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## STUDY ON INCREASING THE EFFICIENCY OF PHYSICAL AND TECHNICAL TRAINING FOR BEGINNER HOCKEY PLAYERS, BY DEVELOPING GENERAL AND SPECIFIC MOTRICITY

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### Abstract

*Objective.* Physical and technical training are basic factors of sports training, regardless of the sport. The content of physical training consists of methods and means of action aimed at harmonious physical development, the development of general and specific motor skills, a condition for the correct acquisition of hockey-specific skills and implicitly a correct and efficient technique. The aim of the study is to highlight the most effective methods for assessing the level of physical and technical training at the level of beginners. The evaluation of novice athletes is an important step in the beginning of practicing performance sports, because the harmonious physical development, general and specific motor skills, well-mastered technical elements, is the guarantee of a successful sports career.

*Methods.* To conduct the research, we used the following research methods: the method of studying the literature, the method of direct and indirect observation, the method of pedagogical experiment, the statistical method, the graphic method. The research involved ice hockey players (25 subjects), beginner level, at which initial and final assessments were applied to highlight physical development, general and specific motor skills, as well as the level of mastery of technical skills specific to the game of ice hockey.

*Results.* The independent variable consists of a physical and technical training program, which contains methods and means of action that contribute to the harmonious physical development as well as to the development of general motor skills and the acquisition-consolidation of technical elements specific to the game of ice hockey, adapted to novice athletes.

*Conclusions.* In conclusion, it is found that the establishment of appropriate methods for assessing the motor potential and the level of mastery of the technique of some technical elements and structures, determines the evolution in performance of athletes.

*Key Words:* assessment, physical training, technical training, ice hockey, sports performance.

### Introduction

Performance sport entails the implication of several factors with scientific support, leading to the attainment of the sports results proposed. In addition, throughout the instructive-educative process, it is important to cover several phases, (each of them with training rules for athletes, which must be observed).

To train children and juniors, the attention of the coaches should focus on physical and technical training. The studies and practice in the field demonstrate that the weighting of general physical training is higher than specific training; as athletes evolve in terms of age and training, the ratio reverses.

Physical training among children and juniors is performed considering the following aspects:

determining the type of effort, nervous implication, somatic particularities of players – through the particularised approach to the development of basic motor skills specific to ice hockey. In addition, physical training represents the foundation for the development of technical qualities specific to hockey players.

The experts in the field – Bukac L., Safarik K., (1971), Plante J., (1972), Dryden K., (1973), Lariviere G., (1974), Koska V., (1975), Horschly L., (1977), Crihan V., (1982), Belmonte V., (1994) – argue that among practice factors, physical training is the component ensuring the development of the physical skills among children and juniors, the increase in exercise capacity and harmonious

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coordination of the activity of all bodily systems and apparatuses, necessary for obtaining high indicators of speed, skill, strength, and resistance.

In a game, the strongest, fastest, most skilful, more resilient and – course – with the best technical and mental training will be the winners. The physical qualities of the hockey players condition the contents of actions – the form is provided by the game technique, thus providing the procedures expressing certain physical skills.

To obtain good physical training, various group of exercises may be used – recommended by the Romanian Ice Hockey Federation – in the unitary methods used for beginners, namely: exercises for general physical development; exercises from complementary sports; special exercises, preparing to acquire the technique of the game; exercises and games with hockey-related rules.

The training effort in a lesson – and in a cycle, implicitly – modifies by varying the number of repetitions, the execution rhythm, by extending or shortening the resting breaks, though the degree of difficulty.

For the younger groups – 8-12 years old – as *physical training means*, recommended by: Koska V., (1971), Crihan V., (1982), it is useful to use the following means: exercises without apparatus and with gymnastic apparatus (gymnastics bar, ladder, vaulting horse, bench, exercises with medicine balls, etc); paths with combined obstacles, with various degrees of difficulty; speed run, forwards and backwards, covering 30 m, 40 m, 60 m; middle-distance races – 400 m; run up to 800 m, on various types of fields; jumps with or without take-off (Penta jumps); squats, push-ups, chin-ups; relays and movement and preparatory games, considering that the competitive element mobilises the children.

