COMPARATIVE STUDY CONCERNING THE BALANCE DEVELOPMENT AT ADULTS BY MEANS SPECIFIC TO SPORT GAMES

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Abstract:

Purpose. The present study is a continuation of a research conducted in 2009/2010 and wants to prove that, if we include means specific to sports (handball, basketball, volleyball, football) in every physical education lesson, than we will accomplish, in addition to developing various psychomotor skills and education of motor tool-applied skills - balance, an ensuring a level of training appropriate to its current requirements and objectives, even if the subjects are adults, the advantage being that its development can be achieved with relatively low equipment material condition.

Methods and procedures. This study was conducted over a period of one academic year (2010-2011) at the Petroleum - Gas University of Ploiesti, and was performed on a total of 80 students, 40 boys and 40 girls, divided into four groups, two experimental formed by 20 students (20 boys and 20 girls) and two control groups consisting also of 20 students (20 boys and 20 girls). The present experiment was based on the balance test with the device in the form of a "T".

Results. Analyzing statistical data obtained in the two years of experiment we can say that the evolution of subject experiment groups is comparable, in most cases, the averages and amplitude obtained having a higher evolution in the second year of experiment, but also having cases when the averages and amplitude values lower in 2010/1011 opposed to 2009/2010, these cases being rare.

Conclusions. The results obtained show that compared with traditional methods of balancing development, sports specific games methods are of at least equal importance to them in improving balance, as evidenced by the results. Also, one can say that there is a link between motor skill improvement - balance and the increased general training by means of specific sports games.

Keywords: balance, adult, sports games

Introduction

Balance is part of the utility-applied motor skills group being very important as a completion of some of the qualities that are designed to maintain stability through moving the body or holding it in different positions. As you know this skill can improve in almost any equipment material condition. Within an individual's lifetime this habit is formed, developed and educated. In this study the focus is on educating balance by specific sports, knowing that through education of balance, education and development of self is also achieved, the development of space orientation of the body and its segments, posture and static-kinetic reflexes development etc..

The hypothesis that I started for this study was that, if we include every physical education lesson specific means sports (handball, basketball, volleyball, football) we achieve a better matching, superior to students undergoing classical curriculum, providing a requisite level of development and current objectives, even if subjects are of adult age. The stages through which the training and development (education) that motor skills are: familiarity with the motor act phase, learning stage or analytical segmentation, organization and systematization stage, stage grouping and stage automation and improvement (Gh. Mitra, Al. Mogoş, 1975, C., Bota, 2000, E. D., Colibaba, I.,Bota, 1998).

Developing balance is achieved by performing motor duties while traveling in balance, by increasing or decreasing the number of points of support, gradually decreasing support base, changing the direction of movement in balance, gradual ascension of the support surface (M., Ifrim, 1986, R., Manno 1996).

This study aimed to establish a methodology system of action, based on different means specific to sport games and their introduction in the physical education classes with students, having as finality, in addition to the motor capacity development, the education of balance.

Motor skills development is a conditional reflex activity, and it's based on repeated interaction between excitations - kinesthetic, visual, auditory cortex with the same intensity transmitted in the same order and the balance is a polyvalent skill that relies on the finesse of the kinesthetic sense and also on the coordination of muscle groups that based on the specific motor actions restore body stability, both statically and dynamically.

Materials and methods

The research that formed the basis of this study was conducted over a period of one academic year (2010-2011), being the continuation of a study from the academic year of 2009-2010 at the Petroleum - Gas University of Ploiesti, and was conducted on a number of 80 students, 40 boys and 40 girls, divided into four groups, two experimental and two control groups each consisting of 20 students (20 boys and 20 girls).

Subjects in the experimental groups have used means specific to sports games that also aim at motor skill improvement - balance in each lesson, while those in the control groups went through physical education

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classes under the existing program.

The results were compared with results obtained in 2009/2010, when the experimental group used a series of specific means of improving the balance among which applicative tasks containing balance exercises, static exercises (leg sweep on the ground and on the gym bench with carrying side arms - top, back, standing on one foot on the ground with the other one in different positions, standing on the shoulder blades with arms outstretched on the ground obliquely, raising and maintaining vertical feet for 15 sec., the balance with one foot on the ground and gym bench with carrying the arms sideway - up, back, etc.) and dynamic exercises (walking on a line on the ground, walking on the tips of the feet on the narrow side of the bench walking on the gym back with moving arms, front or back controlled running on the bench gym etc).

Continuing the previous study we wanted to see if there is any difference between using methods specific to the balance development and using the methods specific to the sport games that aim at balance development.

