsmen, satisfaction of trainers, pleasure of supporters and professional sport lives (Zekioğlu and Tatar, 2006). One of the people ensuring that sport competitions will pass successfully and smooth is referee. In refereeing, personality traits and physiologic factors are more important than kinesis performance. An effective conduct is related to personality of referee, his self-esteem, calmness and even kindness (Sellin, 2003). As conducting a competition, such perfections as being able to identify sportsmen, being in a good communication, being able to understand them and to control their feeling requires emotional intelligence, regulation, leadership and efficient communication ability. At this point, referee's ability to understand just own feelings and desires and to control them in competitions confronts us as a deficiency and inadequacy. One of the heading factors that affects referees' performance as to be at the highest or lowest level is whether referees have the communication ability or not (Sülün, 2013). Our needs and motivations affect our decisions and perceptions. So even if audience are in hopeless manner, they also want their team to win and at this circumstance they see that the ball would be inside the pitch, though line judge would announce it is outside. So, excessive sympathy, passion and ignorance prevent today's people from saying stop their emotions and winning desire. In this circumstance, a deviant fanaticism emerges. Therefore a sport is not an instrument any more but a goal to win. Also in sport platform, there is both excessive anxiety and stressful atmosphere with regard to audience and sportsmen. In this existential exciting atmosphere, the physical manners of sportsmen, trainers, referees, audience is often ignored. Because of only intensifying towards success aim, such factors as fair play, spirit of Olympic, physiology, sportive morality could be passed over (Öztürk et al., 2004). Empathique behaviour is also important to decrease aggressive behaviors in sportive atmospheres. It is estimated that

in addition to sportsmen making the best of a bad situation, trainers and referees, audiences' understanding each other and being in a good relationship have a positive effect so as to decrease these kinds of behaviors. As empathy is considered one of the important elements of effective communication, investigating of referees' empathique tendency is highly significant.

Methods. Pattern of the research

Research is a survey model aiming to investigate Empathique Tendency Level of individuals working as active football referee in Ankara region.

Research Group. Samples of this research consist of totally 49 referees, 8 female and 41 male active football referees whose average ages $23 \pm 3,64$ selected randomly among referees working in Ankara region for the last one year.

Data Acquisition Device

In this research Empathique Tendency Scale developed by Dokmen (1988) (ETS) is used as data acquisition device. Empathique Tendency Scale (ETS) is developed in order to quantify individuals' potential to show empathy in daily life. It is a Likert kind of scale and consists of 20 questions and each question grades from 1 to 5. When the points are calculated, questions 3,6,7,8,11,12,13,15 are calculated diversely. The lowest score is 20 and the highest score is 100. Total score means empathique tendency score of participant. The high score means that empathique tendency is high; the low score means that empathique tendency is low. Reliability Study of ETS was applied twice by Dökmen (1988) to 70 students every three weeks, the relationship between these two scores obtained from these applications is $r=.82$. In this study cronbach alpha reliability index is obtained as .88. EST's reliability study however 'Understanding Emotions' part of ETS and Edwards Personal Preference Inventory was applied by Dökmen (1988) to 24 people and analogue scales index is calculated as $r=.68$.

Analysis of Data

In the analysis of data, of the descriptive statistics methods frequency, percentage, arithmetic mean and standard deviation are used for individual information. In order to realise difference; Among Non-Parameter tests, Mann-Whitney U and Kruskal Wallis tests are applied as normal distribution and homogeny conditions are not occurred in gender, referee degrees and refereeing years variances. Meaningfulness level is determined as .05.

Results

Table 1. Demographic Variances of Research Group

Variances	N	%	
Gender	Female	8	16,3
	Male	41	83,7
	Total	49	100
Referee degree	HIF	27	55,1
	Region	22	44,9
	Total	49	100
Referee year	1-3	5	10,2
	4-6	7	14,3
	7*	37	75,5
	Total	49	100

Table 2. According to Research Group's Gender Variances the Results of Mann-Whitney U Test related to Empathique Tendency Levels

Variances	N	X	Range averages	Mann-Whitney U Test
Gender	Female	8	7,37	23,00
	Male	41	,37	25,39
	Total	49		

As understand from obtained data in Table 2, the empathique tendency scores of sportsmen differ greatly in terms of their gender variances [$t(49) = 148; p > 0.5$].

Table 3. According to Variances of Refereeing Degrees of Research Group the Results of Mann-Whitney U Test related to Empathique Tendency Levels

Variances	N	X	Range Averages	Mann-Whitney U Test
Refereeing range	HIF	27	7,32	21,26
	Region	22	,50	29,59
	Total	49		

As understand from obtained data in Table 3, empathique tendency scores of sportsmen differs greatly in terms of variances of refereeing degrees [$t(49) = ,196; p < 0,5$]. The scores of HIF referees ($x=7,32$) is determined as higher in comparison with scores of region referees ($x= ,50$).

Table 4. According to Variances of Refereeing Years of Research Group the Results of Kruskal Wallis Test related to Empathique Tendency Levels

Variances	N	Range Averages	sd	X ²	p
Refereeing year	1-3	5	34,70		
	4-6	7	34,50	2	1,178
	7	37	21,89		,028*

As understand from obtained data in Table 4, the



empathique tendency scores of sportsmen differ greatly according to refereeing year variances [$t(49) = 7,178; p < 0.5$]. The scores of referees working more than seven years ($\bar{X} = 1,89$) are lower than the scores of 4-6 yearly referees ($\bar{X} = 34,50$) and the scores of 1-3 yearly referees ($\bar{X} = 34,70$).

iscussion

Samples of this research consist of totally 49 referees, 8 female and 41 male active football referees whose average ages $23 \pm 3,64$ selected randomly among referees working in Ankara region for the last one year. 55% of referees are working as HIF referee and 44,9 % of referees are working as region referee. 1-3 yearly referees constitute 10,2 %, 4-6 yearly referees constitute 14,3 % and 7 and more yearly referees constitute 75,5 % of the group. In the conducted study, the Empathique Tendency Scale scores of active female football referees are found higher than male referees, yet the difference between them is not considerable as statistic. In different studies were carried out by Eisenberg and Lenon (1983), Schireman and Gundy (2000), Lennon and Kopriva (1991), Myyry and Helkama (2001), Duru (2002), Toussaint and Webb (2005), Durak and Vurgun (2006), Karabulut and Pular (2013) on different groups, it is realised that female referees have higher empathique tendency in comparison with male referees. These findings support research findings. This result can be explained on the ground that women response the situations more emotionally than men; furthermore women are regarded as calmer, more moderate and more thoughtful by society and at last with 'woman sensibility' (Dökmen 2005). However in the statistic data in the chart 3, it is understood that there is a considerable relationship between refereeing degrees and ETS scores. The tendency of HIF referees another words, of beginner nominee referees is higher than the scores of region referees who are more veteran than themselves. On account of being new in the field and having fresh memory if they play football in previous life, their empathique behaviors may have affected this emerging result. In chart 4, it is understood that there is a considerable relationship between refereeing year variance and the scores of empathique tendency scale. As the working years of referees increase, it is realised that empathique tendency get lower and they display less empathique behaviors. This result can be explained on the ground that referees can behave more comfortable in front of the audience as a result of increasing experiments with growing older, and they can behave more individually with this comfort so the empathy may also decrease (Dorak and Vurgun 2006). In the study undertaken on a different group. Karabulut and Bahadır (2013), has found that as the empathy is increasing, the empathique tendency is decreasing. This research also supports

findings.

Conclusions

In order to reach more explanatory and satisfactory results and contribute to sport science by investigating related literature in consideration of discussions, the results obtained from this research, when considered that it includes active football referees in Ankara can offer bellow suggestions;

- Similar researches may be done by enhancing the number of samples,
- Empathique tendency levels may increase with different variances of referees,
- The relationship between behaviors of applying game rules while referees are conducting matches and empathy level may be investigated,
- The differences between the empathique tendency of other branch referees and the empathique tendency of football referees may be investigated,
- In refereeing training, the information about 'Empathy' concept may be increase

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Original article

THE EFFECT OF RECREATIONAL ACTIVITIES ON EMOTIONAL INTELLIGENCE AND PSYCHOLOGICAL SECURITY LEVEL AND THEIR RELATIONSHIP TO THE LEVEL OF ACADEMIC ACHIEVEMENT OF THE JUVENILE CRIME IN THE EASTERN REGION (DAMMAM) IN SAUDI ARABIA

ELTANAHI NAGLA¹, KASSEM KAWTHER²

Abstract

The aim of this study to identify the effect of recreational activities upon the emotional intelligence and psychological security in relation to the level of academic achievement of juvenile in House Social Observation of Dammam city, this is done through the use of an experimental approach which is applied to the juvenile.

Methods. A Number of (80) subject between the ages of (12-18) years through the program contains the recreational activities represented in physical and cultural programs and camps, other) was applied for 14 weeks, through the application of an experimental design for one group using pre-post measurement which is suitable to the nature of the study, Where the pre-post measurements are focus upon emotional intelligence psychological security and the level of academic achievement of juvenile in House Social Observation of Dammam.

Results. The evaluation of this program was done via the use of SPSS. Results showed significant differences between the pre-post measurements of emotional intelligence, psychological level of security; also there is positive statistically significant relationship between emotional intelligence and psychological security and level of academic achievement of juvenile in House Social Observation of Dammam.

Conclusions. There are significant differences between pre and post measurements for all axis of psychological security of the Juvenile in house social observation in Dammam city.

Keywords: Recreational Activities - Emotional Intelligence- Psychology Security- Juvenile crime.

Introduction

With the development of societies, the juvenile have evolved numerous patterns of crime. this age group are not few numbers committed different patterns, but those belonging to the community, and, therefore, has become the role of the penal institutions is not deposit and deter juvenile crime only, but their treatment and modify their behavior through treatment and rehabilitation programs provided by community, to return elements of valid and effective, this is known as precautionary measures. For these reasons the societies highlighted the importance of re-integration and rehabilitation and issuing instructions for care of Juvenile crime with focus upon training programs, rehabilitation, acquiring knowledge and instilling of socially acceptable behavior and morals. Thus institutions have very important and clear role in giving the opportunity to juvenile for re-integration into the community and to make them useful and effective.

The human need to be assisted and to be in the right way in order to not to lose the community

whose quotation was opened expense of created by his people and his clan, and to make it a breadwinner for himself instead of to be dependent on this community to the extent that the juvenile is available that the role of the programs and rehabilitation, it is reflected positively on their behavior after their return to the Community (Saleh, 2004). There are efforts being made by correctional institutions to remove delinquent from the case of delinquency or crime and lute to or not to repeat the criminal acts, through medical, psychological intervention or intervention by specialists in the field of education, moral and religious and other fields. It can be said that the reform and remedial programs work in an integrated manner to create the juvenile and preparing to become a human being normalized.

The juvenile needs security, which represents the most important politically motivating behavior throughout life. It is one of the basic needs for healthy growth and compatibility and psychological health per capita, the psychological security is

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closely linked to survival instinct and also linked to feel that the individual lives in an environment friendly with saturated needs and others loves respect and accept him within the community, and that he is stable and safe, homely, compatible socially stable, and lives in an adequate housing and a sustainable livelihood. In this way the security is true physically and psychologically, and that what must be committed to avoid danger caution and deals with the crisis wisely and natural disasters, and to make the juvenile is confident and trust, this is what is needed in the juvenile that live away from the atmosphere of family planning, which gives a sense of security (Go Leman, 1995).

Maslow, 1970, noticed the importance of a sense of security and the need for a mechanism for access to a particular goal, he sees human have many needs and considered that security is the one of basic needs of human beings and, as the need to provide reassurance and stability, protection and freedom from fear, anxiety and confusion and others, he pointed out that security is the strongest and the most pressing needs and a link to an individual, especially if exposed to real threats causing many psychological disorders.

Goleman, 1995, refers to the presence of non-knowledge capacities which may play an important role in the success of the juvenile and classify those capacities into emotional and social aspects, he assumed that the emotional intelligence is the capacity of learning and section the emotional efficiency to two sections, the personal efficiency, that enable us to manage ourselves and social efficiency, that enable us to manage ourselves with others.

As penal institutions as a means to rehabilitate juvenile delinquents, and rehabilitation to return to normal society as normal individuals, and their reintegration into the process of sustainable development and that they can become upstanding members of society, it was necessary to focus programs of education, which is based on achieving psychological security and capabilities to achieve positive skills about himself and his society.

The purpose of the study:

This study aims to design recreational activities program and its impact on the emotional intelligence, psychological security in relation to the level of academic achievement of juvenile in the house of social observation in Dammam city of the eastern region.

Material and Methods

This study includes (80) juvenile in the house of social observation in Dammam city of the eastern region. The two researches performed homogeneity procedure for the community of the study in some of the physical and psychological variables

Afaf, 2008, assumed when normal individual lacks non – knowledge skills, he cannot live psychologically and socially as normal because it is difficult to communicate with himself and with members of his society, this means of SOE at the psychological level, which stunt the ability to learning.

Alhamami, Aida, 2001, confirmed that the recreational activities contribute significantly to the acquisition of many good qualities such as belonging and denial of, self-respect for others and cheerfulness and interaction, happiness and contentment, which contribute to non-knowledge skills.

Magda, 2000, assumes that the report of the Association of American Physicians refers to the application of different kinesthetic activities and recreational programs lead to reducing the incidence of nervous tension, psychological depression, and anxiety and give the child an opportunity for training on sound behavior through various positions of kinesthetic activities and recreational games.

In view of the herald of all age groups, the recreational activities is considered a key component of learning and have the highest degree of importance in the learning process because it have an important role to play in physical, dynamic, emotion and social growth, which allows multiple opportunities such as speed think, act, awareness, perception and concentration .

The essence of the study problem is around on programs of recreational activities provided for juveniles within the house of social observation in Eastern Region and their impact on the emotional intelligence that cannot be missing in the juvenile that live psychologically and socially, and also the psychological security, including achieve consensus of professional affiliation and social security community, which reflected positively on the academic achievement, which is one of the important indicators and affecting the life of the individual and development of mental abilities.

targeted. The age 16.33 ± 0.73 years, the level of intelligence 27.07 ± 4.14 degrees

The heterogeneity of the axis of emotional intelligence at the center of the Intrapersonal Scale 14.74 ± 0.23 degrees, the focus of the social efficiency 26.76 ± 0.16 degrees, Stress Management Scale 22.79 ± 0.19 degrees, Adaptability Scale 21.67 ± 0.89 degrees, the general mood scale 32.44 ± 0.33 degrees, Positive Impression Scale 13.45 ± 0.06 degrees.

The heterogeneity of the axis of psychological security, the axis of the need to independence 33.37 ± 1.66 degrees, the axis of the



need to force 40.48 ± 2.44 degrees, the axis of the need for stability and a sense of peace 33.75 ± 2.4 degrees, the axis of the need to avoid pain 36.12 ± 2.91 degrees, the axis of the need for the system and the Arrangement 42.06 ± 3.13 degrees, the axis of the need to reassure 28.25 ± 2.93 degrees, the axis of the need for protection 34.56 ± 1.71 degrees.

Collection data tools:

Registries:The use of private registries of juvenile, in order to obtain data about the level of academic achievement for each juvenile.
Interview: The research team work performed several personal interviews with experts to determine the content of recreational activities to achieve the goal of research and the content was introduced to experts and finalized in accordance with the capabilities of the juvenile, the most important recreational activities are chosen to be matching with those stage age to develop emotional intelligence and psychological security and to provide better conditions for satisfying their needs of activity under the supervision of the scientific directed lead to achieving integrated sound growth.

Higher IQ: (preparation of Mohammad Khairi), emotional intelligence measurement, security psychological measurement, students' academic degrees, recreational activities program.

Emotional Intelligence scale "Bar-On": this study used Bar-On Emotional Intelligence scale, which is designed to measure emotional intelligence for students from the ages of (7 -18) years old, and includes Bar-On to measure emotional intelligence - in original form (60) a distributed over six sub-standards following dimensions: personal competence (intrapersonal scale). It consists of (6) The following figures were taken paragraphs (53-43 -31-28 -17-7), social efficiency (interpersonal scale) consists of (12) a paragraph figures are taken from (59-55 -51-45 -41-36 -24-20-14 -10-5-2), management of pressure (stress management scale) consists of (12) a paragraph figures are taken from (3-58 -54-49 -46-39 -35-26-21 -15-11-6). Adaptation (adaptability scale) consists of (10) paragraphs of the following figures were taken (12 -57-48 -44-38-34-30 -25-22 -16), general mood (general mood scale) consists of (14) a paragraph figures are taken from (-60-56 -50-47 -40-) (37-32-4-1 -29-23 -19-13 -9-), positive impression (a positive impression scale) consists of (6) The following figures were taken paragraphs: (52-42 -33-27 -18-8) as well as the standard for determining the credibility of the student in the selection of appropriate responses.

The preparation of emotional intelligence scale: was introduced to a number of professors of the Faculty of Education in the sections "measurement, psychology, and special education" to make sure

the accuracy of content, the arbitration outcome reveals no need for the scale to amend any of its items. The scale was applied to a sample survey for estimation of accuracy and stability of the scale to make sure it is valid.

Procedures for correcting the scale: Bar-On scale include four options for each sentence, choose the student from the options, which are as follows: (1) very rarely applies to, (2) is rarely applied to, (3) sometimes applies to, (4) often applies to. With the highest degree of each single function to increase Emotional Intelligence when tested, except for the figures following paragraphs: (58-54 -53-49 -46-37 -35-28 -26-21 -15-6).

Internal Consistency Validity: The account extract the value of the correlation between the degree of each after college degree dimension and degree college degree for each of the measure emotional intelligence, where the value of the correlation coefficient axis personal efficiency 0.833*, axis of social efficiency 0.711*, the management of pressures 0.754*, Adaptability 0.669*, general mood 0.851*, positive impression 0.687*, and it was clear that there is a relationship between the degree of statistical function connectivity all after Degree College for the gauge and this indicates that the terms are consistent Procedure each axis.

Reliability of Emotional Intelligence scale:

The reliability of the emotional intelligence scale was estimated by the manner the application of the scale and its reapplication after two weeks interval on an exploratory sample (20) juvenile of the Community Research and outside research sample, the correlation between the first and second application axis personal efficiency 0.469*, axis of social efficiency 0.832*, The axis of the pressure 0.818*, axis of adjustment 0.954*, the axis of the mood of the 0.475*, axis of positive impression 0.619*, where it was found that the correlation coefficient between the two applications first and second link factor, pointing to a flat measure emotional intelligence

Psychological Security Scale:

It consists of 140 words of seven main axis are: the need to independence, the need to force, the need for stability and a sense of peace, the need to avoid pain, the need for the system and the arrangement, the need to reassure, the need for protection, there are in front of all the words three selection (often - sometimes - rarely), the high-degree indicate the satisfaction of the need and low-degree indicate dissatisfaction of the need, the range of degree for each axis of scales lies between 20:60 degrees.

Internal Consistency Validity:



The account extract the value of the correlation between the degree of each after college degree dimension and degree college degree for each of the measure psychological security, where the value of the correlation coefficient axis need to independence 0.713 * , the need to force 0.756 * , the need for stability and a sense of peace 0.768 * , the need to avoid pain 0.711 * and the need for the system and the Arrangement 0.829, need to reassure 0.743 * , the need to protect 0.852 * , and it was clear that there is a relationship between the degree of statistical function connectivity all after Degree College for the gauge and this indicates that the terms are consistent Procedure each axis.

Reliability of Psychological Security Scale:

The reliability of the psychological security scale was estimated by the manner the application of the scale and its reapplication after two weeks interval on an exploratory sample (20) juvenile of the Community Research and outside research sample, the correlation between the first and second application axis need to independence 0.87 * and the need to force 0.73 * , the need for stability and a sense of peace 0.89 * , the need to avoid pain 0.87 * , the need to arrange 0.79 system, the need to reassure 0.82 * , the need to protect 0.76 * , where it was found that the correlation coefficient between the two applications first and second link factor, pointing to a flat psychological security scale.

Proposed program of recreational activities:

The researcher attended in the design of the proposed program the following: access to the previous reference and research theoretical framework, taking the opinion of experts in the program, taking into account an appropriate program of activity entertainment, capabilities of proposed juvenile with poorer performance and individual differences, gradualism in the implementation of the Program, taking into account factors of safety and security throughout the period of the implementation of the program, flexibility , applicability, and modification if required.

Components of the program:

Proposed program includes recreational activities, cultural activities, sports activity, social activities, and art activities:

- **cultural activities:** the creation of a scientific education courses in human development and to contribute to the development of self-development and capacity building for the juvenile, which opened the door to discussion and questions, the establishment of religious seminars contribute to the modification of behavior of the juvenile in accordance with the teachings and guidance our religion right way in the future, the establishment of cultural competitions include the most beautiful

wall magazine, the best known, honors the winner, holding competitions include religious holy Quran prophetic Hadiths, the establishment of better health awareness campaign.

- **Social activities:** activating organizational committees through the choice of the best group (the mosque - Public Service - agriculture - Health Unit) and the establishment of better family competitions in relation to discipline and commitment, choose the best group in terms of participation, choose ideal juvenile, receptions, and offers light competitions to make practitioners more active.

- **Art activities:** design technical solids using cork, the work of some art panels in national festivals and competitions to refine technical talent.

- **Sports activities:** include regular organization in sports football activity, volleyball, basketball, handball, running, jogging, and fitness competitions; the establishment of an open day includes fun games such as tug discus throwing chairs and other games , exercise cardio- karate training, where it was recognized for contribution to the acquisition of the juvenile fitness , self-confidence and psychological security, and it is practiced three times a week Training Unit (60) minutes divided into (10) minutes warm-up (45) minutes major part (5) minutes relaxation .

The researcher had taken into account the following rules during the performance of cardio karate training: gradually in load training through an arrangement content so that starts from easy to difficult and simple to complex, the diversity of exercises, warm-up with stretching exercises including flexibility joint and spine, taking into account individual differences and balanced development over all parts of the body.

The basic part: this is the most important part of the program and through which the main goal of the study is achieved. This part includes the training of Cardio Karate that involves the basic skills of karate of defense methods (blocking – feet movements) and attack methods (punching – hitting – kicking). The two researches chose the suitable skills for this program.

Feet positions: Front – stance (zenkutsu –dachi), Back – stance (kokutsu – dachi) , Straddle – leg Stance (kiba – dachi) , Sparring Front stance (zenkutsukumite –dachi)

Blocking methods: Downward block (Gedon-Bari) Rising block (Jodan Age-Uke) , Inward forearm block (ChudanUchi-uke) , Outward forearm block (Soto-ude-uke) , Seward hand block(Chudan - Shuto –Uke)

Punching methods: Rising Punch (Age-Zuki) , Short Punch (kizami-zuki) , Lung Punch (Oi-zuki) , Reverse Punch (Gyaku-zuki).



Kicking methods: Front Kick (Mae – Geri), Back Kick (Ushiro – Geri), Side Kick (Yoko- Geri), Roundhouse Kick (Mawashi – Geri

Statistical analysis

Data were examined using computerized statistical packages (SPSS). Differences between two

measuring were analyzed using one sample T-TEST .And correlation between variables was assessed by a person correlation , significance was accepted at the $p < 0.05$ level.

Results:

Table (1) significant differences between measurements before and after the measure emotional intelligence.

Variables	Pre M± SD	Post M± SD	T
Personal competence	14.81±1.15	19.24±1.16	*28.38
Social efficiency	26.3±1.56	36.3±2.71	*29.84
Pressure management	23±1.19	32.38±2.21	*34.13
Adapt	21.38±1.04	36.18±3.56	*38.44
General mood	31±1.31	44.45±2.22	*57.33
Positive impression	13.59±1.04	19.85±1.58	*30.76

T Value in Level 0.05=2

Table 2. Significant differences between measurements before and after the measure psychological security

Variables	Pre M± SD	Post M± SD	T
The need to independence	33.37±1.66	34.68±1.95	*8.72
The need to force	40.48±2.44	41.18±2.56	1.73
The need for stability and a sense of peace	33.75±2.40	34.93±2.93	*5.22
The need to avoid pain.	36.12±2.91	37.75±2.62	*6.79
The need for the system to arrange	42.06±3.13	43.06±3.56	1.46
The need to reassure	28.25±2.93	30.12±3.57	*3.29
The need for protection	34.56±1.71	36.25±2.54	*5.40

T Value in Level 0.05=2



Table 3. Significant differences between measurements before and after the measure the level of academic achievement

Variables	Pre M± SD	Post M± SD	T
the level of academic achievement	74.08±9.62	89.52±4.48	15.59*

T Value in Level 0.05=2

Table 4. Correlation between the level of academic achievement and intelligence emotional

Correlation	Personal competence	Social efficiency	Pressure management	Adapt	General mood	Positive impression
the level of academic achievement	0.303*	0.381*	0.320*	0.281*	0.297*	0.307*

R Value = 0.217

Table 5. Correlation between the level of academic achievement and psychological security

Correlation	The need to independence	The need to force	The need for stability and a sense of peace	The need to avoid pain	The need for the system to arrange	The need to reassure	The need for protection
the level of academic achievement	0.258*	0.273*	0.291*	0.306*	0.453*	0.387*	0.278*

R Value = 0.217

Discussion

Table (1) shows significant differences between pre and post measurements for all axis of emotional intelligence. Table (2) shows significant differences between pre and post measurements for all axis of psychological security, where the highest rate of improvement was in the axis of the need to reassure followed by the need for protection, followed by the need to avoid pain, the need for independence, the need for stability) while the least rate of improvement was in the axis of the need for system and arrangement, the need to force. Table (3) shows significant differences between pre and post measurement for the level of academic achievement. The researcher documented that the improvement in all axis of emotional intelligence and psychological security was attributed to program of recreational activities proposed by the researcher, where it was contributed to a positive emotional intelligence in all axis and the aspects of psychological of security, through regular practice of juvenile the recreational activities including various social, cultural, religious and different sports activities and training cardio karate, which reflects many healthy, psychological and physical benefits. The results of this study was matching with

each of Afaf (1980), Attiat (1982), Mohamed (1987), Kamal(1990) in the opinion that the various kinds of recreational activities contribute in giving the individual knowledge of experiences, skills

development and create opportunities for creativity, innovation, and thus to improve the individual physical, psychological, social and mental health.

The study of Aly(1998)emphasizes that practice sports have a positive impact on the psychological, mental development, mental efficiency and the ability to focus attention. Also the study of Nashwa(1999)stressed on the sport exercise to help improve psychological sense of security in juvenile. The researcher attributed the absence of a marked improvement in the axis of "the need to force, the need for the system and the arrangement," in the psychological security scale to the instability and lack of normal familial environment or clear future or the existence of a clear objective seeks to achieve these juvenile. Table (4& 5) shows the positive relationship between the emotional intelligence, psychological security and the level of academic achievement. The researcher documented



the positive relationship is due to the presence of variety of recreational activities in the applied program and this is consistent with the study of Suhad (2010) on the collective activities, games, and group discussion raises the cognitive and emotional efficiency of the student. The study of Nagla & Nashwa (2011); Eric & Jennifer (2002) confirmed cardio-karate training is more safe method for the individual to perform, regardless of the level of previous experience and per capita and its main benefits to increase fitness level, muscle strength and flexibility by learning methods of self-defense, and help to increase the sense of self-confidence and contribute to the easing of stress that the individual may be exposed to, as well as working to increase the motivation of achievement and improve the level of academic ambition. This is consistent with the study of Mayer et al. (1990), Fawky (2001), Parker (2004) that there is relationship between emotional intelligence, educational attainment and academic success. Milton (2006) indicates to the existence of a correlation between psychological security and level of ambition, where psychological security is one of important requirements to achieve quality education and scientific achievements.

In the view of Golman (1998) that access to success begin with mental capacity but it is not enough to achieve excellence, as it must be to ensure that the presence of efficiency is a must to ensure benefit of mental and cognitive abilities to the maximum possible degree (Mona, 2002). Alsaïd (2001) pointed to what the modern studies stressed about there are some emotional factors to be important in personal success and its contribution in this success is more than the contribution of knowledge capacities. Also he see that Emotional Intelligence is a potential power contribute by 80% of success in life, while academic intelligence contributing by 20% of this success.

Conclusion:

- There are significant differences between pre and post measurements for all axis of emotional intelligence of the Juvenile in house social observation in Dammam city.
- There are significant differences between pre and post measurements for all axis of psychological security of the Juvenile in house social observation in Dammam city.
- There are significant differences between pre and post measurement for the level of academic achievement of the Juvenile in house social observation in Dammam city.
- There are the positive relationship between the emotional intelligence, psychological security and the level of academic

achievement of juvenile in house social observation in Dammam city.

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Original article

EFFECT OF PLYOMETRIC TRAINING WITH DIFFERENT INTENSITIES ON KINEMATICS VARIABLES IN FOSBURY-FLOP HIGH JUMP

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Abstract

Purpose. This study aims to identify whether plyometric training with varying high intensity of depth jump exercises has greater effects on the physical and kinematics variables and Fosbury-Flop high jump achievements than fixed high intensity plyometric training or not.

Methods. Twenty-four third year physical education students recruited to participate in this study. They have been divided into two experimental groups each consists of 12 students, each have participated in plyometric Training program for 12 weeks, 3 times per week. The first experimental group used different high intensity plyometric exercises at 70-90% of maximum box height, while the second experimental performed plyometric exercises at 80% of box height. Vertical jump, long jump, 30 meters sprint, Fosbury-Flop high jump as well as kinematics analysis (the height of the jumper's body mass centre of (MC) at the end of take-off (H1), the height that the jumper raises his MC during the flight (H2), the difference between the maximum height reached by the MC and the height of the crossbar (H3), horizontal velocity at beginning and end of takeoff phase, vertical velocity at beginning and end of takeoff phase, maximum knee flexion angle during takeoff, takeoff angle, thigh angle, takeoff time) have been measured before and after training in both groups. T independent and T paired were used to identify statistical differences between groups and pre-post measurements in the same group; respectively.

Results. Vertical jump improved by 21.81% and 11.17% in the first and second group respectively (first group: 42.83±2.98 to 52.17±2.89 cm, P <0.05; second group: 43.25±2.86 to 48.08±1.62 cm, P <0.05). There was an improvement in the kinematic variables; i.e. vertical velocity at the end of takeoff phase has improved in the first and second group by 3.0% and 1.7%, respectively (first group: 3.66±0.28 to 3.77 ±0.24 m/s, P <0.01, second group: 3.53 ±0.14 to 3.57 ±0.13 m/s, P <0.05). Fosbury-Flop high jump performance has also improved (first group: 159±5.58 to 171.75±5.45 cm, P <0.05, second group: 156.50cm ±5.55 to 162.25cm ±4.86, P <0.05).

Conclusion. Plyometric exercise training with different exercise intensities have shown greater effects than plyometric exercise training with fixed intensity in improving explosive power, kinematic variables and Fosbury-Flop high jump, which attributed to the participation of greater number of motor units in muscle contraction with different intensity than the fixed intensity.

Key words. plyometric training, fosbury-flop, high jump.

exposed to sudden expansion under the influence of decentralized contraction immediately followed by high-speed centralized contraction and the main purpose of this method of training is to activate the reflection mechanism and mechanical properties of muscle fibers (Wilkerson, 1990; Donald, 1998). Motor activity produced by body falling from height to ground lead to light bending in the joints then stopping movement along muscles in both horizontal and vertical directions; then enter shift phase from decentralized to centralized contraction; the best form of plyometric training is deep jump (Jacoby, 1983). There are many forms of plyometric exercises like leaps; jump on the barriers and deep jump; could be performed by one foot or two feet, in order to develop leg muscles explosive power giving quick results as shown by vertical jump from stability and 30 m sprint tests (George, 1999).

Explosive power degree associated with number of aroused motor units and becoming more and more in

Plyometric Training plays an effective role in developing explosive power abilities. Fosbury-Flop High Jump requires both speed and power skills to achieve high performance level (Gambetta, 1987).

Most of international standardized records in high jump achieved through successful approach and take off; therefore training programs should focus on developing motion path for approach and take off as well as teaching tactics over the bar (Tonics, 1986; Myers, 1989; Tellez, 1993).

Plyometric training deemed to be the most important exercises for production of explosive power required during take-off phase in the high jump to reach the maximum possible height over the bar (Raid, 1989). Plyometric training helps muscle to reach maximum strength in the shortest possible time, and this called the explosive power; which is highly needed in jump, sprint and shooting competitions. (Dintiman, et al., 1998). Plyometric training aims to develop the explosive power of leg muscles, where muscles are

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stability, where the student stand behind take off line, feet little far, the student swing arms, bent knees and jump, student have three trials, best one to be recorded. 30 m sprint with flying start, student start sprint before fixed distance with 10 meter to calculate exact time of 30 meter sprint to calculate the actual speed, Fosbury-Flop high jump as per IAAF laws)

Researchers also used videograph to perform pre and post kinematic analysis (height of the COG at the end of take-off phase (h1), height that the jumper raises his MC during the flight (h2), the difference between the maximum height reached by the MC and the height of the crossbar(h3), horizontal velocity at the start of take-off phase [touch-down] (Vh_TD), horizontal velocity at the end of take-off phase (Vh_TO), vertical velocity at the start of take-off phase (Vv_TD), vertical velocity at the end of take-off phase (Vv_TO), maximum knee angle in the take-off phase, takeoff angle, hip angle, takeoff time).

2 Video cameras were uses with 240 frame/second speed and one camera with 30 frame/second speed, each camera fixed on three dimension holder camera (1) perpendicular on left approach curve to videograph competitors using there right leg, far from curve-mid with 35 meter and 1.15 meter high, videograph area 9.5 meter, camera (2) perpendicular on right approach curve to videograph competitors using their left leg, far from curve-mid with 35 meter and 1.15 meter high, videograph area 9.5 meter, camera (3) perpendicular on the bar from left side far from the bar-mid with 6 meter, 1.65 meter height, videograph area 3 meter, Dartfish program used for kinematic analysis.

Training program consisted of 36 training sessions, 3 units weekly for 12 weeks. Both experimental groups used the same program for Fosbury-Flop High Jump with difference only in intensity distribution form to determine the best experimental group using two forms of plyometric training (Single Leg Depth Jump, Depth Jump)

Example: While training with six boxes, in different high intensity training boxes will be 70% and 90% intensity alternativel, so total intensity will be $(3 \times 70) + (3 \times 90) = 480$, while for fixed intensity same number of boxes used with 80% intensity for all boxes so total intensity will be $(6 \times 80) = 480$ Thus, the training intensity is the same, with difference only in intensity distribution. Figure 1 show training intensity distribution during the program.

the case of arousing the largest possible number of muscle motor units, this controlled by stimuli degree as increasing intensity, which lead participation of a larger number of motor units and thus increase the explosive power (Ref.). Motor units requires a certain amount of arousal or stimulation and do not respond without the occurrence of such amount of arousal which is called threshold i.e. minimum nerve arousal which motor unit respond with contraction to maximum contraction degree and do not respond if arousal degree is lower than threshold and this called law of all (All - Or- No Response). All muscle fibers in the motor unit receive the same nerve stimuli and thus all the muscle fibers of this motor unit contract to maximum level it as soon as arousal degree reach threshold level (Abu ElEala, 2003). From all what mentioned above, researchers found that there is no studies about wave intensity plyometric training as training done only with fixed intensity, So they worked to complete the previous studies by developing a new model for the form of plyometric exercises as they believe in importance of this training method in developing explosive power, and consequently improving standardized level for Fosbury-Flop High Jump.

Methods

Twenty-four student- third year physical education students had been recruited to participate in this study. They have been divided into two experimental groups each consists of 12 students. The first experimental group used different high intensity exercises, while the second experimental used fixed intensity for the same exercises.