At this age, long and strenuous efforts are not recommended, because they lead to nervous system fatigue, lower exercise capacity and overloading, with negative effects on health and subsequent development. Such recommendations were made by: Crihan V., (1982), Șiclovan I., (1987), Zapletal M., (1980), Portnov I.I., (1986), Platonov V.N., (1984), Nicu Alexe, (1993), Dumitru Colibaba Evuleț and Ioan Bota, (1998).

Specific physical training – according to Tarasov A.V., (1968), Bukac L., Safarik K., (1971), Plante J., (1972), Koska V., (1975), Horschy L., (1977), Crihan V., (1982), – plays an essential role in the multilateral training of hockey players and its

purpose is to improve the motor skills in conformity with the requirements of the specialisation. Specific physical training is part of the process of improving the hockey technique and tactics, by developing speed, skill, resistance and strength, (as they manifest in the game).

Within the specific physical training, the aim is to develop the speed of displacement, reaction and execution; speed resistance, strength and skills specific to ice hockey depending on compartments and positions. It is recommended for the exercises used for developing strength in alternation with exercises for suppleness and stretching.

In the conditions of physical training on land, it is effective to use *elements of hockey technique*, as per the guidelines of the Romanian Hockey Federation, such as speed runs holding the cross with both hands, forwards and backwards, runs imitating skating steps; leading the softballs through the pegs, on a flat surface (asphalted land); shooting at the goal, all the procedures standing, starting from a flat, slippery surface, (wet plyboards, hardboards.); hockey on ice or hard surface, using a softball; complementary games (soccer, rugby) with hockey tasks; for instance, the use of the body (body-check) in the dispute with the opponent. The use of the cross – besides the fact that it represents a resistance element – will create hockey-specific skills for the athlete.

It is worth highlighting that the acquisition and improvement of the physical qualities overlap. The development of one implicitly leads to the development of the other; each of them was given due importance.

Emphasising the role and importance of the *technical training* specific for ice, the acquisition of skating technique constitutes the base of acquiring all the technical elements of ice hockey, a valid general concept stressed by the following: Bukac L., Safarik K., (1971), Plante J., (1972), Dryden K., 1973, Lariviere G., (1974), Koska V., (1975), Horschy L., (1977), Crihan V., (1982), Belmonte V., (1994).

Rapid gliding on ice requires significant physical efforts from the player. For the muscular effort made, the mandatory adjuvant is the optimal use of all factors contributing to rapid gliding using minimum effort. We can obtain this by alternating correctly muscle contraction and relaxation.

To learn skating as well as possible, one should begin early – even from the age of 8 for the first ice hockey elements. Skating specific to this game can be

acquired holding the cross, (which should be adapted to the age, to prevent faulty habits).

To explain and demonstrate the movement, it is necessary to emphasise the basic mechanism of each movement, for a better insight – according to Virgil Crihan (1982). While performing the skating exercises, executions differences may appear, (some of them good, some others with errors). The latter may be primary or secondary. The primary errors modify the structure of the basic movement; hence, they must be removed carefully. The secondary errors – though they do not modify the basic structure of the exercises, they are also negative.

If we ensure the correct acquisition of execution mechanism for the movements specific to hockey skating, we lay the foundation for learning and improvement in this sport. The artistry and technique of the hockey game are conditioned ultimately by speed, skill and safety while gliding on ice. The following authors argued such stances: Koska V., (1971), Bukac L., Safarik K., (1971), Horschy L., (1977), Plante J., (1972), Dryden K., (1973), Lariviere G., (1974), Crihan V., (1982), Belmonte V., (1994). Successful learning and improvement in this sport consist of the execution of many exercises and repetitions.