From sports specific methods used in the academic year 2010/2011 I mention:

Handball:
- Successive static jumps or moving jumps, with the handball ball in the hands (between the ankles).
- Throwing at the goal while jumping (or jump over the gymnastics bench), with changes of direction and no change of direction, with or without performing double leg jumping left or right.
- Passing the ball while running, throwing and landing procedures under different balances.
- Leaped step while carrying the handball ball forward - up, jumped leaped step carrying the ball to the chest with maintaining a balanced position in the phase of flight and landing.
- Exercises regarding goalkeeping and blocking throws.
- Themed game etc.

Basket:
- From standing, or fundamental position - lateral, vertical, anterior-posterior balance.
- From fundamental position - imbalances.
- From standing, jumping with landing in fundamental position.
- Sitting with the ball held between your ankles - jumping with knees to the chest.
- Themed game.
- Sitting with the ball held between your ankles - jumping as the ball on the distance of 15-20 m to maintain a balanced position.
- Exercises that target learning stops, pivoting, etc..

- Various exercises that include changes of direction, dribbling, passing, jumping on one foot or two feet, throwing at the basket, etc..

Football:
- Jumping while ball striking with the head imitation.
- Individual, hanging ball, hitting the ball with the head from standing or from shifting position and landing with maintaining a balanced position.
- Hitting the ball to the wall and stopping it from rebound with the left or right foot.
- Passes in three or four from running in line with increased stopping and taking over the ball.
- Bilateral themed game.
- Exercises that include turns, stopping and taking the ball through the counter-blow or depreciation etc.

Volley:
- Exercises aiming at the fundamental position (high, medium, low).
- Passing of volleyball while jumping over the net and landing in fundamental position.
- Exercises designed for field shifting, service from front down and up, attack hit and block.
- From squatting in pairs, disrupting the partner from the squat position jumping and pushing in the hands.
- Imitation of the attack hit for the entire length of the field (take off, jumping, hitting, landing) with emphasis on achieving fair and balanced landings.
- Jumping on one leg, two legs, trunk extension from squat with the volleyball in their hands.
- Successive attacks from passes "rising" with withdraw.
- Complex exercises to attack and block, etc..

The test which was at the basis of this experiment was the balance test with the device in a "T" shape. Through the balance test (ECH) was measured the ability to maintain balance on a device known as a "T" which stands as an inverted "T" on the ground. This device consists of a vertical plate with a width of 2 cm., length 61 cm. and 4 cm height., and a horizontal plate, the vertical plate being in the middle, which has a length of 61 cm. and width of 35 cm. Subject under experiment climbs with one leg on the device with the hands on hips and looking to maintain the balance on the device as long as possible (Figure 1). Time is measured until the subject falls off the device, touches the ground with the free foot or raises the hands on his hips. The time resulted is expressed in seconds, the test being carried out both with the left foot and whit the right.

Figure 1. Device in a "T" shape for measuring the maintaining of the balance capacity

The methods used for this study were: bibliographic study method, measurement and recording method, experimental method, statistical and mathematical method and graphic method, and the statistical and mathematical indicators which were the basis for data processing were: arithmetic mean, median, upper limit (X_{max}), the lower limit (X_{min}), quartiles, range (W), standard deviation (S) and coefficient of variation (CV).

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The obtained results and their interpretation

The conducted experiment is found as statistical data in tables 1, 2, 3 and 4 where the statistical calculations of initial and final values of the balance test for the two groups (experimental and control), for boys and girls, both the right leg and left leg, are presented in the two years. Also, the means from statistical calculations are presented graphically in Figures 2-5, both from the year 2009/2010 and the year 2010/2011

Table 1. Statistical values of the balance test – boys – the experiment group

	Experiment group							
	2009/2010				2010/2011			
	TI		TF		TI		TF	
Number	20		20		20		20	
	St.	Dr.	St.	Dr.	St.	Dr.	St.	Dr.
Arithmetic mean	5,55	6,75	13	14,6	6,4	5,9	14,8	14,05
Minimum	3	3	8	7	2	2	8	9
Maximum	11	18	18	22	10	11	19	20
Amplitude	7,45	7,85			8,4	8,15		
Median	5	6	14	15	6,5	5,5	16	15
Lower quartile	4,75	4	10,75	13	5	5	14,75	13
Upper quartile	6	8	15	16	8	7	17,25	17
Standard deviation	1,82	3,86	2,83	3,27	2,21	2,02	2,58	2,52
Coefficient of variability	32,79	57,25	21,75	22,37	34,53	34,30	16,37	16,76