The two experimental groups were homogenous: first group (age 19.76 ± 0.37 , height 1.78 ± 3.34 cm, body mass 72.17 ± 3.24 kg, best record during competition were 159.00 ± 5.58 cm) and second group (age 19.46 ± 0.39 , height 1.81 ± 2.84 cm, body mass 74.08 ± 3.55 kg, best record during competition were 156.00 ± 5.55 cm)

The researchers used (high Jump test from stability, where the student face the wall, arm raised height, after sipping fingers in water to mark the highest points in standing position, the student swing arms, bent knees and jump high, making another mark with hand, distance between the two marks to be recorded, each student have three trials, and the best one recorded for analysis. Long jump test from

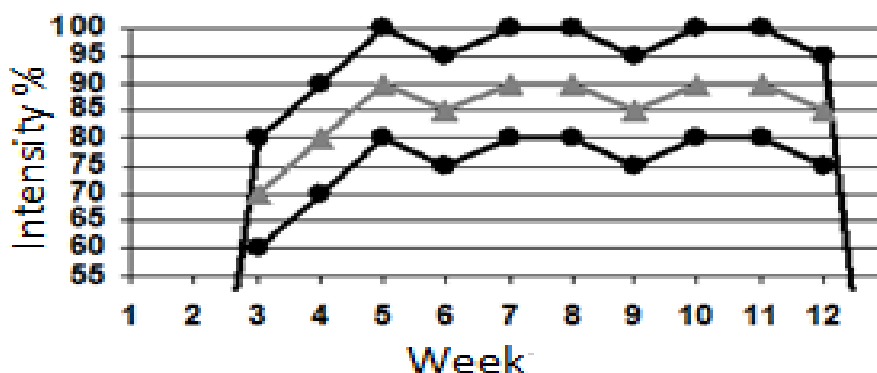


Figure 1. Training intensity dynamic during the training program for boxes height for both experimental group

Researchers used the following statistical factor and methods: average, standard deviation, Skewness, independent t test, paired T test)

0.70% in the first and second group respectively (first group: 5.74 ± 0.10 to 5.83 ± 0.11 m/s, $P < 0.05$; second group: 5.68 ± 0.13 to 5.72 ± 0.13 m/s, $P < 0.05$). Horizontal velocity at the end of take-off phase improved by 0.84% and 0.57% in the first and second group respectively (first group: 3.57 ± 0.07 to 3.60 ± 0.07 m/s, $P < 0.05$; second group: 3.50 ± 0.10 to 3.52 ± 0.09 m/s, $P < 0.05$). Vertical velocity at the start of take-off phase improved by 13.33% and 7.41% in the first and second group respectively (first group: 0.30 ± 0.05 to 0.34 ± 0.06 m/s, $P < 0.05$; second group: 0.27 ± 0.05 to 0.29 ± 0.05 m/s, $P < 0.05$). Vertical velocity at the end of take-off phase improved by 3.01% and 1.70% in the first and second group respectively (first group: 3.66 ± 0.28 to 3.77 ± 0.24 m/s, $P < 0.05$; second group: 3.53 ± 0.14 to 3.59 ± 0.13 m/s, $P < 0.05$). Maximum knee angle in the take-off phase improved by 3.35% and 1.69% in the first and second group respectively (first group: 146.58 ± 6.19 to $142.67 \pm 6.81^\circ$, $P < 0.05$; second group: 148.25 ± 5.69 to $145.75 \pm 5.55^\circ$, $P < 0.05$). Take-off angle improved by 1.48% and 1.93% in the first and second group respectively (first group: 39.83 ± 2.62 to $40.42 \pm 1.88^\circ$, $P > 0.05$; second group: 38.92 ± 1.51 to $39.67 \pm 1.30^\circ$, $P > 0.05$). Free leg angle at the end of take-off improved by 0.83% and 0.93% in the first and second group respectively (first group: 99.92 ± 3.45 to $100.75 \pm 3.05^\circ$, $P < 0.05$; second group: 97.67 ± 4.12 to $98.58 \pm 3.37^\circ$, $P > 0.05$). Take-off time improved by 3.57% and 1.98% in the first and second group respectively (first group: 0.196 ± 0.01 to 0.189 ± 0.01 s, $P < 0.05$; second group: 0.202 ± 0.01 to 0.198 ± 0.01 s, $P < 0.05$).

Results

Vertical jump improved by 21.80% and 11.17% in the first and second group respectively (first group: 42.83 ± 2.98 to 52.17 ± 2.89 cm, $P < 0.05$; second group: 43.25 ± 2.86 to 48.08 ± 1.62 cm, $P < 0.05$). Horizontal jump improved by 13.24% and 6.22% in the first and second group respectively (first group: 228.50 ± 7.39 to 258.75 ± 5.77 cm, $P < 0.05$; second group: 231.83 ± 3.88 to 246.25 ± 3.47 cm, $P < 0.05$). (30 m) improved by 2.68% and 1.33% in the first and second group respectively (first group: 3.73 ± 0.06 to 3.63 ± 0.04 s, $P < 0.05$; second group: 3.75 ± 0.06 to 3.70 ± 0.05 s, $P < 0.05$). Fosbury-Flop high jump performance has also improved by 8.02% and 3.67% in the first and second group respectively (first group: 159 ± 5.58 to 171.75 ± 5.45 cm, $P < 0.05$, second group: 156.50 cm ± 5.55 to 162.25 cm ± 4.86 cm, $P < 0.05$). H1 - height of the COG at the end of take-off phase improved by 0.83% and 0.82% in the first and second group respectively (first group: 1.21 ± 0.04 to 1.22 ± 0.03 cm, $P > 0.05$; second group: 1.22 ± 0.03 to 1.23 ± 0.03 cm, $P > 0.05$). H2 the height that the jumper raises his MC during the flight improved by 5.23% and 3.53% in the first and second group respectively (first group: 1.72 ± 0.03 to 1.81 ± 0.04 cm, $P < 0.05$; second group: 1.70 ± 0.05 to 1.76 ± 0.05 cm, $P < 0.05$). H3 the difference between the maximum height reached by the MC and the height of the crossbar improved by 80% and 33.33% in the first and second group respectively (first group: 0.05 ± 0.02 to 0.09 ± 0.03 cm, $P < 0.05$; second group: 0.06 ± 0.03 to 0.08 ± 0.03 cm, $P < 0.05$). Horizontal velocity at the start of take-off phase (touchdown) improved by 1.57% and

Table (1). Average, standard deviation, T value for post measurements in both experimental groups

variable	1 st experimental group		2 nd experimental group		T test value
	Mean	SD	Mean	SD	
Vertical jump from stability (cm)	52.17	2.89	48.08	1.62	4.27*
Long jump from stability (cm)	258.75	5.77	246.25	3.47	6.43*
30 m sprint, flying start (sec)	3.63	0.04	3.7	0.05	3.91*
High jump (cm)	171.75	5.45	162.25	4.86	4.51*
height of the COG at the end of take-off phase (h1)	1.23	0.03	1.22	0.03	0.84
the height that the jumper raises his MC during the flight(h2)	1.81	0.04	1.76	0.05	2.24*



(cm)					
the difference between the maximum height reached by the MC and the height of the crossbar(h3) (cm)	0.09	0.03	0.08	0.03	0.6
vertical velocity at the start of take-off phase (m/sec)	5.83	0.11	5.72	0.13	2.30*
vertical velocity at the end of take-off phase (m/sec)	3.6	0.07	3.52	0.1	2.28*
horizontal velocity at the start of take-off phase (touch-down) (m/sec)					
	0.34	0.06	0.29	0.05	2.31*
horizontal velocity at the end of take-off phase (m/sec)	3.77	0.24	3.59	0.13	2.22*
Maximum knee angle in the take-off phase (angle)	142.67	6.81	145.75	5.55	1.22
Takeoff angle (angle)	40.42	1.88	39.67	1.3	1.14
Free leg hip angle at the end of take-off (angle)	100.75	3.05	98.58	3.37	1.65
Takeoff time (sec)	0.189	0.01	0.198	0.01	2.22*

* Significant at 0.05 field (T significant at 0.05 = 2.07)

Table 1 results revealed significant differences between the two experimental groups in favor of first experimental group in physical, skill variables and some kinematic variables

Discussion

Results of pre-post measurements of both groups which are Vertical jump from stability, Long jump from stability, 30 m sprint, flying start, High jump, the height that the jumper raises his MC during the flight(h2), the difference between the maximum height reached by the MC and the height of the crossbar(h3), vertical velocity at the start of take-off phase, vertical velocity at the end of take-off phase, horizontal velocity at the start of take-off phase, horizontal velocity at the end of take-off phase, Maximum knee angle in the take-off phase, Free leg hip angle at the end of take-off for first group only, Takeoff time) that there are significant differences at 0.05 level while there is no significant differences in height of the COG at the end of take-off phase (h1) and takeoff angle for first group, and height of the COG at the end of take-off phase (h1), free leg hip angle and takeoff angle for second group, researchers interpret this for training program effectiveness with its plyometric and skill exercises which lead to enhance post-measurements. Researchers also argue that enhancing physical variables is from the important reasons for enhancing kinematic variables for Fosbury-Flop High Jump, and subsequently the standardized record.

These results in agreement with that plyometric training is one form of explosive exercises which called expansion reverse response where muscles move fast from expansion contracting to shortening contracting and where nerve system respond fast by producing maximum strength in minimum possible time (Lee, 2006). Plyometric training is specialized training designed to develop nerve explosive power through enhancing motor units work to produce maximum power in lowest possible time (Partic, 2000). Plyometric training aim to develop explosive power for leg muscles as it works to activate reversal mechanism and mechanical properties of muscle

fibers under the effect of expansion, which increase strength production and speed (Wilkerson, 1990; G. Donald, 1998). This also in agreement with (Wilmore & Castell, 1994) who argued that plyometric training is jump exercises using what is called response which give the muscle elastic property and enhance jump efficiency.

The height of projection of the COG is dependent on the vertical velocity the athlete is able to obtain at the end of the take-off phase of the jump (Dapena, 1992). Increases in take-off velocity as small as 0.1 m/s can result in a 3-4 cm increase in COG projection height. The two factors that determine the take-off vertical velocity are the horizontal velocity of the approach and the ability of the athlete to convert the horizontal velocity to vertical velocity (Dursenev, 1991).

Researchers return non significant differences in height of the COG at the end of take-off phase (h1) to the stability of sample height, while takeoff and hip angle did not affect by training program due to stability of technical performance of both groups which in turn mean that plyometric training is the base of enhancing kinematic variables related to physical variables, there was little enhancing in hip angle for first group as a result of enhancing physical variables. Researchers return better enhancing percentage in first group to using wave intensity in training program.

Table 1 results reveal that there are significant differences at 0.05 level in post measurements between the two groups in favor of first experimental group in (Vertical jump from stability, Long jump from stability, 30 m sprint flying start, high jump, the height that the jumper raises his MC during the flight(h2), vertical velocity at the start of take-off phase, vertical velocity at the end of take-off phase, horizontal velocity at the start of take-off phase, horizontal velocity at the end of take-off phase, takeoff time). There were no



significant differences in (height of the COG at the end of take-off phase (h_1), the difference between the maximum height reached by the MC and the height of the crossbar (h_3), Maximum knee angle in the take-off phase, Takeoff angle, and free leg hip angle at the end of take-off)

Researchers return that to wave method used within training sessions with first experimental group, which led to positive enhancing percentage in physical, kinematic groups and standardized record.

These results in agreement with (A.Abu ELeala, 2003: N. Ahmed, 2003), who argued that Explosive power degree associated with number of activated motor units and becoming more and more in the case of arousing the largest possible number of muscle motor units, this controlled by stimuli degree as increasing intensity, which lead participation of a larger number of motor units and thus increase the explosive power.

Also agreed with (Abu Eleala, 2003) who argued that motor units requires a certain amount of arousal or stimulation and do not respond without the occurrence of such amount of arousal which is called threshold i.e. minimum nerve arousal which motor unit respond with contraction to maximum contraction degree and do not respond if arousal degree is lower than threshold and this called law of all (All - Or- No Response). All muscle fibers in the motor unit receives the same nerve stimuli and thus all the muscle fibers of this motor unit contract to maximum level it as soon as arousal degree reach threshold level.

Researchers also return that there were no differences in height of the COG at the end of take-off phase (h_1) to stability of student height, and difference between the maximum height reached by the MC and the height of the crossbar (h_3) to short distance between COG and the crossbar. They also return non-significant differences in Maximum knee angle in the take-off phase, Takeoff angle, free leg hip angle at the end of take-off to enhancing strength and speed and not kinematic positions related to body angle.

Plyometric training lead to increase speed of fast muscle fibers, tendons, muscles to store maximum elastic power, increasing muscles ability to produce explosive power. The importance of plyometric training appear in linking strength and speed together as plyometric training is specialized exercises designed to develop nerve explosive power through enhancing motor units work to produce maximum power in lowest possible time (Partic, 2000)

Conclusions.

From all what mentioned before researcher conclude that using plyometric training with different wave intensity is better than using fixed intensity plyometric training within training sessions and training program.

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EFFECTS OF ELECTRONICALLY SUPPORTED ANIMATED STORIES ON EDUCATION AND EDUCATIONAL VALUES FOR ORPHANS IN THE EASTERN PROVINCE (SAUDI ARABIA)

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Abstract

Purpose. This study aims to identify the effect of electronically supported animated stories on the aspects of learning and on some of the educational values in kindergarten orphan children in the Eastern Province (Dammam) in Saudi Arabia.

Methods. The experimental curriculum was used to test the preliminary design of the experimental group (assessed before and after). It was implemented on a sample of 30 orphans, boys and girls, from orphanages in the Eastern Province. Several educational aspects of Arabic, English, Math and Art were measured using the researcher's designed tests, the educational values criteria as well as the cognitive knowledge assessments in order to measure the before and after progress.

This result was attained by applying 18 educational units at a rate of 3 units per week. Each unit lasted two hours and covered two electronically supported animated stories. The first one was related to education and the second one to scholastic values.

Conclusions. This program had a positive effect on the studied group. It contributed to a considerable development of pedagogical learning and cognitive knowledge of educational values.

Keywords: Animated stories, Aspects of learning, Educational values.

Introduction

The orphan is a society member who needs the most care and support. Neglecting him may affect his character negatively. He should be considered one of the social human resources that contribute to the development of society. For that reason, he must be cared for, educationally, psychologically and socially. Therefore, caring for orphans is not only based on personal efforts but it has become a science that organizes educational and support means.

It is also an art that requires definite directions and specific requirements in recruiting teachers and supporting staff (Awatif, 2004) Caring for orphans who are deprived of their immediate families' love and care and who have no other alternative sheltering than the one provided by the orphanage, insures their safety, progress and support in the community. At the same time, caring for orphans' supplies them with valuable productive energy and the necessary tools to protect them from going astray and being a negative influence in society (Mohamed, 1989). Compared to the child supported by his family that answers all his needs, the orphan has to fend for himself or rely on the society to

care for him and look after his rights. If an orphan is cared for at a young age, he will prosper, develop and contributes positively to society. It is no wonder that we find societies interested in supporting their orphans and continuously encouraging caring for them in order to compensate for the lack of the paternal presence and their love.

This research discusses the different learning aspects and educational values experienced on orphans to fulfill their basic needs to grow and be a positive asset in society. Since the children's potential abilities weaken if not nurtured and encouraged appropriately, it's therefore our duty to prepare our children to adapt to changes that we face nowadays (Hafez, 2004). For this reason, both (Mohammed and Adnan, 1999; Mufti, 1998) agreed that games are one of the powerful ways that a teacher can use to connect with his pupils. They are the best tools to develop imagination, attention and creativity. Amaland, Saadia (2001) insist on the fact that educational animated stories are considered as effective methods for the 21st century children to acquire values, habits and good behavior. They are also successful means to convey knowledge

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and information and to help children to learn well and alter their behavior.

The Objectives:

This research aims to study the effects of the electronically supported animated stories on education and pedagogical values of orphans in the eastern Province

Methods

The experimental curriculum was used, in concordance with the nature of this research, to measure the progression of the experimental design of the experimental group. It was conducted on a sample of 30 orphans, boys and girls, of the eastern Province for the school year 2013-2014. It was primordial to observe homogeneity in age (5.42 ± 0.52), Arabic

(10.23 ± 0.72), English (46.78 ± 2.51), Math (22.45 ± 1.44) and artistic expression skills (26.73 ± 1.13). Testing was carried out on a sample of 4 children within the community but not part of the original sample.

Information gathering methods:

Testing learning aspects: it includes testing Arabic, English, math and art skills through games, electronically supported animated stories, using visuals and true&False questions.

Scientific Factors (Credibility – Consistency) of testing learning aspects:

Credibility:

A credibility measuring assessment was put in place to classify the studied samples in a descending order and they were divided in groups of 4 as shown in the table below:

Table 1 Credibility of education aspects

N: 4

Variables	high - erd quarters	Low - erd quarters	T
M_±SDM_±SD			
Arabic language skills test	10.02±0.75	11.13±0.62	3.95
English language skills test	47.11±1.09	45.08±1.11	3.91
Math language skills test	23.36±0.78	22.14±0.84	3.19
Artistic language skills test	27.73±0.61	26.06±0.97	4.37

T value at 0.05

The table shows statistical differences between the first and last group in all learning aspects tests which show credibility of the tests used. As for the consistency, the same test was used on a different sample at a 3 day interval as shown below.

Table 2. The correlation between the first and second application

N=4

Variables	First	second T
M_±SDM_±SD		
Arabic language skills test	10.31±0.82	10.29±0.560.873*
English language skills test	46.72±1.01	46.74±1.140.779*
Math language skills test	22.53±0.93	22.61±0.610.811*
Artistic language skills test	26.81±0.74	26.87±0.830.856*



The significance of the correlation coefficient at the level value $<.05$

Table 2. The correlation coefficient value ranges (.873-.779) which indicates the existence of a statistical parabolic relationship between the first and second application for all learning aspects test which shows consistency of the test used.

2- Visual cognitive achievement of education values testing:

In order to attain the best results in analyzing knowledge testing and committing to scientific approach to conduct this assessment, Dr. Kawthar used scientific references to draw the test using 40 static pictures.

She managed to alternate difficult and easy pictures and test expressions ranging between (0.20-0.70) in difficulty and (0.30-0.80) in simplicity knowing that excellence exceeds 0.30

3-Measuring education values:

This assessment by Dr. Kawthar consists of four axes:

Religion and ethics education axis: contains 22 sentences with a credibility range of (0.777-0.967)

Discipline and hygiene education axis: contains 17 sentences with a credibility range of (0.708-0.927)

Social interaction and helping others: contains 5 sentences with a credibility range of (0.834-0.922)

This evaluation is presented to the supervisors of the social care institutions in Eastern province, Dammam by using yes/no questions and grading from 1-2 with a total ranging between (51-102)

Experimental Research Execution:

18 two-hour educational units at a rate of 3 units per week were implemented for a period of 6 weeks. Each unit contains electronic animated stories. The first one includes a learning aspect and the second an education value. Assessment is given after every 8 units with 25 questions answered using pictures, drawings and shapes.

Statistical analysis

Data were examined using computerized statistical packages (SPSS). Differences between measuring two groups were analyzed using one sample T-TEST. And correlation between variables was assessed by a person correlation, significance was accepted at the $p0.05 < \text{level}$.

Results

Table 3. Correlation labs for experimental groups of education values

Variables		Pre M± SD	Post M± SD	T	%
Learnin g	Arabic language skills test	8.42±0.31	10.27 ± 0.26	6.61*	18.01
	English language skills test	46.72±0.81	50.83±1.12	7.78*	8.80
	Math language skills test	22.48±0.47	43.21±1.39	8.56*	92.22
	Artistic language skills test	26.81±0.55	51.42±1.82	10.19*	91.79
educationa l values	Religious and ethics studies	41.32±3.82	81.87±2.56	13.41*	98.14
	Organization and hygiene	35.64±2.97	71.19±2.43	10.62*	99.75
	the honesty	11.45±1.43	22.07±2.01	13.76*	92.75
	Cooperation and helping others	12.73±1.71	25.04±1.68	9.84*	96.70
Total		101.14±3.35	200.17±4.49	17.72*	97.91
Cognitive achievement of education values		36.61±2.22	71.88±2.54	11.45*	96.43

*value $<.05$

Discussion

Table 6 shows drastic differences in the statistics between the 'after and before measure' of the experimental group. In all studied aspects for the favor of the 'after measure'. The percentage of improvement in the 'after measure' has existed in all learning and educational aspects. The researcher claims that the positive affect for the suggested program that was implemented on the experimental group by using the computer and what has been taken into consideration when the program was

prepared by choosing exercises and animated movies. The animated stories include electronically enforced stories to help children learn some subjects like Arabic, English, and math. Also, the program includes stories that encourage educational ethics which are displayed in an interesting way.

This is done with the help of some tools having different shapes, colors, and sizes which children enjoy. In addition, the program included activities that focus on replacing social situations with individual situations which reinforces the social aspect for the sample of the research.



Moreover, the program includes educational situations.

This depends on expressing themselves by drawing situations or anything they like to express. This helped the children develop, reinforce, and collaborate the flexibility in acceptance of opinions of other people. This also adjusted the behavior to a desired one which helps moderacy by interacting with others. Hence, kids would appreciate all educational value and apply what they learn in different life situations. In this aspect Mustafa, 1991 suggests that the animated activities are the best to achieve the objectives of preschool stages. Using this can help adjust the behavior of kids and arming them with skills and definition that improves the learning, social, and movement aspects.

Caring for the movement aspect of kids has a big effect in realizing different growth aspects. The value of playing increases the kids' imagination and helps them in social integration. Also, movement activities are the best way to teach children different experiences and terms through regular movements. The children's knowledge increases and they gain new skills and terms.

The improvement of the experimental groups of the 'after and before measure' in learning educational aspects depends on how effective is the electronic enforced suggested program. This is to satisfy kids needs and the acceptance of each of it with the suitable technique. In this stage children tend to move and play. They are very eager to learn at this stage. For that reason, the suggested program was a good start that helped with improving and developing the fundamental skills for children. Also, it enables them to accept and strengthen benign educational ethics which kids learn in this level or stage faster than he can learn in coming years.

Zakia 2002 and others claim that the childhood stage is considered to be one of the most important stages in life if not the most important. In this stage the first personality seeds are planted and

this is what creates personalities and moral of children. It also helps abilities and talents nurture and grow especially for sensitive children. The childhood stage is considered a vital period for basic abilities to grow, and reinforcing information.

Conclusion

Electronic stories have a positive effect showing statistically in favor to the experimental group in developing educational aspects and knowledge ethics. Statistically, this experimental group in the after measure succeeded more than the before method in learning and educational ethics.

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Original article

INVESTIGATION OF THE RELATIONSHIP BETWEEN AGILITY AND BALANCE IN TRAINABLE MENTALLY DISABLED ATHLETES WHOSE AGES RANGING FROM 8 TO 14

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Abstract

The aim of this study is to find out the relationship between agility and balance in trainable mentally disabled athletes.

Methods. In this study, a group of 15 mentally retarded men that are studying in private educational institutions and doing sports was selected as the experimental group. Their ages range from 8 to 14. It is composed of male athletes with intellectual disabilities whose mean of age is 10.80 ± 2.14 years, average of body weight 48.06 ± 4.74 kg, mean of the length size $154,73 \pm 5,10$ cm. Agility and balance tests were administered to the experimental group. The data were evaluated in SPSS 22 statistical program by means of Correlation Analysis.

As a result of statistical analysis; positive significant relationship was found between age and weight parameters ($r=83,7$, $p < 0.001$), between age and height parameters ($r = 88.2$, $p < 0.001$). There is a significant positive relationship between height and weight parameters ($r=93,9$, $p < 0.001$). It is seen that there is a significant negative relationship between height and agility parameters ($r=-62,4$, $p < 0.05$). It is found that there is a significant negative relationship between balance and agility ($r=-.70,4$, $p < 0.01$). It is determined that there is a significant positive relationship between balance and weight parameters ($r=65,8$, $p < 0.01$). There is a significant positive relationship between balance and height parameters ($r=72,8$, $p < 0.01$).

Conclusions. Based on the advent of the ball, sudden change of direction and ensuring balance during the standstill in athletes with intellectual disabilities is very important. So, balance performances of athletes with intellectual disabilities are thought to be associated with the agility performance.

Keywords: Trainable Mental Disabled, Agility, Balance.

Introduction

It is stated that children with mild mental disabilities who are on the verge of motor performances and physical suitability can compete with their peers having normal mental abilities. However, they are four years away from trainable children and generally males are superior with respect to performance (Krebs, 1995). It is widely known that girls with normal mental abilities are better at agility and balance than boys with normal mental abilities. On the other hand, mentally retarded boys are more agile and balanced than mentally retarded girls and ÖZE children are more agile than EZE children. Normal children generally become acquainted with parts of their own bodies and develop a better body image. Mentally retarded children have difficulty in distinguishing themselves, knowing parts of their bodies, picking sides, accepting their body parts that do not work properly, which causes deficiency in developing a healthy self perception of the body. (Sherill and Ruda 1998). Sports is an important

factor that help societies stay healthy. Many researchers today are investigating the effects of sports on the agility of young individuals. Balance is defined as the ability to put the body into the desired position during the static and dynamic movements (Günaydın, 1993). Balance, a term describing the dynamic which prevents the body from falling into place can also be defined as maintaining the line of gravity of a body within the base of support with minimal postural sway under different conditions (Zenbilci, 1995). Balance is an ability to maintain the posture within the base of support (Magnusson, Enbom, Johansson, Pyykkö, 1990). Balance is the ability to control with minimal muscle activity in the static and dynamic positions. It is also described as maintaining the line of mass of the body within the base of support. Maintaining the balance under the effect of environmental factors is one of the most basic motor skills. The ability of balance and postural stability is an integrated function of many movements to be

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performed (Akman, Karataş, 2003).

Agility is regarded as a locomotor skill which enables the sportsmen to change their directions. These movement patterns are frequently observed in field sports like basketball, football, tennis and lacrosse (a similar game to hockey). As a result, agility is commonly defined as the coordination of stopping short, changing direction and speeding in an effective way while keeping the horizontal and vertical motor control (Verstegen and Marcelllo, 2001). A sportsman with high agility is supposed to have some qualities like visual processing in addition to dynamic balance, spatial awareness and rhythm (Ellis, Gratin, Lawrence, Savage, Buckeridge, Stapff, Tumilty, Quinn, 2000).

Agility is basically essential for the performance of sportsmen because of three reasons. First of all, improving agility provides a great opportunity to have a control over the nerve-muscle system and motor skills. Second, agility lowers the probability of injuries which are usually caused by the change of direction and enables individual motion mechanics to enhance in a suitable way. Finally, improvements on the ability of changing direction in a quick way increase the overall performance of attack and defence (Little and Williams, 2005), (Okudur., Sanioglu.,

2012). This study is aimed at investigating the agility parameters of 15 volunteer mentally retarded male children who are actively engaged in sports in private educational institutions. IQ of the subjects of the experimental group is between 55-65 and their ages range from 8 to 14 years old.

Methods

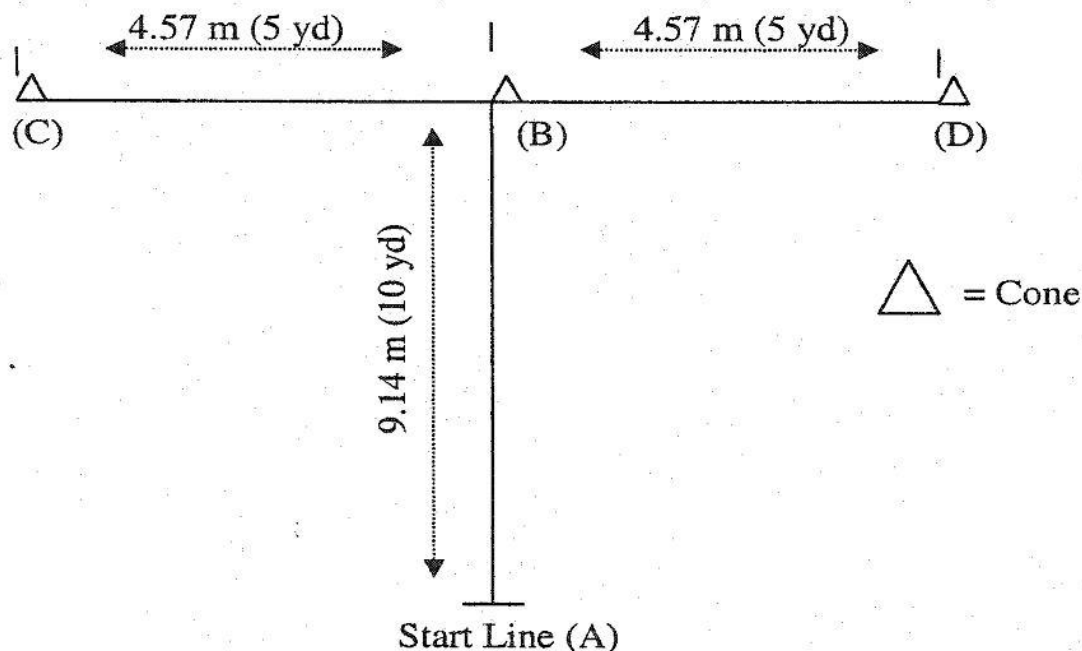
Subjects. The aim of this study was to investigate the agility parameters of mentally retarded children who attend private educational institutions and get engaged in sports actively. The intelligence levels (IQ) of the 15 volunteer subjects range from 55-65 and their ages are between 8 and 15 years old. The male members of the experimental group perform 2-hour-regular exercises three times a week in the school team with different branches.

Testing Methods

The methods applied are as follows;

The measurement Of Agility

The T test was applied to measure the agility. This test was used to determine the speeds of covering the distance while changing directions in side shuttle, sprint forward and running backward.



Three cones were placed on the same line with an interval of 4.57 m. The cone A was placed 9.14 meters away from the cone B which is in the middle of the three cones. First of all, the subjects

were asked to touch the cone B with right hand starting from the point A. Then, they were asked to shuffle from the cone B to the cone C and to touch with left hand. After that, they were asked to shuffle

from the cone C to the cone D and to touch with right hand. Then again, they were asked to shuffle to the cone B and to touch with left hand, running back to the point A. The duration of the test was measured with a chronometer. Every subject was made to perform the test twice and their best time was recorded as seconds (Pauole, Madole, Garhammer, Lacourse, Rozenek, 2000).

Measurement Of Balance. Balance Board. It is composed of a round wooden part with 30 cm diameter, 10 cm height and four oval legs in

the middle underneath. The user tries to stand on the board with both feet and the user's body must stay balanced enough to keep the board's edges from touching the ground and to keep from falling off the board. The highest duration of keeping balanced is recorded as seconds (Kaya, M 2003).

Statistical Analysis. Statistical level of significance for the data obtained in the study is $p < 0,05$.

Results. The values obtained for his study is given in the table below.

Table 1 the relationship between agility and age, weight, height parameters.

	n	Age	Weight	Height
Weight	r	,837***		
	p	,000		
Height	r	,882***	,939***	
	p	,000	,000	
Agility	r	-,410	-,520*	-,624*
	p	,129	,047	,013

* $p < 0,05$ ** $p < 0,01$ *** $p < 0,001$

In table 1, the relationship between agility and the parameters of age, weight and height of the mentally retarded children who are engaged in sports actively at a private school in Kayseri was discussed. As a result of the analysis, a positive and significant relevance between age and weight parameters ($r = 83,7$ $p < 0,001$) and between age and height parameters ($r = 88,2$ $p < 0,001$) was detected.

No significant relevance between age and agility parameters ($r = -41$, $p > 0,05$) was detected. However, a positive relationship between weight and height ($r = 93,9$ $p < 0,001$) was detected. Moreover, a negative relationship between height and agility ($r = -62,4$ $p < 0,05$) was determined. No remarkable relevance between weight and agility ($r = -52,0$ $p > 0,05$) was detected.

Table 2 The relationship between Balance and the parameters age, weight, height and agility.

	n	Age	Weight	Height	Agility
Balance	r	,503	,658**	,728**	-,704**
	p	,056	,008	,002	,003

* $p < 0,05$, ** $p < 0,01$, *** $p < 0,001$

In table 2, the relationship between the agility and the parameters of balance, age, weight and height of the mentally retarded children who are actively engaged in sports at a private school in Kayseri was indicated (corelation-sperman). As a result of the analysis, a negative and significant relationship between the

balance and agility parameters ($r = -70,4$ $p < 0,01$) of the mentally retarded children actively engaged in sports was determined.

A positive and remarkable relationship between the balance and weight ($r = 65,8$ $p < 0,01$) parameters and the balance and height ($r = 72,8$ $p > 0,05$)



parameters. However, no significant relationship between the balance and age ($r=50,3$ $p>0,05$) parameters was detected.

Discussion

In this study, the agility and balance parameters of the mentally retarded children who are actively engaged in sports at private schools were taken into consideration. Accordingly, 15 subjects who are mentally retarded and actively engaged in sports were included in the study.

In their research, Auxter and Pyeer (1985) stated that the participation of the mentally retarded individuals in sports activities contribute to their psychologic, social and motor developments and in this way, sports have a remedial effect on the mentally retarded and performance-increasing influence on the motor skills.

Hamilton et al and Arslanoğlu et al determined no relevance between balance and physical performance in their researches. On the other hand, it was found that a relationship between balance and agility exists in contrast to these results (Hamilton, Shultz, Schmitz, Perrin, 2008).

Erkmen et al compared the balance performances of sportsmen in different branches. The study indicated that the gymnasts have the best performance and the basketball players have the worst performance and the football players are better than the basketball players and worse than the gymnasts. The balance abilities of the gymnasts are more developed than those of the footballers and the basketballers and footballers have approximate balance abilities

(Erkmen, Suveren, Göktepe, Yazıcıoğlu, Şenel, 2010). Arslanoğlu et al investigated the relationship between reaction time and balance of elite badminton players and detected no relevance between the reaction times and the dynamic balance scores (Arslanoğlu, Aydoğmuş, Arslanoğlu, Şenel, 2010).

Okudur and Sanioğlu concluded that there exists a positive and significant relationship between the agility performances and balance performances measured with DHPS of the male tennis players who are 12 years old. Some positive influences of both low and high intensity sports on the physiological and sensory motor skills playing some roles in balance control were observed (Gauchard, Jeandel, Perrin, 2001).

Thanks to 6-week- balance exercises, some improvements were observed in the balance after the change of direction and the stabilities of the footballers (Gauffin, Tropp, Odenrick, 1998). Therefore, it is obvious that the tennis players should do balance exercises.

Agility is generally defined as the effective combination of stopping short, changing direction and speeding while keeping the motor control both in horizontal and vertical direction (Verstegen and Marcello 2001).

In conclusion, it is essential for the mentally retarded sportsmen to be able to keep the balance as changing direction and stopping in accordance with the direction the ball moves. As a result, it is assumed that the balance performances of the mentally retarded sportsmen are closely related with their agility performances.

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Original article

PHYSICAL DEVELOPMENT OF 16-YEAR-OLD YOUTH IN POLAND

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Abstract

Problem statement. In determining the physical development of children and young people one of its characteristics is evaluated, which is grow (height and body mass). Correct physical development promotes health and well-being in every period of human life. The aim of this study was to determine the state of the physical development of 16-year-old youth in Poland.

Methods. The study was conducted in the school year 2008 at vocational schools in Kielce, Poland. The study included 2067 adolescents aged 16 years. In view of the 734 tested disorders in health and development were found. Finally, the study involved 210 people, both girls (33 people) and boys (177), coming from a city (over 39%) and from a village (nearly 61%).

Results. In more than 16% of respondents were identified abnormalities in physical development (grow), especially among technical school students (over 15%) living in the city. Identified problems, low body mass (11%) and short stature (above 8%) predominated among the tested living in the city. Obesity is a health problem for 5% of the respondents from the rural environment. Underweight was confirmed among youth educating on the level of basic vocational schools (nearly 14%), living in the countryside.

A strong correlation and low strength of the relationship were confirmed ($p < 0.05$; $r_c = 0.26$) between physical development of the tested and learning in their chosen profession.

Conclusions. Growth disorders may limit among others physical activity, fitness and exercise capacity of respondents. It is necessary to take the medical care of young people with identified disorders in physical development. It is necessary to reinforce physical activity among young people.

Keywords: health, physical development, grow, vocational school.

Introduction

Data on physical development are the main positive indicator of the health of children and adolescents. Proper physical development affects the successful mental, motor, social and emotional development (Markowska, 2002; Taras, Potts-Datema, 2005; Nowak - Starz, 2008, Cieśla, 2011). The World Health Organization (WHO) provides a broad approach to the implementation of preventive health care for students (World Health Organization, 1997).

In Poland, since 1972 preventive medical examinations of children and young people have been carried out in certain age groups. Performed screening tests of 16-year-old youth are aimed to determine the level and pace of physical development, to make qualifying group for physical education and school sports, to detect potential health problems. Counseling is conducted for healthy lifestyle and choice of further education or work (Wojnarowska, 2000; Oblacińska, Wojnarowska, 2002; Regulation of the Minister of Health, 2004; National Health Program, 2007; Król, Kwiatkowski, 2009, Regulation of the Minister of Health, 2009).

At age 16, there is a dynamic development in the course of which in some individuals are revealed or exacerbated a variety of disorders (Wojnarowska, 2000; Nowak-Starz, 2008; Wojnarowska, 2010).

In adolescence there are intensive physical changes to the construction and body weight (Suliga, 2000; Król, 2004; Kułaga et al, 2011). In 2010, 18% of boys and 11% of girls aged 15-16 years were overweight and obese (Wojtyniak, Goryński, Moskalewicz, 2012).

The doctor determining the level of physical development of youth, in the event of irregularities (short stature, obesity, low body mass) may decide to limit the study in selected vocational school and the chosen direction of education (Oblacińska, Wojnarowska, 2002; Oblacińska 2013). For there are numerous physical and physiological constraints on the choice of profession and vocational training. These include, among others, occupations requiring heavy physical effort, standing position, difficult climatic conditions, being at the height, good manual efficiency (Wojnarowska, 2000; Roesler et al, 2000; Vieweg et al, 2007). Deviations in health status and development of the youth are associated with a

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higher risk of accidents and injuries.

Properly extending physical development generally determines the values of health and psycho-physical capabilities of young people, which undoubtedly plays an important role in the learning process, choosing a career and in adulthood.

Material and methods

The study was conducted in the school year 2008 at vocational schools in Kielce, Poland. The study included 2067 adolescents aged 16 years. In view of the 734 tested disorders in health and development were found. Finally, the study involved 210 people, both girls (33 people) and boys (177), coming from a city (over 39%) and

from a village (nearly 61%). The study used two equivalent methods: the method of documentary research and diagnostic survey. The statistical correlation of selected features was verified with non-parametric Chi-square test.

Results

It was found that young people surveyed derive mainly from the rural environment. Educating in vocational schools is of great interest in the environment (Table 1).

Interest of the respondents in education in vocational schools is undoubtedly related to the short period of training (2-3 years) in jobs that are very popular and provide an opportunity for the labor market (Table 2).

Table 1. Characteristics of the study group divided into the chosen school and environment.