In ice hockey, *puck leading* – as a technical element – involves perfect handling of the game object using the cross. Hence, a hockey player must control it permanently in various game situations, even at very high speed; players should focus on solving various tactical actions, not on holding the puck in the cross.

According to the opinions uttered by Kostka V. (1975), a great insight into puck leading technique and its movements leads to the easy acquisition of numerous puck-handling procedures.

Generally, holding the cross to handle the puck involves both hands. The two-hand grip has three versions, depending on the distance between hands. Usually, such distance equals the shoulder width. It may be shorter or longer depending on the lower hand position, which may be: closer to the support hand, namely 20-30 cm from it; in an average position, namely 30-40 cm, farther away from the support hand, at about 40-60 cm. The first position ensures wide manoeuvres, with a wide field of action, used mainly for leading the puck and for dekes. The second position creates a lever for great strength, used mainly for executing passes and for certain goal shooting procedures.

The third position – entailing a lever for strength, too – is used for taking over the puck, for goal shooting and engagement execution. It is also very important to place the cross with the edge on the ice.

For a good acquisition of puck leading, especially among children, head position and gaze orientation are essential, (Bukac L., Safarik K.,1971; Plante J.,1972; Dryden K.,1973; Lariviere G.,1974; Koska V.,1971; Horschy L.,1977; Crihan V.,1982; Belmonte V., 1994).

Gaze orientation: the players – beginner or advanced – will not watch the puck, but their vision field should help them move and become oriented in the arena. Puck monitoring is to be ensured by peripheral vision. Players may lead the puck standing or in motion. The methods for learning this technical element are based on the accessibility principle and its rules. Hence, acquisition begins with the simplest elements: standing puck leading, following by puck leading in motion.

The positive results of instruction and formation largely depend on the coach's professionalism and qualities. In the process of training the athletes, a coach has essential tasks, for which they require a wide array of knowledge and a great insight into the theoretical and practical matters of the hockey game.

## Methods

Our research aims to point out the necessity of physical and technical training in children's practices. Hence, I have started from the hypothesis that the development of general and specific motricity at an optimal level is essential for obtaining the medium- and long-term performance objectives.

I have used the following methods in this study: literature review, pedagogical observation, testing method (tests, control trials, measurements); pedagogical experiment, statistical-mathematical data processing and interpretation method.

After determining the performance objective, I applied tests and control trials meant to assess the somatic development of players and their general and specific motricity level.

To assess the physical and technical training level of the beginner athletes practising ice hockey, 25 subjects participated in the study; they are athletes at the School Sports Club in Galați. In this respect, I applied tests and control trials (6), and the results were compared with the national means and with

those proposed by the Romanian Ice Hockey Federation for this age.

### Results and interpretation of the data obtained

To assess the level of the technical training specific for ice, I applied 4 control trials, which I compared to the national means. Thus, by applying the two categories of tests, I wished to highlight the physical and technical training level of beginner hockey players in Galați. (Tables 1 and 2)

In the *Standing long jump*, between the results obtained by the athletes of Galați and the arithmetic mean of 160.36 cm, compared to the one of 162 cm, the national mean proposed by the FRHG, there is a difference of 1.64 cm.

In the trial *50-m speed run*, the difference between means is 0.44 hundredths of seconds to the detriment of the athletes of Galați (9".14 compared to 8".70).

**Table 1.** The results obtained in the physical trials of the beginner hockey players in the country and in Galați, compared to the means proposed by FRHG (n=275)

No.	Sample studied	SLpl (cm)	50m (sec)	Softball (m)	Abd. 30"	Mobilit (cm)	Res.600 m (sec)
m.a	FRHG	162	8.70	27.10	20	55	2'36"
m.a	country	161.4	9	24.5	19.5	54	2'37"
m.a	Galați	160.36	9.14	23.76	20.68	54.12	143.08=2'38"

**Legend:** SLpl- standing long jump.

Abd- abdomen in 30 seconds.

