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Original article

ANALYSIS OF RESULTS CONCERNING THE EVOLUTION OF FUNCTIONAL INDICATORS IN BEGINNER HOCKEY PLAYERS, AFTER THE APPLICATION OF MOVEMENT GAMES

TRANDAFIR MARIUS¹, GHEORGHIOU GABRIEL¹, POPESCU VERONICA², GIDU DIANA VICTORIA³

Abstract

Objective. The aim of the research is to improve the training process for novice hockey players by applying movement games. In the initiation stage, it is necessary to carry out a thorough physical training because it supports the effort in training and competitions, contributes to the correct mastery of the technical elements and procedures and prevents the occurrence of injuries.

Methods. The research was attended by 24 subjects, children and juniors from CSS Galați, who practice ice hockey. To carry out the study, several research methods were used, as follows: analysis of the literature, observation method (direct and indirect), test method which allowed the evaluation of the targeted functional individuals, experimental method and statistical-mathematical method that allowed highlighting the evolution of the results obtained from the trainings performed.

Results. Following the training, which was based on the use of movement games, there was an improvement in physiological indicators. The evolution of the obtained results emerged from the statistical analysis performed for each subject.

Conclusions. We believe that the use of movement games in the training of novice hockey players is indispensable for the development of deadly qualities, but also contributes successfully to the formation of specific deadly skills and abilities. The realization of the physical training is agreed by the novice athletes, thus, the analyzed physiological indicators had very good values.

Key Words: training, movement games, ice hockey, physical training, evaluation, physiological indicators.

Introduction

At the beginning of performance sports practicing, at the level of children and small juniors, movement games represent the most important means contributing to the achieving of general and specific physical training.

The general definition of play is a situation where a multitude of rational elements – players – choose successively and independently, in an order and in specified conditions, through a set of rules a certain decision (carry out an action) out of several types of alternatives; this definition was formulated by Zapletal M., (1980) and developed by Babanski J.K., (1980), Șiclovan I., (1987), Portnov I.I., (1986), Platonov V.N., (1984), Badiu T., (1995), Dumitru Colibaba Evuleț, and Ioan Bota, (1998), Bompa T.O., (2001), Dragnea A.C., Mate-Teodorescu S., (2002).

On a general note, play is an activity specific to childhood or to the process of forming and developing the human being, as stated by Colibaba-Evuleț and Bota (1998), concerning the various

definitions and the signification of play.

During childhood, play is a central activity; as children join school, play becomes secondary; during youth, the channelling and energy input activities become essential, and work age has relaxing activities as specific. Consequently, while for children play is a formative and modelling conduct, for adults it has complementary functions to those of work, namely functions of rest and relaxation (Babanski J.K., 1980; Iacovlev V., 1981; Șiclovan I., 1987; Portnov I.I., 1986; Platonov V.N., 1984; Badiu T., 1995; Bompa T.O., 2001).

Until school age, play is as important for a child as work for an adult, representing at the same time an indirect preparation for work, through its contribution to the multilateral formation of a child's personality and to the development of mental capacity, and through the fact that it reflects reality, thus transposing and transforming it on the imaginary level, according to Chiriță G. (1983), one of the first researchers to explain play on materialistic bases,

¹ Universitatea Dunărea de Jos din Galați, Facultatea de Educație Fizică și Sport, Galați, Romania

² Universitatea Alexandru Ioan Cuza din Iași, Facultatea de Educație Fizică și Sport, Iași, Romania

³ Universitatea Ovidius din Constanța, Facultatea de Educație Fizică și Sport, Constanța, Romania

Corresponding author: marius77trandafir@yahoo.com

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showing that in social life, work comes first, then play, just like in a child's life, play comes before work. The same concepts on the emergence and importance of play among children, as well as the role of play in social life, are also underpinned by the following authors: Avram L.,(1992), Badiu T., Ciorbă C., (1999).

As a complex reality, involving the child's cognitive and affective resources, play becomes the field where the most important informative and formative influences are exercised. In an attempt to determine the biological evolution of play, some authors consider it the discharge of excess vital force; others believe that any living being – when playing – manifest a congenital spirit of imitation. From among these authors, I mention the following: Chateau J., (1972), Claparete E., (1975), Iacovlev V., (1981), Solomon M., (1984), Georgescu M., (1993).

J. Piaget (1972) also identifies and analyses the main characteristics of play in relation to the moral rules; he studied the acquisition of play rules by children and their degree of conscience, implicitly how children of various ages represent the mandatory character of the rules they observe, differentiated by age and by their intellectual development.