Name of school	Town		Village		Total	
	n	%	n	%	n	%
Complex School of Information Tchnology	34	41,46	23	17,97	57	27,14
Complex of Mechanics and Economics Schools	13	15,80	38	29,69	51	24,29
Complex of Vocational Schools No 1	35	42,68	67	52,34	102	48,57
Total	82	100,00	128	100,00	210	100,00

Table 2. The students in the study with regard to the type of school and educational direction

Name of school	Job/direction of education	Type of school						Total	
		Technical		Basic vocational		Specialised secondary school			
		n	%	n	%	n	%	n	%
Complex School of Information Tchnology	electronics technician	10	5,78	0	0,00	0	0,00	10	4,76
	IT technician	39	22,54	0	0,00	0	0,00	39	18,57
	information management	0	0,00	0	0,00	8	100,00	8	3,81
Complex of Mechanics and Economics Schools	mechatronics technician	9	5,20	0	0,00	0	0,00	9	4,29
	polygraphy technician	21	12,14	0	0,00	0	0,00	21	10,00
	mechanical technician	21	12,14	0	0,00	0	0,00	21	10,00
Complex of Vocational Schools No 1	construction technician	11	6,36	0	0,00	0	0,00	11	5,24
	technician of landscape architecture	13	7,51	0	0,00	0	0,00	13	6,19
	Environmental technician	4	2,31	0	0,00	0	0,00	4	1,90
	Water treatment technician	7	4,05	0	0,00	0	0,00	7	3,33
	road technician	10	5,78	0	0,00	0	0,00	10	4,76
	geodesy technician	11	6,36	0	0,00	0	0,00	11	5,24
	wood technology technician	7	4,05	0	0,00	0	0,00	7	3,33
	clothing technology technician	10	5,78	0	0,00	0	0,00	10	4,76
	bricklayer	0	0,00	20	68,97	0	0,00	20	9,52
	Painter/wallpaper hanger	0	0,00	5	17,24	0	0,00	5	2,38
carpenter	0	0,00	4	13,79	0	0,00	4	1,90	
Total		173	100,00	29	100,00	8	100,00	210	100,00

Physical development disorders were found in over 16% of the respondents studying primarily in professions: road technician, geodesy technician,

wood technology technician, clothing technology technician, bricklayer and carpenter.

The most common of these was a shortage of body weight (above 7%), often manifested in boys from towns. Comparatively the young people were diagnosed with short stature (almost 4%) and

obesity (over 4%). Adolescents lived in different environments (urban and rural).

More growth disorders were revealed among students at technical school (15.61%), mainly in boys living in the city (Figure 1).

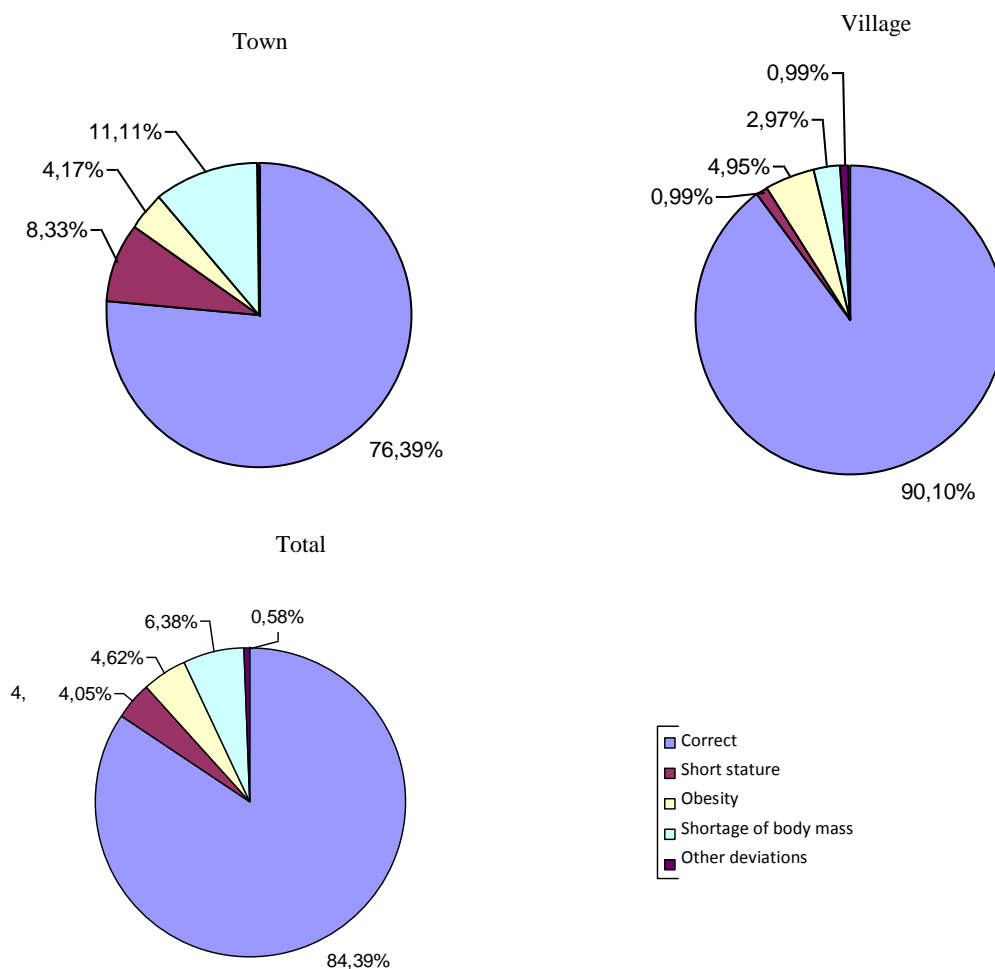


Figure 1. Growth disorders among students of technical schools divided into the environment.

Identified disorders, low body mass (over 11%) and short stature (above 8%), dominated among students living in the town, while obesity (almost 5%) and short stature (nearly 3%) concerned respondents from the rural environment.

In the group of 29 peers studying at the basic vocational level, growth disorders were observed in over 13% of them coming from a village. These

deviations were associated mainly with a shortage of body weight. The same results were obtained in specialized secondary schools.

The results were statistically analyzed determining the dependence of growth on the chosen by the students of education direction (Table 3).

Table 3. Growing vs chosen by the respondents education direction

Grow (physical development)	Education direction							
	Technical		Basic vocational		Specialized		Total	
	n	%	n	%	n	%	n	%
Correct	146	84,39	25	86,20	4	50,00	175	83,33
Short stature	7	4,05	1	3,45	0	0,00	8	3,81
Obesity	8	4,62	0	0,00	1	12,50	9	4,29
Shortage of body mass	11	6,36	2	6,90	2	25,00	15	7,14
Other deviations	1	0,58	1	3,45	1	12,50	3	1,43
Total	173	100,00	29	100,00	8	100,00	210	100,00

$$\chi^2 = 16,299 > \chi^2_{0,05; 8} = 15,507; r_c = 0,26$$

Results of chi-square test (χ^2) confirmed the strong correlation and low strength of the relationship ($p < 0.05$; $r_c = 0.26$) between the result of the medical examination on the growth and education direction chosen by the subjects. It can be seen that physical development disorders may be considered by the doctor in terms of limitations of education in the chosen by the student vocational school and related educational direction. It must be assumed that in the case of surveyed students growth disorders can be compared by a physician with the exercise abilities of respondents (eg shortage of body weight - lifting heavy objects) and their agility (obesity - less efficiency and physical exercise).

Discussions

The dynamic development of the market economy, thereby increasing demand for a variety of professions, have increased interest among young people in vocational education. The surveyed youth chose vocational education at secondary school and basic vocational education.

Both boys and girls come from rural environment. A clear relationship was confirmed between the environment in which students are brought up and the selected school ($p < 0.001$).

The choice of career at such a young age (16 years old), in the period of adolescence, requires a many-sided support of families, schools, doctors and nurses, employers, state (Woynarowska, 2000; Markowska, 2002; Nowak - Starz, 2008). Not without significance is comprehensive knowledge of the student's chosen profession, of the requirements during its execution, and thus their opportunities and abilities (Król, Kwiatkowski, 2009).

Although implemented in Poland preventive medical examination show numerous health disorders of 16 year-olds, including physical development (Woynarowska, 2010; Oblacińska, 2013), it was found

that the subjects and their parents do not take into account the health status in career choices.

As previously pointed out in the research by Woynarowska, 2000; Roesler et al, 2000, Viewegi et al, 2007, Taras H, Potts - Datema, 2005; Kulaga et al, 2011, diagnosed among nearly 16 % of respondents growth disorders: overweight and obesity (4.29 %), short stature (3.81 %) and low body mass (7.14 %) raise concerns about the health safety at risk of teens as well as their future career.

A clear statistical relationship was confirmed between the results of the medical examination and selected by the respondents direction of education in most of the analyzed features. Recognized disorders in physical development - grow ($p < 0.05$) significantly influence the direction of education chosen by the respondents. At the time of practical training and subsequent career people with developmental disorders (eg short stature) may have unsuited to their growth workplaces, which creates a risk of injury and promotes the adoption of unergonomic position during work. No exercise limitations are meaningless such as a shortage of body weight - lifting heavy objects, obesity - less efficiency and physical exercise.

To support the actions outlined in the operating objective 8 (National Health Programme 2007-2015, 2007) studies and the obtained results confirming the significant disorders of physical development among respondents require continuation of research to determine the essential causes that adversely affect the health of adolescents and their elimination.

Conclusions

1. Youth in adolescence show disorders of physical development.
2. Growth disorders affect the limitations of practical training in their chosen profession.
3. Abnormal physical development significantly reduces any possibility of a young man.



4. The discussed issue needs further study for a more exact understanding of the problem and the effect of corrective actions taken.

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SPONTANEOUS AND ORGANIZED PHYSICAL ACTIVITY OF 6-YEAR-OLD CHILDREN LIVING IN POLAND

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Abstract

Purpose. One of the factors stimulating child's development is rationally programmed regular physical activity defined as physical burden, which a person is subject to during everyday work and free time. Activity may be spontaneous or suitably planned and organized, but only comprehensive activity in different areas is a positive measure of health. Restriction of motor activity, employing it in fragmentary, excessively directed forms, causes negative biological effects of both individual and population character and leads to disorders of biosocial balance. Spontaneous hyperactivity of a child constitutes an integral component of not only physical and motor development, but it also influences on psychical and social sphere.

The objective of the paper is the analysis of the level of physical activity among 6-years-old children from Poland.

Methods. The material of the study contains findings of the research on children accomplishing in pre-school departments of schools and nurseries in randomly chosen institutions in all regions of Poland. The studies of the children were done in 2006 in months September – October. The investigation included 25317 children and their parents from 1364 educational institutions. It has been about 10% of the population of polish children born in the 2000 year. Information about the range of spontaneous and organized physical activity of the researched children was obtained on the basis of author's questions. They were comprised in a questionnaire for parents and they concerned the organization of motor activities (their intensity & frequency) in a free time. The whole material was verifying and statistically calculated.

Results. Data from our studies indicate that physical activity of pre-school children in Poland is under the healthy level. All day long more that 15% children do not move enough for their age. What is really worrying is that almost 80% 6-years-old boys and girls do not participate in any organized physical activity pose schools or nurseries.

Conclusions. Supporting children in their activity is very important from the point of view of their future.

Key words: 6-years-old children, physical activity, pre-school children, health.

Introduction

As a result of the development of means of communication and the mechanization of housework and professional work a modern man is not as physically active as it was a few dozen or a few hundred years ago. There are more and more evidence that hypokinesia has adverse consequences in many areas of life including health, social relations (Geiß, Parhofer, Schwandt, 2001). The problem of low physical activity affects every age and occupation group, including children and young people. Competition for active leisure activities has become a variety of media (Jago, Baranowski, Baranowski et al., 2005; Cleland, Crawford, Baur et al., 2008). Especially for the youngest generation, a computer, television, electronic devices become more attractive than physical games and plays with peers (Król, Jasińska, Nowak-Starz, et al., 2010). This results in

long hours of immobility and being in the room instead of active spending free time in the fresh air. As a consequence, in many countries there is a dramatic increase in the fraction of children and adolescents with the problem of overweight and obesity (Kalies, Lenz, von Kries, 2002; Lioret, Marire, Volatier, Charles, 2007; O'Neill, McCarthy, Burke, Hannon, Kiely, Flynn, Gibney, 2007; de Jong, Visscher, HiraSing, Heymans, Seidell, Renders, 2013). This problem also applies to Poland, where between 1995 and 2004 by 5% increased the group of six-years-old children with overweight and obesity (Resiak, 2007). Currently in Poland, according to various studies, there are 15-18% of overweight children at the age of 5-18 and obesity 4-5% (Król, 2004; Kozieł, Szklarska, Bielicki, Malina, 2006; Oblacińska and Jodkowska, 2007; Jopkiewicz, Przychodni, Jopkiewicz, Krzystanek, 2011).

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Lack of exercise and physical activity during childhood carries many other consequences. Physical efficiency and endurance of young generation is reduced. The biggest changes concern the muscle strength and endurance tests of the body. Weakness of postural muscles leads to problems with maintaining good posture and favors the emergence of a variety of defects and deformities of movement apparatus. Dangerous trend appears to be not only in the increasing group of young people with a variety of locomotor defects, but more and more children has disorders in many areas of body posture.

Low activity is also associated with a very important aspect of life and functioning of children which is schooling. It has been shown that physical exercise is an important element stimulating a brain to active adaptation and prepare it for a better job (Castelli, Hillman, Buck, Erwin, 2007; Haapala, 2012). Moreover, it was also found that physical activity of children has beneficial effects on improvement of memory, cognitive or learning processes (Vaynman, Ying, Gomez-Pinilla, 2004; Hillman, Erickson, Kramer, 2008; Mashburn, 2008). This is very important for young children, especially beginning schooling. Good performance, not just manual, but of the entire body allows a child to acquire knowledge about the world and prepare for new challenges in school and beyond it. Characteristic for the first decade of human life the need for physical movement is a substrate to form habits and develop interest in physical activity. It is important to support a child in achieving his spontaneity, but also allow him, through a variety of activities, to develop a sporty fitness and motor skills (Timmons, Naylor, Pfeiffer, 2007). Spontaneous activity of the child gives him/her a chance to meet his/her own motor needs, interests, contacts with peers. In contrast, organized physical activity is designed to shape the habit of being active throughout their lives and equalizing movement deficits resulting from modern lifestyle. In the various regions and communities the proportions between these types of activities may be different. Comparing the situation in a given country or population reveals trends occurring in a particular region or over the next few years. The aim of this study was to analyze the level of spontaneous and organized physical activity of 6-year-old children living in Poland.

Methods

The study material were the results of the studies conducted in the framework of the national project "A six-year-old in Poland. Diagnosis of the tested spheres of development". The project included diagnosis of physical, motor, mental, social and emotional development, health and family and school environment of six-year-old children. The research used data collected in the

second test sequence, ie September-October 2006. This series of tests covered about 10% of the population of children born in 2000 in Poland, attending 1,364 kindergartens or schools. Parents or guardians of all the children were asked to fill out a detailed questionnaire containing a series of questions concerning the tested spheres of development of six-year-olds. 25317 duly completed surveys were studied.

Information about the range of spontaneous and organized physical activity of the researched children was obtained on the basis of author's questions built according to J. Drabik's (1997) suggestions for children at pre-school age and first class of primary school. They were comprised in a questionnaire for parents and they concerned the organization of motor activities (their intensity & frequency) in free time. In order to examine the physical activity level of children during the day parents were asked to determine whether their child takes such effort that he/she is sweating, fast breathing, tired. There were three possible answers suggested, ie almost never, several times a day, "all the time".

In Polish educational system six-year-old children prepare to take primary education in the so-called zero class, which can be organized in preschool or school institution. Thus, this study included the division into these two types of educational institutions. 14155 respondents attended kindergarten, ie 55.91%, while 11162 attended school, ie 44.09% of the children. The analysis also included a place of living of the surveyed six-year-olds. Dichotomous division into the city and the countryside was applied. 14310 respondents lived in the city, ie, 56.52%, and 11007 in rural areas, ie 43.48% of boys and girls.

The collected material was subjected to statistical analysis. The variability of the differences between the compared populations was assessed using a nonparametric chi-square test.

Results

Analyzing the level of physical activity of the test children first was evaluated spontaneous activity during the day. Parents generally declared that their children at least for a few minutes several times a day move intensely. Such an answer was given by more than 59% of the respondents. The lack of such activity during the day was observed in over 16% of children. It should be emphasized that it concerned more girls (18.9%) than boys (14.0%). Differences between the sexes were also marked with the answer "all the time the child is active". Definitely more often that activity concerned boys. The results of chi-square test assessing differences between gender in relation to intensive physical activity during the day proved to be statistically significant ($\chi^2 = 150.04$, $p < 0.0001$) (Table 1). These results seem to be very worrying due to the

mobility needs of children at this age. It should be expected that responses indicating very high activity of six- year-olds will prevail. However, only slightly more than 20% of girls and 26.6% of boys was characterized by physical activity that is appropriate for their age.

Table 1. The frequency of intense physical activity during the day of boys and girls

Next it was analyzed whether the place of living is associated with the level of activity of 6-year-old children (Fig.1). Disturbing trends were observed in relation to the rural environment. A much larger population of six-year-old children living in rural areas was not active during the day (18.8%) compared with their peers from the city (14.5%). In considering this issue separately for sex, it should be clearly noted that girls living in rural areas were characterized by the lowest activity during the day, because in as many as 20.9% of these, parents chose the answer "almost never" (chi-square = 27.40, $p < 0.001$). Large differences also occurred when comparing the lowest level of physical activity of boys from the rural and urban environment, in favor of the respondents in the city (chi-square = 82.23, $p < 0.001$).

Figure 1. The frequency of intensive physical activity during the day of boys and girls by place of residence (city, village)

Various educational institutions create a unique climate for functioning children in them. In kindergarten, due to the schedule during the day and adaptation of infrastructure facilities corresponding to the needs of children, it is believed that they provide more favorable environment for the growth and activity of children. School attended by the 6-year-olds, in most were less suited to the needs of younger children. Often having sports base, they do not make it available for six-year-olds and pupils of younger classes. Supporting natural movement needs of children through the organization of physical activities in educational institutions, their appropriate level, type and frequency, and the attitude and creativity of a teacher foster kneading in children the habit of physical activity in leisure time. Therefore, it was examined whether the type of the facility to which the tested children attended differentiated their activity during the day (Fig.2). These differences occurred to be statistically significant ($\chi^2 = 74.18$, $p < 0.001$). Among school children there was a much larger group of physically inactive (18.5%) than among preschoolers (14.7%).

Figure 2. The frequency of intensive physical activity during the day of boys and girls by institution (kindergarten, school)

Children in preschool and early school age are characterized by the need of movement. It is preferably satisfied by them in a spontaneous way - fun, games of movement. However, more often it is

emphasized that due to school activities and the use of various electronic media by children, their activity is far too small in relation to needs. Thus, an important supplement element of these deficiencies are additional organized sports activities. Parents of the respondents were asked whether their children attended and how often in organized sports activities. Over 80% of children did not have any organized physical activity per week (Table 3). Only slightly more than 1% of girls and boys at least 5 times a week participated in organized physical activities. It should be assumed that this was a group of children undertaking systematic sports training in their chosen discipline.

Table 2. Frequency of organized physical activity during the week of boys and girls

Organization of physical activity for children involves the need to have proper housing base and adequately trained staff of teachers, trainers and instructors. Not in every place such conditions can be assured. Hence, it was assumed that the place of residence will differentiate the possibility of taking an organized physical activity. This assumption has been confirmed, as the results of chi-square test for both the study group as a whole and in division by gender were statistically significant (for the tested children and place of residence $\chi^2 = 932.13$, $p < 0.0001$; for girls and place of residence $\chi^2 = 470.38$, $p < 0.0001$; for boys and place of residence $\chi^2 = 464.79$, $p < 0.0001$). Among children living in rural areas as much as 88.7% of them did not attend any physical activities outside the preschool or school institution. In cities, this percentage was lower and amounted to 74.8% of the respondents. In addition, children residing in the village twice less participate in physical activities (1-4 times per week) than their peers from the city (Fig. 3).

Figure 3. Frequency of organized physical activity during the week of boys and girls by place of residence (city, village)

Analyzed was also the frequency of taking up an organized physical activity during leisure time, depending on the type of institution (school, kindergarten) attended by the child. The results of chi-square test were statistically significant ($\chi^2 = 445.30$, $p < 0.0001$). Organized physical activity was more often taken up by children of kindergarten than school institutions (Fig. 4).

Figure 4. Frequency of organized physical activity during the week of boys and girls by institution (kindergarten, school)

Low physical activity during childhood is associated with a significant probability of occurrence of a number of health problems in the future. One of the ways to maintain an appropriate level of physical activity of the young generation are physical activities carried out within the framework of the curriculum in schools and kindergartens. They are becoming increasingly important due to the fact that in everyday life there

are fewer situations demanding considerable physical effort also from children. In addition, as noted above only a slight percentage of the population of 6-year-olds participate in organized physical activity outside school or kindergarten. A very big problem in schools, especially in middle school and high school are exemptions from physical education. It rarely happens in the junior class divisions, where parents decide on exemption from physical education. Most frequently they do so because of ill health of their children. The positive aspect observed in the present study is that most parents of both boys and girls declared rare release their children from physical activity in preschool or school (the result of chi-square test proved to be statistically insignificant $\chi^2 = 0.14$) (Table 3).

Table 3. Frequency of exemption from physical activities of boys and girls

Parents living in urban and rural areas showed a similar attitude to releasing children from physical activities. In both environments, the responses were almost identical. The results of chi-square test proved to be statistically insignificant ($\chi^2 = 4.0$) (Fig. 6).

Figure 6. Frequency of exemptions from physical activity of boys and girls by place of residence (city, village)

Statistically significant differences were found between the type of institution attended by the child and the frequency of exemptions from physical activities ($\chi^2 = 13.53$, $p < 0.01$). Children from kindergarten were less likely to be released from such activities than their peers attending school. This may be due to the fact that the school does not provide the children of the younger classes with the access to sports base, the gym, the same does not create the appropriate conditions for the implementation of such activities. Basically, physical education is organized at school corridors or in classrooms (Fig. 7).

Figure 7. Frequency of exemptions from physical activity of boys and girls by institution (kindergarten, school)

Discussion

Controlling and supporting physical activity levels need to be talked about already for the youngest. As studies from different countries show its level in relation to the child population is insufficient. Changes in the level of physical activity can be considered in terms of the generation gap (Roth, Ruf, Obinger et al., 2010) and a generation in different age groups. The report on the lifestyles of young people in Europe developed by Brettschneider and Nul (2004) clearly indicates a steady decline in physical activity of children and adolescents with age, especially in girls. Subsequent generations of children and adolescents in Europe (Cleland, Crawford, Baur et

al., 2008; Labbrozzi, Robazza, Bertollo, Bucci, 2013; Lelonek, Jopkiewicz, 2013), but also in other regions of the world (Prochaska, Sallis, Long, 2001), spend less and less time on having fun and playing sports. As a result, their physical fitness is falling (Cieřla, Markowska, 2010; Roth, Ruf, Obinger et al., 2010), which is a very important indicator of health because it determines the morphological and physiological capabilities of the whole human body, not only the functioning of the locomotor system. The effect of this perspective on physical fitness is adoption of the popular concept of *Health-Related Fitness* (H-RF). Skinner and Oja, 1994, singled out in the framework of this concept (H-RF) components that affect health such as morphological, musculo-skeletal, motor, cardio-respiratory and metabolic ones, which can only be developed through physical activity.

The level of spontaneous and organized physical activity of Polish six-year-olds is clearly too low. According to the recommendation of the American College of Sports Medicine (2009), children should be active at least 3-4 times a week, preferably every day. In addition, it was recommended that effort went from moderate (physical activity that noticeably increases breathing, sweating and heart rate) to vigorous (physical activity that substantially increases breathing, sweating, heart rate) intensity. However, a high proportion of parents did not note such intensity of effort during the day (16%). In addition, a disturbing fact was a very small group of children who attend additional physical activities outside the preschool or school institution. Only 1% of six-year-olds participated 5 or more times a week in various forms of physical activity. It can be assumed that this is the fraction of children interested in activities of a sporting nature to a greater extent. This low activity of six-year-old children fills concern and forces to intense action to improve the situation. More and more institutions, global and communal recognize this problem.

World Health Organization Regional Office for Europe in work "Step to health. A European framework to promote physical activity for health" (2007) identified a number of problems that cause a reduction in physical activity in different social groups. Moreover, some recommendations were given how to improve this state. With regard to preschool and school children one point talks about a very important and yet simple solution. In order to motivate children to develop physical activity habits that will stay with them throughout their lives, physical education and physical activity in school and kindergarten should first of all be fun. This postulate seems to be very simple to implement, but a number of studies show that pupils evaluate physical education as unattractive. Negative attitudes to these activities increases with



age, and relate more to girls than boys (Starc, Strel, 2012; Labbrozzi, Robazza, Bertollo et al., 2013).

Conclusions

Supporting children in their activity is very important from the point of view of their future. Physical activity has a positive influence on academic performance and self-esteem. In addition, if your child is active, he/she will continue such behavior in youth and subsequent periods of life.

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Table 1. The frequency of intense physical activity during the day of boys and girls

Activity during the day outside the institution		boys	girls	generally
almost never	n	1820	2323	4143
	%	14,0	18,9	16,4
a few times	n	7746	7274	15020
	%	59,5	59,2	59,3
all the time	n	3460	2694	6154
	%	26,6	21,9	24,3
generally	n	13026	12291	25317
	%	100,0	100,0	100,0

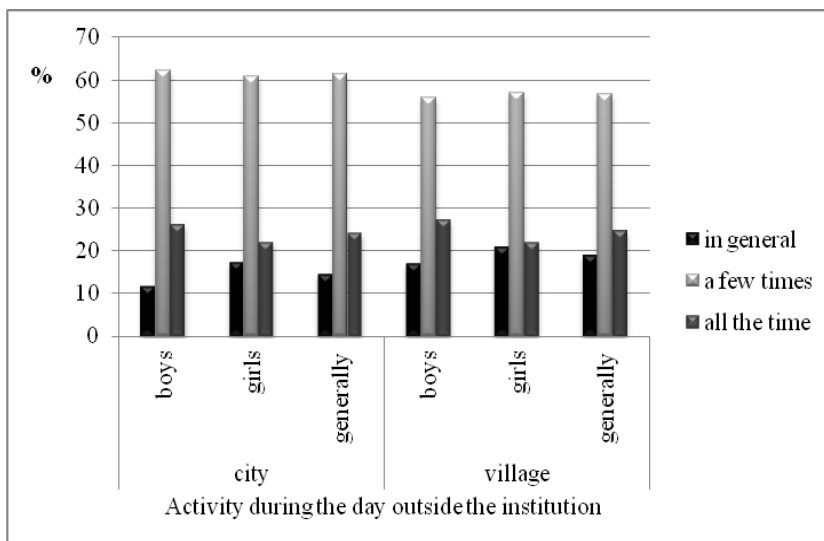


Figure 1. The frequency of intensive physical activity during the day of boys and girls by place of residence (city, village)

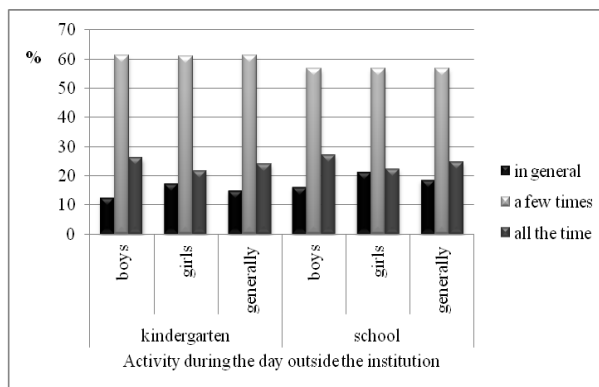


Figure 2. The frequency of intensive physical activity during the day of boys and girls by institution (kindergarten, school)

Table 2. Frequency of organized physical activity during the week of boys and girls

Activity during the week outside the institution		boys	girls	generally
in general	n	12049	11080	23129
	%	81,9	79,8	80,8
1-4 times	n	2478	2652	5130
	%	16,8	19,1	17,9
5 times or more	n	191	160	351
	%	1,3	1,2	1,2

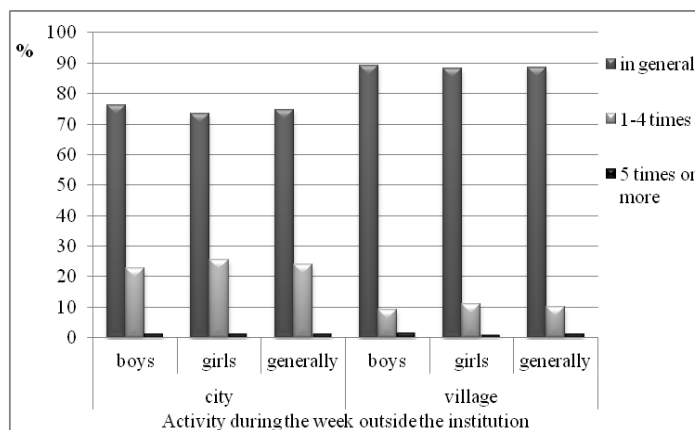


Figure 3. Frequency of organized physical activity during the week of boys and girls by place of residence (city, village)

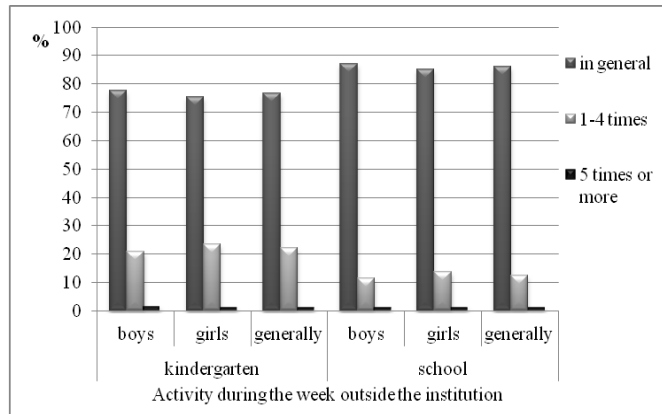


Figure 4. Frequency of organized physical activity during the week of boys and girls by institution (kindergarten, school)

Table 3. Frequency of exemption from physical activities of boys and girls

Exemptions from physical activities		boys	girls	generally
rarely	n	14177	13462	27639
	%	95,7	95,8	95,8
often	n	585	543	1128
	%	4,0	3,9	3,9
very often	n	46	43	89
	%	0,3	0,3	0,3

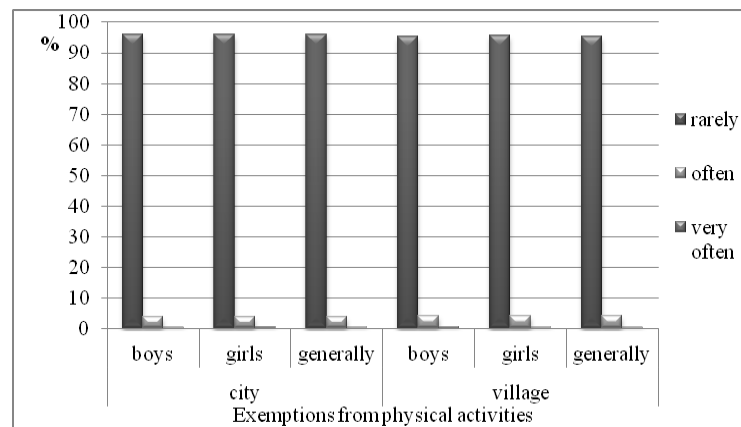


Figure 6. Frequency of exemptions from physical activity of boys and girls by place of residence (city, village)

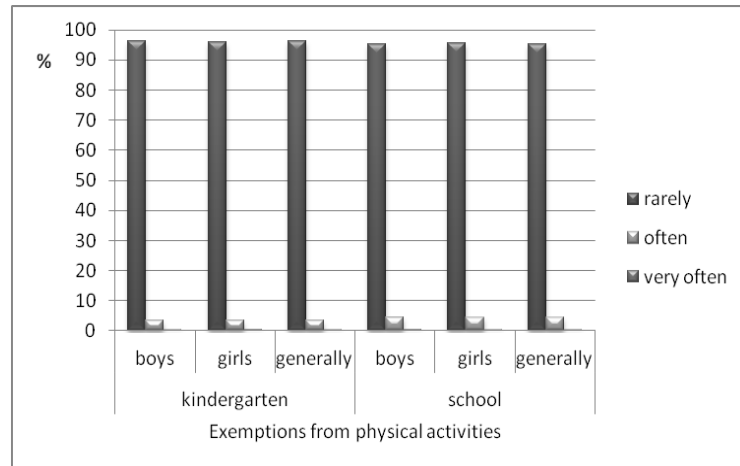


Figure 7. Frequency of exemptions from physical activity of boys and girls by institution (kindergarten, school)



THE EFFECTIVENESS OF PLYOMETRIC TRAINING ON MUSCLE STRENGTH FOR SOCCER PLAYERS

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Abstract

Objectives. The aim of this study is to examine the effectiveness of plyometric training on muscle strength for soccer players in a project school in Kuala Lumpur.

Methodology. All 60 subjects were divided randomly into two groups (N=60). For the first 30 randomly selected were subjects grouped into the controlled group (N=30) and the other class consisted the treatment group (N=30). The study used the quasi experimental method with pre-post-test designing and standing broad jump as measuring instrument. The acquired data was analysed based on the matter of the study; that is about the difference of the mean between the two study groups. Paired t-test was used to make a comparison to see each group's level of improvement in skill.

Result. The findings showed that the treatment group showed a significant difference ($p=0.00<0.05$). It is suggested that the treatment group's mean ($M=9.57$) was much better than the controlled group's ($M=5.80$). This based on the different outcome of the post and pre-post and pre test after six weeks of treatment practice with plyometric.

Conclusion. The implication shows that plyometric training can enhance strength among football players. Coaches and teachers should look into essential factors that play an important role in developing the powers, skill and overall strength of our football players.

Key words: Effectiveness, Plyometric training, muscle strength, soccer.

Introduction

The concept of plyometric is a training that provides extra stresses towards the muscles during pre-stretching phase and stretching reflex done during muscle shrinkage (Radcliffe & Farentinos, 1999). This will increase the explosive energy production. Repeated trainings in a set of exercises will provide maximum impacts. According to Chu (1998), present plyometric training (PT) has been known by a number of coaches and athletes as one of the training method for increasing muscular abilities. In the early 1970s, it was made practical for track events and by the 1980s it was used by coaches for other sports such as weightlifting, volleyball and soccer. For soccer, that requires skills such as kicking, running and holding a ball, muscular strength on the legs is needed. When jumping to make a header for a striker or a save by a goalkeeper, the height of a jump depends on the level of muscular strength on the legs. Therefore, each player must possess a certain level of muscular strength and power on the legs to challenge the strength of the opponent players as well as able to perform the skill at a high consistency level. In a plyometric training programme, a lot of benefits can be achieved. It will affect daily behaviours, strength level, accurate running technique and initial touch on the surface of the ground. The combination of these training benefits is suitable to be applied by coaches in increasing players'

performance (Fox & Mathews, 1981).

Methodology

Framework. The framework of this research utilized the quasi-experimental method with pre and post tests. The subjects were divided into control and treatment groups. The treatment group had to undergo track and plyometric trainings that were consisted of five stations within the duration of six weeks. The plyometric training consisted of exercises such as standing jump over barrier, side to side ankle hop, and two foot ankle hop. For the control group, the subjects had to only undergo track trainings that consisted of five stations. The track trainings conducted were distance jump, leg curl, chin up, shooting and sprints.

Sampling. The researchers had randomly selected 60 students. Based on the total number of selected research samples at 60 students (N=60), they were again randomly selected to be divided into two balanced groups. Each of the group formed will contain 30 students (N=30). The two groups will each be called as control and treatment group respectively. The intact sampling method was also employed in this research purposely to ease the process of trainings and supervisions. The subjects for this research have been selected for their active participation in specific sports and also considering the total number of contact hours in programmed trainings. Most of these players were



placed in the school hostel to alleviate their involvement and the conduction of the training program implementation.

Instrument. The instrument applied in this research is the Standing Broad Jump (American Alliance for Health, Physical Education, Recreation and Dance, 1976) to measure the strength of leg muscles. The instrument was chosen because it has high validity ($r=.607$) and high reliability value at 0.963 (Johnson & Nelson, 1986) to test the strength of leg muscles. Findings of a research done by Luebbers et. al. (2003) found that the effect of plyometric training can be measured by the distance of jumping. It can provide the ability of strength of the leg muscles. Apart from that, jumping exercise was selected because the movement is similar with sports movements and relatively at low complexity level (Mc Bride et. al, 2005).

Data Analysis. Data that has been collected was analysed descriptively by using the *Statistical Package for the Social Science for Windows (SPSS version 12.0)* to obtain the means and standard deviations to find out whether there was any significant difference between the pre-test and post-test for both treatment and control groups consisted of soccer players from a sports project school selected by the researchers. Apart from that, inferential analysis of independent t-test was conducted to find out whether both groups are aligned during the pre-test. Paired samples t-test was also utilized to obtain the mean difference between the pre-test and post-test scores in each group. Next, independent t-test was conducted to detect whether there were any significant difference between the control and treatment group for the post-test.

Findings

Independent t-Test on the pre-test scores between the control and treatment groups

Table 1 Comparison of Pre-test Scores between Control and Treatment Groups

Group	Mean	Mean Difference	Standard Deviation	t-value	Sig.
Control	5.03	0.00	0.99	1.0	1.0
Treatment	5.03		0.99		

$p > 0.05$, $N=30$, $df=58$

Table 1 shows the mean scores for control and treatment group pre-tests. No significant difference detected where $p = 1$ ($p > 0.05$). Thus it was safe to assume that both groups were equally balanced.