Mobilit- coxofemoral mobility.

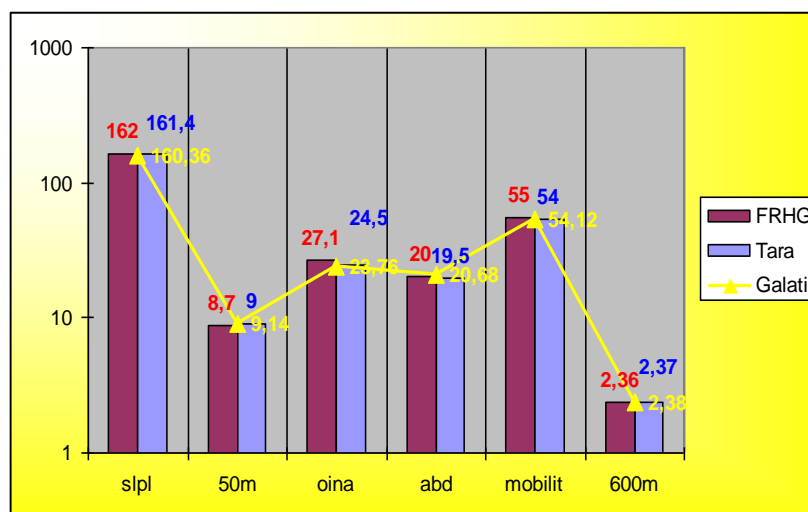
Res- resistance 600 metres.

In the trial *Softball throw*, the athletes of Galați obtained a mean of 27.10 m, 3.34 m lower than the national mean of 27.10 m. Just like in the trial of standing long jump, I believed that the different was more significant than the results compared from the other trials.

In the trial *Abdominal strength*, the results are positive compared to the national mean. The Galați athletes, with a mean of 20.68 repetitions, exceeds the national mean of 20 repetitions, with a positive difference of 0.68 repetitions.

In the trial *Mobility*, the athletes of Galați obtained an arithmetic mean of 54.12 cm, namely 0.88 cm lower than the national arithmetic mean proposed by the FRHG, of 55 cm. The difference between the two means is not significant. In the trial

*Resistance run* (600 m flat), the two arithmetic means of the Galați athletes 2'.38" and national 2'.36" demonstrate sensibly equal values. The difference of 2" for the national mean is insignificant.



**Figure 1.** Comparative motricogram with the evolution of the arithmetic means in the physical trials

As illustrated by the motricogram, besides the abdomen 30 sec. trial – showing an insignificant increase of 0.68 repetitions – all the other physical trials show lower results obtained by the Galați athletes than the national mean.

Insignificant results were recorded in the trial of standing long jump, too, namely 1.64 cm, and in the trial of softball throw, namely 3.34 cm.

The motor qualities involved in these two trials are speed – strength for the lower limb muscles and speed – strength – skill for the upper train muscles. Hence, the difference in value between Galați and the national value in the physical trials is not significant.

Concerning the level of technical training, I performed the following tests presented in Table 2; I compared the results to the values proposed by FRHG and to the national centralised values.

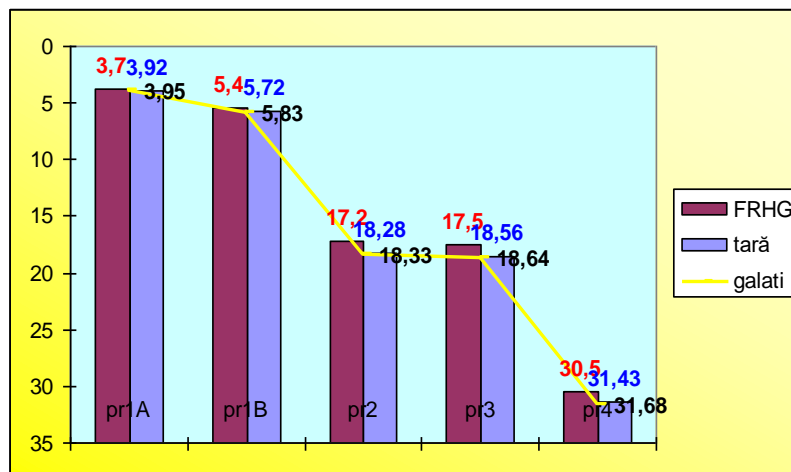
**Table 2.** The results obtained in the technical trials of beginner hockey players in the country and in Galați, compared to the baselines proposed by FRHG (n=275)