Play largely contributes to the implication of children in a multilateral communication, generated by the subject chosen and by the role. Through play, children acquire knowledge regarding professions, activities, human conduct, concepts expressed by numerous aspects, such as: Hirtz P., Sass H., (1988). It may be stated that play is a school of life, stimulating the capacity of life – a complex activity reflecting the world and the society.

According to the Russian pedagogical researcher K. V. Uşinski (1957), in his main work "Man as an object of education", whereas a child lives and activates more intensely during play than in reality, the environment still exercises one of the strongest influences on children's play. P. F. Leshaft – as Chiriță G. (1983) mentions – argues that "play is an exercise that prepares the child for life"; it is the mirror of the environment where the child lives and develops.

Whereas ludic activities bring fun along, play is not reduced to pleasure. According to J. Chateau (1972), pleasure has a moral nature. Play represents for children an inexhaustible source of impressions contributing to an enrichment of knowledge about the world and life; it forms and develops characters, skills, inclinations, aspirations. Concerning the influence of games on character and skill formation, the following specialists uttered similar views: Uşinski K.V., (1957), Niculescu M., (2000,2002).

Correct play – acquired in an arena – influences individual throughout their entire life. Through it, people get used to accepting defeat and to tasting the satisfactions of victory. The persons acquiring it in an arena later transpose it in life.

Play may also have a multitude of moral qualities cultivated through it – the spirit of sacrifice, the perseverance, the courage that may be developed even by using the simplest games (Zapletal M.,1980; Baroga L.,1984; Weinek J.,1994; Colibaba Evuleț & Bota, 1998).

The teacher's role in play is crucial; the following requirements should be met in this respect, according to Badiu T. et al., (1995), Şiclovan I., (1987), Chiriță G., (1983): carefully monitoring the game unfolding to observe the accuracy of athletes; execution and the observance of rules; identifying typical execution errors; noticing the behaviour and particularities of athletes' manifestation: if players participate honestly to the game, without hindering their opponents, if they show initiative, if they help each other, if they have the courage of being responsible for their own acts, etc. Teachers must fight against the desire manifested by certain athletes to obtain victory at all cost, thus ignoring the rules established. In addition, it is necessary to foresee and combat any brutal manifestations during a game. Athletes with inappropriate behaviour should be sanctioned promptly, either by temporary removal or by points for the opponents. The second method is the most recommended because the collective is determined to have a critical attitude, to manifest a combative spirit and their own opinion, the observance of game discipline should not hinder the children's enthusiastic manifestations. Teachers must ensure the active participation of athletes and they must allow the exteriorisation of feelings, but without exceeding certain limits.

Movement games are used successfully both at the beginner level and in the older age groups, because the competition determines emulation, involvement, observance of the rules and last but not least, the thorough acquisition of the basic technical elements and procedures of ice hockey. Movement games are used in training in all sports games, but also as a means of selection, so, "although they are specific to the secondary cycle, they can be used successfully in the primary cycle, when we intend to repeat, strengthen - the application and application of technical procedures, and the selected students show that they master the basic mechanism "(Savu, C.V., 2018).

Methods

The research methods used in the study were the study of speciality analysis, the observation method,

the method of tests with the help of which I assessed the functional indicators of athletes, and the statistical-mathematical method.

The purpose of the research is represented by the improvement of the training process in beginner hockey players by applying the movement games. Research hypothesis. I assume that by using the movement games, within sports training during the initiation stage, the results of functional indicators will be influenced positively.

The research was attended by novice athletes (10-11 years old) from CSM Dunărea Galați representing the control group and athletes from the School Sports Club, representing the experiment group, both groups having the same numerical composition.

The tests applied to assess the functional indicators were carried out before the training phase (initial testing) and after applying the training

program (final testing). The training (independent variable) comprised mainly the application of the movement games under various forms – they were used to ensure general and specific physical training and the acquisition of motor skills and qualities specific to ice hockey. The two groups (control and experiment) participated in 5 workouts per week, lasting 90 minutes for each workout.