Paired t-Test on the pre-test and post-test within the control group

Table 2 Comparison between the Pre-test and Post-test in the Control Group

	Mean	Mean Difference	Standard Deviation	t-value	Sig.
PreTest	5.03	0.77	0.99	-6.71	0.000*
Post-Test	5.80		1.13		

$p < 0.05$, $N=30$, $df=58$

Table 2 showed the mean scores for pre-test and post-test within the control group. T-test on the mean difference showed that t -value = - 6.71, was significant ($p < 0.05$). The result proved that there was a significant difference between the pre-test and post-test within the control group for muscular strength on legs.

Paired t-Test on the pre-test and post-test within the treatment group

Table 3 Comparison between the Pre-test and Post-test in the Treatment Group

	Mean	Mean Difference	Standard Deviation	t-value	Sig.
Pre-Test	5.03	4.54	0.99	-27.60	0.000*
Post-Test	9.57		1.13		

$p < 0.05$, $N=30$, $df=58$

Table 3 showed the mean scores for pre-test and post-test within the treatment group. T-test on the mean difference showed that t -value = - 27.60, was significant ($p < 0.05$). The result proved that there was a significant difference between the pre-test and post-test within the treatment group for muscular strength on legs.



Independent t-Test on the post-test scores between the control and treatment groups

Table 4 Comparison of Post-test Scores between Control and Treatment Groups

Group	Mean	Mean Difference	Standard Deviation	t-value	Sig.
Control	5.80	3.77	1.13	-12.73	0.000*
Treatment	9.57		1.17		

$P < 0.05$, $N = 30$, $df = 58$

Table 4 shows the mean scores for control and treatment group post-tests. T-test on the mean difference showed that t -value = - 12.73, was significant ($p < 0.05$). The result proved that there was a significant difference between the control and treatment groups in the post-test for muscular strength on legs.

Discussions. According to the American College of Sports Medicine (1998), fitness training conducted at least twice per week with high intensity and systematically can increase the power of the leg muscles. In every planned training programme, there are several principles that must be adhered to. To achieve effective results, one of the determining factors is specificity principle. Luebbers et. al. (2003) states that it is necessary for coaches to identify the type of training that is appropriate to achieve threshold for each training session. By controlling this variable, coaches will be able to increase the anaerobic power of athletes. The duration of training programme is also one of the mechanisms in ensuring the effectiveness of the training. According to Luebbers (2003), the duration of training for six weeks and above will enable neuromuscular adaptability to happen. This will provide a good potential in the production of maximum muscular power. Change or performance enhancement is the aim for all coaches. The pattern of regime of training may differ, but the target is always the same. In the context of competition at highest levels, although change after training is small, it will still be important because it can provide a combination that can be manipulated in producing a good result after undergoing a comprehensive training programme (Unger & Wooden, 2000). Specificity is also one of the factors that can influence training where it is able to integrate the components of strength with that of nerve system which controls the motor performance. The pattern in recruiting a certain motor unit may be different depending to the velocity of muscular contraction. Hazeldine (1994) states that the specificity factor refers to the target aimed to be achieved be it for muscle development or certain sports area. This will involve the training or specific movements in building the intended parts or target in a certain area of sports or chosen event. Through the addition of training intensity such as repetitions, it can increase the level of fitness followed by the increment of workloads. By increasing the workloads, muscular strength can be produced effectively. This will encourage the muscles to contract at maximum level, and stimulate adaptability and adaption when doing the tasks. With the addition of workloads, progressive difficulty level will also be increased towards the muscles. Muscles that are experiencing difficulties will increase the strength level

to overcome it. When the muscles can overcome the difficulty level, they will be able to undergo the training with the added difficulty (O'Shea, 1976). One of the plyometric training patterns is by utilizing jumping. The intervention of plyometric training is seen as a large effect towards the speed of running at the accelerating phase. Specific principle stressed in this training has shown a magnitude change in the performance of accelerating and produced strength at running phase. The transfer of training to real situation is one of the advantages that is produced through plyometric training. For example, the level of velocity of muscular actions during training is quite similar with the actual event. Thus, the transfer of acceleration and strength from plyometric training can be evident at the acceleration phase while running (Rimmer & Sleivert, 2000). The strength of leg muscles depends on the size and number of muscles. By undergoing plyometric training programme, it can provide positive effects towards production of power and increased size of muscle fibres. The training is also recommended for any type of activity that involves motor movements such as running and jumping. Also, this type of training can produce the number of explosive energy in a short period of time. It will boost the performance of players' strength in any sport involved (Potteiger et. al. 1999). Improvement in the muscle performance followed by plyometric training will increase the process of recruiting the motor unit. The increase in muscular strength is also due to the increase in the size of muscle fibres. This will develop the muscle size to become bigger (hypertrophy) and simultaneously influence the height of jump (strength of leg muscles) as well as the threshold of power (Potteiger et. al., 1999). Preparation of players must be considered before participating in a real competition. The production of strength at maximum level is critical for every player. This will increase the production of power that can contribute towards the performance of players' strength. Plyometric can be manipulated by weights or difficulties. The effects of plyometric will be more significant if the weights were increased. It can be increased by adding the number of exercises in each set and also the number of sets. The increment of kinetic subjects will be added to outdo the weight or mass of the individual body (Vossen et. al., 2000). By adding the weights, muscles will have to do extra work.



The process of concentric and eccentric will assist the performance enhancement of athletes. Plyometric training is a combination of contraction and expansion of muscles where elastic energy storage can be evident in frame muscles. Through power and velocity, each muscle fibre can produce large energy during the expansion as compared to contraction of muscles. The change in the structure of connecting tissues also influences the mechanism during training sessions (Jamurtas et. al., 2000). It is also due to the increment of the size of muscle fibres. The production of muscular strength is related with the development of the size of muscle fibres. Specific plyometric training can focus to a certain muscle and the kind of event to participate. In the preparation of soccer players, the leg muscles play vital roles. The plyometric training programme has similarities in terms of difficulties and aerobic exercises. With the prolonged training periods as well as increase in the number of weights and intensity, adaptability can be constructed (Robinson et. al., 2000). Running and jumping actions as well as continuous leaping in soccer also influenced the success of a team. Plyometric is a type of training that can improve the performance of straight jumping and anaerobic power. When plyometric movements were implemented, muscles will undergo a change phase, from eccentric to concentric. The contraction and expansion process will reduce the time and increase the production of power more than usual. Muscles that stored excess elastic energy and the stimulation of muscle expansion are exploited to enable more tasks to be completed during concentric movement phase (Luebbbers, et. al., 2003). According to Reilly et. al. (1993), plyometric training uses muscular expansion and contraction cycle. The regime of this training employs bouncing, jumping and leaping used for special events such as sprints, jumps, gymnastics and other sports involving expansion and contraction of the muscles to produce explosive power. Due to the weight received during training, such acceleration and running action is well suited for a football game. Although the type of individual muscle fibre is genetically determined, the process of training muscles can be done to make them compatible with the desired pattern. This indicates that the production increase on receptor stimulations and increased motor unit activity will happen when undergoing plyometric trainings. With plyometric drills, more motor units will be stimulated and activated. This will extend the period from experiencing lethargy at the threshold level (Mc Laughlin, 2001). In plyometric training, the element of body weight is one form of difficulty. It will force the muscles to perform additional tasks. Difficulty training not only can increase strength and power but also level of flexibility. Besides, increasing muscular abilities can enhance energy and health to prolong life expectancy (Moran & Mc Glyn, 2001). The use of difficulty training method is to increase muscular strength, speed and power to improve sports performance. Since most sports use movements that involve force and velocity,

most coaches consider them as an important element especially among strength coaches (Baker et. al., 2001). Strength is a fitness component that must be mastered by athletes in ensuring success in events they participated. The ability to jump is the main contributor towards the success of distance sports such as long jump (Chu, 1988). The effect of jumping exercise towards straight jump is that the height of jump can be increased, through plyometric training. Plyometric drills are the connector for explosive power that enables players to optimize energy production. Hence the combination of plyometric and weight training must be utilized by athletes (Tricoli et. al., 2005). Increasing the ability to jump is the main goal for athletes. With a carefully planned programme, their abilities can be improved from 10% up to 25%. Most of the training methods used provide emphasis on muscles involved for the required skills. According to Myer et. al. (2005), the effect of plyometric training can be improved with the combination of difficulties or increasing additional weights for players who has persistently undergone plyometric training.

Conclusions

The research finding denotes that plyometric is one of the training forms appropriate for strength enhancement. This training must be given focus by coaches, Physical Education teachers, sports teachers and authorities involved in sports programmes because the effectiveness of the training can be proven after six weeks of training. In addition, the use of minimal equipment also enables such training to be applied by all parties where it uses body weight as difficulties. Coaches of other types of sports can also take into account this training because strength is one of the factors in determining effectiveness and quality of individual player. Plyometric training can also be revealed to school students as one of the ways to measure the level of muscular strength on their legs when involved in Physical Education activities in school.

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EFFECTS OF MOVEMENT EDUCATION PROGRAM BASED ON BLUE AND GREEN COLORS ON VANILLYLMANDELIC ACID AND MOTOR ABILITIES FOR CHILDREN WITH ATTENTION DEFICIT/ HYPERACTIVITY DISORDER

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Abstract

Purpose. We respond to the colors in everything we do, whether we realize it or not. You respond to a traffic light changing to green or from yellow to red. You respond to red and blue flashing lights on a fire engine or sheriff's car. You also respond to the color of your environment such as a classroom, office building, or your own home. Responses to room colors are found below consciousness. The question is how do we respond to these colors and why? The aim of this study was to determine the effect of movement education program based on blue and green colors on Vanillylmandelic acid and motor abilities for children with attention deficit/ hyperactivity disorder.

Methods. The sample consisted of 30 kids from Arab Republic of Egypt and used in this study, all participations divided into equally to (2) groups (experimental groups -15kid) and (control group -15kid), the experimental group performed the education program based on blue and green colors for (8) weeks, and the control group practiced the traditional training only into the kindergarten.

Results. The results indicated that increased significantly between the pre and post measures for the experimental group except the plat-tapping, Hand Grip, Sit - Ups test, and Bent Arm Hang.

Conclusions. The results indicate that two months of the movement education program program can improve physical variables, and reduce the hyperactivity.

Key words: color, motor abilities, kids.

Introduction

The movement is one of the necessities of life for the child, he cannot live without also dependent child's upbringing and development of his physical, mental and psychological movement, it is in which to learn and grow and develop so it was necessary to emphasize the importance of the role played by education mobility in the educational process, especially with children in the stage First and always movement is a fundamental way to express their thoughts and feelings and self - concepts and in general, they are noticeable physical response to the stimulus, whether internally or externally, and most important what distinguishes it is that the wide diversity of forms and methods of performance.

(Acosta, et al. 2004) indicated that the kindergarten occupied a privileged position in the concerns of many countries of the world in recent times, including the Arab Republic of Egypt, is the attention of the most important criteria, which is measured by the progress of nations and advancement, where it became a wealth of peoples is not measured with all its territory of but the extent of natural treasures refined to the talents of their children and help them healthy growth in order to contribute to the establishment and advancement of civilizations.

Indicates (Osama, 1995) that a child at this age to friendly natural tendency to play and movement, and through this tendency child learns by practice, has

high-end scholars of modern education to the importance of play and movement and found it an advantage of features that must be tapped and utilized, and can be child-rearing and the development of his physical, mental, psychological, social and ethical whether in the case of movement and activity endeared to itself.

(Foneset al. 2000) that one of the basic objectives of the studied physical education is to provide the means and the pillars of the integrated development of the child in terms of physical, motor and social development.

Consistent (Lee, 2001) that the activities of small toys that cares about them studied physical education activities are the most common and the exercise by children within the lesson and abroad and contribute a significant role in the development of motor skills essential where it is these skills base practices kinetic where the child care practice and develop longer a mainstay of the practice in motor sports activity Specialist.

In addition to being physically active, children need to learn fundamental motor skills and develop health related physical fitness (cardiovascular endurance, muscular strength and endurance, flexibility, and body composition). In another word, Physical education is an ideal way to encourage activity and develop fitness among children and, for many children, will be their only preparation for an active

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lifestyle. Evidence also exists that physical education may enhance academic performance, self-concept, and mental health (Johnson, & Rosen, 2000). It also offers an opportunity for therapy, but it is seldom exploited properly.

Hyperactive children typically have a rough time in PE because of their poor listening skills, distractibility, and impulsiveness. Therefore, fencing sport is one of the sports that are beneficial because it involves structure, rules, rituals, a stop-and-think attitude, and absolute obedience. No techniques are taught until the children have learned to stop, listen, and think. The techniques involved in this sport are usually monitored carefully, emphasizing over and over that these are sports and are not to be used for any aggressive play.

Clearly there are some hyperactive children, who need drug therapy, but for a lot of children, the reality is that physical activity, movement, sport could at least reduce the severity of the condition. Researchers in the present study therefore applied the basic fencing skills program for the hyperactive children. Then they compared the children's activity level before and after the program, besides measuring the physical variables included in the physical fitness scale, in order to measure the effect of the program on these variables. On the other hand, they measured the urine catecholamine for those children, as a reflection for the physiological changes too.

Often described as a child who suffers from hyperactivity child bad or difficult or child who cannot adjust. Some parents bothering them hyperactivity in their children through punish them, but the punishment increases the problem worse. Also, forcing the child to something cannot work exacerbates the problem and is a disorder locomotors activity overload medical condition satisfactory launched in the past few decades, several labels including syndrome hyperactivity, brain damage simple, and so on, which is not a simple increase in the level of physical activity, but a significant increase is so that the child cannot sit quietly never, whether in the classroom or on the dining table or in the car.

(Wolraich, et al. 1998) noted that excessive motor activity disorder is one of the most common neurological disorders among children and it is primarily due to genetic reasons due to the absence of one of the genes.

And reminds (Lee, 2001) that the locomotors activity overload in children common disorder and increase the prevalence of the male three times with him in females, although the disorder occurs in the early stages age early, but it is rarely diagnosed in children in pre-school.

(Nolan, et al. 2001) indicate that this disorder usually appears before seven years of age and lasts at least six months may disappear or continue a year or two as the causes of the situation, and the advantage of history infected child activity, motor overload in the early years of his life with three features a frequent

crying, sensitivity delicate external stimuli, and is suffering from sleep disorders.

This situation is not considered learning difficulties but the problem behavior in children and have these children usually hyperactivity and aggressive and cannot focus on something for more than a minute, usually mental capacity for these children normal or closer to normal, and be the main problem in children with such syndrome is that excessive motor activity disorder does not help them to make use of the information or stimuli around them, so the benefit from mainstream education or weak in the normal way, where they need first to control the behaviors locomotors activity overload.

(Pliszka et al. 1996) that hyperactivity is a biological neurological disorder caused by a defect in nerve cell formation is caused by an increase secretion of catecholamines hormones.

It is noteworthy (Wigal, et al. 2003) that catecholamines hormones is one of the hormones pressures. It consists of (adrenaline - norepinephrine - dopamine), and it can be inferred from these hormones in urine by measuring the Vanillylmandelic acid (VMA), this is an indication of the levels of catecholamines hormones. And that the current studies indicated the presence of correlation between the severity of sports training and catecholamines levels in the urine.

Prevalence rates range from excessive motor activity disorder between 3-5% in the community while you see some of the other studies that the proportion of 15% among school-age children. (Wolraich, et al. 1998)

The Researcher observed the lack of studies on movement education as a means of kinetic treatment of these disorders, despite their importance and positive impact on access to effective treatment and safety of this group of children.

Studies indicated the lack mobility programs are codified in a scientific manner interested in the children of this stage people with hyperactivity prompting the researcher to the number of small games program aims to teach children with hyperactivity a variety of activities based on competition with oneself and others compared to traditional programs.

Material and Methods

Subjects:

The sample consisted of 30 kids from Arab Republic of Egypt and used in this study, all participations divided into equally to (2) groups (experimental groups -15kid) and (control group -15kid), the experimental group performed the education program based on blue and green colors for (8) weeks, and the control group practiced the traditional training only into the kindergarten.

Procedures

Age, height and weight were recorded. Height was assessed with a standard tape measure on a wall; weight was measured with household scales.



Ethical considerations:

The researchers have considered the value of research for children, parents, and community and also the possible discomfort and risk of the intervention on children's safety. Therefore there were reasons behind the use of foot work only (as a basic skill) and not using the one to one fencing between children. This was to protect them from any planned or unplanned physical injuries

Researchers also considered not using the custom and mask that they are beyond the financial ability of average social level Egyptian families. This has been also decided for other ethical reasons such as safety measures to protect those children from any un-organized movement which might put them at risk of injury.

Consent for research participation was given orally by some parents as Egyptian people usually feel uncertain if they are asked to sign any paper work. As children were protected from risk of injury, no compensation policy was included in research procedures. Children and their families were instructed about their freedom to withdraw from the study at any time if they are not happy and privacy of the clients was guaranteed.

Measurement instrument

Conners' Teacher Rating Scale.

Study subjects' activity level has been assessed using the Abbreviated Conners' Teacher Rating Scale-10 items (ACTRS- 10 items). Children's physical fitness has been assessed using the EUROFIT (European Scale Measuring Physical Fitness). Items of the EUROFIT are ten categories measuring the physical fitness but the researchers have excluded one item due to study setting circumstances (some measures are only applicable in the laboratory setting) : (1) Flamingo Balance (FLB). (2) Plate Tapping (PLT). (3) Sit and Reach (SAR). (4) Standing Broad Jump (SBJ). (5) Hand Grip (HGP). (6) Sit - Ups (SUP). (7) Bent Arm Hang (BAH). (8) Shuttle Run (SHR).

Motor abilities tests

The EUROFIT normally includes cardiovascular endurance element, which is not available in the community setting.

In Flamingo Balance (FLB) test, the researcher measured the general balance on one foot above a bar (its length is 5 cm and its height is 4 cm). The score (timing = 60 seconds) has been given on the number of trials to keep child's balance on the bar.

In Plate Tapping (PLT) test, Quick tapping on two plates alternatively is using the preferred hand. The circle of both plates is equal to 20 cm and each plate is 60 cm away from the other. The un-preferred hand is put on a slide that is midway of the whole distance. The researcher has taken the timing in which the child tapped on the plates (50 times) alternatively.

In Sit and Reach (SAR)test, it measures the body flexibility. In this activity the researcher measured the body flexion on the front (as much as the

child can do) from the long sitting position. The results recorded using centimeter scale.

In Standing Broad Jump (SBJ)test, It measures the power through assessing the jumping a specific distance from the standing position. The researcher has calculated and recorded the best reading in centimeter from two predetermined trials done by the child.

In Hand Grip (HGP) test, this implies the static strength of the preferred hand (hand in use). The measures were taken in kilograms using a graded manual dynamometer for the hand in use. The researcher has taken the best reading from the two trials, while a time gap (rest) in between the two trials.

In Sit - Ups (SUP) test; it measures the muscular abdominal endurance. The researcher recorded the maximum number of sitting ups that were achieved by the child in 30 seconds.

In Bent Arm Hang (BAH) test, it measures the muscular endurance of the arms and shoulders. The reading was taken in 1/10 second.

In Shuttle Run (SHR) test, the child run a ten meters distance five times (two directions). It measures the speed of running and the child's fitness. The timing was recorded.

Catecholamine Urine Test.

Catecholamines are substances produced by nerve tissue including the brain and the inner part of the adrenal glands. These adrenal glands produce large amounts of catecholamine as a reaction to stress. The main catecholamine breakdown into the compounds Vanillylmandelic acid (VMA) and metanephrine, which are passed in the urine.

The researchers have measured the catecholamine level in urine before and after the training program (physical intervention) for the children of the study sample. The urine sample was collected from each child to test the effect of physical exercise on the catecholamine level in urine that is expected to be reduced in hyperactive children compared with their normal control group. Special instructions were given to the children regarding the sample collection, type of food and medication that might affect the catecholamine urine test results.

Statistical Analysis

All statistical analyses were calculated by the SPSS.V.16 (Statistical Package for the Social Sciences). The results are reported as means and standard deviations (SD). T Test was used to compare group means in variance analysis results that were found statistically significant. Differences in means were considered if $p < 0.05$.

Results

Table (1) T-test Between Experimental and Control Groups before the Intervention

Variables	Measu. unit	Experimental group		Control group		T test
		Mean	SD.	Mean	SD.	
Age	Year	5.64	.84	5.60	.88	.23
Length	Cm	116.60	4.01	115.79	4.63	.93
Weight	Kg	21.50	4.35	21.79	4.89	.31
HA	Deg.	16.56	3.82	15.98	4.19	.72
FLB	No.	7.22	1.68	7.10	1.88	.16
PIT	No.	10.19	2.13	10.56	2.41	.74
SAR	No.	4.94	1.35	4.09	1.43	.35
SBJ	Cm	121.16	4.16	120.32	3.71	1.06
HGR	Kg	12.94	2.87	16.52	2.44	.78
SUP	No.	14.0	2.15	14.22	2.29	.49
BAH	Time	10.38	2.18	10.98	2.15	1.3
SHR	Time	25.29	1.62	25.09	1.45	.64
VMA	Mg .day	8.93	.820	8.91	.69	.77

T-test result between the experimental and control group showed that both study groups were homogenous as evidenced by the lack of significant differences across all the domains of EUROFIT and other measures too.

Table 2. Mean \pm SD and T test for the experimental group.

Variables	Measu. unit	Pretests		Posttests		Change rate %	T sign
		Mean	SD.	Mean	SD.		
HA	Deg.	16.56	3.82	11.40	2.77	23.93	Sig.
FLB	No.	7.22	1.68	4.60	3.02	21.44	Sig.
PIT	No.	10.19	2.13	12.57	4.54	15.71	Not
SAR	No.	4.94	1.35	8.30	2.11	48.43	Sig.
SBJ	Cm	121.16	4.16	126.00	2.14	3.69	Sig.
HGR	Kg	12.94	2.87	18.50	2.79	9.21	Not
SUP	No.	14.0	2.15	20.20	2.39	11.11	Sig.
BAH	Time	10.38	2.18	11.69	2.48	15.63	Not
SHR	Time	25.29	1.62	21.12	1.36	10.16	Sig.
VMA	Mg .day	8.93	.820	8.05	.77	9.81	Sig.

It has been found that all the variables examined were significant except the plat-tapping, Hand Grip, and Bent Arm Hang. This could be explained by the intervention employed by the researcher (based on colors); therefore all other tasks based on arm movement skills were found no significant.

Table 3. Mean \pm SD and T test for the control group.

Variables	Measu. unit	Pretests		Posttests		Change rate %	T sign
		Mean	SD.	Mean	SD.		
HA	Deg.	15.98	4.19	14.40	3.54		Not
FLB	No.	7.10	1.88	9.55	3.13		Not
PIT	No.	10.56	2.41	11.66	4.22		Not
SAR	No.	4.09	1.43	5.32	2.43		Sig.
SBJ	Cm	120.32	3.71	121.22	2.02		Not
HGR	Kg	16.52	2.44	17.50	2.21		Not
SUP	No.	14.22	2.29	18.12	2.76		Sig.
BAH	Time	10.98	2.15	9.44	2.34		Not
SHR	Time	25.09	1.45	24.03	1.24		Not
VMA	Mg .day	8.91	.69	8.89	.54		Not

It has been found that all the variables examined were no significant except the Sit and Reach (SAR) test and Sit - Ups (SUP) test.

Table 4. Mean \pm SD and T test for the control and experimental groups

Variables	Measu. unit	Experimental group		Control group		T test
		Mean	SD.	Mean	SD.	
HA	Deg.	11.40	2.77	14.40	3.54	Sig.
FLB	No.	4.60	3.02	9.55	3.13	Sig.
PIT	No.	12.57	4.54	11.66	4.22	Not
SAR	No.	8.30	2.11	5.32	2.43	Sig.
SBJ	Cm	126.00	2.14	121.22	2.02	Sig.
HGR	Kg	18.50	2.79	17.50	2.21	Not
SUP	No.	20.20	2.39	18.12	2.76	Not
BAH	Time	11.69	2.48	9.44	2.34	Not
SHR	Time	21.12	1.36	24.03	1.24	Sig.
VMA	Mg .day	8.05	.77	8.89	.54	Sig.

It has been found that all the variables examined were significant except the plat-tapping, Hand Grip, Sit - Ups test, and Bent Arm Hang.

Table 4. Correlation Factors between hyperactivity scale and Vanillylmandelic acid & physical variables.

Variables	HA	FLB	PIT	SAR	SBJ	HGR	SUP	BAH	SHR	VMA
HA		.948**	.918**	.207*	-.150	-.101	.180	.229*	.216*	.889**
FLB			.879**	.145	-.146	-.112	.101	-.196	.181	.734**
PIT				.135	-.058	-.057	.121	-.187	.157	.147
SAR						-.714**	-.757**	-.660**	-.815**	.646**
SBJ						.663**	.580**	.621**	-.589**	.228*
HGR							.754**	-.737**	-.576**	.143
SUP								.695**	-.594**	.552**
BAH									-.608**	.717**
SHR										.655**
VMA										

Table 4. showed that there was a positive correlation between the factor of hyperactivity and all other measures included in the EUROFIT except the correlation between the hyperactivity & BAH that was found negatively correlated. This could be explained by the degree of hyperactivity exhibited by children that hinders the function of BAH in those children as their ability is quite less than the time duration in which task should be completed.

No correlation between the hyperactivity and the SBJ (Standing Board Jumb), and the HGR (Hand Grip) and the SUP (Sit-Ups) were found, this could be explaining that there is no relationship between the three tests (power measures) (SBJ, HGR, and SUP) and the hyperactivity manifested by those children.

Discussion

Anxiety and hyperactivity are major problems that inhibit school performance. Stop, think, and retreat strategies can reduce both of these problems. A student can be asked simply to sit quietly and engage in actual relaxation for a few minutes to collect his or her thoughts... (Refs) This practice has the benefits of teaching the AD/HD child the self-discipline of sitting still, focusing the mind, achieving a quiet state, and being able to achieve self-control through an inner-motivated, self-starting activity.

(M. Margalit, &N. Arieli, 1984)agreed that the child needs to concentrate on one specific task for only a short time. The task or technique at hand is changed into another quickly. Through the hour-long class, the child is engaged in a variety of repetitive tasks, but the tasks vary and interest is sustained. Therefore the present researchers applied these strategies to keep children on task through the whole sessions. The child was taught to develop powers of concentration, but in very short bursts that are manageable. Students were able to internalize a valuable life skill when they internalized this notion of breaking a task into small components and being satisfied with small successes (Pelham, et al. 2000).

Because children learned skills in small, digestible instructions, they also learned to develop their concentration skills in small, achievable steps. They did not need to concentrate hard for an hour or more— rather; they concentrated on executing a touch, step-forward or stepping for two minutes (Stormont, et al. 2000). Gradually, their ability to concentrate improved. The children learned to control their bodies, and to control their emotions and reactions. As they practice touch, step-forward, or stepping, they learned to control their emotions, in order to not hurt one



another if any physical friction is experienced between peers/ players.

Since it is not the motor activity that magically transforms the child, but rather the instructor that gives the child tools to address the symptoms of hyperactivity outside the fencing class, treating hyperactive children with fencing or. Other physical education programs can be more time-consuming and, sometimes, more costly, than automatically treating the disorder with the available medications. It requires considerable commitment and work from the parents, and the active participation of the child in the process.

Movement educational program emphasized concentration in a number of ways, not the least of which is the necessity to perform one technique or set of techniques over and over again in order to perfect it. This increased ability to concentrate developed gradually, just as young practitioners learn to learn in small increments and rejoice at small accomplishments. Research results supported the idea that children with hyperactivity can manage their lives without resort to medication and its harmful sideeffects (refs).

Conclusions

The results indicate that two months of the movement education program can improve physical variables, and reduce the hyperactivity.

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Original article

STUDY ON THE USE OF THE C GROUP ELEMENTS – JUMPS AND LEAPS AND D GROUP ELEMENTS – BALANCE AND FLEXIBILITY IN THE WORLD CHAMPIONSHIPS OF AEROBIC GYMNASTICS

NICULESCU GEORGETA¹

Abstract

Problem statement. Aerobic gymnastics is not only a type of physical training but also a top-level competitive sport which attracted many practitioners. As sports discipline has evolved rapidly through spectacular accessibility, being an attraction and challenge for the athletes who have completed their competitive activity in artistic gymnastics. The harmonious combination of specific resources (basic steps, difficulty elements) and nonspecific means (technical elements of acrobatic gymnastics, rhythmic gymnastics, classical and modern ballet) led to improvement to the level of mastery of the motor content of this sport considered scene sport. In the composition of exercises at all competition levels in aerobic gymnastics are used elements from all four difficulty groups: group A – dynamic force, group B – static force, group C – jumps and leaps and group D – balance and flexibility.

Methods. The present paper aims to analyze quantitatively by comparing the used elements from the difficulty group C – jumps and leaps and D- balance and flexibility from the twelve editions of the World Championships of aerobic gymnastics. Note that the representative teams of Romania's aerobic gymnastics have participated at all editions in the world championships starting with the year 1995, Paris edition, and the last being in Sofia, year 2012, gaining valuable results, enshrining the gymnastics representative as a great force in this sportive discipline.

The working hypothesis is that the elements from group C – jumps and leaps – have a large percentage in the composition of exercises used in competition levels compared with the elements from group D – balance and flexibility. This is observed in all editions of the World Championships of aerobic gymnastics. The research method used was an ascertaining study based on video images.

Results. The obtained results confirm the working hypothesis.

The conclusions certify that at all competition levels: female individual, male individual, mixed pairs, trios and groups, the elements from the difficulty group C (jumps and leaps) have a higher percentage than the elements of the difficulty group D (balance and flexibility) in the World Championships of aerobic gymnastics. There is to be mentioned that this group C has the largest number of families of elements.

Key words: aerobic gymnastics performance, difficulty elements, jumps, balance, flexibility.

Introduction

Aerobic gymnastics was developed at the International Federation of Gymnastics (IFG) starting with the year 1994 when in Paris were unified all the international federations, under only one regulation. At the beginning the contests were organized after different regulations of their own, initiated by diverse international federations: International Aerobic Federation (IAF), Aerobic Sports and Fitness International Federation (ASFIF), American National Aerobics Commission (ANAC). Thus at the I.F.G. Congress, in 1994 was decided that all the structures and competition existent systems should be unified in only one system, with an unique regulation and then to organize the first World Championship of Aerobic Gymnastics, in 1995. It was difficult to reunite a big number of competitors from Brazil (one million practitioners), Argentina, Australia, New Zealand, USA, Japan, Germany, Italy, Spain, which had their own regulations. Therefore at the first World

championship that took place in Paris in 1995 had participated 34 countries and also Romania.

Till now there had been 12 editions of the World Championships starting with the one from 1995. They have been organized annually until the year 2000, and starting with the 2002 edition they took place biennially. The contests were: female individual, male individual, mixed pairs, trio, till the 2000 competition. At the Klaipeda World Championship (2002) was introduced the group contest, and at the 2012 edition in Sofia (Bulgaria) two more were introduced: aerobic step and aerobic dance. The International Federation of Gymnastics decided to give medals to teams, at Nanjing, in 2006.

Internationally Romania's aerobic gymnastics became a road opener and a model in defining the concept of this new sportive discipline (Niculescu, 2000). Thus in female individual was won 1 gold medal, 3 silver medals, 3 bronze medals at all World Championships. The male individual won 3 silver

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medals and 3 bronze medals. In mixed pairs our gymnasts won the first place twice, the second place twice, the third place five times. The contest that brought us the biggest satisfactions was the trio where the fifth gold medals, the fourth silver medals and the fourth bronze medals made the Romanian trio the best in the world. Also the group contest brought the Romanian gymnasts three gold medals and one bronze medal. It must be mentioned the fact that in the team contest introduced in 2006, Romania won the first place.

Methods

In the performance gymnastics the elements are divided in four difficulty groups: Group A – Dynamic strength, Group B – Static strength, Group C – Jumps and Group D – Balance and mobility. This diversity of elements offers multiple possibilities of composition, the exercises having a balance between the aerobic movements (combinations of up and down movements) and difficulty elements, and the arms and legs movements must be strong and well shaped by total use of space. All this ensures harmony and esthetics to the movements impressing the audience through interpretation, difficulty and dynamism in exercise execution.

The base model of the exercise in aerobic gymnastics must contain combinations of basic steps specific to aerobics, passing and transitions among levels, difficulty elements whose number varied depending on the regulations of the Code of Points and of the contest. In the composition of exercises the number of the difficulty elements was permanently changed, initially being of 20, then dropping to 16, then to 12 and now is 10 (www.fig-gymnastics.com).

Since 1994 till now the Code of Points was enriched with almost 200 elements from which half are of superior value. The group with the most substantial evolution regarding the new elements were: group A- dynamic strength, group B- static strength and group C – jumps (www.fig-gymnastics.com).

The biggest group is C group - jumps, that through volume, number of families, possibilities of execution, detachment, finalization (standing, split, push up) it offers the most numerous and spectacular composition solutions. In all the contests the elements from the jumps group bring a touch of spectacle, especially in mixed teams, trio and groups, because are made synchronically. The optimal parameters of execution of each jump highlight driving qualities like: detention, mobility, balance, coordination, strength.

Group C is the whole set of difficulties and ways of execution, starting from one leg (Leap) or two legs (jump), on the spot, in two steps with moose, with

diverse shapes of free expression, landing on the floor, in push up, in split, or in push up in one arm or on both arms, the jumps becoming means, forces of content, artistic and technical departing. In gymnastics the strength is found under different forms of manifestation: dynamic strength, static strength, explosive strength (Vieru, N., 1997) being considered basic driving quality, because any movement means muscular contraction, tightly correlated with others (Potop, V., 2008).

Jumps in aerobic performance gymnastics have 4 phases: preparation for impulse or moose, the impulse, the flight and landing. Thus the moose is specific by tightening the jumps with the basic steps or by executing 2 steps of walking or running. Jumps can also be made from standing without moose.

The impulse is made from one leg or both, it must be full of energy, short, strong and must ensure an optimal height for flight as to execute different actions in the air (leg scissors, detachments in split, turns of the body around main axes, combined movements) and the landing can be finalized in: standing on one leg, standing, push up (push up in hick split, frontal prone).

Depending on the body position in air there are vertical jumps, vertical to horizontal and horizontal.

The D group elements are those that highlight articulations' mobility of gymnasts, the aptitude to execute movements with the highest amplitude possible, actively and passively (Manno, R., 1996) and balance capacity that implies maintaining positions on a support floor as reduced as possible (Macovei, S., 2007) and restoring it after the displacements and high amplitude solicitations. In the technical execution of elements and in maintaining the balance, the kinesthetic, vestibular and force aptitudes have a major role.

The elements from the Code of Points have values from 0.1 to 1 point. In the composition of exercises, the coach introduces elements with higher values so as the gymnasts gain a big grade in difficulty and a good position in world championships and cups.

Results

Regarding the analyzed content, the paper aims to comparatively and quantitatively evaluate the entire content of C group difficulty elements (jumps) and D group elements (balance and mobility), in finalist gymnasts of all 12 World Championships organized till now. Also it will be presented the frequency of elements with 0.8, 0.9, 1 point value from the last two world championships in the fifth contests.

The results obtained in C group of difficulty – jumps (table 1.1)

Table 1.1. Dynamics of the elements in category C- Jumps and leaps

Round Year	Individual women's	Individual men's	Mixed pairs	Trio	Group
1995 Paris	33,00%	34,75%	26,16%	26,60%	
1996 Haga	35,50%	35,00%	27,00%	26,90%	
1997 Perth	36,80%	38,20%	28,30%	28,10%	



1998	Catania	37,50%	34,00%	29,27%	29,16%	
1999	Hanovra	39,10%	35,40%	30,00%	27,70%	
2000	Riesa	39,80%	37,10%	31,13%	29,36%	
2002	Klaipeda	33,75%	33,89%	26,00%	24,66%	22.40%
2004	Sofia	26,60%	25,40%	25,50%	25,50%	26,22%
2006	Nanjin	25,90%	25,17%	24,79%	26,85%	26,30%
2008	Ulm	50,99%	47,91%	44,78%	46,87%	47,91%
2010	Rodez	48,75%	43,75%	51,04%	47,91%	47,91%
2012	Sofia	53,50%	47,50%	50,00%	51,04%	48,61%

Analyzing the elements' dynamics from this group in the content of the exercises presented in the contest finals from all 12 World Championships, being confirmed that there are big variations in using the elements from this group, caused by the modification of the Code of Points. Thus the biggest percentage of

elements from group C was obtained in the individual women contest (53,50%) in the World Championships in 2012 in Sofia. The smallest percentage was obtained in group contest (22.40%) in Klaipeda in 2002.

The results obtained in the D group of difficulty - balance and mobility (table 1.2)

Table 1.2. Dynamics of the elements in category D – Balance and flexibility

Round Year		Individual women's	Individual men's	Mixed pairs	Trio	Group
1995	Paris	30,48%	18,84%	26,16%	15,01%	
1996	Haga	28,33%	20,00%	16,66%	20,00%	
1997	Perth	26,67%	10,31%	12,76%	12,50%	
1998	Catania	24,18%	18,76%	13,33%	26,31%	
1999	Hanovra	25,00%	15,67%	14,28%	26,66%	
2000	Riesa	18,66%	13,33%	15,34%	14,28%	
2002	Klaipeda	24,70%	16,00%	20,30%	24,66%	20,83%
2004	Sofia	25,00%	25,00%	25,90%	25,50%	25,40%
2006	Nanjin	25,00%	16,66%	16,66%	14,80%	20,30%
2008	Ulm	17,70%	16,66%	18,74%	16,66%	17,70%
2010	Rodez	20,00%	21,25%	17,70%	15,62%	18,75%
2012	Sofia	17,50%	17,50%	18,75%	14,58%	15,27%

Regarding the use of D group elements, the biggest percentage were obtained in female individual (30,48%) in the first World Championship in Paris, in 1995, and the smallest (10,31%) in 1997 in Perth in male individual.

