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ASSESSMENT OF PHYSICAL CONDITION OF SENIOR HANDBALL PLAYERS

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Abstract. *The objective of the research was to obtain useful information on physical training for senior handball players, for this purpose we developed and applied a training plan designed to achieve a high level of physical training. Each test applied to athletes was relevant, in order to obtain useful information on physical training, for senior handball players. Specialization and differentiated treatment of players during training is a fundamental methodological orientation in modern sports training, required by the heterogeneous composition of groups of players in terms of somato-functional development and motor skills qualities.*

The research conclusions, obtained after applying the initial and final tests, indicate the need to apply training programs specific to the sport played, customized according to the specifics of the game, age and motor experience, to improve the physical training of senior handball players. A good physical condition and specific to the handball game is essential in the current handball game and offers the optimal conditions for obtaining sports performance. A contribution to the development of the training process has the training plan which establishes the objective, the share of specific training factors for each training stage.

The means and methods exposed in the training program of the experiment group were successful, and its effect materialized through a real increase in motor skill indices. At the final test, the athletes included in the control group reported a relative and insignificant evolution of the specific physical condition, at the final tests for the evaluation of the specific physical condition obtaining a significant improvement of the results.

Keywords: *physical training, physical condition, final test, physical tests, handball players.*

Introduction

Sports training (including the course physical training) is widely presented in the literature. Regarding the physical training, it is specified its presence in all stages of training, in different weights, it contributing to the realization of sports training and obtaining performances in competitions [2, 3, 4, 6, 7].

Physical training is an indispensable element for sports performance and intervenes decisively in an optimal development of all indicators that manifest the main physical qualities - strength, speed, endurance, suppleness and dexterity, all in close relation to the characteristics of sports.

A good physical training of high performance handball players, along with native features, ensures an optimal level of development in terms of performance, manifested by speed, strength, relaxation and very good aerobic performance, along with somatic cues required by handball during current - taller, stronger players with higher body weight [8].

The training of high-performance handball players must be correlated with the situations encountered in the game and which they must face successfully. The most common motor skill demands in competitions are: high intensity actions, physical contact and resilience during the game [1].

Top handball players are distinguished by individual physical performance in terms of relaxation, strength, specific strength, speed on short distances.

Physical training, programmed in accordance with the individual characteristics of athletes contributes to the development of motor skill and physical potential, which is crucial in achieving performance, a significant contribution having the strength and power developed in the context of training specific to handball [5].

Training for the physical training of elite handball players must include means that contribute to the development of strength and power, specific coordination and endurance, agility and relaxation, through training with high intensity intervals and short duration (up to 15 seconds), the effect final being visible in achieving an optimal level of training, which will contribute to the achievement of the set performance objectives [9].

Physical training in handball is a complex task, because it must be planned and correlated with the other aspects of sports training (technical, tactical, psychological), the specifics of the playing positions and the individual characteristics of the players, to ensure the optimal development of fitness.

Materials and methods

In conducting the research we started from the hypothesis that the implementation of a training program containing means adapted to the game model in performance handball at senior level will lead to the improvement of the specific physical condition of senior handball players.

Each of the two groups consisted of 19 athletes, to whom the following tests were applied: speed / sprint (10m, 20m), Illinois test (agility), 30/15 IFT test (endurance).

The initial testing period was July 12-14, 2019, Calarasi, for the experimental group, respectively August 1-3, 2019, Iasi, for the control group, at the beginning of the centralized training of the team.

The final testing period took place between December 14-16, 2019, Calarasi, for the experimental group, respectively December 11-13, 2019, Iasi, for the control group, before the competition break.

Results and discussion

Within the groups, on play stations, there are small differences, the values obtained at the control tests, at the initial testing, by the athletes from the experiment group are slightly higher than those obtained by those of the control group (Tables 1 and 2; Figures 1 and 2).

Table 1. Tests and results on initial testing. Intergroup statistical analysis. Running tests

Group		Speed		Specific agility	Resistance aerobic
		10m sprint (s)	20m sprint (s)	Illinois test (s)	30/15 sec IFT (km/h)
E	X	1.91	3.17	15.64	18.08
	S	0.041	0.104	0.469	0.584
	Cv	2.17	3.27	3.00	3.23
M	X	1.91	3.17	15.65	18.00
	S	0.040	0.099	0.468	0.553
	Cv	2.09	3.10	2.99	3.07
F(1,36)		0,002	0,021	0,001	0,183
P		> 0,968	> 0,886	> 0,978	> 0,671