Table 2. Statistical values of the balance test – boys – the control group

	Control group							
	2009/2010				2010/2011			
	TI		TF		TI		TF	
Number	20		20		20		20	
	St.	Dr.	St.	Dr.	St.	Dr.	St.	Dr.
Arithmetic mean	5,6	6,05	7,35	7,9	6,35	6,15	7,95	8,65
Minimum	3	2	4	4	3	2	4	3
Maximum	16	13	17	15	13	11	18	17
Amplitude	1,75	1,85			1,60	2,50		
Median	5	5,5	7	7	5	6	7,5	9
Lower quartile	3,75	3	5,75	5	4	5	5,75	7
Upper quartile	6	8	8	8,25	7,5	8	9	9,25
Standard	2,94	3,17	2,94	3,30	3,17	2,08	3,85	3,048

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deviation								
Coefficient of variability	52,59	52,40	40,04	41,86	49,87	33,89	48,54	35,24

Table 3. Statistical values of the balance test – girls – the experiment group

	Experiment group							
	2009/2010				2010/2011			
	TI		TF		TI		TF	
Number	20		20		20		20	
	St.	Dr.	St.	Dr.	St.	Dr.	St.	Dr.
Arithmetic mean	5,35	4,5	11,25	12,65	5,75	5,65	11,9	13,4
Minimum	2	2	6	9	2	3	5	9
Maximum	25	12	25	16	19	14	23	18
Amplitude	5,9	8,15			6,15	7,75		
Median	4	4	10,5	13	5	4,5	13	13
Lower quartile	3	3	9,75	11	3,75	4	10,75	11,75
Upper quartile	5,25	5	13	14	6,25	7	14	15
Standard deviation	4,93	2,164	4,02	1,95	3,69	2,80	3,69	2,30
Coefficient of variability	92,22	48,09	35,77	15,44	64,3	49,49	28,66	17,18

Table 4. Statistical values of the balance test – girls – the control group

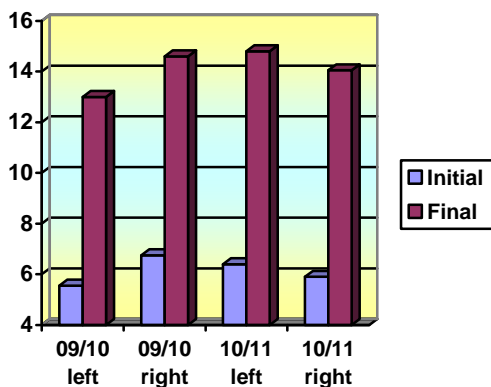|	Control group							
	2009/2010				2010/2011			
	TI		TF		TI		TF	
Number	20		20		20		20	
	St.	Dr.	St.	Dr.	St.	Dr.	St.	Dr.
Arithmetic mean	5,75	6,2	7	8,1	6,05	6,85	7,95	8,9
Minimum	2	2	3	3	3	2	4	4
Maximum	17	15	19	18	15	15	17	17
Amplitude	1,25	1,9			1,9	2,05		
Median	5	5,5	5,5	7	5,5	6	7	9
Lower quartile	3	3	5	5,75	4	5	5,75	6,75
Upper quartile	7	9	8,25	10	7,25	8	9	10,25
Standard deviation	3,66	3,59	3,87	3,71	2,76	3,23	3,48	3,17
Coefficient of variability	63,80	57,94	55,42	45,82	45,65	47,19	43,85	35,69

Figure 2. Medium values at the balance test
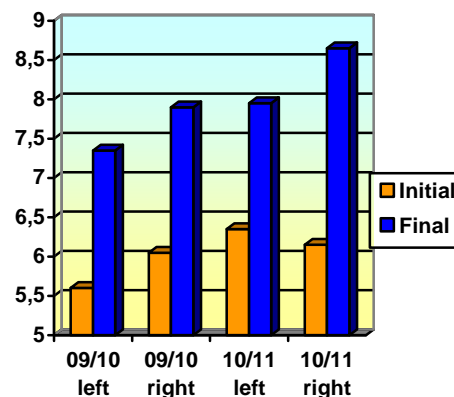Boys - experiment group

Figure 3. Medium values at the balance test
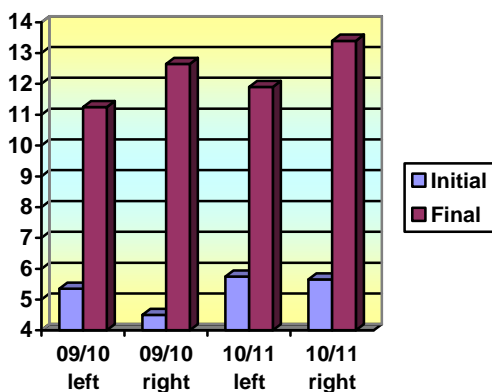Boys – control group

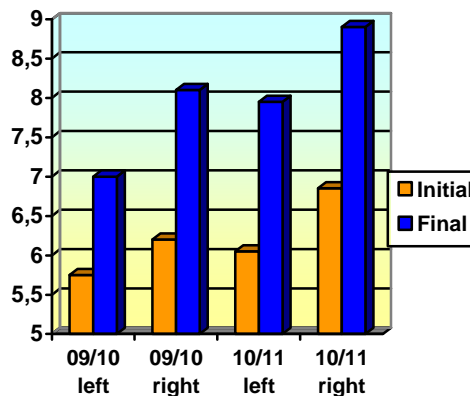**Figure 4.** Medium values at the balance test
Girls - experiment group

Figure 5. Medium values at the balance test
Girls – control group

From the above tables and figures we can see the differences between the means at the test done, both for boys and girls, the differences being presented on the two years in which the experiments were conducted.