The frequency of elements from group C (jumps) and D (balance and mobility) had the value 0.8-1 in the World Championships in Rodez and Sofia – women's individual (table 1.3)

Table 1.3. Women's Individual

Group	Family	Elements	Value	Frequency
C RODEZ	Straddle jump/leap	C348 1/1Turn straddle leap to push up	0,8	7x
	Cossack jump	C488 1/1 Turn cossack jump ½ turn to split	0,8	1x
	Pike jump	C598 ½ Turn pike jump ½ twist to push up	0,8	4x
	Split jump/leap	C688 1/1 Turn split jump switch to split	0,8	1x
	Scissors leap	C828 Scissors leap ½ turn 1/1 turn	0,8	1x
C SOFIA	Straddle jump/leap	C348 1/1Turn straddle leap to push up	0,8	7x
	Pike jump	C598 ½ Turn pike jump ½ twist to push up	0,8	5x
		C600 1/1 Turn pike jump ½ twist to push up	1,0	1x
	Split jump/leap	C688 1/1 Turn split jump switch to split	0,8	2x
D RODEZ	Illusion	D198 Free illusion to free vertical split	0,8	2x
		D200 Free illusion to 1/1 turn free vertical split	1,0	2x
D SOFIA	Illusion	D218 Free double illusion to vertical split	0,8	2x
		D219 Free double illusion to free vertical split	0,9	3x



Discuss. Analyzing the two groups it can be observed the use of elements from the Straddle jump/ leap, Cossack jump. Pike jump, Split jump/leap, Scissors leap and illusion families used 7 times, the highest frequency at the C348 element, and the smallest frequency in the elements from the family Cossack jumps, Pike jump, Split jump/leap and Scissors leap in both world championships. Elements of 1 point we see in this contest in the Illusion and Pike jump elements.

The frequency of elements from group C (jumps) and D (balance and mobility) had the value

0.8-1 in the World Championships in Rodez and Sofia – men's individual (table 1.4)

Table 1.4. Men's individual

Group	Family	Elements	Value	Frequency
C RODEZ	Air Turn	C109 3/1 Air turn	0,9	2x
	Straddle jump/leap	C428 1/1Turn straddle jump to push up	0,8	2x
		C348 1/1Turn straddle leap to push up	0,8	1x
	Cossack jump	C478 1/1 Turn cossack jump 1/1 turn	0,8	2x
	Pike jump	C600 1/1 Turn pike jump ½ twist to push up	1.0	7x
	Scissors leap	C828 Scissors leap ½ turn 1/1 turn	0,8	7x
C SOFIA	Free Fall	C150 Free fall 3/1 twist airborne	1.0	1x
	Straddle jump/leap	C348 1/1Turn straddle leap to push up	0,9	1x
		A230 Straddle cut ½ twist to wenson	0,8	1x
	Cossack jump	C478 1/1 Turn cossack jump 1/1 turn	0,8	1x
	Pike jump	C598 ½ Turn pike jump ½ twist to push up	0,8	2x
		C600 1/1 Turn pike jump ½ twist to push up	1.0	6x
Scissors leap	C828 Scissors leap ½ turn 1/1 turn	0,8	7x	
D RODEZ	Illusion	D218 Free double illusion to vertical split	0,8	4x
		D219 Free double illusion to free vertical split	0,9	2x
D SOFIA	Illusion	D218 Free double illusion to vertical split	0,8	1x
		D219 Free double illusion to free vertical split	0,9	2x

In gymnasts competition the element C600, from the family Pike jump, having the value of 1 point was used 7 times in the World Championship in Rodez and 6 times in the World Championship in Sofia. This can be explained by the fact that the male gymnasts have a bigger strength than female gymnasts. The element C150 from the family Free Fall having the value of 1 point was used only one time. The frequency of C and D group elements have the value 0.8-1 point in the

world championships in Rodez and Sofia – mixed pairs (table 1.5)

Table 1.5. Mixed pairs

Group	Family	Elements	Value	Frequency
C RODEZ	Straddle jump/leap	C348 1/1Turn straddle leap to push up	0,8	6x
	Pike jump	C598 ½ Turn pike jump ½ twist to push up	0,8	8x
	Scissors leap	C828 Scissors leap ½ turn 1/1 turn	0,8	4x
C SOFIA	Straddle jump/leap	C348 1/1Turn straddle leap to push up	0,8	6x
	Pike jump	C598 ½ Turn pike jump ½ twist to push up	0,8	7x
		C600 1/1 Turn pike jump ½ twist to push up	1.0	1x
Scissors leap	C828 Scissors leap ½ turn 1/1 turn	0,8	2x	
D RODEZ	-	-	-	-
D SOFIA	Illusion	D218 Free double illusion to vertical split	0,8	2x

In mixed pairs (1f+1m) was introduced in the exercise only one element of maximum value because the gymnasts do not risk executing these elements. The highest frequency is found in Pike jump family, the C598 element with the value of 0.8, used 8 times in the Rodez world championship and 7 times in the Sofia world championship. The frequency of C and D group elements have the value 0.8-1 point in the world championships in Rodez and Sofia- trio (table 1.6)

Table 1.6. Trio

Group	Family	Elements	Value	Frequency
C RODEZ	Straddle jump/leap	C348 1/1Turn straddle leap to push up	0,8	4x
	Pike jump	C598 ½ Turn pike jump ½ twist to push up	0,8	8x
	Scissors leap	C828 Scissors leap ½ turn 1/1 turn	0,8	3x
C SOFIA	Straddle jump/leap	C348 1/1Turn straddle leap to push up	0,8	3x
	Pike jump	C598 ½ Turn pike jump ½ twist to push up	0,8	5x
		C600 1/1 Turn pike jump ½ twist to push up	1.0	2x
	Scissors leap	C828 Scissors leap ½ turn 1/1 turn	0,8	5x
D RODEZ	-	-	-	-
D SOFIA	Illusion	D218 Free double illusion to vertical split	0,8	2x

In the trio contest the Pike elements have the highest frequency in both world championships, used 8 and 5 times. The maximum value (1 point) was the element C600 used 2 times and also from the Pike family. In the Rodez world championship was not used any element of difficulty from D group (value 0.8-1 point).

The frequency of C and D group elements have the value 0.8-1 point in the world championships in Rodez and Sofia- group (table 1.7)

Group	Family	Elements	Value	Frequency
C RODEZ	Straddle jump/leap	C348 1/1Turn straddle leap to push up	0,8	4x
	Pike jump	C598 ½ Turn pike jump ½ twist to push up	0,8	8x
	Scissors leap	C828 Scissors leap ½ turn 1/1 turn	0,8	2x
C SOFIA	Straddle jump/leap	C348 1/1Turn straddle leap to push up	0,8	2x
	Pike jump	C598 ½ Turn pike jump ½ twist to push up	0,8	5x
		C600 1/1 Turn pike jump ½ twist to push up	1.0	1x
	Scissors leap	C828 Scissors leap ½ turn 1/1 turn	0,8	3x
D RODEZ	-	-	-	-
D SOFIA	-	-	-	-

Table 1.7. Grup

In the group contest, the most spectacular, the elements of 1 point were introduced only one time and the one having 0.8 value were introduced 24 times. The highest value is found in the Pike family used 8 times in the Rodez world championship. The D group elements (value 0.8-1 point) are not found in any of the analyzed championships.

Conclusions

- analyzing the gymnasts exercises along the World Championships it can be confirmed that the elements from group C are found with a percentage of over 44% in the last three editions in all 5 contests. The highest percentage was found in the edition in Sofia at female individual (53,50%);

- regarding the balance and mobility exercises from group D it can be observed the dropping tendency of using the elements of balance and mobility in the

composition of exercises at all editions of world championships compared with the use of C group elements, because these need special qualities from the competitors;

- in the female individual contest it can be observed a balanced use of 5 and 4 families of elements from group C, in the two editions studied in terms of use and values. From D group the female gymnasts have used elements only from Illusion family with values from 0.8, 0.9 to 1 point;

- in the male individual contests are mostly used elements with maximum value of 1.0 from Pike jump family, the gymnasts having a higher explosive strength;

- in the composition of the exercises from mixed group pairs are used for 35 times elements with the value 0.8;



- the trio and group contests introduced in 2002 in the world championships are the most spectacular and the highest use have the elements with the value 0.8, because the timing has to be perfect.

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Original article

VALIDITY OF RPE SESSION IN YOUNG MALE KARATE ATHLETES

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Abstract

Purpose. This study aimed to assess the validity of the rating of perceived exertion (RPE) session method vs. HR-based methods (Edwards and Banister) for quantifying karate's training load (TL).

Methods. Eleven young karatekas (age 11.34±1.76 years, height 143±6.786 cm, body mass 48.13±7.33 kg, HRmax 205±0.98 bpm) participated in this study. The training sessions was performed on 5 consecutive days with two training sessions for day. During the training Heart Rate was recorded with Cardio "Suunto Memory-Belt" so to calculate the Trimp (Banister) and Training Load (Edwards), while the session-RPE scale is based on the Borg category ratio RPE scale and then modified by Foster et al (CR-10). The validity of RPE method in young Karate athletes, was studied by correlation analysis between RPE session's training load and both Edwards and Banister's training impulse score' method.

Results. The HR and RPE were collected from 10 training sessions with inter-day (two sessions for days) correlations were determined (n=11 × 5 days). The mean session-RPE values and correlations in each exercise mode between session-RPE and HR-based TLs (ie, Edwards's TL and Banister's TRIMP) showed TL, r = 0.79; 95% CI: 0.67 to 0.87 and Banister's TRIMP, r = 0.63; 95% CI: 0.44 to 0.77.

Conclusion. The results of the present study provide evidence that the session-RPE method is a simple and inexpensive tool that accurately provides a similar quantification of internal TLs as assessed by the HR-based methods during the various training modes with young karate practitioners. The complex physiological interactions during karate sessions that were dedicated for developing a wide variety of physical capacities makes it difficult for coaches to accurately quantify training load using HR or time measures. Thus, the session-RPE method provides a practical, low-cost, and non invasive tool of quantifying karate training loads, thus making it a valuable tool for athletes, coaches, and sports scientists.

Key Words: Young Karatekas; Perceived Exertion; Martial Art; Heart Rate.

Introduction

Article I. The studies on karate's performance analysis have shown that combats sport requires repetitions of intensive short sequences of attack and/or defence that are interrupted by brief/active periods and/or passive recovery in-between (Beneke et al., 2004; Iide et al., 2008; Chaabene et al., 2013). Moreover, the latter physiological pathways showed that several studies have stressed the importance of performing appropriate training loads (TL) to enhance performance and have demonstrated, for instance, that some changes in performance can be mainly attributed to varying periods of easy and hard training loads (Foster, 1998). Nevertheless, for being able to schedule and monitor training loads in karate athletes, there is a need for a valid and accurate tool for assessing TLs (Haddad et al., 2011). In this regard, the coach's intuition about training loads may not be reliable for accurately monitoring training, given the

complexity of training mode interactions (Barroso et al., 2013). The risk is that unsuitable training will be prescribed, which could result in detraining and/or overtraining or injury and, then, performance deterioration. Several methods that integrate exercise intensity and volume (Foster, 1998; Foster et al., 2001). Most of these methods, as heart rate (HR) response to exercise intensity and duration, provide objective measures of physical effort that might allow for the quantification of a training session as a unit of physical effort (Imamura et al., 1998). Although HR-based methods provide objective measures of TL, they appear to be a poor method for evaluating intensity during several intensity exercises (i.e., intermittent and plyometric exercises) (Foster et al., 2001). A method based on the perceived exertion during the entire training session (as session-RPE) was suggested by Foster et al. (Foster et al., 2001). This approach has been received increasing attention in recent years in

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compact sport (Haddad et al., 2011). Foster et al. (Foster et al., 2001) simplified the quantification of TL by substituting HR data by a session-RPE measure.

RPE is based on the observation that athletes inherently monitor the physiological stress they experience during exercise. RPE has been correlated with many physiological measures of exercise intensity, such as oxygen consumption (VO_2), ventilation, respiratory rate, blood lactate concentration, HR and electromyography activity, during a variety of exercise protocols (Fabre et al., 2013; Scott et al., 2013). Recently was studied (Impellizzeri et al., 2005) the relationship between the session-RPE method and three approach methods (Banister's TRIMP, Edwards' summated-heart-rate-zones method, and Lucia's TRIMP) in during training and match play. Authors reported a significant individual correlations between the session-RPE method and Banister's TRIMP method (Banister, 1991) ($r=0.65$), and between the session-RPE method and Edwards' summated-heart-rate-zones method (Edwards, 1993) ($r=0.70$). A recent study by Milanez et al. (Milanez et al., 2013) analyzed the relationships between the RPE of a whole exercise session and objective measures of exercise intensity during a single karate training session. Significant relationships ($p<0.05$) were found between the mean TL session-RPE and mean lactate, percentage of maximum HR, and percentage of HR reserve. However, the relationship between session-RPE-derived TLs and HR-based TLs has not been fully assessed in elite karate players across a range of exercise modes. Therefore, this study assessed the validity of the session-RPE method across all typical training modes of a karate training program in young karate practitioners (Vando et al., 2013).

Material and Methods

Subjects

Eleven male youth Karate athletes (means \pm SD: age 11.34 ± 1.76 years, height 143 ± 6.786 cm, body mass 48.13 ± 7.33 kg, HRmax 205 ± 0.98 bpm) volunteered to participate in the present study. All participants (i.e. both experimental and control group) had at least 3.5 years of karate training background with two to three karate training session per -week (total 3-4 hours per week). None of the subjects ever underwent any endurance strenuous activity or resistance training outside of their normal training program. The study conformed to the Declaration of Helsinki 1964 and was conducted after approval from the local Ethics Committee. The procedures, risks and goals were explained to the participants tutor and written parental consent was obtained prior to participation in addition to the subjects' consent.

Experimental set-up

According to "Italian Federation of Martial Arts (FILKAM)" guidelines, participants took part in a 1-wk Karate training camp consisting of one to two

daily sessions planned by the team' coach. Maximum heart rate (HR_{max}) was estimated ($220 - \text{age}$) (Miller et al., 1993). Athletes were involved in two 60 minutes training session's inter-day (morning session and afternoon session for seven consecutive days) during the Summer Camp (Vando et al., 2013) included specific karate exercises performed as follows: 10 minutes of coordinative trunk, arms (simultaneity rotation: right vs. left) and legs exercises (alternating rotation: right vs. left) in different body planes in forward-backward displacement (distance of 15 meters); 15 minutes of flexions, lunges and extra-rotations of lower limbs exercises in different body planes followed by dynamic stretching (DS) postures (Haddad et al., 2013) performed in standing and seated positions. DS consisted of one sets of 7-min, five exercises with 30 sec each (i.e. five muscle groups: quadriceps, hamstrings, plantar flexors, adductors and hip flexors) Finally, 35 min of specific karate skills including upper and lower limb offensive and defensive techniques.

Monitoring Training Loads

Individual training load was calculated using the Foster's session-RPE procedure (Foster et al., 2001) for each day. This method involved multiplying the training duration in min by the mean training intensity. The session-RPE scale is based on the Borg category ratio RPE scale and then modified by Foster et al (Foster et al., 2001) (CR-10), which translates the athlete's perception of effort into a numerical score between 0 and 10. This test is designed to ask the athlete to respond to a simple question. "How was your workout?" with the goal of getting an uncomplicated response that reflects the athlete's global impression of the workout. In the present study, the validated French version of the CR10-scale was used (Haddad et al., 2011). All athletes had been familiarized to this scale before the start of the study (3 wk preceding the training camp) and followed standardized instructions for RPE.

Each athlete's RPE was collected approximately 30-min after each Karate session to ensure that the perceived exertion referred to the whole session rather than the most recent (end-of-session) exercise intensity. During the Karate competition, athletes' RPEs were collected ~5-min after each Karate fight to ensure that the perceived effort referred to the Karate combat. Fight session-RPE was calculated by multiplying this fight RPE by Karate fight duration.

Criterion Methods for Quantifying Physical Training Loads

Two HR-based training load methods were used to measure internal Training Loads (TL): Banister TRIMP and Edwards TL (Banister, 1991; Edwards, 1993). The Banister TRIMP (Banister, 1991) tries to weight the session duration using an exponential factor, as in the following formula:

$$- TD \times HR_R \times 0.64e^{1.92 \cdot HRR}$$



In which TD is the effective training session duration expressed in minutes and HR_R is determined with the expression $[(HR_{TS} - HR_B)/(HR_{max} - HR_B)]$, where HR_{TS} is the average training-session heart rate and HR_B is the heart rate measured at rest. The HR-based method proposed by Edwards (Edwards, 1993) was also used as a common indicator of internal TL in various disciplines. The criterion-related validity between Banister's TRIMP and Edwards's TL was verified in many studies, such as that of Borresen and Lambert (Borresen & Lambert, 2009), who found high significant correlation between these two HR-based methods ($r = 0.98$; 95% CI: 0.96 to 0.99). Recently, this method was published in a review article of Borresen and Lambert (Borresen & Lambert, 2009) as an index of training stress like Banister's TRIMP and Lucia's TRIMP. Practically all the research analyzing the ecological validity of session-RPE has used this HR-based method. This method determines internal load by measuring the product of the accumulated training duration (minutes) in five HR zones by a coefficient relative to each zone (>50–60% of $HR_{max} = 1$, >60–70% of $HR_{max} = 2$, >70–80% of $HR_{max} = 3$, >80–90% of $HR_{max} = 4$, and >90–100% of $HR_{max} = 5$), and then summing the results. Training intensity during each Karate training camp session (Vando et al., 2013) was recorded using HR monitors (Polar Team System, Polar, Kempele, Finland), with HR recorded every 5-s. After each training session, HR data were downloaded to a computer using appropriate software (Polar Advantage Software, Polar Electro, Oy, Finland). To assess resting HR, athletes did lay on a bed for 10-min at ~6:20 a.m.. The resting HR value corresponded to the minimal HR observed during this 10-min period.

Statistical Analysis

Data were analyzed using SPSS 15.0 statistical software package (SPSS Inc., Chicago, IL). Descriptive statistics were expressed as mean \pm SD. The sample size was established with post-hoc statistical power analysis (Faul et al., 2007). Pearson product-moment correlation coefficients were calculated to determine whether session-RPE and the various HR-based TL methods were convergent. The magnitude of the correlations was determined using the modified scale of Hopkins: $r \leq 0.1$, trivial; $>0.1-0.3$, small; $>0.3-0.5$, moderate; $>0.5-0.7$, large; $>0.7-0.9$, very large; $>0.9-1$, nearly perfect; and 1 perfect. Significance and meaningful acceptance of the correlation were set at 5% ($p < 0.05$) and 0.5 (large to perfect), respectively.

Results

The HR and RPE were collected from 10 training sessions with inter-day (two sessions for days) correlations were determined ($n=11 \times 5$ days). The mean session-RPE values and correlations in each exercise mode between session-RPE and HR-based TLs (ie, Edwards's TL and Banister's TRIMP – Figure 1) showed TL, $r = 0.79$; 95% CI: 0.67 to 0.87 and

Banister's TRIMP, $r = 0.63$; 95% CI: 0.44 to 0.77 with $p < 0.001$ respectively.

Discussion

The present study showed for the first time the application to Foster's RPE-based approach (Foster et al., 2001) to quantify internal TL during different modes of karate training in karatekas. Particularly, we determined the correlations between session-RPE and two HR-based methods widely considered to be valid indicators of internal TL during all modes of training sessions present at the training camp. The correlations between session-RPE and Banister's TRIMP and Edwards's TL were, $r = 0.63$ "moderate" and $r = 0.79$ "large", respectively. The magnitude of the association between the session-RPE and HR-based TLs was high enough to confirm that session-RPE can be used as a strong alternative for quantifying training loads during special physical training in young karatekas. These results are in according with the Foster study (Foster et al., 2001), who showed that individual correlations between the session-RPE method and Edward's TL ranged between $r = 0.75$ and 0.90.

In the present study, the correlation between session-RPE and Banister's TRIMP was $r = 0.63$ ($p < 0.01$) while Edwards's TL was $r = 0.79$ ($p < 0.001$), which confirms the validity of the RPE method as an accurate mode of training load monitoring during intermittent exercise. The study of Earnest et al. (Earnest et al., 2004) showed that the RPE method might provide a more accurate training load's monitoring compared to the other methods based on HR when both aerobic and anaerobic metabolisms are activated simultaneously.

Conclusions

This study provide evidence that the session-RPE method is a simple and low cost device that accurately provides similar quantification of internal TLs as assessed by the HR-based methods during the various training modes in karate sessions. The complex physiological interactions during karate sessions that were dedicated for developing a wide variety of physical capacities makes it difficult for coaches to accurately quantify training load using HR or time measures.

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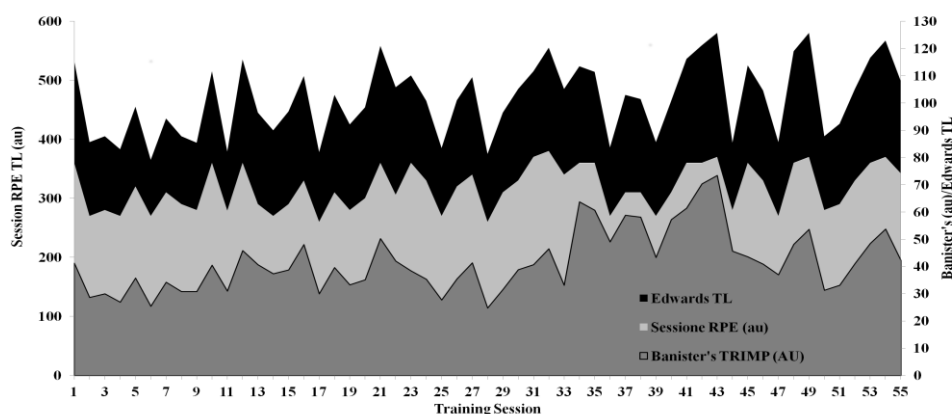


Figure 1. Profile of the session rate of perceived exertion training load (TL) vs. Edwards's/Banister's methods across the training sessions examined during the training camp.



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Original article

NEW RESULTS USING THE METHOD OF INCREASING THE EFFICIENCY OF EDUCATIONAL PROCESS IN SCHOOLS BASED ON THE QUESTIONNAIRES FOR MEASURING SATISFACTION OF THE PARENTS

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Abstract

Problem statement. Nowadays achieving an effective collaboration between school and family for education of children is a hot topic and parents can become real partners for teachers in education, if is established a beneficial interaction regarding students in order to form a harmonious personality, to understand and to accept the requirements and conditions involved in the educational process.

The aim of the research is to identify different ways to increase efficiency in educational process in the school units of Constanta County. Research objectives are: to identify the attitudes of parents towards school; to determine the level of satisfaction of the parents with various specific aspects of education; to compare the levels of satisfaction of the parents at the beginning and at the end of educational system of children;

Methods. The study appreciated aspects and to recommend these aspects to the managers for optimizing the educational process; to highlight the relationship between school and family from the perspective of the parents.

Results. Sample consisting of 38761 representative parents for the population of Constanta county was obtained randomized; we used a questionnaire for parents interpreted by practitioners and representatives County School Inspectorate of Constanta, in collaboration with a team of psychologists from County Center of Resources and Educational Assistance of Constanta, after its' application in schools, supported by managers, psychologists and teachers. Statistical data obtained revealed a high level of parental satisfaction about the educational process in schools (pre-primary cycle, primary, secondary and high school) especially about the educational offers and management, as well as the involvement of teachers and the directors of the school units and the importance of recommendations of the parents to streamline their activity. The partnership school - family can form effective team to initiate projects that invite parents to work together with teachers and to promote school activities in local community.

Conclusions. This important study identify the perception of beneficiaries of educational services in relation to all aspects monitored and may be an important step in development of a functional relationship student - family - school.

Key words: education, efficiency, partnership, school, family.

Introduction

Education is a complex good with many dimensions, and as parents evaluate schools they have to strike a balance between the different attributes of education that schools represent. The complexity of that task is compounded by the fact that the level of existing information they have about schools is often limited (Schneider et al., 2000). School choice is a complex and contentious issue. And much of the debate about choice often resembles a shouting match in which, scholars talk around and past each other (Schneider and Buckley, 2002). Despite the rapid expansion of school choice, many doubt the ability of parents to make good choices. The Carnegie Foundation (1992) concluded that "many parents base their school choice decision on factors that have nothing to do with the quality of education" including the availability of day care, convenience, social factors, and the range and quality of interscholastic sports. A Twentieth Century Fund report argued that parents are

not "natural 'consumers' of education" and that "few parents of any social class appear willing to acquire the information necessary to make active and informed educational choices" (Ascher et al., 1996).

Achieving effective collaboration between school and family, suitable for rearing and education of children is a hot topic. Parents can become real partners in the education of students in terms of awareness of their multiple roles. This can become a reality if parents and teachers establish a beneficial interaction with students regarding the formation of a harmonious personality, understanding and accepting the requirements and conditions partner involved in the educational process. Through this study developed by County School Inspectorate of Constanta aims to identify ways to increase efficiency of instructive - educational process in schools. The objectives of the study are: to identify the attitudes of parents towards school; to determine the level of satisfaction of the parents with various specific aspects of education; to compare the levels of

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satisfaction of the parents at the beginning and at the end of educational system of children; to study appreciated aspects and to recommend these aspects to the managers for optimizing the educational process; to highlight the relationship between school and family from the perspective of the parents.

Methods

Questionnaire for parents were approved and performed by representatives of County School Inspectorate of Constanta in collaboration with a team of teachers, psychologists of County Center of Resources and Educational Assistance of Constanta, then it was applied in all units school of Constanta County, with support of school managers, school psychologists and teachers in the school year 2012-2013. The sample includes 38761 parents is structured as follows: 6626 parents of preschool children, 8033 parents of primary school pupils, 15190 parents of middle school students, 8693 parents of students in high school and 219 parents of students with special educational needs integrated in educational process. The sample is representative for the population consists of parents of students in Constanta, both by reference to the number of parents of students at each level of education and for the total number of students and parents in the county.

Results

Parental responses to questionnaire items regarding their satisfaction with the educational results of students were centralized to all study levels, then were analyzed and plotted. Statistical data obtained show that parents are satisfied to a large extent and to a great extent about the activity of units school as institutions of education and also to the teachers activity and management. From the point of view of the parents, the schools offer a good education and management, but are also a number of recommendations which must be considered and implemented to optimize these aspects.

The main reasons that generate the presence of parents in the kindergarten/schools indicates a major concern about knowledge of the evolution of behavior of children; improving parenting skills through partnership with teachers; knowledge of the frequency classes. We present in this study comparative data regarding to the reasons that lead parents of pupil and of high school students to participate in the different activities proposed by the school.

The main reason that causes parents to come to kindergarten indicate a principal concern for behavior of children (27.4%), the evolution of schooling prerequisites procurement plan (24.11%) and improving parenting skills through partnership with teachers (23.53%). This study showed us that the parents of high school students are concerned, in particular, whether the child's school (30.06%), also in behavior of students (23.26%), the frequency of students (18.88%) (Figure 1).

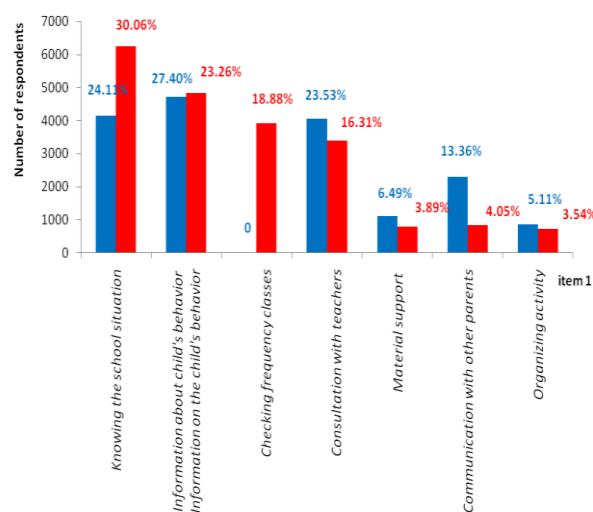


Figure 1. The reasons for the presence of parents in the kindergarten/schools of Constanta County (blue indicates pre-primary school; red indicates high school).

Frequent presence of parents in the kindergarten/school is conducive to effective partnership school - family, given the availability of parents to be present in the institution, whenever necessary! Given that approximately 30% of parents are present to a lesser extent the institution, is necessary to develop concrete strategies designed to attract family involvement in school life and thus in ensuring education of their child (Parents School). Our obtained data showed that most parents (90.35%) are satisfied and very satisfied with all analyzed aspects, particularly by the level of training provided by the school. Generally, parents of high school students who participated in this study (65.95%) are satisfied and very satisfied with the aspects analyzed, particularly the level of training provided by the school.

Given that the pre-primary to high school level, the percentage of parents satisfied that highly satisfied with the training provided by the school attended by their children decreases, we believe that it could be improved by a constant concern for all educational factors in this regard.

Regarding the quality of school and extracurricular activities, the greatest degree of satisfaction with services is expressed by the pupils with special educational needs, all other parents expressing satisfaction level of 70%; this is generating the need for more involvement of the representatives of education Constanta.

Regarding safety climate, discipline and the atmosphere/climate of the group/class that teaches children existing in schools was identified at approximately 100% satisfaction in the kindergartens, that integrating schools, while primary and secondary schools, secondary respectively, the percentage decreases to about 70%, suggesting the need to improve this parameter, the level stated.

It was found that the majority of parents participating in this study are largely concerned and heavily satisfied with the teachers, as managers of group/class and in terms of quality activities with preschoolers/pupils, the highest percentage being recorded in the nursery. We recommend that it is necessary to maintain the same level of satisfaction of the beneficiaries to other levels of education. In this study, parents consider that the actual material basis of the school is good in general, but improving where is necessary, can increase the efficiency of the educational process. Percentages obtained, regardless of to which we refer, indicate the need to identify resources to ensure an adequate endowment of educational approaches made by good cooperation with parents, school managers and local community.

Given that parents are aware and highlights the need to better organize their work in terms of parents' committees is essential to stimulate parents in this regard.

While in the nursery or integrating schools, most parents are satisfied with the importance given their point of views by representatives of schools, revealing that there is generally effective communication in primary and secondary school, it is necessary optimizing communication between school and family. In the kindergartens and integrative schools, most parents are satisfied about the image of schools in the community, but significant percentages of specific sample need to ensure visibility and a greater promotion of its community.

Dominant way of communication is direct, achieving parents through meetings and discussions with teachers, but this parents concern decreased significantly from pre-primary to secondary school level, generating the conclusion that concrete proposals are necessary to motivate parents constantly to collaborate with the school. The share of parents who are largely satisfied with the usefulness of the information taught in schools decreases, from kindergarten to high school, which indicates the importance of educational approaches aimed at developing life skills of students, regardless of the field and the level at which we report. The number of parents who appreciate the content of the curriculum as modern and adapted to the needs of their children significant decreases when making a comparison between kindergarten and school integration, on the one hand, and primary, secondary and high schools, on the other hand. A large number of parents consider in a very large extent and largely accuracy assessment system of students at this level, but changes can be made in order to optimize the evaluation of the students, given variations in results from one level to another.

Most parents of pre-primary children and children with special educational needs appreciate that teaching methods engage actively children in learning, being very efficient, but this satisfaction decreases towards primary and secondary schools, and high schools,

respectively, although the percentages exceed half of sample (Figure 2).

Extra-curricular activities organized by the nursery/school are considered to be very interesting and useful, about three quarters of the parents surveyed, regardless of the level to which we refer. It was found that activities which involve most of the parents are dedicated to parents, this results indicates us the necessity of diversification the range of activities that can be more attractive to the school.

Identified factors that contribute to a large extent to children's success in life are these: teachers, educational projects, educational qualifications, training hours of counseling and guidance, the content of school curriculum and extracurricular activities. There are a number of other factors that contribute to children's success in life and mention them could be the subject of research on the personal opinions of parents. Based on these results, we find that in the hierarchy of factors that contribute to children's success in life, determined by the majority of parents of preschool children/students ranks first contribution of teachers (about 90 % regardless of level) which valorizes them, but it also empowers the educators. Almost all parents appreciate that preschoolers/pupils are satisfied about the educational activity in schools.

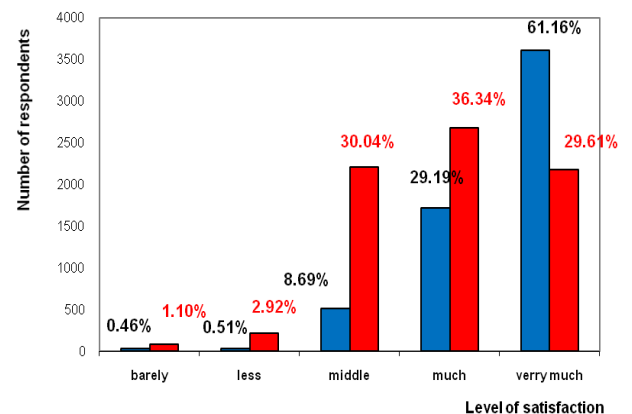


Figure 2. The level of education provided by students in school units of Constanta County ((blue indicates pre-primary school; red indicates high school).

Parents appreciate the educational provision to be folded on the school community needs and considers balanced and well chosen extracurricular educational activities held in school. Also, the parents think that the working atmosphere in school is relaxed, stimulating competition and enable each student to state.

Discussions

Our results showed that parents appreciate as positive the following aspects of children's education: teaching methods and strategies; varied educational offer; implementation of partnerships, projects, extracurricular activities; effective communication between parents, teachers and school managers.



Also, parents appreciate that schools receive adequate physical endowment. Parents of high school students consider very important diversification through specialization, qualifications offered by educational institutions in Constanta schools network and the type of ECDL certification/CISCO.

Recommendations of the parents on educational offer of school units are aimed at: improving educational space (more spacious classrooms, gym, modern playground); improving facilities (furniture, audio-video); school psychologist with the permanent program in school unit, given the importance of psychological counseling; development of more physical activity outdoors and more educational projects themed area of life skills development; active involvement of parents committees; after-school programs in schools; involving a larger number of students in projects; wearing school uniform; studying a foreign language from the preparatory class; stimulating methods of student creativity; fewer holiday themes; extension of programs/projects to facilitate international cooperation in schools abroad; investment in upgrading classes and laboratories with European funds and others, except parents sponsorships; involvement of parents both in school and in the extracurricular activity; permanent access in each class at IT resources; improve discipline and safety issues of students in schools.

Regarding managerial activity at pre-primary, primary and secondary schools, parents identified assessments, such as open and efficient communication between teachers, parents and of school manager; ensuring an optimal climate for motivating teachers, professional development, promoting the competitiveness of loyal employees; concern for attracting funding; involvement in extracurricular activities.

Parents surveyed offered a number of suggestions about the optimization of following aspects: encouraging excellence and pride of belonging to a school community, like introduction of school uniform; conducting projects involved both student (volunteer projects) and their parents; development of various emergency simulations for the formation of specific skills; finding financial sources, other than sponsoring their parents to sustain school activity; directing 2% of the tax to school; organization of competitions that stimulate creativity and skills development; sports suit the needs of students; improve the material in all schools; organizing discipline circles; organizing special classes (mathematics, foreign languages); organizing after-school programs and several activities like "school parents" type; improving discipline breaks by providing the school; harsher punishment for students for disciplinary offenses; a number of suggestions are aimed at ensuring discipline by hiring security companies; ensure continuity in the classroom of the teacher; ensuring preparedness overtime final years; promoting school and specific information technology tools (website, Facebook page).

Parents of high school students have also offered suggestions for optimizing the management activity, such as: diversification of education (vocational school return, a higher share of practical training curriculum, inclusion of pedagogical counseling hours in the curriculum, to study of the German language; several circles - modern languages, geography, history, mathematics, Romanian; diversification of optional courses, creation of bilingual classes); increasing the share of extracurricular activities; measures in reducing absenteeism; better involvement in ensuring discipline in the school; student's safety in school areas (access based on the student card, video surveillance cameras in the hallways and in class); better communication between teachers and students; better involvement in the relationship with parents; improve the efficiency of teachers; investment in material base; increase transparency in managerial act; promoting school and specific information technology tools or other administrative measures (program students not to exceed hour 19.30; additional staff care in all schools).

Conclusions

Analyzing the results and developing actions to ensure a higher quality of the entire educational system in Constanta County school units, we can obtain new results oriented towards success in terms of linking the school with the family more powerful.

The partnership school - family can be developed through activities that engage students and their families, this way forming an effective team through projects that invite parents to work with teachers approaches that promote school activities in community image.

This study identified perception of beneficiaries of school educational services in relation to all aspects monitored and may be an important step in the development of a functional relationship student - family - school.

Acknowledgments

We thank to all parents from units schools of Constanta County, psychologists, teachers, managers and specials thanks to the inspectors participating in this study for centralizing data and interpreting the results that ensure the development and validation of the instrument used in this research and its application. No funding was used for this study.

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Original article

YOUNG PEOPLE AND LEISURE-TIME SPORT ACTIVITIES

SABĂU ELENA¹

Abstract

Objective The aim of the study was to investigate the sport activity level during the leisure-time and the body mass index of the young people.