Table 2. Final results and tests. Intergroup statistical analysis

Group		Speed		Specific agility	Resistance aerobic	Strength			Isometric force
		10m sprint (s)	20m sprint (s)	Illinois test (s)	30/15 sec IFT (km/h)	Semi-squat	Bench press	Upright Barbell Row	Plank (s)
E	X	1.86	3.09	15.50	19.29	141.47	83.79	42.32	152.11
	S	0.038	0.100	0.438	0.839	12.817	6.989	4.978	26.104
	Cv	2.07	3.24	2.83	4.35	9.06	8.34	11.76	17.16
M	X	1.91	3.17	15.64	18.16	126.42	75.79	34.16	127.63
	S	0.040	0.097	0.467	0.443	10.976	8.324	4.272	27.048
	Cv	2.10	3.06	2.99	2.44	8.68	10.98	12.51	21.19
F(1,36)		14,136	6,007	0,956	27,058	15,119	10,294	29,382	8,054
P		<0,001	< 0,019	>0,335	<0,001	<0,001	<0,003	<0,001	<0,007

At the **10 m sprint test**, the experiment group obtained a progress of 0,05 sec (having an average of 1,91 sec at the initial test and 1,86 sec at the final test); In percentage terms, the progress was 2,62%. By applying the simple intragroup ANOVA technique to the experiment group, an F value of 14,540 was obtained, a significant value for the limit of 10,1% ($P < 0,001$). The control group did not register any increase between the two tests (initial test 1,91 sec, and final test also 1,91 sec). The same technique applied to the control group indicated an F value of 0.030 at a P limit of 0,871, thus above the P value of 0,05, the minimum limit accepted in such research. At the initial testing between the two groups there were no differences (control group – 1,91 sec; experiment group – 1,91 sec), a fact confirmed by the application of the simple intergroup ANOVA technique that did not indicate statistical significance. The analysis of the intergroup statistical significance at the final testing indicated a value of 14,136 for F, a statistically significant value for the P limit of 0,001.

Regarding the **20 meter sprint test**, the experiment group obtained a progress of 0,08 sec (having at the initial test an average of 3,17 sec, and at the final one of 3,09 sec); In

percentage terms, the progress was 2,52%. By applying the simple intragroup ANOVA technique to the experiment group, an F value of 5,460 was obtained, the significant value for the P limit of 0,025. The control group did not register any increase between the two tests (initial test 3,17 sec, and final test also 3,17 sec). The same technique applied to the control group indicated a value for F of 0,013 at a limit for P of 0,908, thus above the value of 0,05, the minimum limit accepted in such research. At the initial testing between the two groups there were no differences (control group – 3,17 sec; experiment group – 3,17 sec), a fact confirmed by the application of the simple intergroup ANOVA technique that did not indicate statistical significance. The analysis of the intergroup statistical significance at the final test indicated a value of 6,007 for F, a statistically significant value for the P threshold of 0,019.

Regarding the **Illinois test**, the experiment group obtained a progress of 0,14 sec (having at the initial test an average of 15,64 sec, and at the final test of 15,50 sec); In percentage terms, the progress was 0.9%. By applying the simple intragroup ANOVA technique to the experiment group, an F value of 1,002 was obtained, the insignificant value for the limit

of 0,323. The control group registered in the two tests an increase of 0.01 (initial test 15.65 sec, and final test 15.64 sec), in percentage 0,06%. The same technique applied to the control group indicated a value for F of 0.003 at a limit for P of 0.959, the value of P should be 0.05 or less to be significant. At the initial testing between the two groups there were no significant differences (control group - 15.65 sec.; experiment group - 15.64 sec.), a fact confirmed by the application of the simple intergroup ANOVA technique that did not indicate statistical significance. The analysis of the intergroup statistical significance at the final test indicated a value of 0.956 for F, a statistically insignificant value for the P limit of 0.335.

At the **30/15 IFT test**, the experiment group obtained a progress of 1,21 km/h (having at the initial test an average of 18.08 km/h, and at the final one of 19,29 km/h); In percentage terms, the progress was 6,69%. By

applying the simple intragroup ANOVA technique, in the experiment group an F value of 26,662 was obtained, the significant value for the limit of 0,1%. The control group registered in the two tests an increase of 0,16 km / h (initial test 18 km / h, and the final test 18,16 km/h), in percentage 0,89. The same technique applied to the control group indicated a value for F of 0,945 at a limit for P of 0,388, thus above the value of 0,05, the minimum limit accepted in such research. At the initial testing between the two groups there were no significant differences (control group - 18 km/h; experiment group – 18,08 km/h), a fact confirmed by the application of the simple intergroup ANOVA technique that did not indicate statistical significance. The analysis of the intergroup statistical significance at the final testing indicated a value of 27,058 for F, a statistically significant value for the P limit of 0,001.