	Pr IA	PrIB	Pr II	PrIII	PrIV
<b>NATIONAL MEAN</b>	3 <sup>''</sup> .92	5 <sup>''</sup> .72	18 <sup>''</sup> .28	18 <sup>''</sup> .56	31 <sup>''</sup> .43
<b>GALAȚI MEAN</b>	3 <sup>''</sup> .95	5 <sup>''</sup> .83	18 <sup>''</sup> .33	18 <sup>''</sup> .64	31 <sup>''</sup> .68
<b>FRHG MEAN</b>	3 <sup>''</sup> .70	5 <sup>''</sup> .40	17 <sup>''</sup> .20	17 <sup>''</sup> .50	30 <sup>''</sup> .50
<b>DIFFERENCE GL/FRHG</b>	0 <sup>''</sup> .25	0 <sup>''</sup> .43	-1 <sup>''</sup> .13	-1 <sup>''</sup> .14	-1 <sup>''</sup> .18

**The first technical trial** – forwards skating and backwards skating between the blue lines. In this trial and in all the technical trials, the beginner athletes in Galați, with 3<sup>''</sup>.95 and 5<sup>''</sup>.83, obtained lower scores than the arithmetic mean proposed by FRHG, namely

3<sup>''</sup>.70 and 5<sup>''</sup>.40. The difference between means of 0<sup>''</sup>.25 and 0<sup>''</sup>.43 is more significant in backwards skating, considering that the distance covered is relatively small (20 m).





**Figure 2.** Comparative technicogram with the evolution of the arithmetic means in the technical trials

**The second technical trial** – the small marathon – this trial focuses on speed and it comprises many stops, in both forwards skating and backwards skating. The difference between the arithmetic mean obtained by the hockey players in Galați 18".33 and the one proposed by FRH 17".20, namely 1".03, is rather significant to the detriment of the Galați players.

**The third technical trial**, complete Canadians 360° to the left and to the right. This trial is meant to assess the acquisition degree of complete turns 360° (Canadians), on the right and on the left side. Players will execute this from forwards skating. The arithmetic mean obtained by the athletes of Galați – 18.66 sec. – compared to 17.50 sec. the national mean demonstrates in this case, too, an insignificant negative difference of 1.14 seconds, to the detriment of the Galați players.

**The fourth technical trial** was the great marathon. It was the most difficult trial in terms of effort and it highlighted a difference of the arithmetic mean of over a second (1.18 sec) to the detriment of

the Galați players. There was a significance difference in this case, too: the Galați athletes failed to get close to the mean proposed by FRH.

Thus, the results presented demonstrate that the rather low indicators in the trials are due to the inconsistency between the methodics of training for beginner hockey players and the requirements of the Romanian Ice Hockey Federation. It is also due to the inadequate methodics for the age and specifics of ice hockey. Another cause is the inadequate selection of the best means concerning general or specific physical training, and concerning specific ice hockey technical training.

To improve the level of physical and technical training, we propose the implementation of movement games, as a specific means and method for this age, in both training on land and on ice.

I present as follows the categories of movement games, with the purpose of contributing to the physical and technical training of children and junior hockey players. I mention that the movement games were assessed within the research conducted.