After analyzing and interpreting statistical indicators it can be said that in both years (2009/2010 and 2010/2011) there was a higher evolution in the experimental groups (boys and girls) compared with control groups.

At boys, at the experiment group that made progress in 2010/2011 was higher than in 2009/2010 for both feet, this growth was of 8.4 sec. to 7.45 for the left leg, and 8.15 in comparison with 7.85 sec. for the right leg. Also there is a reversal of values at initial and final tests in the two years of study, if in 2009/2010 the values for the right foot were higher than those of the left leg, both in the final and initial testing, in 2010/2011 we notice that those from the left leg are superior to those of the right foot. Comparing

separately the initial values from the two years we notice that the initial value of the left leg in the first year is lower than the second year (5.55 sec. to 6.4 sec.), while the right foot in the first year value is of 6.75 sec. to 5.9 sec. in the second year. The trend is maintained also in the final testing, the mean values being of 14.8 sec. in the second year compared to 13 sec. in the first year for the left leg, and 14.05 sec. in 2009/2010 to 14.6 in 2010/2011.

Control group - boys is characterized by developments in both tests and both legs of the results in 2010/2011, an a mean of 6.35 sec. for the left leg and 6.15 sec. for the right leg at the initial test in 2010/2011 compared to 5.6 sec. left leg and 6.05 sec. for the right in 2009/2010. At the final test the values are higher in 2010/2011 compared with 2009/2010 in both legs, which are of 7.95 sec. compared with 7.35 sec. left leg and 8.65 sec. from 7.9 sec. right foot. The difference between initial and final tests decreases in 2010/2011 with 0.15 seconds left leg than in

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2009/2010, while for the right foot we notice an increase of 0.65 sec.

At girls, the experiment group has a higher evolution in 2010/2011 to 2009/2010 both at the initial values (5.75 sec. from 5.35 for the left foot and 5.65 sec to 4.50 sec for the right leg) and at the final ones (11.90 sec. compared with 11.25 sec. for the left leg and 13.4 sec. to 12.65 sec for the right leg). Instead the amplitude increases in the second year by 0.25 seconds over the first year at the left leg and drops at the right one with 0.40 sec.

At the control group girls the tendency of the experiment group is maintained, the values since 2010/2011 are superior to those of year 2009/2010, both at the initial values (6.05 sec. to 5.75 for left foot and 6, 85 sec. to 6.20 sec for the right foot) and at the final ones (7.95 sec. compared to 7 sec. for the left leg and 8.9 sec. to 8.1 sec. for the right foot). The difference between the means increases in 2010/2011 to 2009/2010 in both legs, for the left leg with an increase of 0.65 sec and for the right of 0.15 sec.

Although the values are clustered around the average, for all tests in both years tested, the degree of homogeneity of the groups is average - at the final testing of the 2010/2011 in boys, experiment group, both for the left leg and right, and at the final testing of the experimental group girls for the leg in both years tested, and is poor, both for the boys and girls from the rest of the tests made.

Conclusions

From the study we conclude that, if we include in every physical education lesson means specific to sports games (handball, basketball, volleyball, football) then we can make a balance improvement, providing a level of development corresponding to the current requests and objectives, even if the subjects are of adult age.

Sports games have an important role in improving various analyzers, this having an important role on improving motor skill - balance.

One of the important aspects in the favorable development of balance is also the maintenance of correct body attitude during the execution of different types of exercises.

Comparing the two years of experiment we can say that the evolution of groups subject to experiment is comparable, in most cases the obtained averages and the amplitude have a superior evolution in the second experiment, but there are cases when the means and amplitude values decrease in 2010/1011 opposed to 2009/2010, these cases being rare.

The complexity of motor actions specific to sports can be a continuous increase of the balance and coordination values, being a pleasant way of education, even in adulthood.

Compared with traditional methods of balance development, sports games specific methods are of an at least equal importance to them in improving the balance. Also, one can say that there is a link between motor skill improvement - balance and an increased level of general education by means specific to sports games.

Lack of material equipment does not affect the balance improvement, only balls and of course a sport field being needed, without the need for expensive equipment purchases that universities and schools cannot afford.

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