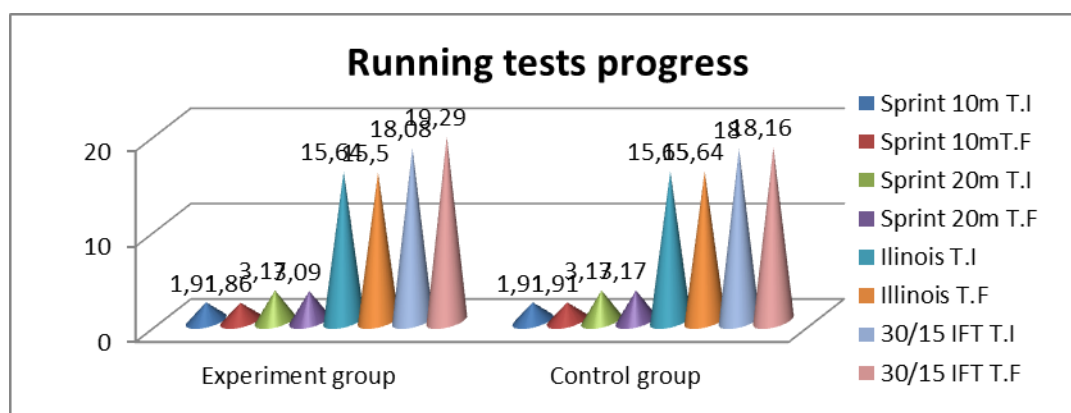


Fig. 1. Graphical representation of the results recorded by the two groups at the running tests (initial and final tests)

Overall, the average rate of progress recorded by the experiment group was 0,09 sec, in 3,18% percent, and in the control group the progress obtained was only 0,003 sec, in 0,24% percent, after the period subjected to the experiment. The most important advances were those registered by the experiment group in the running tests, **30/15 IFT (1.21 km / h)**, in percentage 6.69%, and **sprint 10 meters (0.05 sec)**, in percentage 2,62%, following the

20 meter sprint trials (0.08 sec), in 2,52% percent and in the **Illinois test (0.14 sec)**, respectively, in 0.9% percent. In the control group, the only significant progress was in the **30/15 IFT test (0.16 km/h)**, in percentage 0,89%.

Even in the running trials, compared to the control group, the progress of the experiment group was higher, after the period subjected to the experiment.

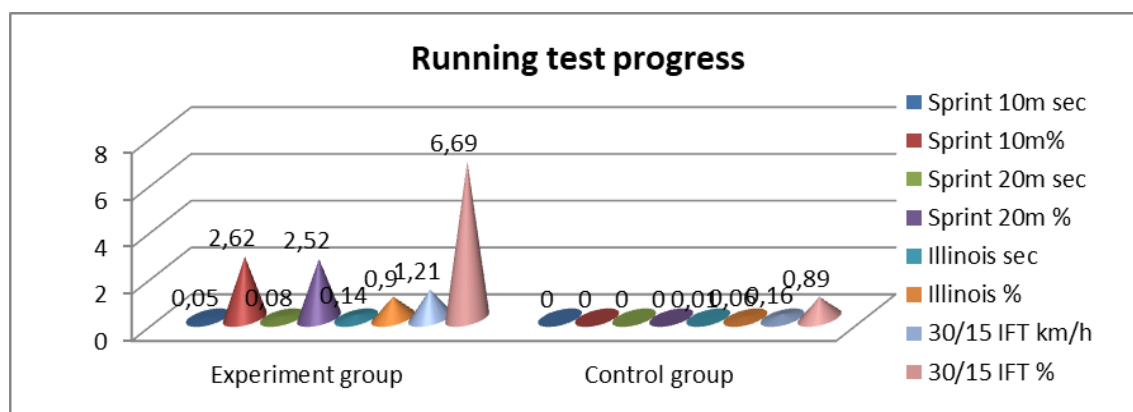


Fig. 2. The graph representing the overall progress made by the players of the two groups in the running tests at the final test

Conclusions

As a result of the application of the methods exposed in the training program of the experiment group, a real increase of the motor skill indices was highlighted. At the final test, at the tests for the evaluation of the specific physical condition, a significant improvement of the results was obtained (progresses made: running speed / sprint 10m - 0.05 sec; running speed / sprint 20m - 0.08 sec; Illinois test - 0.14 sec; **30/15 IFT** - respectively 1.21 km / h). Comparing the results obtained by the experimental group at the final testing of the control group, it can be concluded that the exposed means had an

increased influence in the development of the specific physical condition of the subjects in the experimental group.

Both the training plans and the planning of the physical training sessions performed by us determined an improvement of the specific physical condition of the handball players subjected to testing in the experimental group. The athletes included in the control group reported a relative and insignificant evolution of the specific physical condition.

An optimal level of physical condition specific to the handball game is essential in the current handball game and offers the premises for obtaining sports performance.

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