Results and discussions

Within this research, I measured *four functional indicators*, for the two groups participating in the experiment. The indicators are as follows: vital capacity, measured in (cm³), with the help of the spirometer; the Lorentz index, heart rate measured for 15 seconds, and the Dorgo index. (Table 1)

Table 1. Centralisation of statistical indicators – the functional parameters

WITNESS GROUP		witness	I.Lorentz	HR/15sec	I.Dorgo
T.I.	Arith. mean	2441	15.627	21.36	-7.38
	S	445.51	2.5051	0.7	0.407
	m	89.102	0.5010	0.14	0.081
	Cv	18.251	16.030	3.277	-5.517
T.F.	Arith. mean	2498.8	15.955	21.04	-7.424
	S	423.077	2.3627	0.6757	0.425
	m	84.615	0.4725	0.135	0.085
	Cv	16.931	14.808	3.211	-5.731
t		0.4703	0.4757	1.644	0.373
p(0,05)=2,064		>0.05	>0.05	>0.05	>0.05
EXPERIMENT GROUP					
T.I.	Arith. mean	2492	16.135	21.08	-7.556
	S	483.838	2.8675	0.702	0.397
	m	96.7677	0.5735	0.140	0.079
	Cv	19.415	17.772	3.331	-5.267
T.F.	Arith. mean	2524	16.282	20.92	-7,736
	S	453.486	2.681	0.5715	0.395
	m	90.697	0.536	0.1143	0.079
	Cv	17.966	16.465	2.732	-5,115
t		0.2412	0.1881	0.8834	1,61
p(0,05)=2,064		>0.05	>0.05	>0.05	>0.05
t ₁		0.203	0.458	0.6779	2,72
p(0,05)		>0.05	>0.05	>0.05	<0.05
Note: “t” – calculated between the initial and final indicators of each group; “t ₁ ” – calculated between the final indicators of the witness and the experiment group; “p” – the one in Fisher’s table at the 0.05 significance threshold, in conformity with the researched sample.					

I calculated and interpreted graphically the statistical distribution and homogeneity indicators, as well as the t and t₁ indicators, standing for the significance of value increases between tests and

between groups. Indicators were interpreted by the significance threshold $p = 0.05$, for a frequency of 25 cases. (Figure 1)

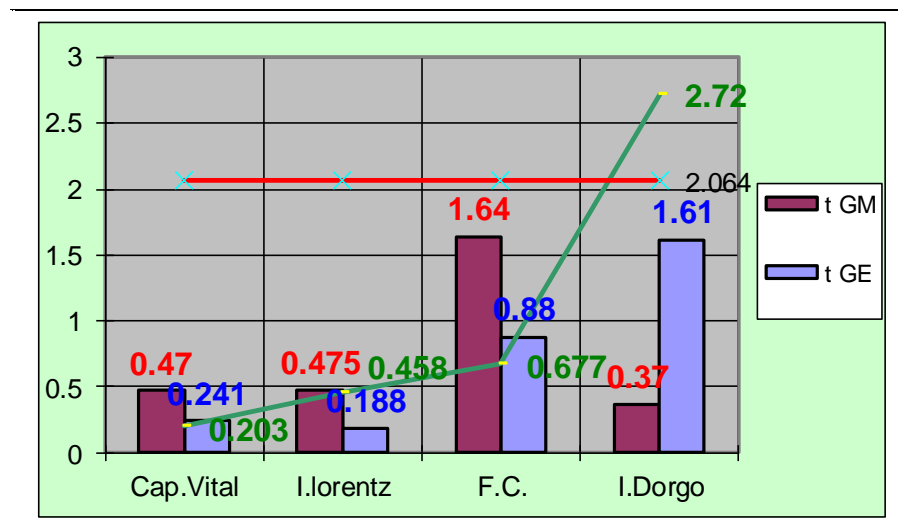


Figure 1. The evolution of statistical significance indicators in functional indicators

Vital capacity

Arithmetic mean features increased values for the experiment group in both the initial testing, of 2492 cm³, compared to 2441 cm³, the value of the witness group, and the final testing 2524 cm³ for the experiment group, in comparison with 2498,8 cm³ for the witness group.

Concerning the evolution of arithmetic mean between the testing moments, the witness group with 57.8 cm³ has recorded a slightly more significant increase in the value than the experiment group, namely 32 cm³.

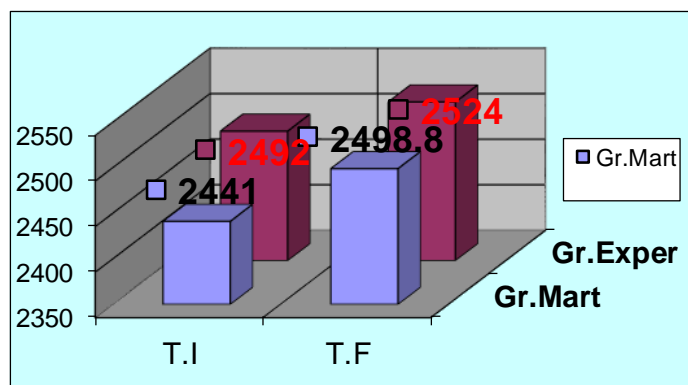


Figure 2. The evolution of arithmetic mean concerning vital capacity (cm³)

Standard deviation in the final testing recorded approximately equal values for the experiment group – 453.48, and the witness group – 423.07.