Methods The work is a non-experimental study. It is a pilot study applied to some groups of high school and college students. The measurement research instruments used for the study were physical activity index and body mass index. In order to find out the physical activity index we applied the survey with three parameters (intensity, lasting and frequency) with four-five levels, quantified by figures and applied in a formula. The final score characterizes physical activities and fitness category of the subjects. An other instrument used is body mass index, that is a measure of relative weight based on an individual's mass and height. The samples of study were three groups of subjects, males and females: the first is high school students aged 16-19; the second group is college students aged 20-25 and the third group is college students 26-30 years old. The total number of subjects is 165.

Results The results indicate the average scores 40-60 points for 21-25 years male category. The other categories of gender and age scores are included at 20-40 points. Calculated body mass index is about 18.8-25 kg/m² for males, age 16-25 years and females aged 21-25. For the others subjects the body mass index is 25-30 kg/m².

Conclusions Most subjects had an inadequate physical activity that means sedentary persons with poor fitness. Almost the same majority is slightly overweight.

Key words: young people, leisure-time sport, physical activity index, body mass index.

Introduction

The health benefits of physical activity are widely recognized. The literature provides information about the implications of different age and gender population groups in physical activities. Global recommendations of World Health Organization on physical activity for health for adults aged 18-64, includes leisure time physical activities that improve cardiorespiratory and muscular fitness and bone health. People should do at least 150 minutes of moderate intensity aerobic activities throughout the week.

Regular physical activity for young people improves health and fitness as strength and endurance, helps growing up with healthy bones and muscles, helps control weight and increases self-esteem. Overweight and obesity, which are influenced by physical inactivity and poor diet, can increase one's risk for diabetes and poor health status. Guidelines recommend that all young people should participate in physical activity, of at least moderate intensity daily. Children and young people aged 5-18 need to maintain a basic level of health practicing at least 60 minutes of physical activity every day. Physical activity should be moderate to intensity activity that means working hard enough to raise heart rate and break a sweat.

Physical inactivity is an important health risk factor. Health is related with factors of people who are

inactive.

According to Bota (2006) population must be educated to turn to account free time in their own benefit. Thus, education becomes leisure education component of integrate education. Education is based on deep positive people's psychology.

Physical activities practiced rhythmic high or moderate intensity related with decreased importance of psychological tension. Aerobic activities last 15-45 minutes are effective means of lowering a psychological tension Roman, Rusu (2008).

Since 1982 Baecke and colleagues said that evaluation of physical activity is often found to be important in reach out healthy especially in the area of cardiovascular disease and obesity. They showed that level of education was positively related to the leisure-time index in both sexes. The subjective experience of work load was inversely related to the sport index, and the leisure-time index in both sexes. The lean body mass was positively related the work index, and the sport index in males, but was not related to the leisure-time index in either sex. These differences in the relationships support the subdivision of habitual physical activity into the three components (intensity, duration, frequency).

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Methods

The work is a non-experimental study. It is a pilot study applied to some groups of high school and college students. The measurement research instruments used for the study were physical activity index and body mass index. In order to find out the physical activity index (PAI) we applied the survey with three parameters (intensity, lasting and frequency) with four-five levels, quantified by figures and applied in a formula (Intensity x Duration x Frequency = Score Total).

The final score characterizes physical activities and fitness category of the subjects.

Another instrument used is body mass index (BMI), that is a measure of relative weight based on an individual's mass and height (kg/m²). The samples of study were three groups of subjects, males and females: the first is high school students aged 16-19; the second group is college students aged 20-25 and the third group is college students 26-30 years old. The total number of subjects is 165 (table 1).

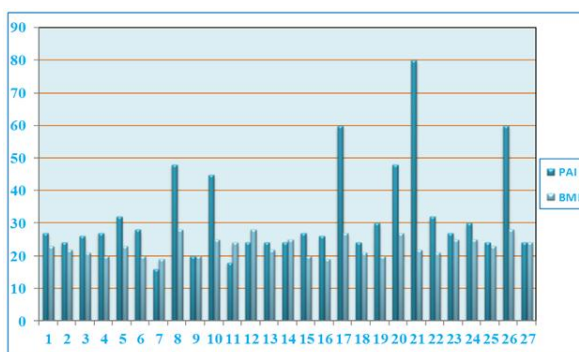
Table 1 Subjects on pilot study

Groups/Gender	Males (n)	Females (n)
Group 1 (16-19)	27	-
Group 2 (20-25)	26	-
Group 3 (26-30)	22	-
Group 4 (16-19)	-	33
Group 5 (20-25)	-	31
Group 6 (26-30)	-	26

Results

In graph 1 it is presented the group regarding the physical activity index and body mass index for young males aged 16-19. The average value of this parameter is 32.40 that means a evaluation at not good enough activity score. The best personal value of PA Index is

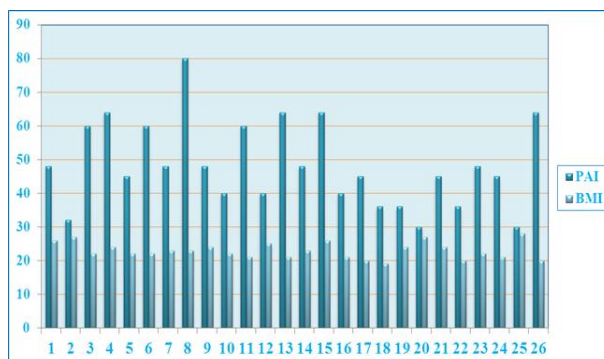
80 and the lowest personal value is 16. Regarding the level for body mass index the average value is 23.03. This shows a normal weight for the young males 16-19 year old. The maximum value of BMI is 23.03 and the minimum value BMI is 16.



Graph 1 Physical Activity Index & Body Mass Index for Group 1

In graph 2 there are the results for group 2 males 20-25 year old. We notice an average of 48.30 units for PA Index that represents an acceptable evaluation score. The values range goes between minimum 30

units and 80 units for group 2. The BMI average shows 22.96 a normal value for healthy people. The maximum value of BMI is 28 units and the minimum value is 19 units.

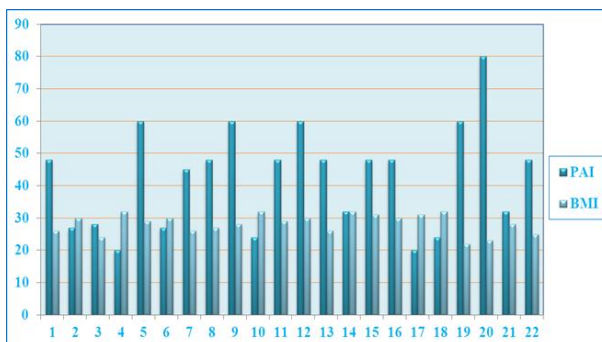


Graph 2 Physical Activities Index & Body Mass Index for Group 2

In graph 3 there are represented the personal values for group 3 of males 26-30 years old. The PH Index range of values extend from the lowest value 20 units up to the highest value 80 units. The average value for

that age is 42.50 units that shows acceptable evaluation score for whole group. Regarding BMI the average of the group is 28.31 units that means overweight

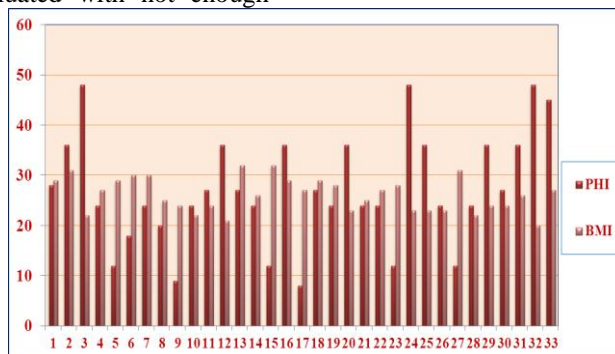
category of young males people. The range of values runs from 22 up to 32 units.



Graph 3 Physical Activities Index & Body Mass Index for Group 3

In graph 4 there are individual values of the group 4 females aged 19-20. The average value of PH Index is 27.15 units. The range of values for this parameter is large and goes from the lowest 8 units up to the highest 48 units. The group is evaluated with not enough

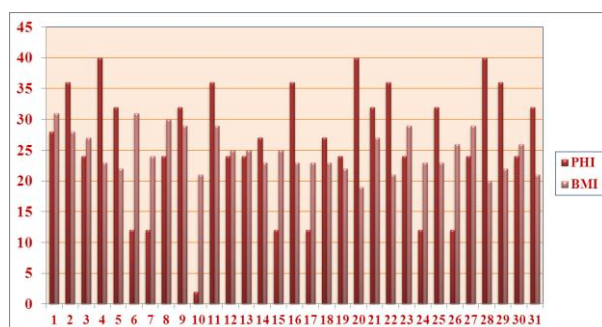
activity score. Looking at the BMI values of we find a range from 32 units to 40 units, with an average values of 26.15, that means a group with overweight near by the beginning of the range.



Graph 4 Physical Activities Index & Body Mass Index for Group 4

The graph 5 presents the individual values for two parameters of subjects aged 20-25. The PH Index average is 26.06 with a large range of values from 2 up to 40 units. The evaluation shows a not enough activity score. Looking at BMI we find out an average of 24.83

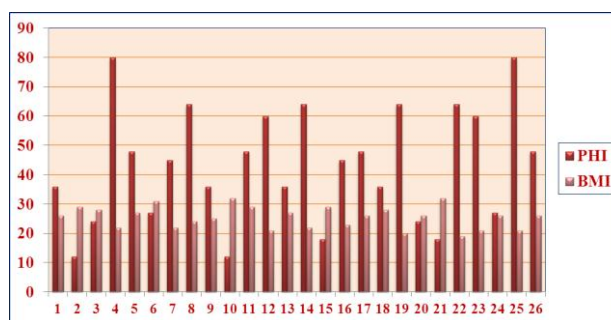
that places the group of young females 20-25 at normal category of weight, very close to overweight category. The range of BMI values goes from 19 up to 31 units scores.



Graph 5 Physical Activities Index & Body Mass Index for Group 5

The graph 6 presents the results for group 6 of females aged 25-30. The range of individual PAI values is very large and score goes from 12 to 80. The PAI average value is 43.23 that places the young females at the score evaluation of acceptable but could

be better. The BMI amplitude goes from 19 to 32 and the calculated average value is 25.46 units, that indicates an overweight category for young females aged 25-30.



Graph 6 Physical Activities Index & Body Mass Index for Group 6

Discussions

There is growing concern on physical inactivity in young adults. Experts are interested on the reasons of the levels of physical activity and with changes in physical activity levels will help to develop specific prevention strategies. Some study describes the prevalence and potential determinants of physical activity behavior and behavior changes of young adults.

A large study made by Marinez-Gonzales and his equip (2001) seems to be the first study determining the prevalence and amount of leisure-time physical activity, which is the first step to define strategies to persuade populations to increase their physical activity. So, Northern European countries showed higher levels of physical activity than southern ones. A higher percentage of men practiced any leisure-time physical activity. Also, an inverse association between body mass index and leisure-time physical activity was found. The prevalence of any physical activity during leisure time in the adult European population was similar to the U.S. estimates. Nevertheless, the amount of activity is low, and a wide disparity between countries exists.

Data from Australia, the United States and Europe collected by Stubbs and Leeshow, 2004 increased self-reported energy intake associated with obesity, in contrast to earlier suggestions that the obesity epidemic has occurred despite minimal or increase in per capita energy intake from food. The effect of increased energy intake is compounded by sedentary lifestyles. Both physical activity and nutrition must be addressed to reduce the prevalence of obesity and improve the health. At an individual level, physical activity is clearly important for weight control. Physical activity is an effective adjunct to dietary management for weight loss and maintenance.

Zimmermann-Sloutskis and colleagues' study (2010) based on the Swiss Household Panel, for subjects 14-26 years old, found out that in both young males and young females, the prevalence of inactivity was increasing with age. Women were less active than men of the same age. The most important findings were the strong effects of sport club membership on

general physical activity. The correlation between sport club membership and exercise was not surprising in its nature, but in its strength.

Australian Bureau of Statistics (2006) published provides a brief overview of the prevalence of physical activity in Australia. So adults aged 18 years and over who were sedentary or exercised at a low level were more likely to be classified as having a high or very high level of psychological distress than those who had moderate to high exercise levels.

According to Sirard (2013) physical activity levels suffer a marked decline during adolescence, especially for girls, with the most dramatic decline occurring between ages 15 and 18 years. Physical activity for female adolescents was associated with their male and female friend's physical activity including their male and female best friends. Male adolescents' physical activity was associated with their female friends' physical activity.

The data obtained by Negru (2012) shows that the most of the subjects (pupils, students and employees) do sportive activities for short time less than 30 minutes. In the same time the majority of young people prefer open air activities on workout programs without the guidance of a specialist. The study shows that a great number of women do not practice any sports. The employed young people recognize physical activities related with health.

In a study on students aged 18-23, that evaluate the physical activities Vanvu, Radu (2012) conclude that the Physical Activity Index indicate a rising line between the range reasonable and superior, 60% of subjects having chosen an acceptable lifestyle towards an active and healthy one. Getting more practice on physical activities guidance by specialists the attitude of the young students became more positive. They became aware of the effects of physical activities for a healthy lifestyle.

Options for students in rural areas relating to sport activities indicate boys preference for soccer and girls preference for aerobic gymnastics. Physical activities attract children from rural areas. Favorite sports activities are the school (Ciortianu, Rata, 2010).



Conclusions

Regarding the young males attitude for physical activities it seems that males aged 20-25 are more active and conscious in this field. They have a fair activity and a normal (healthy) weight. Is it possible to be a more open mind and interest of good and healthy looking?

The young males aged 16-19 have a poor activity and a normal weight yet. Maybe the next range of age will bring new and healthy attitude for physical activity.

Young males that reach on other range of age, 26-30 keep on the habitude to practice physical activities, but something happened because they get more heavy and became overweight, it is true very close by normal weight. It seems to be an important signal to have more control on their weight.

For females there is no range of age with a balanced relation between physical activities and weight. So, at the adolescents age 16-19 the girls have a poor physical activity and they are overweight, very close by normal, but the figures calculated get in overweight range.

Young females 20-25 years old have a normal weight, but very close by overweight. They have a poor physical activity that can push very easy the girls very in the range of overweight.

The same unstable situation have the young females aged 26-30. They are more conscious on practicing physical activity and realize an acceptable (fair) activity, but this is not enough, because they are overweight.

The data shows that males are more active than females and they show to be more carefully at age 20-25.

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Original article

EFFECT OF ROYAL JELLY INGESTION FOR FOUR WEEKS ON HEMATOLOGICAL BLOOD MARKERS ON SWIMMERS

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Abstract

Purpose. Royal jelly is an ergogenic aid used for the purpose of preventive medicine by athletes. Its effects on human beings have not been completely known. Investigating the impact of different doses of royal jelly on swimmers' hematological blood markers was aimed in this study.

Methods. 40 healthy swimmers at the age of 18-25 years, performing the same training program, participated in the study. The athletes were divided into 4 groups and each group consists of 10 athletes. 2 gr/day to the first group, 1 gr/day to the second group, 500 mg/day to the third group and placebo to the fourth group were given. In a 4-week training period of 2 hours per day and 5 times a week, totally 20 km swimming was performed. Blood samples were taken at rest after 12 hours of starvation and hematological analyses were done before the royal jelly ingestion and 4 weeks later.

Results. Significant differences were found in erythrocytary (RBC), leucocyte (WBC) and Platelet (PLT) parameters of the swimmers. While a decrease was found in HCT, CHCM, CH and HDW variables; an increase was found in MCV, MCH and MCHC. While a decrease was found in different groups of WBC, BA%, LY% and BA# variables, there was an increase in EO% of 1 gr royal jelly group. Also, there was a significant increase in PLT, MPV, PCT and PDW variables.

Conclusions. It was found that some differences on the hematological variables may be related to the exercise, and 4-week royal jelly supplementation with these quantities and time did not have sufficient effect. It was suggested that it can be effective with higher doses and in a long time.

Key words. Royal jelly, hematologic parameters, swimmer, exercise, ergogenic aids.

Introduction

At the present time, it is known that physical activity and moderate exercise are important factors to prevent disorders and to live healthy (Nielsen, Skjonsberg, Lyberg, 2008). It is possible to say that, except for physical activity, natural foods are also effective to improve health status and prevent disorders, and so increase the performance (Clark, 2008). Sedentary people fulfill the mental and physical requirements with daily foods. This situation is different in athletes because while physical activity is increasing, athlete can not fulfill the nutritional requirements. Therefore, individuals need vitamins, minerals, essential amino acids and many biological substances whose prior function is to fulfill the body requirements. Because of these requirements, except for the talent and training, many ergogenic substances have appeared to assist athletes and improve physical performance. Some types of ergogenic aids such as pharmacological, mechanical, physiological, psychological ones and natural foods are available among these ergogenic substances. While some kinds of these substances can damage, some of them are

natural nutrients (Joksimović, Stanković, Joksimović, et al. 2009; Zorba, Mollaoğulları, Erdemir, 2000).

One of the natural nutrients used to achieve sporting success is royal jelly. Royal jelly is a kind of nutrient secreted by the hypopharyngeal and mandibular glands of the worker bees for growth of young larvae and a main food of the queen bee (Echigo, Takenaka, Yatsunami, 1986; Guo, Saiga, M. Sato, et al., 2007; Oršolić, 2013). It is composed of protein, lipid, free amino acids, vitamin and sugar (Oršolić, 2013; Silici, Ekmekçioğlu, Kanbur, 2010; Lercker, Savioli, Vecchi, et al., 1986; Kanbur, Eraslan, Silici, et al., 2009) and used for the treatment of many diseases due to the nutrient-rich ingredients (Nagai and Inoue, 2004).

During exercise, a sum of fluid flows from vein to tissue and density of erythrocyte, hemoglobin and plasma proteins increases (Karacabey, Peker, Paşaoğlu, 2004; Özdengül, 1998). The amount of leukocyte in blood increases with the contribution of leukocyte which sticks on the blood vessel wall when blood stream is increased by exercise. Also, hormonal changes contribute to this increase (Khansari, Murgu, Faith, 1990; Waern and Fossum, 1993; Akgün,

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1994). With the exercise, all kinds of stress lead to increase of leukocyte, this increase is more significant during intensive exercise.

The main reason of this increase is that blood pressure (especially systolic blood pressure) and fluid filtration towards tissues increase. Another reason is that osmotic pressure increases because of that the products of metabolism increase in interstitial fluid and so fluid flows into the tissues (Karacabey, Peker, Paşaoğlu, 2004; Özdengül, 1998). A decrease characteristically occurs in hemoglobin and hematocrit values in athletes performing intensive exercise program and it is called as athletes anemia (Londeann, 1978).

There is a positive relationship between fluidity of blood and aerobic performance. The decrease in plasma viscosity and fibrinogen density, and ergogenic aids assumed as an advantage for the volunteers doing exercise can provide more oxygen for active muscles. There is a tendency for athletes to use ergogenic aids unconsciously for improvement of aerobic performance (Zorba, Mollaoğulları, Erdemir, 2000). Physical exercise capacity depends on the oxygen-carrying capacity for the tissues which work with maximum oxygen consumption. Oxygen content provided for tissues is determined by blood volume which arrives in the tissue and oxygen-carrying capacity. The most important factor to determine the oxygen-carrying capacity is hemoglobin concentration and erythrocyte number in circulation (Yapıcı, 2006).

In this study, it was aimed whether there is an effect of royal jelly supplementation with the same exercise programs on swimmers' hematological parameters.

Methods

Subjects. Forty healthy swimmers at the age of 18-25 years, performing the same training program, voluntarily participated in the study. The athletes were randomly divided into 4 groups and each group consists of 10 athletes. 2 gr/day to the first group, 1 gr/day to the second group, 500 mg/day to the third group and placebo (cornstarch) to the fourth group were given. Royal jelly capsules, produced with the permission of the Ministry of Agriculture and Rural Affairs of Turkish Republic, were given to the 30 athletes in the volunteer group one time a day 20-30 minutes before breakfast for 4 weeks.

The swimmers performed totally 20 km swimming training 2 hours per day and 5 times a week

Results

Table 1. Physical characteristics of subjects by groups before and after intervention

Variables		Placebo	500 mg	1 gr	2 gr
		M±SD	M±SD	M±SD	M±SD
Age (Year)		20.90±1.45	21.90±2.77	21.20±0.92	21.70±1.34
Body Height (cm)		168.90±10.06	172.10±9.92	168.70±7.10	174.50±7.28
Body Weight (kg)	Pre	61.69±15.37	64.34±14.73	60.45±10.90	65.80±11.80
	Post	61.90±15.68	64.68±14.28	60.75±10.36	65.77±11.76
BMI (kg/height (m) ²)	Pre	21.36±2.99	22.33±4.61	21.14±3.01	21.53±2.99

for 4 weeks. The volunteers did not use any kind of vitamin, medicine or supplement since 2 months before the study and until the end of the study. Ethical committee permission were obtained from Erciyes University Deanery of Medical Faculty as well as written, informed consent from the volunteers.

Physical measurements of the Volunteers

The measurements of body height (via seca tape measure), weight and body composition (via Tanita BC 418 MA) were taken.

Royal jelly

Royal jelly used in this study was provided from Civan Beekeeping (Bursa, Turkey) and it was kept at -20 °C until the beginning of the study. Royal jelly and placebo (cornstarch) were filled into the capsules (500 mg). The filled capsules were put in the deep-freezer at -20 °C to protect.

Determination of the Amino acid content of Royal Jelly

Royal jelly used in this study was bought from the company whose analyses were already done (M. Kanbur, G. Eraslan, S. Silici, et al., 2009; S. Silici, S., O. Ekmekçioğlu, G. Eraslan, et al., 2009), and in accordance with this previous chemical analysis, the content of the royal jelly was determined.

Collecting Samples and Biochemical Analyses

Approximately 4 ml blood sample was taken into the tubes containing EDTA for CBC from each volunteer two times, at rest before starting the study and after the 4-week training period. Hematological values of the samples, obtained from volunteers, were tested at the central laboratory of Erciyes University Hospital. The blood samples were analyzed by using the device named Siemens Advia 2110i hematology system.

Statistical Analysis

SPSS 13.0 statistical software package was used for data analyses. The data distribution was tested with the Shapiro-Wilk test. The statistics of variables were briefly reported by using mean and standard deviation. Pre- and post-test results of the groups were tested with one-sample t-test, and intergroup comparisons were analyzed with one-way analysis of variance. To determine the distinctness Tukey HSD test was conducted. Significance level was taken as 0.05.



	Post	21.42±3.07	21.69±2.89	21.20±2.85	21.50±2.95
Fat (%)	Pre	17.15±5.15	13.27±4.42	13.56±6.96	14.81±5.78
	Post	16.54±5.05	12.61±4.75	13.35±7.88	14.91±5.84

M, mean; SD, standard deviation; n, number of subjects.

No significant difference was found in body weight, body mass index (BMI) and body fat percentage (Fat %) of placebo group, 500 mg, 1 gr and 2 gr royal jelly groups according to the pre-and post-exercise both intragroup and intergroup comparisons ($p>0.05$) (Table 1).

Table 2. Erythrocyte parameters of subjects by groups before and after intervention

Variables		Placebo	500 mg	1 gr	2 gr
		M±SD	M±SD	M±SD	M±SD
RBC $10^6/\mu\text{L}$	Pre	4.43±1.35	5.17±0.51	4.93±0.92	4.96±0.35
	Post	4.73±0.57	4.99±0.60	5.09±0.43	4.86±0.31
HGB (g/dL)	Pre	13.96±1.79	15.29±2.03	14.52±1.72	14.49±1.14
	Post	14.16±1.60	14.82±1.80	14.57±1.93	14.73±1.21
HCT (%)	Pre	41.68±4.73	44.88±4.60	43.11±4.68	42.88±2.87
	Post	41.29±4.42	42.92±4.59** ↓	43.07±4.51	42.69±3.06
MCV (fl)	Pre	86.34±4.08	86.72±3.35	83.96±3.07	86.59±3.56
	Post	87.50±4.57	86.11±3.31	84.55±4.72	87.94±3.14* ↑
MCH(pg)	Pre	28.86±1.45	29.55±2.12	28.19±1.61	29.21±1.63
	Post	29.97±1.85** ↑	29.71±1.64	28.58±2.38	30.34±1.26** ↑
MCHC (g/dL)	Pre	33.45±0.83	34.03±1.43	33.53±0.89	33.74±0.64
	Post	34.25±0.79** ↑	34.50±1.00	33.75±1.30	34.50±0.63** ↑
CHCM(g/dL)	Pre	34.17±0.90	34.61±1.12	34.24±1.24	34.56±0.88
	Post	32.39±1.46*** ↓	33.59±2.98	33.01±2.14	32.77±1.33*** ↓
CH(pg)	Pre	29.25±1.37	29.88±1.86	28.61±1.88	29.73±1.55
	Post	28.19±1.38*** ↓	28.74±2.57	27.76±1.85** ↓	28.70±1.81*** ↓
RDW(%)	Pre	13.79±0.69	13.53±1.05	13.86±1.10	13.87±0.60
	Post	13.83±0.52	13.44±1.24	14.07±1.04	14.02±0.52
HDW(g/dL)	Pre	2.74±0.18	2.73±0.20	2.76±0.18	2.89±0.27
	Post	2.47±0.24*** ↓	2.53±0.24	2.59±0.24* ↓	2.55±0.21*** ↓

M, mean; SD, standard deviation; n, number of subjects.

Significant differences before and after intervention: * $p<0.05$ ** $p<0.01$ *** $p<0.001$ ↓: Decrease ↑: Increase

Red Blood Cells (RBC), Hemoglobin (HGB), Hematocrit (HCT), Mean Red Cell Volume (MCV), Mean Cell Hemoglobin (MCH), Mean Cell Hemoglobin Concentration (MCHC), Red Cell Distribution Width (RDW), Cellular Hemoglobin Concentration Mean (CHCM), Hemoglobin Concentration Distribution Width (HDW)

As a result of pre- and post-exercise intragroup comparisons, while there was a significant decrease in HCT of 500 mg royal jelly group ($p<0.01$); in CHCM of placebo and 2 gr royal jelly groups ($p<0.001$); in CH and HDW of placebo, 1 gr ($p<0.05$) and 2 gr ($p<0.001$) royal jelly groups; there was a significant increase in MCV of 2 gr royal jelly group ($p<0.05$); in MCH and MCHC ($p<0.01$) of placebo and 2 gr royal jelly groups. Besides, there was no statistical significant difference in RBC, HGB and RDW of placebo, 500 mg, 1 gr and 2 gr royal jelly groups; in HCT of placebo, 1 gr, 2 gr

royal jelly groups; in MCV of placebo, 500 mg and 1 gr royal jelly groups; in MCH, MCHC and CHCM of 500 mg and 1 gr royal jelly groups; CH and HDW of 500 mg royal jelly group ($p>0.05$) (Table 2).

As for the pre- and post-exercise intergroup comparisons, no statistical significant difference was detected in RBC, HGB, HCT, MCV, MCH, MCHC, CHCM, CH, RDW and HDW among erythrocytary parameters of placebo, 500 mg, 1 gr, 2 gr royal jelly groups ($p>0.05$).

Table 3. Leukocyte parameters of subjects by groups before and after intervention

Variables		Placebo	500 mg	1 gr	2 gr
		M±SD	M±SD	M±SD	M±SD
WBC10 ³ /μL	Pre	7.57±2.08	9.05±3.83	8.70±1.40	9.12±1.84
	Post	7.74±2.44	7.14±1.62	7.09±1.43* ↓	7.50±1.49* ↓
NE %	Pre	56.84±5.70	60.69±10.29	59.60±6.89	63.47±7.72
	Post	61.64±8.23	60.03±5.33	57.51±7.63	59.46±9.57
EO %	Pre	1.96±1.03	2.10±1.25	1.63±0.69	1.50±1.25
	Post	1.65±0.97	2.94±2.51	2.23±0.57* ↑	2.33±1.80
LY %	Pre	33.09±4.59	28.84±8.63	30.06±5.91	27.23±6.64
	Post	29.84±6.93	28.26±4.56	31.98±6.58	30.27±8.20
BA %	Pre	0.68±0.55	0.49±0.34	0.73±0.35	0.69±0.36
	Post	0.29±0.12	0.24±0.13* ↓	0.30±0.12** ↓	0.27±0.13** ↓
MO %	Pre	5.36±1.02	6.03±1.49	6.02±1.23	5.34±1.34
	Post	4.90±0.97	6.31±2.68	6.13±0.90	5.42±1.28
NE# 10 ³ /μl	Pre	4.37±1.53	5.79±3.65	4.75±1.27	5.89±1.75
	Post	4.90±2.01	4.27±0.94	4.13±1.22	4.55±1.39
LY# 10 ³ /μl	Pre	2.45±0.50	2.35±0.29	2.57±0.41	2.40±0.34
	Post	2.21±0.62	2.05±0.73	2.23±0.53	2.20±0.38* ↓
MO# 10 ³ /μl	Pre	0.39±0.08	0.53±0.22	0.52±0.09	0.48±0.14
	Post	0.37±0.10	0.42±0.11	0.43±0.08	0.40±0.08
EO# 10 ³ /μl	Pre	0.21±0.19	0.19±0.13	0.14±0.06	0.13±0.10
	Post	0.12±0.06	0.19±0.18	0.16±0.04	0.17±0.11
BA# 10 ³ /μl	Pre	0.06±0.06	0.15±0.26	0.06±0.03	0.14±0.27
	Post	0.02±0.01	0.02±0.01	0.02±0.01*** ↓	0.02±0.01

M, mean; SD, standard deviation; n, number of subjects.

Significant differences before and after intervention: *p<0.05 **p<0.01 ***p<0.001 ↓: Decrease↑:Increase

White Blood Cells (WBC), Lymphocyte (LY), Neutrophil (NE), Monocyte (MO), Eosinophil (EO), Basophil (BA)

According to the pre-and post-exercise intragroup comparisons, while there was a significant decrease in WBC of 1 gr and 2 gr royal jelly groups (p<0.05); in BA# of 1 gr royal jelly group (p<0.001); in BA % of 1 gr, 2 gr (p<0.01) and 500 mg (p<0.05) royal jelly groups; in LY# of 2 gr royal jelly group (p<0.05); a significant increase was found in EO % value of 1 gr royal jelly group (p<0.05). Besides, no statistical significant difference was found in MO#, NE#, EO# numbers and NE%, LY% and MO% values of placebo, 500 mg, 1 gr and 2 gr royal jelly groups; in WBC value

of placebo and 500 mg royal jelly groups; in EO % and BA# values of placebo, 500 mg and 2 gr royal jelly groups; in BA% value of placebo group; in LY# value of placebo, 500 mg and 1 gr royal jelly groups (p>0.05).

As for the pre- and post-exercise intergroup comparisons, no statistical significant difference was found in WBC, LY#, MO#, EO# and BA# numbers, and NE%, EO%, LY%, BA% and MO% values among leukocyte parameters of placebo, 500 mg, 1 gr, 2 gr royal jelly groups (p>0.05) (Table 3).

Table 4. Thrombocyte parameters of subjects by groups before and after intervention

Variables		Placebo	500 mg	1 gr	2 gr
		M±SD	M±SD	M±SD	M±SD
PLT 10 ³ /μL	Pre	281.90±67.45	260.10±57.60	262.80±42.92	244.70±69.45
	Post	310.40±67.50* ↑	273.50±73.77	313.90±64.81** ↑	274.00±59.82
MPV (fl)	Pre	8.21±0.26	8.23±0.36	8.32±0.41	8.34±0.47
	Post	8.71±0.42** ↑	8.76±0.52	8.99±0.48*** ↑	9.07±0.76*** ↑
PCT (%)	Pre	0.43±0.66	0.21±0.04	0.22±0.03	0.42±0.64
	Post	0.27±0.07	0.25±0.06	0.28±0.05*** ↑	0.25±0.04
PDW (%)	Pre	41.76±2.78	41.16±4.72	42.76±3.89	42.32±4.02
	Post	41.49±4.32 ^{ab}	37.30±8.54 ^a	42.05±6.01 ^{ab}	46.69±5.77^{b*} ↑

M, mean; SD, standard deviation; n, number of subjects. Significant differences before and after intervention:

p<0.05 **p<0.01 ***p<0.001 ↓: Decrease↑:Increase, ab: No significant difference between the groups which have the same letter and in the same line.

Platelets (PLT), Mean Platelet Volume (MPV), Platekrit (PCT) and Platelet Distribution Width (PDW)



As a result of pre- and post-exercise intragroup comparisons, a significant increase in favour of post-exercise values was found in PLT value of placebo ($p < 0.05$) and 1 gr royal jelly ($p < 0.01$) groups; in MPV value of placebo ($p < 0.01$), 1 gr and 2 gr ($p < 0.001$) royal jelly groups; in PCT value of 1 gr royal jelly group ($p < 0.001$) and PDW value of 2 gr royal jelly group ($p < 0.001$). However, no significant difference was detected in PLT value of 500 mg and 2 gr royal jelly groups; in MPV value of 500 mg royal jelly group; in PCT value of placebo, 500 mg and 2 gr royal jelly groups, and in PDW value of placebo, 500 mg and 1 gr royal jelly groups ($p > 0.05$).

According to the post-exercise intergroup comparisons, a significant difference was seen in PDW variable of swimmers; while a significant decrease was found in 500 mg royal jelly group, there was a significant increase in 2 gr royal jelly group ($p < 0.05$). No significant difference was found among placebo, 500 mg and 1 gr royal jelly groups; and among placebo, 1 gr and 2 gr royal jelly groups ($p > 0.05$) (Table 4).

Discussion

It is known that bee products such as pollen and propolis have been used in science for various reasons until today. However, it is seen that there is no comprehensive study about royal jelly studied on athletes.

No significant difference was found in body weight, body mass index and body fat percentage values of placebo, 500 mg, 1 gr and 2 gr royal jelly groups in both intergroup and intragroup comparisons of pre- and post-exercise. It was thought that this is because the volunteers were trained athletes and except for the royal jelly any kind of extra diet program was not used. While there was a significant decrease in HCT value of 500 mg royal jelly group, in CHCM of placebo and 2 gr royal jelly group, in CH and HDW of placebo, 1 gr and 2 gr royal jelly groups; a significant increase was found in MCV value of 2 gr royal jelly group, in MCH and MCHC values of placebo and 2 gr royal jelly groups according to pre- and post-exercise intragroup comparisons. This result was evaluated as a finding on royal jelly although it was not so significant. It was known that the values of erythrocyte parameters show an alteration with regular exercise (Patlar and Keskin, 2007). In a study made on rats by using royal jelly supplement, a significant increase was found in HCT value of exercise group (Ju-Fang, Lin-xiang, Jia-bin, et al., 2006). In another study conducted on people to investigate the effects of propolis supplement on erythrocyte and oxidative stress, it was seen that RBC and HGB values significantly decreased after giving propolis (Jasprica, Mornar, Debeljak, 2007). In the study made in order to examine the effects of glycerol support, a different kind of supplement, on some hematological parameters on athletes doing exercise regularly and sedentaries, no significant difference was detected in RBC, HGB and HCT values (Patlar and Keskin, 2007). In another study in which ambrotose

supplement was used on healthy individuals, there was a statistical significant decrease depending on the exercise in haematocrit values of the group exposed to both ambrotose and exercise (Bloomer, Canale, Blankenship, et al., 2010). According to a study made on athletes, after usage of creatine (0.03 mg/kg) and multivitamin supplement (0.01 mg/kg) a significant increase was found in HGB and RBC values, while no significant difference was detected in HCT levels (Milasius, Dadeliene, Ribaubine, 2006). In a study conducted on rats, there were some significant differences in RBC and HGB levels in intergroup comparisons after giving propolis (S. Mohammadzadeh, Shariatpanahi, Hamed, et al., 2007). RBC number and HGB concentration are effective in muscular activities of athletes. Therefore, while there is an alteration in RBC and HGB levels, its reason can be the muscular activities. An alteration is seen in hemoglobin and erythrocyte levels of the individuals doing exercise (Broadbent, 2011). If the severity of exercise is increased, erythrocyte destruction increases. In consequence of exhausting and strenuous exercise, erythrocyte destruction accelerates; but the products of disjunction increase erythrocyte formation by stimulating the systems related to production of blood (Yapıcı, 2006). It is thought that the increase in MCV, MCH and MCHC occurred in relation to the exercise. In a similar way, in the study made by Noushad et al. (2012), significant increases were detected in erythrocyte parameters based on exercise. By reason of the fact that exercise influences many physiological conditions such as hematological indicators, it was concluded that the differences detected in the present study are related to the exercise.

According to the pre- and post-exercise intragroup comparisons, while there was a significant decrease in WBC of 1 gr and 2 gr royal jelly groups; in BA# of 1 gr royal jelly group; in BA % of 1 gr, 2 gr and 500 mg royal jelly groups; in LY# of 2 gr royal jelly group; a significant increase was found in EO % value of 1 gr royal jelly group. In a study in which propolis supplement was used, no significant difference was found in WBC (Zorba, Mollaoğulları, Erdemir, 2000). In a study made on rats, after giving propolis, there was no significant difference in WBC level in intergroup comparisons (Mohammadzadeh, M. Shariatpanahi, Hamed, et al., 2007). In another study conducted to examine the effects of glycerol support on some hematological parameters on athletes doing exercise regularly and sedentaries, WBC showed no differences in terms of the initial and last value of the supplementation, post-exercise WBC numbers significantly increased in all groups except for the sedentaries. However, it was stated that exercise and glycerol support in that amount (1,2 mg/kg/day) and duration (20 days) have no significant impact on WBC (Patlar and Keskin, 2007). In a study made to examine the effects of antioxidant supplements on athletes, a significant increase was found in WBC



value after 4-week exercise period (Nielsen, Skjonsberg, Lyberg, 2008). As a result of creatine (0.03 mg/kg) and multivitamin (0.01 mg/kg) supplementation on athletes, a significant increase was seen in WBC levels of creatine and multivitamin groups levels (Milasius, Dadeliene, Ribaubine, 2006). Also, in a study made rats, pumpkin seed flour was given at different doses (100-200-300-400 mg/kg) and there was a significant increase in WBC levels (Adepoju and Adebajo, 2011).