**Table 3.** Motion games - independent variable

Movement games for forming the motor abilities and skills	Movement games for developing the basic motor skills
<b>Basic motor skills</b> <ul style="list-style-type: none"> <li>M. g. for walking</li> <li>M. g. for running</li> <li>M. g. for jumps</li> </ul>	<b>M. g. for speed</b>  <b>M. g. for skill</b>

<ul style="list-style-type: none"> <li>• M. g. for throwing-catching</li> </ul> <p><b>Applicative-utilitarian motor skills</b></p> <ul style="list-style-type: none"> <li>• M. g. for climbing - escalating</li> <li>• M. g. for crawling</li> <li>• M. g. for balance</li> <li>• M. g. for transport-object handling</li> </ul> <p><b>Sports motor skills</b></p> <ul style="list-style-type: none"> <li>• Specific m. g. for each sports branch (sports game)</li> </ul>	<p><b>M. g. for strength</b></p> <p><b>M. g. for resistance</b></p> <p><b>M. g. for mobility, elasticity, suppleness</b></p>
<p><b>Movement games for learning the basic technique specific to hockey</b></p>	
<p><b>Executions without the puck</b></p>	<p><b>Executions with the puck</b></p>
<p><b>Learning the fundamental positions</b></p> <p>M. g. for gliding</p> <p>M. g. for <b>cutting the ice</b></p> <p>M. g. for <b>detours</b></p> <p>M. g. for <b>stops</b></p> <p><b>Learning ice gliding</b></p> <p>M. g. for cutting the ice</p> <p>M. g. for <b>detours</b></p> <p><b>Learning stops</b></p> <p>From forwards skating</p> <p>From backwards skating</p> <p>Skating to the left</p> <p>Skating to the right</p>	<p><b>Learning puck leading</b></p> <p><b>Cutting the ice while puck leading</b></p> <p><b>Detours while puck leading</b></p> <p>Simple detours – double detours</p> <p><b>Learning takeover passes</b></p> <p>From forwards skating</p> <p>From backwards skating</p> <p>Skating to the left</p> <p>Skating to the right</p>
<p><b>Movement games for forming the skills and abilities specific to ice hockey / technical training</b></p>	
<p><b>M. g. for adjusting to the fundamental position</b>        Without the cross – With the cross, standing – While moving</p> <p><b>M. g. for learning goal shooting</b>        Standing. From the right – From the left</p> <p><b>M. g. for the specific training of the goalie</b></p> <ul style="list-style-type: none"> <li>• Adjusting to specific equipment</li> <li>• Fundamental position with the cross and without the cross</li> <li>• Standing and in motion</li> </ul>	

### Conclusions

In the technical trials (II, III, IV), the differences between means are the most significant compared to all the trials conducted. Thus, significant differences were noted concerning the level of physical training and especially of technical training, between the propositions of FRHG and the athletes of Galați. FRHG proposes certain training levels but fails to indicate the concrete methodical ways to reach them.

Due to the analysis conducted on the results of the physical trials, of beginner hockey players, within the previous experiment, I noticed that – besides the 30-sec abdomen trial, where the hockey players in Galați recorded an insignificant increase of 0.68 repetitions, compared to the baselines proposed by F.R.H.G. – all the other physical trials indicate lower scores compared to the national mean. In my opinion, more significant differences were recorded in the trial of standing long jump (1.66 cm) compared to the

means proposed by F.R.H.G. and in the trial of softball throw (3.34 cm) compared to the means proposed by the federation.

After the analysis carried out concerning the results of technical trials in the case of beginner hockey players within the previous experiment compared to the national means proposed by the Romanian Ice Hockey Federation, I found that the results to be lower to the detriment of the hockey players in the research.

The most significant differences (1.14 sec.) were recorded in the third trial (full detours to the left and the right, through three pegs, on a rink length) and the fourth trial (the great marathon; a full tour of forwards skating near the ball cushion and behind the goals; backwards skating), namely 1.18 sec compared to the national mean.

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