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EFFECTS OF SPRINT PROGRAM ON SOME MOTOR AND FUNCTIONAL ABILITIES IN TEACHING PHYSICAL EDUCATION

Summary

The study was conducted in order to determine the effects of sprint training on the transformation of motor skills and functional capabilities in elementary school pupils. The sample of subjects consisted of 54 elementary school pupils in Kosovska Mitrovica, aged 11 years ± 6 months. The experimental group consisted of 27 subjects selected for the sprint training in physical education classes, three times a week for 45 minutes, for a period of eight weeks. The control group also consisted of 27 subjects who, in the same time interval, had the same number of classes as the experimental group, and attended the classes of regular physical education program (three times a week for 45 minutes, for a period of eight weeks). The main aim of the research was to determine the influence of the sprint program in regular teaching of physical education on the development of motoric and functional capabilities in the experimental group members. Another aim of the research was to determine the influence of the program contents of regular physical education on the development of the same anthropological features in the control group of the subjects. The results showed that the experimental group of subjects achieved better results in the tested areas, and that there were significant effects of sprint training in the final testing.

Key words: *physical education, sprint program, motor and functional abilities, elementary school students*

1.INTRODUCTION

In essence, the systematic teaching process is the transformation process by which students are transformed from one state to another, in accordance with the previously established goals of physical education teaching. In order to achieve this, it is necessary to apply the principles of transformation processes, so that the teaching process could be efficiently managed. It is also necessary to know the dimensional structure of the anthropological characteristics and their influence on the efficiency of the performance of technical-tactical elements, because the correctness of the orientation process, the selection of pupils, the efficiency of the teaching process and the achievement of the best results depend on it.

Sprint run is a complex cyclical movement that allows maximum speed to be achieved at a given time, through maximum intensity. From the standpoint of sports training, speed as a physical feature implies the ability of a man to make movements in the shortest time and given conditions, assuming that the task conduction does not last long and there is no fatigue (Milanović, 2007; Palović, R. & Radinovic, Z., 2010.).

A number of authors (Schneider, V., 1994; Bowerman, W. Freeman, W., & Gambetta, P., 1998; Jonić, Z., 2009; Janković, M., 2012;) points out that sprint speed is expressed through cyclical and acyclical movements during motor running. The speed of development and

transmission of force is a key factor in successful sprinting. Whenever the speed of movement increases, there is an increase in the "action" and "reaction" of the soft tissues. Action can be defined as the rate of applied forces in the body, while the reaction refers to the ability of soft tissues and the body as a whole to absorb and recover from these forces.

The overall improvement of the sprint run maximum can be influenced by the development of speed-strength abilities. In order to optimally develop kinematic and dynamic speed indicators, a variety of training methods should be applied and combined in an appropriate way. The transformation of functional abilities definitely belongs to the sphere of the most frequently applied and most useful transformations of the training process. A high level of aerobic ability is extremely important in all sports of extended duration.

In general, the study of the transformation processes of various anthropological features under the influence of workout process on the human organism is one of the most significant subjects of interest in sports science (Bompa, 2006; Milanović, 2007; Malacko, J. & Pejčić, A., 2009), given that many previous research have unambiguously found that certain training processes significantly influence changes in different human abilities and motor skills.

Analysis of the effects under the influence of a specific programmed learning process is increasingly becoming a subject of scientific research (Schneider, V., 1994; Branković, N., 1998; Branković, N., Milanović, S., & Pavlovic B., 2012), considering the importance of research results as exact indicators for further planning and programming of teaching work, as well as for selecting adequate methodological procedures in accordance with the desired goal.

The main objective of this study is to determine the influence of applied sprinting speed exercises in regular physical education to the motor and the functional capabilities of the experimental group of subjects. An additional goal is to determine the influence of the program contents of regular physical education on motor and functional abilities in the control group subjects.

2. METHODS

The population, from which a sample of 54 subjects was taken, consists of male elementary school pupils in Kosovska Mitrovica, aged 11 years ± 6 months. The sample was divided into experimental and control groups. The experimental group was composed of 27 subjects selected for sprint training at physical education classes, three times a week for 45 minutes, for eight weeks. The control group was also composed of 27 subjects who completed classes of regular physical education, three times a week for 45 minutes, for eight weeks.