The variability coefficient also shows for the witness group values of 16.93% in the final testing and of 17.96% for the experiment group in the same testing. Both results indicate average variability, thus average homogeneity. An increase in the value of the variability coefficient between the testing moments is 1.32 units% for the witness group and 1.45 units% for the experiment group. Thus, the value increases

of the variability coefficient were approximately the same in both groups.

The significance indicators “t” and “t1” have recorded values below the significance threshold of 0.05 in Fisher’s table.

The *Lorentz index* – represented by the ratio between vital capacity (cm³) and height (cm).

The analysis of arithmetic mean for this functional indicator shows that the experiment group with a value of 15.95 in the initial testing has recorded an insignificantly higher values than 15.62,

the value of the witness group – also in the initial testing.

In the final testing, the same situation: the experiment group with 16.28 has slightly higher values than those of the witness group, with 16.13.

Concerning the evolution of arithmetic mean in the experiment group, a value increase of 0.33 units was recorded, approximately the same as the one of the witness group, namely 0.51 units, obtained between the initial testing and the final testing.

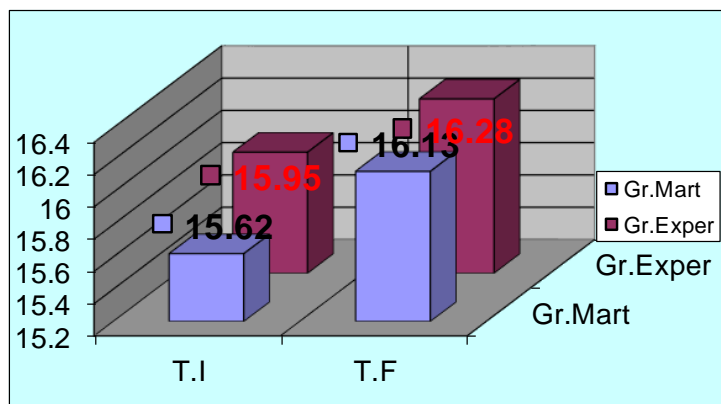


Figure 3. The evolution of arithmetic mean concerning the Lorentz index

All these values of arithmetic mean are within the range of interpretations for the Lorentz index, corresponding to an average level (values between 15 –20).

The evolution of the results concerning distribution indicators also shows more or less equal values. Standard deviation in the experiment group (2.68) and the witness group (2.36), both resulted in the final testing, are approximately equal. The variability coefficient recorded for the experiment group a value of 16.46% and for the witness group of 14.86%, in the final testing, indicating average variability and homogeneity.

The “t” and “t1” significance indicators also show insignificant value increases between groups and between the final testing moments at the two groups, situated below the significance threshold 0.05.

Heart rate (15 seconds)

The arithmetic mean for this physiological indicator shows that in the initial testing, the values recorded by both groups are approximately the same:

21.36 pulses/15sec in the witness group and 21.08 pulses/15sec in the experiment group.

In the final testing, these values are even more similar: 21.04 pulses/15sec in the witness group, almost the same as 20.92 pulses/15sec for the experiment group. The value evolutions of the arithmetic mean between tests indicates in the witness group a difference of 0.32 pulses/15sec, while in the experiment group a difference of 0.16 pulses/15sec, between the initial testing and the final testing.

As for standard deviation, I have found almost equal values. The witness group in the final testing recorded the value of 0.67, while the experiment group also in the final testing – 0.57.

The variability coefficient – accounting for 3.21% in the witness group in the final testing and for 2.73% in the experiment group, at the same testing – also demonstrates values suggesting low variability, thus high homogeneity.

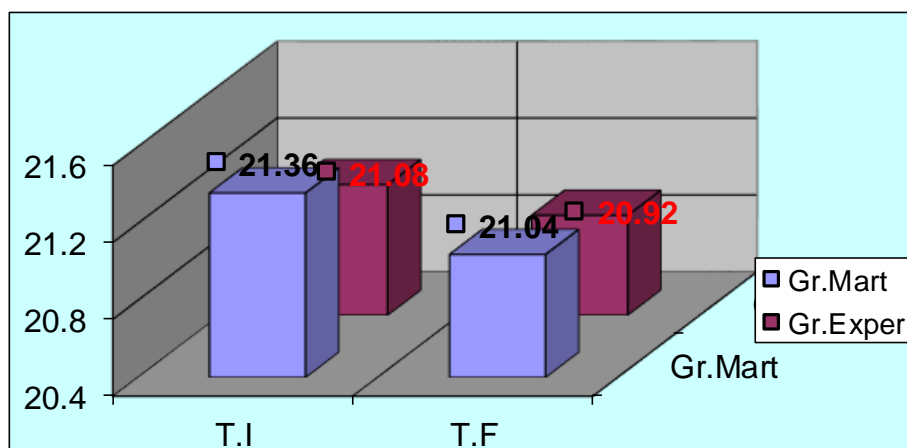


Figure 4. The evolution of arithmetic mean concerning heart rate/15sec

The “t” and “t1” significance indicators feature insignificant values from the perspective of differences, for both the witness group and the experiment group, and for both the final tests of the two groups.