It is known that regular exercise leads to substantial alterations in blood profile. These alterations can occur based on the hormonal changes related to nutrition (Noushad, Ahmedi, Jafri, et al., 2012). As for exercise, there can be some significant differences in both leukocyte numbers and percentages of leukocyte parameters following 12-15 minutes exercise (Yapıcı, 2006). It was thought that the differences found in the present study are because of that the athletes are doing exercise regularly.

As for the platelet parameters, a significant increase in favour of post-exercise values was found in PLT value of placebo and 1 gr royal jelly groups; in MPV value of placebo, 1 gr and 2 gr royal jelly groups; in PCT value of 1 gr royal jelly group and PDW value of 2 gr royal jelly group according to the pre- and post-exercise intragroup comparisons. In the post-exercise intergroup comparisons, while a significant decrease was found in PDW variable of 500 mg royal jelly group, there was a significant increase in 2 gr royal jelly group. Literature supports that PDW value increases as long as the dosage of royal jelly increases. Amount of blood thrombocyte increases as a result of exercise because there is a thrombocyte secretion to blood from bone marrow, spleen and other storage of thrombocyte in organism (Koushki, Mollanovruzib, Rashidlamirc, 2013). In a study made on rats to examine the effects of exercise and royal jelly, there was a significant increase in PLT level of the group exposed to both exercise and royal jelly, compared to the group exposed just exercise (Ju-Fang, Lin-xiang, Jia-bin, et al., 2006). As a result of propolis supplementation on rats, there was no significant difference in PLT value in intergroup comparisons (Mohammadzadeh, Shariatpanahi, Hamed, et al., 2007). Also, in the study conducted to examine the effects of glycerol support on some hematological parameters on athletes doing exercise regularly and sedentaries, no significant difference was found in PLT value (Patlar and Keskin, 2007). In a study made by giving pumpkin seed flour at different doses to rats, a significant increase was found in PLT level (Adepoju and Adebajo, 2011). In another study including L-arginine supplementation on healthy men at the age of 18-25 years, a significant increase was detected in PLT count over the study. It was concluded that there is no difference based on the L-arginine and the decrease is related to the exercise (Corbett, 2009). This study has some limitations: Firstly, the participants were informed about dietary measures but were not controlled, and diet was not recorded the day

before the endurance exercise tests. Secondly, the exercise protocols were performed on highly physically trained individuals. Therefore, the responses observed may not be representative sample of sedentary individuals.

It is thought that the differences detected in the present study are related to the form of the exercise and the training level of athletes.

In conclusion, it is thought that 4-week royal jelly supplementation at different doses showed no adverse effect on hemogram for athletes, and also using different training programs and different doses (higher doses) on more volunteers in a long time can contribute to produce new knowledge.

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PLANNING AND PREPARATION OF PHYSICAL EDUCATION TEACHERS TOWARDS TEACHING PERIOD FOR THE IMPLEMENTATION OF FORM 4 PHYSICAL EDUCATION CURRICULUM FOR THE PHYSICAL FITNESS STRAND

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Abstract

Objectives. Teachers' planning and preparation before implementing any teaching and learning is vital. This study surveys the aspects of Physical Education teachers' planning and preparation in relation with teaching periods.

Methods. Survey method was employed in this study, with 50 Physical Education option teachers were involved as respondents. Descriptive statistics was used to analyze the study findings collected through questionnaires.

Results. The findings of this study showed that Physical Education teachers have planned and prepared their lessons at high levels. The planning and preparation made by the Physical Education teachers were to plan 5 periods for cardiovascular endurance topic (M=4.16; SD=.74), 4 periods for muscular endurance topic (M=4.06; SD=.71), 5 periods for muscular strength topic (M=4.12; SD=.72), and periods for teaching activities (M=3.90; SD=.87).

Conclusions. Based on the overall findings, it was found that Physical Education teachers have given more focus towards the planning of cardiovascular endurance topic.

Key Words: Planning and preparation, teaching period, implementation of Physical Education curriculum.

Introduction

Allocation of teaching period is the amount of time used by a teacher towards a certain subject, duty or activities in classroom (Arends, 1994). Teachers must make necessary planning related to the time allocated before starting any teaching. A good planning will maximize the usage of time allocated (Shahabuddin, Rohizani & Mohd Zohir, 2003). Fatimah (2000) has recommended time allocation for teaching into three stages in order to produce effective teaching. Firstly, the initial stage such as the induction, where during this time teachers will introduce the scope of teaching contents to the students to attract their interests and prepare them to accept the teaching and learning to be delivered. Secondly, the developmental stage where during this time teachers employ appropriate teaching method, use related teaching materials and conduct encouraging interactions with students. And thirdly, the closure stage where teachers make summaries related to the teaching contents that have been delivered to further strengthen students' comprehension as well as the achievement of teaching objectives. According to Sumarjo (2005), teachers have somewhat limited time to implement the teaching of Physical Education (PE). Therefore, while implementing the teaching, they must ensure that every second counts and fully utilized (Siti Aishah, 2007). Arends (1994) also stressed that the time allocated must be used effectively while teaching certain topics to maximize students' learning. United States Department of Health and Human Services (USDHHS) (2000) has recommended that

50% of the class time must be used to implement physical activities actively with students to achieve the objective of a healthy society, in 2010 in the United States of America. Beyer (2008) also seconded by stressing that the PE programmes in secondary schools must be allocated with sufficient time and activities to be able to attract students' interests. This showed that in any PE classroom, appropriate usage of time is vital in implementing physical activities to ensure the achievement of PE objectives. In addition, the Curriculum Development Centre (CDC) (1999) has stressed towards the approach of learning through physical activities to be used in the PE subject. While preparing for lessons, teachers must be smart to plan their time management wisely so that the amount of time is appropriate with the sub topics and important contents to be delivered to the students. This is due to the fact that time has significant impact towards the way a teacher teaches (Cuirkshank, 2003). According to a circular No. 25/1998, a total of 80 minutes a week (40 minutes per period) have been allocated to implement PE and Health Education (HE) in secondary schools. The total time allocated, if systematically planned, can of course assist in the process of the implementation of teaching and learning of PE. There are also schools that scheduled flexible timetables for PE, in which 80 minutes were allocated for one time per week to ease the implementation of PE in schools (Malathi, 2007). For the implementation process of teaching and learning of PE, flexible timetabling has always been applied. In a normal flexible timetabling, PE has always been conducted three or four times in a month as compared to Health Education which is only conducted once or twice per month. In relation to this,



PE teachers were required to properly plan whether to implement PE subject twice or thrice in a month. If the flexible timetabling can be implemented properly, it will definitely be helpful in achieving the determined lesson objectives. In the teaching and learning process of PE, sometimes the periods used were for other activities. For example, in a study conducted by Hynes-Hunter & Avery (2007) in relation with the timetabling block in PE programmes, it was found that most students wasted a lot of time to wait and managing thus having lesser time to complete activities. This circumstance can cause students to not have enough time to learn certain skills effectively. In a study done by Shabeshan (1998), it was found that students took quite a long time to change their clothes and manage equipments during the teaching and learning process of PE in schools. Thus PE teachers must be smart in making planning and preparation towards the teaching period for the teaching and learning of PE in schools. Thus, a PE teacher should plan the teaching period properly before implementing PE teachings. In planning the teaching period, PE teachers must at least able to identify the details to be done in teaching process. According to Kamaruddin&SitiHajar(2004), the time allocation for a certain time period can be utilized for the following: (a) Introduction of set induction, (b) teacher's explanation, (c) teacher and class, (d) class tasks, and (e) conclusion and summary of teaching and learning. Meanwhile, Mohnsen (2003) explained that PE teachers have the tendency to divide their class time into three categories. First is the students' matters time, where students actively involve in the teaching of PE. Second is the lecture time, where a chunk of time is allocated for students to sit and listen while teachers provide them with information. And third is the management time, where a certain portion of time is allocated for non-teaching activities such as queuing up, discipline and equipment management. All in all, whatever that will be conducted during the teaching and learning process, teachers must properly plan and make preparation with regard to the teaching period. This is to ensure that every planned items can be systematically implemented based on the planned time. Stillwell &Willgoose (1997) stated that the time allocated for all

activities when planning for the PE curriculum contents must be maintained within the teachers' teaching framework. This is because the total time allocated will directly influence what needs to be achieved in PE programmes (Pangrazi, 1997). Apart from that, a lot of time is being used for theory and practice in PE (Hynes-Hunter & Avery, 2007). Hence sufficient time is vital so that all students are able to complete the exercises during the teaching and learning of PE (Rink, 2002). This includes physical fitness exercises that require sufficient time for students to complete. PE teachers must ensure that the time for physical fitness exercises were planned properly before they are being implemented in the teaching and learning process of PE in schools. Based on the above arguments and explanations, PE teachers must plan the PE teaching period systematically before implementing teaching and learning process. Thus, the researcher will survey the extent to which PE teachers has made necessary planning and preparation towards the teaching period in the implementation of Form 4 PE curriculum for the physical fitness strand in secondary schools in Gombak district. At present, there is no research that studies about the planning of teaching period for PE in this country.

Research Framework

This study employed a descriptive framework to research about the planning and preparation of PE teachers towards teaching period aspect in the implementation of Form 4 PE curriculum for the physical fitness strand. Research Location and Sample. The study was conducted in secondary schools in the Gombak district, in the state of Selangor. Based on a source obtained from the Policy Planning and Research Division, Malaysian Ministry of Education, the total number of PE option teachers in Selangor in June 2008 was totalled at 371. Gombak is one of the districts that have a lot of PE option teachers, totalled at 50. This district is also active in sports programmes as compared to other districts. Therefore the researcher has decided to select Gombak as the research location.

Table 1 List of Secondary Schools in Gombak District and the Number of Physical Education Option Teachers

No	Schools	Number of Teachers
1.	SMT SgBuloh	2
2.	SMK Hillcrest	1
3.	SMK Kepong	2
4.	SMK Taman Selayang	2
5.	SMK Taman Malawati	1
6.	SMK Ideal Heights	1
7.	SMK Bukit Rahman Putra	2
8.	SMK Taman Desa	1
9.	SMK SgPusu	2
10.	SMK Gombak Setia	2



11.	SMK Taman Ehsan	3
12.	SMK Rawang	4
13.	SMK Hulu Kelang	1
14.	SM Teknik Gombak	2
15.	SMK SgKertas	3
16.	SMK Seri Selayang	2
17.	SMK SelayangBharu	1
18.	SBPI Gombak	2
19.	SMK Tuanku Abdul Rahman	3
20.	SBPI Rawang	1
21.	SMK DarulEhsan	2
22.	SMK Taman Keramat	1
23.	SMK Sri Keramat	1
24.	SMK Bukit Gading	1
25.	SMK Sri Kundang	2
26.	SMK Bukit Indah	2
27.	SMK Bandar TasikPutri	2
28.	SMK Sri Gombak	1

TOTAL	50
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Source: Gombak District Education Office (2008)

Based on Table 1 above, the researcher has involved all PE option teachers who were teaching PE for Form 4 students in secondary school in all of Gombak district. This is because the study conducted was related to the implementation of Form 4 curriculum for the physical fitness strand in secondary school, in which not all of the teachers in the studied schools have in-depth knowledge about the curriculum. To add, according to Julismah (2007), teachers who have qualifications in Physical and Health Education has already been exposed with a lot of knowledge related to contents and pedagogy during their training. Apart from acquiring pedagogical principles, trained PE teachers have also acquired professional teaching training experiences where they can apply the anatomy, physiology, biomechanic, psychology and human movement concepts in PE (Connor, 2009).

Research Instrument

Instrument is any tool used to obtain information, evaluate or study certain matter (Bhashah, 2007). This study employed questionnaires as instrument to obtain the research data. The instrument was constructed based on related theories, related researches, PE lesson syllabus, PE syllabus specifications, PE textbook, information from PE panel files and interviews as well as document analysis conducted by the researcher in several secondary schools in the state of Selangor.

Questionnaire

Questionnaire is a popular data collection technique and was frequently used in a survey study (Cohen & Manion, 1995). Questionnaire is useful to obtain facts about backgrounds, interests, viewpoints, and certain characteristics of research subjects (Alis, 2008). The information acquired from questionnaire is a primary data and can assist in fulfilling the needs of a study (Cheng, 2005). Therefore, questionnaire instrument has been used in this study. The questionnaire used the 'true' and 'false' items (Bhasah, 2007). The questionnaire was build based on the

interviews and document analysis done by the researcher in several national secondary schools in the state of Selangor. Through interviews with PE teachers and school administrators, the researcher was able to identify plenty of information related with the respondents. Meanwhile the findings from the analysis of a few documents such as the PE lesson syllabus PE syllabus specifications and the distribution of PE teaching periods were used as the sources to build the instrument. The questionnaire was build based on the steps proposed by Wan Chik (2007) as the following: (a) prepare questions, (b) distribute questions to a few samples, (c) collect and analyze the information, (d) prepare questionnaire based on the information analysis, (e) distribute questionnaire to a few samples, (f) collect and analyze again, (g) make correction if any weakness was detected to the questionnaire, (h) prepare questionnaire for the final distribution to samples, (i) distribute the questionnaire, (j) collect information from the samples and analyze the results and (k) write a report.

Instrument Validity and Reliability

Validity and reliability of an instrument is a very important procedure in the formation of any research instrument. Therefore, before the instrument is used for any actual study, the researcher must first confirm the validity and reliability.

Instrument Validity. Validity is a basic matter in quantitative study (Armstrong, Gosling, Weinman, Marteau, 1997). It is an important concept in the context of construct evaluations or concepts such as attitude, motivation, perception, fitness and achievement (Azizi, Shahrin, Jamaludin, Yusof & Abdul Rahim, 2007). Validity can be divided into two, which are external validity and internal validity. According to Balachandher (2005), internal validity includes content validity, criterion-related validity and construct validity. To obtain the validity of questionnaire instrument for this study, the researcher



has conducted the content validity. In conducting the content validity, the researcher has relooked and critically reread the sentences, words or appropriate sentence structures to see whether they were appropriate with the components in evaluation. This validity is vital to ensure that the instrument actually measure the concepts that needs to be measured (Azizi, Shahrin, Jamaludin, Yusof, & Abdul Rahim, 2007). For example, when the study was conducted to see the implementation of Form 4 PE curriculum for the physical fitness strand, the researcher included all the topics that were normally covered in the curriculum. This was done to ensure that the instrument really measure what needs to be measured. In evaluating the construct or implementation of Form 4 PE curriculum for the physical fitness strand, the dimension of contexts, resources, processes and products were given emphasis in selecting the items. Thus, the content validity was done to check the suitability of question items. The items were checked in terms of their sentences, focus and terminologies used. The more items that represent the dimensions for the constructs or concepts, the better its content validity will be (Azizi, Shahrin, Jamaludin, Yusof & Abdul Rahim, 2007). After detailed reviews was made towards the questions or statements in the instrument, the researcher implemented a two-phase process to acquire content validity as in a study conducted by Gurvitch, Blankenship, Metzler, & Lund (2008). In the first phase, the researcher sent the instrument to a six-panel member that has the expertise in PE field and programme evaluation and assessment so that they can provide reviews about the statements that were contained in the instrument as well as provide feedback related with the words and instrument contents. This is

Table 3 Questionnaire Coefficient and Reliability Value

Instrument	Variables / Technique	Analysis Technique	Cronbach's Alpha
Questionnaire	Teaching period	α	0.872

During the pilot study, a few feedbacks from PE teachers were recorded. From the feedbacks, the researcher has improved a few words and sentences in the questionnaire so that it can be easily understood by respondents. After improvements have been made, a second pilot study was conducted. The findings obtained from the second pilot study showed a higher reliability value for the questionnaire.

Data Analysis

Quantitative data obtained from the questionnaires were descriptively analyzed. Descriptive statistics were analyzed in the forms of frequencies, percentages, means and standard deviations to show the level of

because instrument formation is a very complex task which is related with technicalities hence expert assistance is very much required in related fields (Stufflebeam, 1985; Aiken, 1997). Azizi, Shahrin, Jamaludin, Yusof & Abdul Rahim, (2007) has also explained that the discovery of content validity is a consideration that can be done by using panel members to consider the extent to which the instrument fulfilled the standards. After receiving the checked instrument back from the panel members, the researcher reviewed it back and makes necessary corrections based on the critiques and recommendations. For the second phase of the content validity process, the researcher distributed the corrected instrument to two PE teachers to be completed. While providing responses, the PE teachers were also encouraged to make notes about any error and ambiguous statements regarding the contents of the instrument. The second phase was the final checking in validity process (Gurvitch, Blankenship Metzler & Lund (2008). The respondents involved in the second phase of validity process will not be involved in the actual study.

Instrument Reliability

The data compiled through all four methods (questionnaire, observation in the form of a structured checklist, interview in the form of a structured checklist and document analysis in the form of checklist) in this study is based on the research objectives set earlier. A pilot study has been conducted to obtain the instrument reliability as portrayed in Table 3. The pilot study for the questionnaire has been conducted in secondary schools in Hulu Selangor district, between February and April 2008 which involved 30 PE teachers.

planning and preparation of PE teachers towards the teaching period in the implementation of Form 4 PE curriculum for the physical fitness strand. To analyze the interpretations of mean values for the rating scale of 5- 'Very Satisfied', 4- 'Satisfied', 3- 'Somewhat Satisfied', 2- 'Not Satisfied', 1- 'Very Not Satisfied', the researcher has divided them into three levels of High, Medium and Low (refer to Table 4). This method has been used by Rudzi (2003), NikMohdRahimi (2004), and Mohamad Aderi & Rohani (2009) in their respective researches.

Example of Calculation:

Maximum Score = 5



Minimum Score = 1

Score difference divided with 3 levels, where $4 \div 3 = 1.33$

Score Difference = $5 - 1 = 4$

Table 4 Categories of Implementation Levels

Implementation Level	Total Score
Low	1.00 – 2.33
Medium	2.34 – 3.66
High	3.67 – 5.00

Research Findings

Background of Respondents

Table 5 showed the frequencies and percentages of respondents' backgrounds from the aspects of gender, race, age, teaching experience, highest academic qualification, teaching qualification and teaching option.

Table 5 Descriptive Statistics for Background of Respondents [Form 4 Physical Education Option Teachers in Secondary Schools in Gombak District] (N = 50)

Respondents' Background Information		Frequency	Percentage
Gender	Male	31	62.0
	Female	19	38.0
Race	Malay	42	84.0
	Chinese	2	4.00
	Indian	6	12.0
Age	21 – 25 years old	1	2.00
	26 – 30 years old	16	32.0
	31 – 35 years old	11	22.0
	36 – 40 years old	9	18.0
	Above 41 years old	13	26.0
Teaching Experience	<1 – 2 years	16	32.0
	3 – 4 years	13	26.0
	5 – 6 years	9	18.0
	7 – 8 years	2	4.00
	Above 9 years	10	20.0
Highest Academic Qualification	Malaysian Certificate of Education (SPM / MCE)	1	2.00
	Malaysian High School Certificate (HSC)	1	2.00
	Diploma	1	2.00
	Bachelor Degree	43	86.0
	Master Degree	4	8.00
Teaching Qualification	Teaching Certificate	3	6.00
	Diploma in Education	13	26.0
	Bachelor in Education Degree	29	58.0
	PGTTC / PGDE	5	10.0
Teaching Option	Physical and Health Education	37	74.0
	Sports Science Education	13	26.0



Note: HSC:High School Certificate; PGTTTC-Post Graduate Teachers Training Course; PGDE-Post Graduate Diploma of Education

From the gender aspect, male PE teachers (62%) were more than female PE teachers (38.0%). From the race aspect, Malay PE teachers (84.0%) were the majority respondents, followed by Indian (12.0%), and Chinese (4.0%). Most of the PE teachers aged between 26 to 30 years old (32.0%). The rest of the respondents aged above 41 years old (26.0%), between 31 to 35 years old (22.0%), 36 to 40 years old (18.0%) and 21 to 25 years old (2.0%). If viewed in terms of the experience of teaching Form 4 PE subject, 20.0% of the PE teachers have taught more than 9 years, 4.0% between 7 to 8 years, 18.0% between 5 to 6 years, 26.0% between 3 to 4 years, and 32.0% less than 2 years. In terms of the academic qualification, most of the PE teachers have obtained Bachelor Degree (86.0%), while the rest of them at Master Degree (8.0%), Diploma (2.0%), Malaysian High School Certificate (HSC) (2.0%), and Malaysian Certificate of Education (SPM / MCE)

(2.0%). While in terms of teaching qualification, 58.0% of them have acquired Bachelor in Education Degree, 26.0% with Diploma, 10.0% with PGTTTC / PGDE, and 6.0% with Teaching Certificate. Lastly, in terms of teaching option, a majority of 74% teachers who are teaching PE for Form 4 students in secondary schools in Gombak district were those with Physical and Health Education option and the remaining 26% with Sports Science Education option. Whether they are with Physical and Health Education or Sports Science Education option, both are trained teachers and have the expertise in teaching PE in secondary schools.

Teaching Period

Table 6 showed the mean, standard deviation and level of planning and preparation of PE teachers towards the elements contained within the teaching period components.

Table 6 Mean, Standard Deviation and Level of Planning and Preparation of Physical Education Teachers for Teaching Period Element (N=50)

<i>Teaching Period Element</i>	<i>M</i>	<i>SD</i>	<i>Level</i>
Planned 5 Periods for Cardiovascular Endurance topic	4.16	.74	High
Planned 4 Periods for Muscular Endurance topic	4.06	.71	High
Planned 5 Periods for Muscular Strength topic	4.12	.72	High
Planned Times for Teaching Activities [set induction, teacher's demonstration, students' demonstration, classroom teaks, groupworks, small games, questioning and answering session or discussions, assessments and assignments]	3.90	.87	High

M- Mean; SD- Standard Deviation

Based on Table 6, it was found that all the elements of teaching period acquired mean score values at high levels. The elements were: planned 5 periods for cardiovascular endurance topic (M=4.16; SD=.74), planned 4 periods for muscular endurance topic (M=4.06; SD=.71), planned 5 periods for muscular strength topic (M=4.12; SD=.72), and planned times for teaching activities (M=3.90; SD=.87). The teaching activities consisted of set induction, teacher's demonstration, students' demonstration, classroom teaks, groupworks, small games, questioning and answering session or discussions, assessments and assignments. Based on the findings, it was found that PE teachers also planned and prepared more time allocation towards the element of cardiovascular endurance topic.

Discussion. It was also evident that the level of planning and preparation of PE teachers towards the teaching periods that has been divided into a few different parts were high (M=3.95; SD=.82). Also, based on the findings, it was found that the elements of planned teaching periods were recorded at high levels:

planned 5 periods for cardiovascular endurance topic, planned 4 periods for muscular endurance topic, planned 5 periods for muscular strength topic, and planned times for teaching activities consisted of set induction, teacher's demonstration, students' demonstration, classroom teaks, groupworks, small games, questioning and answering session or discussions, assessments and assignments. The findings of this study is consistent with the stress made by Fatimah (2000). Fatimah (2000) in her statement has stated that the division of teaching periods into 3 parts was to produce an effective teaching. Based on Fatimah (2000) also, the parts were the initial part, developmental part and closure part. Firstly, the initial stage such as the induction, where during this time teachers will introduce the scope of teaching contents to the students to attract their interests and prepare them to accept the teaching and learning to be delivered. Secondly, the developmental stage where during this time teachers employ appropriate teaching method, use related teaching materials and conduct encouraging interactions with students. And thirdly, the



closure stage where teachers make summaries related to the teaching contents that have been delivered to further strengthen students' comprehension as well as the achievement of teaching objectives. A good planning will maximize the use of allocated time (Shahabuddin, Rohizani, & Mohd Zohir, 2003). Planning that involves the division of teaching periods that were arranged according to certain parts is very appropriate to be implemented so that the subject can be delivered at times which are appropriate to students.

Conclusions. Based on the overall findings, it was found that Physical Education teachers have given more focus towards the planning of cardiovascular endurance topic.

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INCREASING THE QUALITY OF LIFE IN FEMALE ADOLESCENTS BY IMPROVING THEIR PHYSICAL FITNESS

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Abstract

This research *aims* to emphasize the improvement of the functional development (fitness) markers by using aerobic gymnastics means. This research tries to improve the female adolescents' fitness and quality of life through the use of aerobic gymnastics means, to motivate them to independently and long term practice physical exercises, both during physical education classes, and during their leisure time.

The goal of this research is to increase the quality of life in female adolescents, as a result of the improvement in their physical fitness, through the practice of specific aerobic gymnastics physical exercises. As research methods we used: the bibliographical study, the testing method, the experiment method, the statistical-mathematical method, and the graphical representation method.

Methods. The research comprised a number of 40 subjects (20 female adolescents forming the experimental group, and 20 the control group), aged between 18 and 25, and it was conducted at the "Vasile Alecsandri" University of Bacău. The subjects went through a fitness-type aerobic gymnastics program, three times per week. The program comprised harmonious physical development exercises, stretching, relaxation exercises, coordination drills, which envisaged the improvement of the body's functionality markers. The effectiveness of the applied methods was assessed through the Ruffier test, used to evaluate the adaptation to effort. The research data highlight the increase in the quality of life, as a response to the improvement of the subjects' fitness and adaptation to effort.

Results. In regards to the *functional assessment* (the Ruffier test), the data recorded during the initial tests emphasized an insufficient adaptation to the effort, and a poor physical fitness in both groups. The progress of the experimental group, compared to the control group's indicates the effectiveness of the aerobic gymnastics programs, through the values of the Ruffier index that increased from an insufficient adaptation (in the initial assessment) to a medium adaptation to effort (in the final assessment). For the functional capacity, the experimental group recorded significantly better result than the control group, reaching optimal values.

Conclusions. After analyzing the data, one can see that the final results are improved, which proves the effectiveness of the means and methods used here to improve the functional effort capacity.

Using individualized programs and combining different forms of aerobic gymnastics practice, by their contents, help maintain health, improve and correct the morphological line, giving the body a harmonious line and correct posture, which leads to a better quality of life.

Key words: aerobic gymnastics, effectiveness, improvement, physical fitness, quality of life

Introduction

The quality of life "represents the assessment index for the human life, measuring the level of success of an individual or a society" (Carr, Higginson, 2001). In a synthesis, one can say that the quality of life area is defined as being "the entire aspects of personal and societal life that are under the action of objective, subjective, and political factors" (Grigore, 2007). "The movement performed through exercising, professional and non-professional athletic performance, contributes to the creation of a positive self-image, to the implementation in the daily life activities of certain

self-regulating mechanisms for the psycho-behavioral states" (Rață G., Rață Gh., 2008, p.9).

"Considering that the beneficial effects of exercising are multiple and work on different levels" (Bota, 2006) (physical, psychological, and social), one can say that they represent a way of improving the physical fitness, and, implicitly, are a means to secure a high level of the quality of life. A correct lifestyle ensures a good state of health and a better quality of life.

Material and method

This paper aims to present a an optimal working strategy that would improve the female

adolescents' fitness, as an opportunity to increase their quality of life, by creating individualized athletic

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activities programs based on aerobic gymnastics means. The research started from the hypothesis stating that the aerobic gymnastics means plays an important role in the life of a certain segment of the young female population, occupying a special place in the female adolescents' leisure time.

The research tasks envisaged to:

- select certain exercises with an increased effect on improving the fitness, as well as certain aerobic gymnastics complexes, applied through the circuit method;
- choose the subjects for the experiment;
- measure and test the subjects at the beginning and at the end of the experiment;
- record the results;
- do a statistical analysis of the data resulted after the tests, and elaborate the paper.

The research methods used were: study of the bibliographical material, the observation, the experiment, the tests, the statistical-mathematical method and the graphical representation method. For the analysis and interpretation of the data recorded during the research, I used Microsoft Office Excel 2003, to calculate the following indices: arithmetical mean, dispersion, standard deviation (SD), variability coefficient (VC), student's T test - paired samples (Fisher), student's T test - independent samples (F Levene), and the calculation of the regression factor or the enhancement of the effect (r^2) (SPSS: General linear model – univariate).

The research comprised a number of 40 female students (20 forming the experimental group, and 20 the control group), aged between 18 and 25. The research was conducted at the "Vasile Alecsandri" University of Bacău, throughout the academic year 2012-2013, taking 28 weeks, and 84 aerobic gymnastics lessons. The experimental group subjects were involved in aerobic gymnastics programs, while the control group subjects participated only in standard physical education lessons. The main functional parameters were assessed through the Ruffier test,

Results of the research

The results of the study are relevant, superior values being recorded during the final tests, proving

which evaluates the physical fitness, and is based on the variations of the heart beat during three moments: rest, right after the effort, and cool-down. The immediate modifications of the cardiac and vascular parameters, emphasized by the increase of the main functional parameters' values are in tight correlation with the individual's training level, the intensity, duration, and volume of the performed effort. According to the recorded values, indications can be given to improve the person's fitness through training.

The time allocated to an aerobic gymnastics program was 60 minutes, information being given to the female students at the end of each lesson, from the professional publications regarding the role of physical exercises, diet, eating, relaxation, rest. The participants benefited from three aerobic gymnastics lessons per week, on Monday, Wednesday and Friday, the female adolescents' training being in accordance with the aim and goals set for the experimental research. The aerobic gymnastics programs were repeated in those days, with a different dosage. During these aerobic gymnastics programs, individualized programs were performed also, according to the needs of each female student, especially for the areas that needed muscular strengthening for modeling a harmonious body. The individualized programs were performed once a week, on Wednesdays, respecting the aerobic gymnastics lesson parts.

During the warm-up part, the aerobic part, and the cool-down part, there were no modifications, the difference in regards to the individualized programs being made by the muscle groups' development part, through the number of repetitions performed for each area. A varied assortment of exercises was used, from basic gymnastics, ballet, specific aerobic gymnastics steps, classical and modern dance. In order for the lessons not to become monotonous and the exercises boring, new and varied exercises were introduced. The performed exercises were correlated with music and dancing, using gymnastics objects and apparatuses, to make them more attractive.

the effectiveness of the methods that were applied and of the operational models used during the experiment. Table 1 presents the data recorded during testing.

Table 1. Statistical values of the Ruffier index, initial and final assessment

Ruffier Index	Group	X. I.T.	X. F.T.	S. I.T.	S. F.T.	Vc I.T.	Vc F.T.
Aerobic functional capacity (Ruffier Test)	Experimental	11.48	7.45	1.42	0.38	12.40%	5.13%
	Control	11.52	9.68	1.26	0.61	10.95%	6.31%

Legend: X – arithmetical mean; S – standard deviation; Vc (%) – variability coefficient; I.T. – initial testing; F.T. – final testing.

Table 2. Correlations between the Ruffier initial and final tests

Ruffier Index		No. of subjects	Correlation	Sig. (p < 0.05)
1	Ruffier Initial & Final (experimental)	20	.806	.000

Ruffier Index		No. of subjects	Correlation	Sig. (p < 0.05)
1	Ruffier Initial & Final (experimental)	20	.806	.000
2	Ruffier Initial & Final (control)	20	.867	.000

Legend: E – experimental; C – control; sig – significance threshold (p < 0.05).

When testing the aerobic capacity (Ruffier test, Table 2), one could see that there is a direct correlation between the initial and final tests, the correlation coefficient values for the experimental

group being around 0.806, and for the control group, around 0.867, which shows a good positive correlation; it fits in the 0;1 interval (p < 0.05).

Table 3. Paired samples Student's t-test for the Ruffier index

	Pair difference					t	df	Sig. (p < 0.05)
	Arithmetic mean	Standard Deviation	Standard Deviation from the mean	95% the confidence interval of the difference				
				Minimum value	Maximum value			
R. I./F. E	4.03000	1.13791	.25444	3.49744	4.56256	15.838	19	.000
R. I./F. C	1.84000	.79233	.17717	1.46918	2.21082	10.385	19	.000

Legend: E – experimental; C – control; T – Student's t-test; df – number of degrees of freedom (it indicates the volume of the group, the equation being df=n-1, n – representing the number of subjects); sig – the significance threshold (p < 0.05).

In order to see whether the results are significant, the obtained t values were compared with the t values in the Fischer table, corresponding to df = n-1 degrees of freedom, and a confidence interval of 95% (0.05).

If the obtained t values are higher than the Fischer table t value, one can conclude that the differences are significant, if not, one can say that they are insignificant.

Table 4. Independent samples Student's t-test

		Levene's Test for the variance equality		T test - for the means equality						
		F	Sig. (p < 0.05)	t	df	Sig. (p < 0.05)	Difference of the means	Standard deviation for the difference	The confidence interval of the difference 95%	
									Minimum value	Maximum value
Ruffier	there are no sign. diff. between variances	5.448	.025	-13,842	38	.000	-2.23000	.16110	-2.55613	-1.90387
	there are sign. diff. between variances			-13.842	31,878	.000	-2.23000	.16110	-2.55613	-1.90387

Legend: F – Levene test value; sig – significance threshold (p < 0.05 or 95%); T – Student's t-test.

One can see that the Levene's F test value (table 4) is statistically significant (F=5.448, p<0.05). The obtained t value is t(31.878)= 13.842, p<0.01, results that lead to the confirmation of the initial hypothesis. The increase of the effect in the case of the

Ruffier test (table 5) is given by the value of r2=0.835, indicating a percentage of 84; this means that the applied aerobic gymnastics programs had a great effect.

Table 5. Measurement of the effect in the Ruffier test

Source	Sum of the type III squares	df	Means' square	F	Sig. (p < 0.05)	Effect increase
Corrected model	49.729	1	49.729	191,614	.000	.835
Intercept	2934.369	1	2934.369	11306.634	.000	.997
Iv	49.729	1	49,729	191,614	.000	.835
Error	9.862	38	.260			
Total	2993.960	40				
Corrected Total	59.591	39				

a. $R^2 = .835$ (R^2 adjusted = .830)

Legend: df – number of degrees of freedom (it indicates the volume of the group, the equation being $df = n - 1$, n – representing the number of subjects); F – Levene test value; sig – significance threshold ($p < 0.05$).

Discussions

The experimental group recorded an average value of 11.48 in the initial testing, and of 7.45 in the final testing. The control group recorded an average value of 11.52 in the initial testing, and of 9.68 in the final testing (Figure 1). The difference between the two tests was improved by a percentage of **4.03** in the experimental group, and by a percentage of **1.84** in the control group. The variability coefficient shows a high homogeneity in both groups, both in the initial and in the final tests (Table 1). The obtained Student's t-test values ($t = 15.838$ experimental group and $t = 10.385$ control) are higher than the value of the variable $t = 2.093$ in the Fischer table (table 3), for $df = 19$ degrees of freedom, and a confidence interval of 0.05 or 95%. This interpretation of t, as well as the $p < 0.05$, indicates the fact that the differences are significant for both groups. In order to see whether the aerobic gymnastics was effective, and whether there are significant differences between the experimental and the control group, the independent t test was used. The interpretation was done according to the significance threshold and the Levene (F) test value. If $p < 0.05$ and F have a high enough value, then the differences are statistically significant and goes on the second row (meaning there are significant differences between the variances), which is why the value of the second t from the Student's t-test was chosen.

“Physical activity performed regularly and following certain rules, makes an individual get access to a superior (optimum) quality of life” (Suciu, Aldea, Dumitru, PASS 2005).

Dobrescu T., in 2008, considers that any form of practising physical exercises regularly, leads to getting a good physical condition.

We consider that the manner for *optimizing physical condition in order to ensure an increase of the quality of life*, by specific and personalized motor means for different adult categories, is important for the field of study, both scientifically and practically, idea which is also supported by Enache, in 2001.

Conclusions

The superior results obtained in the final tests prove the effectiveness of the individualized aerobic

gymnastics used during this research, which had an effect on the development level of the functional indices, thus confirming the initial hypothesis stating that the aerobic gymnastics means play an important role in the life of a certain segment of the young female population, occupying a special place in the female adolescents' leisure time.

The Ruffier index values increased from an insufficient adaptation level in the initial assessment, to a medium level of adaption to effort in the final assessment.

The aerobic gymnastics programs had favorable effects on the development of the respiratory system by strengthening the diaphragm, and amplifying the respiratory movements, aspects proven by the increase of the vital capacity, showing the effectiveness of the means used to improve the subjects' fitness and quality of life.

The recorded results indicate the fact that the individualized aerobic gymnastics programs that were applied to the experimental group subjects had a greater effect on the functional development indices (physical fitness), in comparison to the control group subjects, who underwent standard physical education programs.

The way in which *fitness is improved, in order to increase the quality of life* through specific and personalized motor means, for different categories of adults, is important for our field, both from a scientific, and from a practical standpoint.

I believe it is useful to use the aerobic gymnastics structures with an adequate musical background during the female adolescents' physical education lesson, this contributing to the creation of a good working mood, allowing the effort to be performed easier, effort that leads to the development of the psycho-motor skills, and especially to a harmonious physical development.

These structures can educate and train one of the basic components of “human bodily beauty” (Luca A., 2001), the expressiveness of movements and the moral traits of the personality.

Through a regular practice of physical exercises, one can reduce the states of depression,

distrust, increase the resistance to stress, the ability to focus, improve the self image and increase self-confidence, the physical exercises having beneficial effects also on one's psyche.

The purpose for practicing various physical activities is to increase one's quality of life by: increasing one's physical capacity, improving one's physical fitness, increasing one's self-confidence, increasing one's enjoyment of physical activity.