Prior to the beginning of the teaching work, and after two months of treatment in both groups, ten tests for assessment of motor abilities were conducted: explosive force, flexibility, coordination, repetitive force and segmental speed test. The tests were selected based on the instructions and recommendations of the Kurelić et. al (1975).

Explosive power was assessed through the *standing long jump* (MSDM) and *standing triple jump* (MTRS) tests. Flexibility was assessed through tests of *twist with the stick* (MISPL) and *forward bend on the bench* (MDPK). Coordination assessment included acrobatic tests of co-ordination and co-ordination tests with the stick. The assessment of repetitive power included- *lifting upper body in 30s* test (MD30) and *squats* (MČUČ), and the assessment of segmental speed was carried out through the *hand tapping* (MTAR) and *foot tapping* (MTAN) tests.

Functional capabilities were assessed through three tests: the Margaria test (FMARG) - for determining the anaerobic muscle potential (1) ; vital capacity of the lungs (FVKPL) (2), and a modified Harvard step test - the pulse frequency after the load (FPPOP) (3). Functional tests in this study were taken from the model of functional tests of Heimar and Medved, 1997.

The program of sprint exercises in the experimental group of subjects realized within regular physical education was conducted with the aim of influencing anaerobic/aerobic

endurance, respiratory and cardiovascular system, strengthening the muscles of the lower extremities and consuming a higher amount of energy, using predominantly interval working methods.

The practical realization of sprint exercises included the following exercises: running in place with pronounced hand movements, quick skipping, jump-rope exercises, quick jumping-jacks, quick heel-striking, short-run sprints, running with a change in step length (same frequency), running with a change in the height of the knees in the step, running under, above and around the ramps to jump up with a runner, running with a progressive speed increase to reach the maximum speed. The maximum acceleration was developed using variables (running with a change in the length of the step (same frequency)), running with a change in the knee height in the step, a sprint run of 4 x 10 meters running, a sprint run of 3 x 20 meters, a sprint run of 2 x 30 meters. Attention was paid that all the subjects participate actively in the organization of the motor content; that individual classes do not last long; that tasks are carried out in groups; that the loads correspond to the individuals` level of abilities.

Data obtained from initial and final testing were processed using the multivariate and univariate analysis of covariance.

3.RESULTS

Table 1. Multivariate analysis of covariance between experimental and control group in motor abilities at final testing with neutralization of differences in initial testing.

Wilks' Lambda	F	df 1	df 2	P-level
.583	7.56	10	54	.000**

Legend: the values of Bertlet's test (Wilks' Lambda), Ra's F-approximation (Rao's R) and level of significance (P-Level)

Table 1. shows the multivariate analysis of covariance which determines the realized effects of experimental treatment on the development of motor skills in the experimental group, compared to the control group in the final test, with the neutralization of the recorded difference in the initial testing. The results show that there is a statistically significant difference at the multivariate level between the experimental and control group subjects at a significance level greater than .01 (P-level = .000), which confirms the Wilks' Lambda test (.583) and F-test (7.56). The current difference occurs under the influence of experimental sprinting exercise, which effectively worked on the development of motor skills in the experimental group.

Table 2. Univariate analysis of the covariance between the experimental and control group in the motor abilities of the final test in the neutralization of the differences in the initial testing.

Tests	Adj. Means	Adj. Means	F-ratio	P-level
MSDM	164.83	153.46	7.82	.000
MTRS	495.60	450.34	6.95	.000
MDPK	38.54	30.72	6.14	.000
MISPL	72.42	84.20	5.82	.000
MOKV	16.25	18.84	1.87	.036
MKOP	11.52	17.53	5.56	.000
MD30	17.14	21.20	5.65	.000
MČUČ	15.30	14.12	2.93	.070
MTAP	39.46	33.45	4.95	.003
MTAN	34.25	26.36	4.54	.000

Legend: arithmetic mean of experimental group (Means (ek)), arithmetic mean of control group (Means (ko)), F-test value (F-ratio) and level of significance (P-level)

Table 2. presents a univariate analysis of covariates of motor skills tests by comparing the results of the arithmetic mean of the experimental and control group in the final testing. Based on the coefficients of the F-ratio and their significance (P-Level), it can be concluded that a statistically significant difference was found between the level of .01 in eight motor tests. With a single test (MČUČ), the difference is not statistically significant at the level of .05, while in the test (MOKV), the difference is not statistically significant at the level .01.