The Dorgo index. The analysis of arithmetic mean concerning this physiological indicator measuring the physical post-effort recovery shows that the experiment group obtained significantly higher values than the witness group, in both the initial testing (-7.56 in comparison with -7.38) and the final testing (-7.73 in comparison with -7.42).

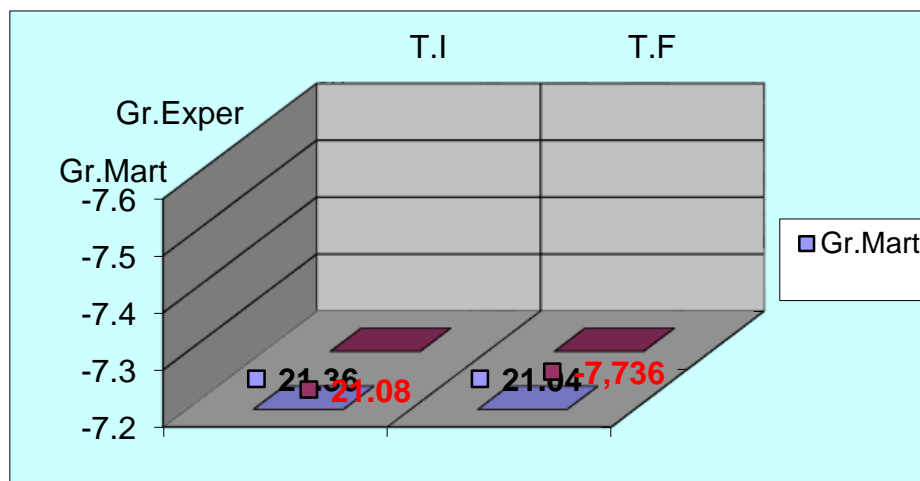


Figure 5. The evolution of arithmetic mean concerning the Dorgo index

The value increases in arithmetic mean for the witness group are insignificant. The witness group increases by -0.04 units between the testing moments, while the experiment group increases significantly, by -0.31 units.

In what regards the evolution of distribution, standard deviation with the value of 0.42 in the witness group, the final testing, is almost equal with 0.39 – the value of the experiment group in the same testing.

The variability coefficient of the witness group in the final testing is -5.73% very similar to -5.115% for the experiment group.

Both values indicate high homogeneity.

The values of the “t” significance indicator show almost significant differences in value, little below the significance threshold of 0.05, between the witness group and the experiment group.

Concerning the “t1” index comparing the final tests of the two groups, a significant difference was noticed in favour of the experiment group: the index

shows 2.72 in comparison with 2.064, namely the significance threshold for the frequency of 25.

Upon analysing the value increases obtained by both groups – the experimental and the witness group – it may be concluded that such increases are significant only concerning the Dorgo index, as a comparison between groups in relation to the final testing.

Excluding the heart rate values – where the witness group has an insignificantly higher value –

Conclusions

After studying and analysing the scientific and methodical literature, I have concluded that currently there is not enough information regarding the training of beginner hockey players. The ones published by the Romanian specialists are relatively old; specialised schools do not own specific training programs. There are just general guidelines concerning certain aspects for training hockey players aged 9-11.

Within this research, I have demonstrated that movement games have proven their utility. Thus, it is safe to say that the beginner athletes accept them

the other measurements have showed slightly higher values for the experiment group than for the witness group.

As a final conclusion, it may be asserted that the movement games used within the basic pedagogical experiment had the greatest influence on the indicator that represented the body's recovery post-effort, namely the Dorgo index. The athletes in the experiment group achieved it significantly faster than the athletes in the witness group.

easily and that the performance objectives are thus attained successfully.

In what regards the value increases of functional indicators – in both groups participating in the basic pedagogical experiment – they were significant only for the Dorgo test. The other indicators suggested natural result evolution, without an influence from the methods applied within the pedagogical experiment.

The functional indicators analysed represent an important landmark for coaches and they account for one of the essential reference points in planning trainings and competitions.

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