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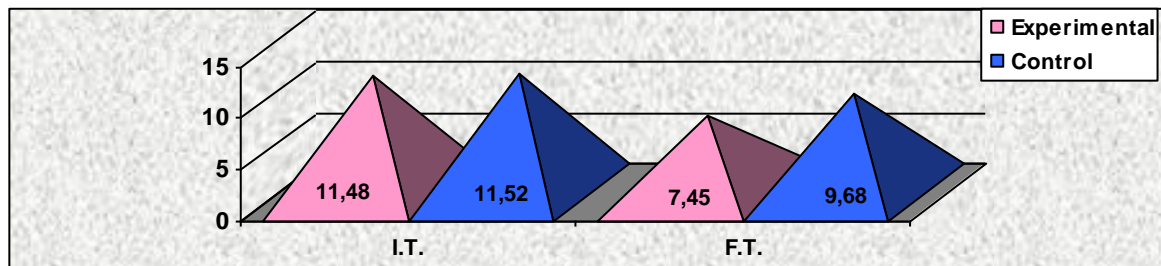


Figure 1. Ruffier Index



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Original article

THE CORRELATION BETWEEN CRITICAL THINKING DISPOSITION AND INTERNAL-EXTERNAL LOCUS OF CONTROL OF CANDIDATE STUDENTS WHO PARTICIPATED IN SPECIAL TALENT EXAMINATION IN SCHOOL OF PHYSICAL EDUCATION AND SPORTS EGE UNIVERSITY

ZIYA BAHADIR¹, ZEHRA CERTEL², BEHZAT TURAN³

Abstract

The aim of this study was to investigate the critical thinking disposition levels and the locus of control in terms of the gender, high school type and doing regular sports among the candidate PE students who participated in special talent examination in physical education and to determine the correlation between the critical thinking disposition and the internal-external locus of control.

Methods. The population of the study was 526 candidate PE students who participated in special talent examination of School of Physical Education and Sports, Ege University during 2010-2011 academic year. Sample of the study were 356 candidate PE students (119 female students and 237 male students) who were recruited using random sampling method. As the data collection tools; California Critical Thinking Disposition Scale (CCTDI) adapted into Turkish by Kökdemir (2003) and Rotter's Internal-External Locus of Control Scale developed by Rotter (1966) and adapted into Turkish by Dağ (1991) and a personal information form were used.

Results. It was found that there was significant difference in critical thinking disposition of the candidate students according to the high school type. In addition, internal-external locus of control of the candidate students were found significantly to be different in gender variable. It was seen that there was a significantly negative correlation between critical thinking disposition and internal-external locus of control of the candidate students ($r=-.144$, $p=.007$; $p<.05$).

As a conclusion it is important to instill students critical thinking ability against problems of school life and daily life as well as to teach them the belief that control over future outcomes depends mainly on them. Moreover; the study can be conducted with different samples.

Key words: Internal-external locus of control, critical thinking and critical thinking disposition, special talent examination.

Introduction

Individual differences in education are important factors that influence success of the students. The factors affecting one's success may include motivation, intelligence, abilities, locus of control, thinking skills and attitudes and learning types. These factors constitute the foundation of human education. Özden (2000) argues that thinking skills consist of critical thinking, problem solving, reading comprehension, scientific thinking, creative thinking and creative problem solving abilities. The effective use of critical thinking ability leads to high level of thinking. Taking the place of the studies investigating thinking ability; critical thinking tries to explain how individuals think and decide (Kazancı, 1989).

The term critical thinking disposition refers to a person's internal motivation to think critically when faced with problems to solve, ideas to evaluate or decisions to make. These values, attitudes and inclinations are dimensions of one's personality which relate to his likelihood to approach problem identification and problem solving by using reasoning (Giancarlo, Blohm, & Urdan, 2004).

Critical thinking may not always be employed. The

first reason is not to have the ability to think critically. In cases where individuals do not have necessary tools, a healthy critical thinking does not occur. The second reason is that if we are of the opinion that we can do but cannot do, it is due to the fact that critical thinking is regarded as a difficult and uncomfortable thing. In this case; it is clear that we do not have critical thinking tendency needed to think critically (Gündoğdu, 2012). According to Gündoğdu (2012); individual with critical thinking possesses some characteristics, too. Those who can manage to think critically can think analytically, are open-minded, seek the truth and are systematic. Those without analytical thinking are unable to think critically. Being open-minded, another feature of the critical thinking, is also important to attain the correct outcome. Those who are not open-minded fail to criticize properly because they are blind to the truth. Those with critical thinking seek the truth. Another prerequisite for critical thinking is being systematic. A thinking style not systematic is left to chance and is not suitable for critical thinking. Besides; each of these above-mentioned critical thinking characteristics are identified as "subscales" of critical thinking (Watson and Glasser, 1994; Kazancı, 1989; Halpern, 1996).

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In sum, critical thinking is closely linked to cognitive processes. For this reason, it can be expected to influence behavioral tendencies of individuals in a relationship. However, control beliefs are also crucial in explaining behavioral tendencies (Bandura, 2001). Locus of control is a personal characteristic that influences directly correct decision-making behaviors. The term of locus of control has been the focus of many researches for over 35 years and its relation to numerous personality variables or personality behaviors has been examined (Dağ, 1991). The concept of locus of control has its origin in social learning theory of Rotter (1954, 1966). In general, locus of control refers to a personality or dispositional variable reflecting the tendency to perceive events as being either a consequence of one's own actions or a consequence of outside factors such as fate, chance or powerful others that are beyond one's personal control (Bearinger& Blum, 1997; Marks, 1998). Rotter's (1966) original locus of control classification places generalized beliefs concerning who or what influence consequences on a bipolar dimension from internal to external control. *Internallocus of control* is the term used to describe the belief that control for future outcomes resides primarily in oneself. That is, people with internal locus of control believe that outcomes are consequences of their own actions rather than luck/chance, fate or others. They also Table 1. Information about the Candidate Students

believe that their own experiences are controlled by their own skills and efforts. By contrast, *externallocus of control* refers to the expectancy that control of outcomes is outside of oneself. People who tend to have externallocus of control tend to attribute their experiences and outcomes to external factors such as fate, chance or luck (Lefcourt, 1982). Departing from the idea that locus of control and critical thinking play a key role in the education of the students; we thought that examination of the correlation between these two terms was necessary. Individuals should be educated by instilling critical thinking and internal locus of control so that they can be successful in different areas, can develop a positive personality under any circumstances, can live and think productively, creatively and positively to maximize their life perceptions.

Method

Participants. The population of the study consisted of 526 students who were enrolled in special talent examination of the School of Physical Education and Sports, Ege University during 2010-2011 academic year. The study was conducted with 356 candidate PE students (119 female students and 237 male students) who were recruited using random sampling method. Table 1 included information on the candidate students.

Variables		n	%
Gender	Females	119	33.4
	Males	237	66.6
High School Type	General	198	55.6
	Vocational	65	18.3
	Anatolian	93	26.1
Academic Field studied at high school	Turkish-Social	138	38.8
	Math-Natural	80	22.4
	Turkish-Math	138	38.8
Place of Residence	Village	55	15.4
	County	78	21.9
	Province	94	23.6
	Metropolitan City	139	39.0
Status of doing Sportive activities regularly	Yes	296	83.1
	No	60	16.9
Total		356	100



Data Collection

As the data collection tools; California Critical Thinking Disposition Scale (CCTDI) and Rotter's Internal-External Locus of Control Scale developed by Rotter (1966) and adapted into Turkish by Dağ (1991) and a personal information form were used. The administration of the scales and the form were made after enrollment for the examination.

California Critical Thinking Disposition Scale (CCTDI)

The scale was developed as a result of Delphi project organized by American Philosophy Association in 1990 (cited by Kökdemir, 2003). CCTDI is a Likert-type scale, consists of 75 items with 7 subscales and is designed to measure critical thinking disposition of the university students. The subscales are Curiosity, Open-mindedness, Systematicity, Analyticity, Truthseeking, Self-Confidence, and Maturity (Facione et al., 1995; Kökdemir 2003). Turkish adaptation of the scale was performed by Kökdemir (2003) on 913 students. As a result of item-total score correlation and principal component analysis; the scale was reduced to 51-item scale from 75-item scale; to 6 subscales from 7 subscales. Internal consistency coefficients of the new scale with 6 subscales ranged from .61 to .78 and total internal consistency coefficient of the scale was calculated 0.88 (Kökdemir, 2003). The internal consistency coefficients of CCTDI ranged from .57 to .22 and total internal consistency coefficient of the scale was calculated .89 in this study. Minimum score to be obtained from a subscale is 10 while maximum score is 60 in CCTDI. High scores to be obtained from the subscales indicate that participant's disposition to that subscale is high, too. A score <40 obtained from a subscale indicates low level of critical thinking disposition while a score >50 indicates high level of critical thinking disposition. Addition of the subscale scores yields total score. The lowest total score is 60 while the highest total score is 360. In this regard, a score < 240 indicates low level of critical thinking disposition while a score > 300 indicates high level of critical thinking disposition (Kökdemir 2003). CCTDI is also utilized for the validity of the educational programs designed to improve the critical thinking tendencies and/or critical thinking skills. Kökdemir

(2003) defines it as a scale which was designed with the help of critical thinking literature and possessed a rich institutional base.

Rotter's Internal-External Locus Of Control Scale

The scale, developed by Rotter (1966) and adapted into Turkish by İhsan Dağ (1991), defines internal locus of control and external locus of control on the results of the events, reflects a generalized expectation and classifies individuals as internally controlled and externally controlled. Validity and reliability tests of the scale were performed on university students. Test-retest reliability coefficient was .83. Reliability coefficient calculated by KR-20 technique was .68 and Cronbach Alpha internal consistency coefficient was .70. Because no standard score table and norm table were presented for the assessment of the scale; statistical analyses were made with raw scores. Despite being composed of 29 pair-items; 23 pair-items are used for scoring and other six items were filler items. They are not scored as part of the scale. Respondents must choose the statement -A or B- for scoring. The scores to be obtained from the scale vary between 0 and 23. Higher scores indicate high level of one's belief in external locus of control.

Data Analyses

Descriptive statistics included frequencies (n), percentages (%), arithmetic means (\bar{X}) and Standard deviation (Sd). To explore the differences; non-parametric tests -Mann-Whitney U and Kruskal Wallis tests- were employed because conditions of normal distribution and homogeneity did not occur in variables of gender, high school type (the school from which participants graduated) and academic field in high school. The correlation between CCTDI and locus of control was tested using Spearman correlation coefficient.

Findings

Findings Related To Critical Thinking Dispositions Of The Students

Mean CCTDI score of the students was 253.40±32.62. Table 2 included the data about whether or not CCTDI scores of the students differed in terms of gender, high school type and academic field in high school.

Table 2. Results regarding mean CCTDI scores of the Students in terms of gender, High School Type (high school from which participants graduated) and academic field at high school.

Variable	n	Mean Rank	P difference			
Gender	Females	119	172.88			
	Males	237	181.32			
	General	198	186.03			
High School Type	Vocational	65	146.63	$\chi^2=7.638$.022*	2-1



	Anatolian	93	184.75		2-3
Status of doing sportive activities regularly	Yes	296	179.48		
	No	60	173.67	U=-.399	.690

*p<.05

When Table 2 was investigated; it was found out that there was a statistically significant difference between students' mean CCTDI scores, and high school where the students studied ($\chi^2=7.638$; $p=.022$; $p<.05$) and academic field at the high school ($\chi^2=14.975$; $p=.001$; $p<.05$) whereas no statistically significant difference was found between students' mean CCTDI scores and gender ($\chi^2=-.730$); $p=.465$; $p>.05$). Mean CCTDI scores of the students who graduated from vocational high schools were lower than those who graduated from Anatolian High Schools (a kind of general high school to which academically more successful students

attend) and General High Schools. Mean CCTDI scores of the students who studied Turkish-Math were lower than those who studied Turkish-Social Sciences and Math-Natural Sciences.

Findings Related To Rotter's Internal-External Locus Of Control Scale

Mean score of the internal-external locus of control scale of the students was 11.24 ± 2.68 . Table 3 included the data about whether or not Rotter's Internal-External Locus of Control Scale scores of the students differed in terms of gender, high school type and academic field in high school.

Table 3. Results regarding internal-external locus of control scale of the Students in terms of gender, High School Type (high school from which participants graduated) and academic field at high school.

Variable	n	Mean Rank		P	
Gender	Females	119	211.72		
	Males	237	161.82	U=-4.357	.000**
High School Type	General	198	177.58		
	Vocational	65	189.72	$\chi^2=1.114$.573
	Anatolian	93	172.62		
Status of doing sportive activities regularly	Yes	296	177.45		
	No	60	183.68	U=-.431	.666

*p<.05

When Table 3 was investigated; it was found out that there was no a statistically significant difference between CCTDI total scores, and high school where the students studied ($\chi^2=1.114$; $p=.573$; $p>.05$) and academic field at high school ($\chi^2=.875$; $p=.646$; $p>.05$) while a statistically significant

difference was found between students' mean CCTDI scores and gender ($\chi^2=4.357$); $p=.000$; $p<.05$). Mean locus of control score of female candidate students was higher than male candidate students; which means that male candidate students were more internally controlled than female students.

The Correlation Between Critical Thinking Tendencies Of The Students And Their Locus Of Control

Table 4 were represented Spearman Correlation Coefficients calculated through mean scores of "CCTDI" and "Locus of Control" Scales.

Table. 4. Correlation between CCTDI and Locus of Control Scales.

CCTDI	Open-mindedness	Analyticity	Inquisitiveness	Self-Confidence	Systematicity	Truth-seeking	CCTDI Total
Locus of Control	$r=-.142^{**}$ $p=.007$	$r=.200^{**}$ $p=.000$	$r=-.086$ $p=.104$	$r=-.120^*$ $p=.024$	$r=-.141^{**}$ $p=.008$	$r=-.019$ $p=.726$	$r=-.144^{**}$ $p=.007$

**P<.01, *p<.05



As seen in Table 4; when students' (n=356) means scores obtained from CCTDI subscales and CCTDI total and mean scores obtained from locus of control scale were analyzed; it was seen that there was a negative and significant correlation between Locus of Control Scale and CCTDI Open-mindedness ($r=-.142$, $p=.007$; $p<.01$), CCTDI Analyticity ($r=-.200$, $P=.000$; $p<.01$), CCTDI Self-Confidence ($r=-.120$, $p=.024$;

Discussions

The following results were obtained from the study which was conducted so as to evaluate critical thinking and locus of control of the students who participated in special talent examination in terms of gender, types of the high school and status of doing regular sports and to explore the correlation between critical thinking dispositions and locus of control:

It may be argued that candidate students had positive and moderate level of mean scores. In the studies of Kökdemir, (2003) Korkmaz and Yeşil (2009), Saçlı (2008), Certel and Yalçınkaya (2011) and Certel et al. (2011a); similar results were obtained. In the study, gender and doing regular sports did not influence critical thinking tendency. There are many studies that concluded that gender did not influence critical thinking tendency among the university students (McDonough, 1997; Scott et al. 1998; Çekiç, 2007; Saçlı, 2008; Certel and Yalçınkaya, 2011; Certel et al. 2011a). CCTDI of the candidate students differed in terms of the academic fields which they studied and graduated from. Critical thinking scores of the students who graduated from vocational high schools were lower than those who graduated from other high schools. Because mean scores of locus of control of the students were near to average scores of the scale; it may be considered as moderate. In the study; it was found out that male candidate students were more internally controlled than female candidate students. In the study of Yeşilyaprak (1988); no correlation was found between locus of control and gender while in the studies of Korkut (1986) and Arıcağ (1995), it was discovered that male students were more internally controlled than female students; which concurred with our study. In the study; it was concluded that type of the high school from which students graduated and status of doing regular sports did not affect locus of control. In the study; it was seen that there was a negative and significant correlation between Locus of Control Scale and CCTDI Open-mindedness, CCTDI Analyticity, CCTDI Self-Confidence, CCTDI Systematicity and CCTDI total. In the study of Saracaloğlu and Yılmaz (2011) on candidate classroom teachers; it was noted that there was a positive and low correlation between locus of control and CCTDI total scores. Teachers with external locus of control had higher critical thinking attitude scores. In the study of Derelioğlu (2004) on university students; there was a negative and significant correlation; which was in line with our study. It is known that those with critical thinking tendency possess such positive characteristics

$p<.05$), CCTDI Systematicity ($r=-.141$, $p=.008$; $p<.01$) and CCTDI total ($r=-.144$, $p=.007$; $p<.01$). On the other hand; no statistically significant correlation was found between Locus of Control Scale, and CCTDI Inquisitiveness ($r=-.086$, $p=.104$; $p>.05$) and CCTDI Truth-seeking ($r=-.019$, $p=.726$, $p>.05$).

as effective problem-solving, producing effective solutions, ability to be open-minded, ability to face their own prejudices and ability to be open to experience. Kökdemir (2003) found that students with high critical thinking tendency gave more rational answers to the questions of decision-making as compared with those with low critical thinking tendency. Besides; Skinner (1996) emphasized that individuals who have internal control perceive higher level of control over events, keep trying and do not surrender when they face difficulties. Although the literature is not rich in interaction between critical thinking and locus of control; Williams and Stack (1972) and Ducette and Wolk (1973) reported that those with internal locus of control were quicker in finding clues that facilitate right decision-making than those with external locus of control. Also; those with internal locus of control can remember past performances better than those with external locus of control and can get use of these past performances in order to predict the future performance correctly. In this sense; that individuals with internal locus of control had higher level of critical thinking tendency – that is, a negative correlation- was in agreement with the literature.

As a conclusion; it is important to instill students critical thinking ability against problems of school life and daily life as well as to teach them the belief that control over future outcomes depends mainly on them. Moreover; the study can be conducted with different samples.

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Objective. The aim of this study is to examine the relationship between skinfolds method (accu-measure caliper) and near-infrared method (FUTREX 1000 Personal Body Fat Tester)

Methods. We used Romanian university students (27 males and 97 females). The body fat percentage was measured by two methods: the skinfolds measurements...

Results. Body fat estimated with accu-measure caliper was moderate correlated with body fat estimated with FUTREX for women ($r = 0.41$)...

Conclusions. We cannot consider that one method of body composition analysis (skinfolds method or near-infrared method) is more accurate than...

Key Words: skinfolds method, near-infrared method, percentage of body fat, fat mass, free fat mass, Romanian students.

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¹ Department of Obstetrics, Gynecology and Women's Health, Division of Biological Sciences, University of Missouri, Columbia, MO 65212, USA. CORRESPONDENCE AND REPRINT REQUESTS: Alissa Viollet, NW509 Health Sciences Center, 1 Hospital Dr., Columbia, MO 65212, USA. aviollet@missouri.edu, tel. 573-882-6334, fax. 573-882-6399

² Department of Anatomy, Institute of Biomedical Sciences, University of São Paulo, CEP São Paulo 05508-900, Brazil. GRANT SUPPORT: Eunice Kennedy Shriver National Institute of Child Health and Human Development HD055231.



The aim of this study was to examine the relationship between skinfolds method (accu-measure caliper) and near-infrared method (FUTREX 1000 Personal Body Fat Tester) for body fat percent, fat mass and free fat mass estimations, in Romanian university students. We used Romanian university students (27 males...

Key Words: skinfolds method, near-infrared method, percentage of body fat, fat mass, free fat mass, Romanian students.

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The chapters: Introduction, Methods, Results, Discussions, Conclusions, Thanks (if necessary) and Bibliography will be written on two columns, except for the tables and charts which will be written on a single column, following the rules of laying out the page..

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Relationship between skinfolds and near-infrared (FUTREX 1000) methods for body fat estimation in Romanian university students

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IONESCU TUDOR MADALIN, PHD ¹, MARCU ANDREI, MS ²

Abstract

Objective. The aim of this study was to examine the relationship between skinfolds method (accu-measure caliper) and near-infrared method (FUTREX 1000 Personal Body Fat Tester) for body fat percent, fat mass and free fat mass estimations, in Romanian university students.

Methods. We used Romanian university students (27 males and 97 females). The body fat percentage was measured by two methods: the skinfolds measurements (accu-measure caliper) and near-infrared measurement (Futrex 1000).

Results. Body fat estimated with accu-measure caliper was moderate correlated with body fat estimated with FUTREX for women ($r = 0.41$) and for men ($r = 0.55$). Fat mass (skinfolds method) skinfolds method and free fat mass (skinfolds method) were moderate correlated with fat mass (near-infrared method), respectively free fat mass (near-infrared method) for women ($r = 0.41$, respectively $r = 0.41$) and correlated for men ($r = 0.60$, respectively $r = 0.60$).

Conclusions. We cannot consider that one method of body composition analysis (skinfolds method or near-infrared method) is more accurate than the other because we don't apply a gold standard method of measurement, for subjects. However, near-infrared method trends to have higher estimations of body fat, then skinfolds method on Romanian students.

Key Words: skinfolds method, near-infrared method, percentage of body fat, fat mass, free fat mass, Romanian students.

Introduction

The increase in obesity is a global phenomenon that is even being addressed by the World Health Organization (World Health Organization, 2003), as well as by medical and government organizations in the world.

One of factors that contribute to body composition changes, respectively to body fat percent grow up is physical inactivity or sedentary lives (National Institutes Of Health, 1998).

Factors, such as age, gender, level of adiposity, physical activity and ethnicity influence the choice of

method and equation. To date, race-specific SKF (American Indian women, Black men, and Asian adults), BIA (American Indian women and Asian adults), and NIR (American Indian women and White women) equations have been developed (Heyward, 1996).

Infrared is not an indicator of body composition in the pre-adolescent population on an individual basis. This method continues to be no accurate, cost-effective means to assess individual body composition by a rapid, noninvasive methodology (Michael, Jan, Wendy, 2003).



Larger prediction errors have been reported with the lower cost, hand-held Futrex 1000 model. Because of these errors, the manufacturer's equations for the Futrex 1000 are not recommended to assess body composition (Wagner and Heyward, 1999).

Kamimura et al. cannot consider that one method of body composition analysis (SKF method, bioelectrical impedance analysis, or NIR method) is more accurate than the other because they didn't apply a gold standard method, for patients on long-term hemodialysis therapy. However, the most simple, long-established, and inexpensive method of SKF thickness seems to be still very useful for assessing body fat (Kamimura, Jose Dos Santos, Avesani, Fernandes Canziani, Draibe, Cuppari, 2003).

In a healthy group of 29 subjects examined by Elia et al., NIR method had little or no advantage over other simple methods in predicting body composition measured by classical whole-body densitometry. NIR method was also found to underestimate body fat increasingly as the degree of adiposity increased. This under-estimation was found to be particularly marked in a small and separate group of grossly obese women, BMI greater than 50 kg/m², whose body composition was assessed by total body potassium as well as by densitometry (Dumitru, 1997).

Heyward et al. concluded that all three field methods, respectively SKF, bioelectric impedance and NIR compared with hydrostatic weighting, accurately estimate the percent of body fat for nonobese women; however, none of these three methods is suitable for estimating the percent of body fat for obese women (Heyward, Cook, Hicks, Jenkins, Quatrochi, Wilson, 1992).

One study concluded that, SKF is higher correlated with under water weighting than did FUTREX 5000 with under water weighting for males (0.95 versus 0.80), females (0.88 versus 0.63), and the whole group (0.94 versus 0.81) and FUTREX 5000 overestimated body fat in lean subjects with less than 8% fat and underestimated it in subjects with greater than 30% fat. Analyzing this, the authors concluded that, SKF give more information and more accurately predict body fat, especially at the extremes of the body fat continuum (McLean and Skinner, 1992).

The present findings indicate that, the FUTREX 5000 provide more accurate estimates of body fat percent than the FUTREX 5000A or FUTREX 1000 instruments (Smith, Johnson, Stout, Housh, Housh, Evetovich, 1997). Continued research with expanded populations is needed to further demonstrate and evaluate the utility of FUTREX 5000A device (Cassady, Nielsen, Janz, Wu, Cook, Hansen, 1993).

Conway et al. concluded that, body composition (percentage fat) estimated in 53 adults (23 to 65 years

of age) by infrared interactance, is correlated with SKF (r = 0.90) measurements. They concluded that, the method is safe, noninvasive, rapid, easy to use, and may prove useful to predict percentage body fat, especially in the obese (Conway, Norris, Bodwell, 1984).

SKF method is still a reliable technique of BF estimation, but if it's not realized with the most accurately instruments the results trends to have errors in BF estimation and FM, respectively FFM (Cyrino, Okano, Glaner et al., 2003). The NIR method is still a questionable technique for BF estimation (McLean and Skinner, 1992; Michael, Jan, Wendy, 2003; Wagner and Heyward, 1999).

The objective of this study is to examine the relationship between skinfolds (SKF) method (accu-measure caliper) and near-infrared (NIR) method (FUTREX 1000 Personal Body Fat Tester) for body fat percent (BF), fat mass (FM) and free fat mass (FFM) estimation, in Romanian university students.

Methods

The subjects were white Caucasian and students at faculties of Ovidius University in Constanta. The aims and methods of the study were explained to the participants, who chose freely to participate in this study. As a result, the sample included 127 students (97 females and 27 males), with age between 18 and 23 years old.

Body height was evaluated with an error of 0.1 centimeters and body weight was evaluated with a calibrated digital scale, with an error of 0.25 kilograms. For this measurement the subjects were dressed summarily. BMI was calculated to estimate the category of weight for each subject by using the Quetelet formula (Dimitre, 1997).

Percent of body fat was estimated with two methods. The first method consisted in calculation of body fat percent with Jackson and Pollock, (1978), equation, for male subjects and Jackson, Pollock and Ward, (1980), equation, for female subjects. The abdominal (taken vertically with a broad grip, 5cm. lateral to the omphalion (centre of the umbilicus)), chest (taken obliquely along the natural cleavage line of the pectoral between the axilla and nipple) and thigh (vertical fold taken midway between the inguinal crease and proximal border of the patella) skinfolds were measured for ...

.....

Results

In table 1 the differences between sexes were significant only for body height (t = 9.838) and body weight (t = 5.841).

Table 1. Physical characteristics of the subjects

Variables	M ± SD	
	Males (n = 27)	Females (n = 97)
Age (years ^{months})	19 ⁷ ± 0 ¹¹	20 ¹ ± 2 ⁸
Body height (cm)	1.789 ± 0.078 *	1.63 ± 0.059
Body weight (kg)	66.074 ± 11.135 *	52.722 ± 7.842
BMI (kg/m ²)	20.598 ± 2.929	19.811 ± 2.485

* differences between sexes, p<0.05.
BMI, body mass index; M, mean; SD, standard deviation; n, number of subjects.

In table 2 the differences between sexes were significant for all variables (BFskf, t = 13.278; FMskf, t = 6.346; FFMskf, t = 11.498; BFnir, t = 7.856; FMnir, t = 2.883; FFMnir, t = 9.861). All variables from SKF method had significant correlations with their correspondent variable from NIR method, when body

height, body weight and age were controlled. BFskf was moderate correlated with BFnir for women (r = 0.41) and for men (r = 0.55). FMskf and FFMskf were moderate correlated with FMnir, respectively FFMnir for women (r = 0.41, respectively r = 0.41) and correlated for men (r = 0.60, respectively r = 0.60).

Table 2. Differences between SKF method and NIR method

Variables	Skinfold method (Accu-measure caliper) M ± SD	
	Males (n = 27)	Females (n = 97)
BFskf (%)	8.962 ± 4.407 *†	21.886 ± 4.704 *
FMskf (kg)	6.25 ± 4.006 *†	11.806 ± 4.085 *
FFMskf (kg)	59.824 ± 8.207 *†	40.915 ± 4.512 *
Variables	Infrared method (Futrex 1000) M ± SD	
	Males (n = 27)	Females (n = 97)
BFnir (%)	13.074 ± 5.988 †	22.805 ± 4.475
FMnir (kg)	8.97 ± 5.431 †	12.164 ± 3.615
FFMnir (kg)	57.104 ± 8.225 †	40.557 ± 5.486

* correlated with BFnir, FMnir and FFMnir for males, respectively for women, when height, weight and age are controlled, p<0.05;
† differences between sexes, p<0.05.
BFskf, body fat - skinfolds method; FMskf, fat mass - skinfolds method; FFMskf, free fat mass - skinfolds method; BFnir, body fat - infrared method; FMnir, fat mass - infrared method; FFMnir, free fat mass - infrared method; M, mean; SD, standard deviation; n, number of subjects.

Discussion

Compared with the anthropometric reference data 1988 – 1994 from United States (National Health and Nutrition Examination Survey, 2005), body height for our subjects was slightly higher for men and slightly lower for women, compared with the corresponding values for Americans. The body weight was lower, for both men and women, compared with the corresponding values for Americans.

Conclusions

Acknowledgments (if is necessary)

I thank all students for participating in this study. No funding was used for this study.

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the analysis of the body composition. Rev Bras Med Esporte, 2003; 9(3):150-153. National Institutes of Health (NIH). 1998, Clinical Guidelines On The Identification, Evaluation, And

Treatment Of Overweight And Obesity In Adults. The Evidence Report. Publication No. 98-4083, Sep: XI-XXX.

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The tables including data will be done on a single column and they cannot be introduced into the text as photographs. The counting (consecutive) and the title of the table (conclusive and concise) will be written on the top right hand. The reference to the table (the quotation in the text) will be found in the text that precedes the table. The number of the table, the title of the table, the results, the statistical section and the abbreviation section will be a constitutive part of the table. It is recommended that you merge the data in as few tables as possible. The additional black lines in the tables including data will be colored in white (Table Tools, Design, Pen Color, White, urmat de Draw Table prin care se trasează peste liniile negre suplimentare culoarea albă).

Table 1. Physical characteristics of feminine subjects

❖ Number and title of the table (Home, Times New Roman, Size 10, Justify).

Variables	Subjects with dominant upper and lower right limb(n = 8)		Subjects with dominant upper and lower left limb (n = 8)	
Height (cm.)	163,25 ± 4,95	3,032%	162,5 ± 4,309	2,652%
Weight (kg.)	66,088 ± 7,343	11,111%	67,038 ± 5,352	7,984%
IMC (kg/m ²)	24,745 ± 1,827	7,383%	25,368 ± 1,439	5,673%
Percentage of body fat(%)	26,625 ± 2,873	10,791%	26,55 ± 2,964	11,164%
Fat mass (kg.)	17,739 ± 3,56	20,069%	17,91 ± 3,235	18,063%

The values are presented as M ± DS și CV%.

IMC, index of body mass; M, mean; DS, standard deviation; CV, variability coefficient; n, number of subjects.

❖ Statistic section (Home, Times New Roman, Size 10, Justify).

The connection between the data in the table and the statistical section will be done through identification letters counted in alphabetical order or identification symbols used in the order *, †, ‡, §, ||, ¶, **, ††, ‡‡, etc.; inside the table, the letters or the identification symbols will be written in the superscript(Home, Superscript) immediately after the data, and inside the statistical section, the identification letters will be written before the hyphen and the statistical comments and the identification symbols immediately before the statistical comments (without a hyphen).

The tables from other publications should be used with the author's (authors') permission, indicating the bibliographic source where it was taken from.

Example: 0,851 ± 0,044 ^a

❖ Statistic data.

❖ The identification letter written in superscript (Home, Superscript).

Example: a – significantly different compared to the force ratio F150 Right side flexion/ F150 Left side flexion, 0°, for the subjects who practise football, respectively athletics (triple jump), F(2, 12) = 5,5;

❖ Identification letter.

❖ Hyphen.

❖ Statistic comment.

Table 2. Means of results of maximum isometric force ratios for feminine subjects who practise different sports

Force ratio	Handball (n = 5)	Football (n = 5)	Athletics (triple jump) (n = 5)
F130 Flexion/ F110 Extension (30°)	0,589 ± 0,109 18,506%	0,556 ± 0,075 13,489%	0,565 ± 0,05 8,85%
F150 Right side flexion/ F150 Left side flexion (0°)	0,851 ± 0,044 ^a 5,17%	0,942 ± 0,056 ^c 5,945%	0,919 ± 0,03 ^d 3,264%

F120 Right side rotation/ F120 Left side rotation (-30°)	0,972 ± 0,07 7,202%	0,825 ± 0,227 27,515%	1,052 ± 0,019 ^e 1,806%
--	------------------------	--------------------------	--------------------------------------

a – significantly different compared to the mean of the force ratio F150 Right side flexion/ F150 Left side flexion, 0°, for subjects who practise football, respectively, athletics (triple jump), F(2, 12) = 5,5;

b – significantly different compared to the mean of the force ratio F150 Right side flexion/ F150 Perfectly ballanced left side flexion (when all the force ratios are equal to 1), 0°, t=7,572;

c – significantly different compared to the mean of the force ratio F150 Right side flexion/ F150 Perfectly ballanced left side flexion (when all the force ratios are equal to 1), 0°, t=2,316;

d – significantly different compared to the mean of the force ratio F150 Right side flexion/ F150 Perfectly ballanced left side flexion (when all the force ratios are equal to 1), 0°, t=6,037;

e – significantly different compared to the mean of the force ratio F120 Right side rotation/ F120 Perfectly ballanced lesft side rotation (when all the force ratios are equal to 1), -30°, t=6,12;

The values are presented as M ± DS and CV%; Significance limit established at p<0,05.

M, mean; DS, standard deviation; CV, variability coefficient; n, number of subjects; t, test t student ; F, test ANOVA.

❖ Statistic section (Home, Times New Roman, Size 10, Justify).

Figures

The tables which contain figures will be done on a single column. The counting (consecutive) and the title of the figure (conclusive and concise) will be written on the bottom left side immediately after the figure. The reference to the figure (the quotation in the text) will be found in the text that precedes the table which contains the figure. The figure, the number of the figure, the title of the figure, the statistical section (if necessary) and the abbreviation section will be a constitutive part of the table that contains the figure. When symbols, numbers or letters are used to identify the parts of the figure, each of them should be explained clearly in the statistical section. It is recommended that you merge the data in as few figures as possible. The lines of the table that contains the figure will be transparent. (Table Tools, Design, Borders, No Borders).

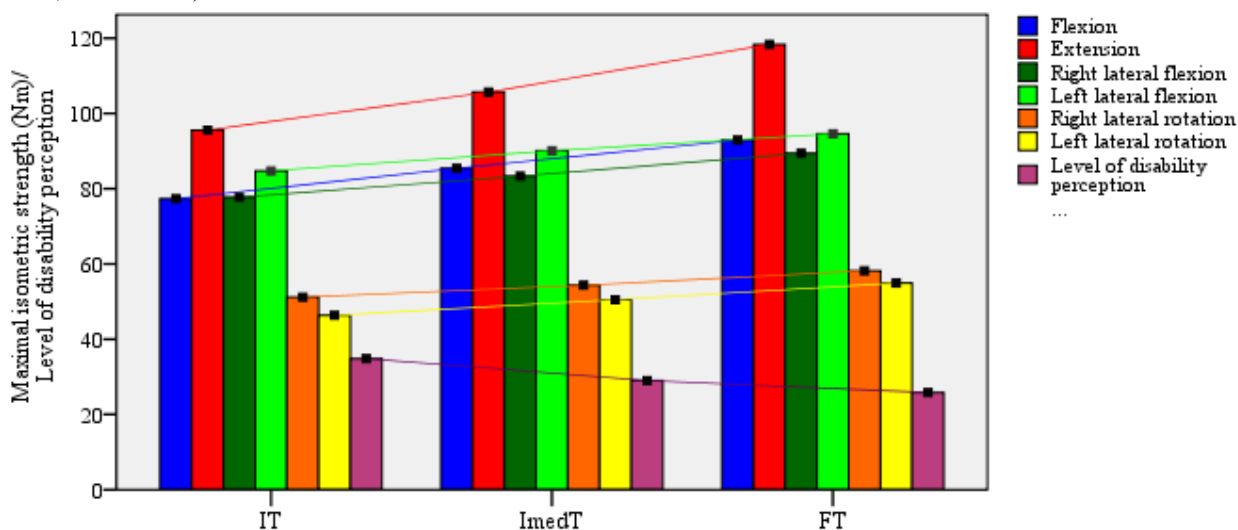


Figure 27. The evolution of means of maximum isometric force and the degree of perception at different tests.

Nm, Newton*meter; IT, initial testing; ImedT, intermediary testing; FT, final testing.

- ❖ Number and title of figure (Home, Times New Roman, Size 10, Justify).
- ❖ Abbreviations used in the figure will be mandatory explained after the number and the title of the figure and/or the statistic section (Home, Times New Roman, Size 10, Justify).

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Measures

Length, height, weight and volume will be specified in metrical units (meter, kilogram or litre or their decimal multiples). Temperature will be specified in degrees Celsius (°C). Blood pressure will be specified in mm column of



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Abbreviations and symbols

The standard abbreviations must be used. You should avoid introducing abbreviations into the title or in the abstract. An abbreviation in parentheses will be preceded by the full description, only the first time the abbreviation is used in the text and only if the abbreviation is not a standard measure unit .

Example: Body weight, body composition, resting metabolic rate (RMR), respiratory quotient (RQ), temperature, fasting serum glucose, insulin, free fatty acids, and ghrelin were assessed at baseline and after 21 d (12-h fast) and 22 d (36-h fast) of alternate-day fasting.

- ❖ Full description of the abbreviation the first time it appears in the text.
- ❖ Abbreviation written in parentheses the first time it appears in the text.

RMR and RQ did not change significantly from baseline to day 21, but RQ decreased on day 22 ($P < 0.001$), which resulted in an average daily increase in fat oxidation of ≥ 15 g.

- ❖ Abbreviations when appears for the second time in the text.

Bibliography

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