Table 3. Multivariate analysis of covariance between the experimental and control group in the functional capabilities in the final testing with the neutralization of differences in the initial testing.

Wilks' Lambda	F	df 1	df 2	P-level
.738	4.39	3	54	.004**

Legend: the values of Bertlet's test (Wilks' Lambda), Ra's F-approximation (Rao's R) and level of significance (P-Level).

Multivariate analysis of covariance in the area of functional capabilities (Table 3) indicates that there is a statistically significant difference on the multivariate level between the experimental and control group subjects at a significance level of more than .01 (L-level = .004), as evidenced by the value of Wilks' Lambda test (.738) and F-test (5.39). The existing difference occurs under the influence of experimental treatment of the running speed which effectively influenced the development of functional abilities in the experimental group.

Table 4. Univariate analysis of covariance between the experimental and control groups in
functional capabilities in final testing with neutralizing differences in initial testing.

Tests	Adj. Means	Adj. Means (ko)	F-ratio	P-level
FMARG	3.18	3.74	5.94	. 000**
FVKPL	2840.00	2760.00	1.81	.231
FPPOP	154.00	162.00	4.64	.000**

Legend: The arithmetic mean of the experimental group (Means (ko), the arithmetic mean of the control group (Means (ko), a value of F-test (F-ratio), and the level of significance (P-level).

The univariate level of covariance analysis between the experimental and control group in evaluation tests of the functional abilities in the final testing, with the neutralization and partialisation of the results at the initial testing (Table 4), indicates that there are statistically significant differences in the Margaria test (FMARG .000) and the pulse frequency after loading. In the case of vital lung capacity (FVKPL .231), no statistical significance was found at the level of .05.

4. DISCUSSION

The results of this study show that the subjects of the experimental group in the final measurement quantitatively differ in motor (tables 1 and 2) and functional abilities (Tables 3 and 4) and that the adaptive sprint program influenced the positive changes in the tested capabilities of the subjects.

The identified intergroup differences in both motor and functional area are in favor of the experimental group, and it can be concluded that the implemented sprint program induced adaptive changes in both motor and functional abilities, and influenced the improvement of the results between two studies in most of the applied tests for the assessment of motor and functional abilities.

The justification of the obtained results can be confirmed by the results of other studies (Šnajder, 1994; Matković, 1998) in which authors emphasize the importance of a properly, methodically designed sprint speed motoring program to increase the level of examined skills.

The statistically significant and better results of motor abilities in the experimental group compared to the control group of the subjects, were certainly achieved, besides the correct choice of exercises, as a result of proper dosing, distribution and control of the applied loads in accordance with the authentic needs of the subjects. This caused the creation of appropriate adaptive processes in the experimental group of subjects and positive changes in their organism.

On the basis of the statistically significant differences in the functional indicators shown in the chapter *Results* (Tables 3 and 4), it can be argued that the length and structure of the applied sprint training program were adequate, and led to an improvement in the level of cardiorespiratory endurance in the experimental group of subjects.

It can be concluded that the sprint program, applied in the experimental group of subjects, was adequately conceived in accordance with the so-called FIDT training process guidelines (frequency, intensity, duration and type of training), and can be applied as a conditional form for planning physical activity in teaching physical education in improvement of functional and motor skills.

CONCLUSION

The conducted research confirmed that there are apparent effects of sprint training on the motor and functional abilities of elementary school students. It has been demonstrated that the proper intensity, duration and frequency of sprint exercises can provide an effective way of continuous improvement in motor and functional abilities in the experimental group of elementary school students.

The research, as an original contribution to science, answered the question of the appropriateness and efficiency of the application of sprint speed training program. The results showed that the experimental group of subjects achieved better results in the tested areas of motor and functional abilities, and that there were significant effects in the final testing.

We believe it is necessary to conduct an extensive research in which the effects of sprint speed training on the motor and functional skills of students are examined. Such knowledge could serve as a basis for the development of training programs that could be applied in the teaching of physical education of primary schools.

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