

## **THE EXAMINATION OF THE EFFECTS OF THE BASKETBALL TEACHING OF PHYSICAL EDUCATION ON EXPLOSIVE STRENGTH OF 3<sup>RD</sup> AND 4<sup>TH</sup> GRADE ELEMENTARY SCHOOL BOYS**

*(Research note)*

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### **Abstract**

*The population from which the sample of the examinees is taken is defined as the population of younger elementary school students 9 - 10 years of age. According to the aim of the research, a sample of 107 examinees is suggested, and they were divided into two sub samples (experimental and control group) which is relatively optimal for the planned research to be accepted. The evaluation of motor abilities, i.e. the explosive strength, significant for this program of measuring, is conducted by usage of the following measuring instruments: long jump from one place; running 20 m from high start; high jump from one place. In this research, multivariate analysis of covariance and discriminative analysis has been taken. In this work, the subject of the research is just one segment of the anthropological area which refers to the appearance of appropriate motor abilities – the explosive strength. The appropriate level of explosive strength is necessary during each motor activity. The given results lead us to the conclusion that the experimental factor is responsible for the significant changes in the evaluation of some anthropological characteristics within the students of younger school age.*

**Keywords:** *elementary school students, motor activity, motor tests, multivariate analysis of covariance*

### **INTRODUCTION**

The basic goals of the physical education teaching is to planned and meaningfully achieve the positive influence on the psychosomatic status, i.e. to provide the incentives for normal growth and development of students, as well as their training for self control and examination of their health and physical abilities (Aleksic, 2010). If it is wanted to significantly influence the anthropological dimensions of younger children of school age, it is necessary to choose the means of physical exercise of general character and apply them with significantly bigger intensity than it is now in practice. In other words, most of the principles and methods of a sports training should be built in the physical education and adapt them to the younger school age, affecting the general motorics, i.e. their motor behavior, and thus, the other anthropological dimensions (Bala, 1981). Such opinions were the starting point for this research which aim is to significantly intensify the effects on the motor space of female students by enriching the teaching with the ele-

ments of sports gymnastics as the means of the physical education teaching on the regular physical education lessons with the female students of the third and the fourth grade of elementary schools. *The subject* of this research is examining the effects of the suggested experimental program of the physical education teaching which would last for one school year, and in which the elements of sports gymnastics as the means of the physical education have the primary role for the transformation of one of the segments of the anthropological space which refers to the expression of certain motor abilities, i.e. static strength of the elementary school female students of younger age in Nis. Looking for the adequate contents for the physical education teaching which would provide greater efficacy of the school physical education, i.e. optimalization of work in this educational area is the basic *problem* of this research.

Basketball is based on the teaching and development of fundamental motoric, i.e. motoric behavior through the learning of the basic basketball positions, elements

and skills through natural ways of moving and play, in non-competitive surroundings. By different moving activities, learning about their body and its motoric, a child develops its motoric, acquires different motoric skills and habits and develops motoric activities.

By determining the basic subject of this research (What to examine?), it is necessary to approach the defining of the aim of the research. In terms of that, *the aim* is defined as following:

- To determine the efficacy of specially programmed physical education teaching classes (with the emphasis on basketball) on the transformation of some anthropological characteristics (motor abilities - explosive strength) of the students of younger school age during one school year.

### **Defining the structure of the explosive strength**

Explosive strength, as the basic motor ability, is very complex as the levels of the movement regulation can change. In addition, the regulation includes energetic mechanisms as well as mechanisms of simple structuring of movement.

Of all the motor abilities, the strength is the most examined and we know the most about it. The strength is defined as „An ability of a human being to overcome the external resistance or to oppose to it by muscle strain“ (Zaciorski, 1975). According to the action criterion it can be differentiated the explosive, repetitive and static strength.

„The explosive strength is defined as the ability to invest the maximal energy in one movement for as short time as possible. This factor is shown in all the movements in which the whole body, its parts or load (equipment) prolong their movement during the gained impulse, i.e. starting acceleration“ (Malacko, 1991).

The explosive strength is dominant in many locomotions that we meet in basketball activity, so because of that, it always attracts attention of basketball experts and scientists.

This motor ability depends on many factors. It is, above all, mostly innate (the coefficient of innateness with this type of strength is 0.80). Biochemical and morphological conditions, as well as the personal characteristics, influences the explosive strength. The explosive strength depends on the percentage and composition of the activated motor units in a certain group of muscles. The pale muscle fibers are innervated by motor neurons which have a very large threshold of stimulation. The white muscle fibers are contracted faster but also became tired sooner. Except that, the explosive strength depends on the quantity of the nerve cells in motor zones which are emitting impulses over the efferent fibers.

In relation to the repetitive and static strength, this type of strength matures significantly earlier and it reaches its maximum between the twenty and twenty five years of age. By an adequate training, it is possible to keep the level of this motor ability on a high level for ten years more, before its values start reducing drastically (Jovanović-Golubović and Jovanović, 2003).

The explosive strength is multidimensional and it is divided into the absolute and relative, where the absolute is made of the explosive strength of throwing and the explosive strength of kicking, and the relative is made of the explosive strength of jumping and the explosive strength of sprint. The explosive strength of arms and shoulders, as well as the explosive strength of legs are topologically separated. The elastic reactive strength (pliometric explosive strength) is the dimension which implies the ability of fast and efficient transition from the eccentric into the concentric muscle action. It is manifested in activities like jumps and throwing, where to the concentric (overcoming) phase precedes a short and fast pre-straining of muscles. In basketball, this ability is manifested within the repeated vertical jumps of basketball players toward a ball.

Basketball demands high level of the explosive strength, firstly the one of the relative type, that is the explosive strength of jump and sprint, but also the explosive strength of throwing (absolute) is an important ability in basketball.

Different variants of jumps (two foot, one-leg, with a running start, without a running start) are present in basketball, which the explosive strength of jump makes one of the most important motor abilities of a basketball player (Trninić, 2006).

### **METHODS**

Population from which the sample of the examinees is taken is defined as the population of younger elementary school students 9 - 10 years of age.

According to the aim of the research, a sample of 107 examinees is suggested, and they were divided into two sub samples (experimental and control group) which is relatively optimal for the planned research to be accepted.

The research was conducted with the third and the fourth grade students of the elementary schools „Bubanjki heroji“ and „Radoje Domanovic“, both from the city of Nis.

The examinees, which compose the sample, must satisfy the condition regularly to attend the physical education lessons.

The evaluation of motor abilities, *i.e. the explosive strength*, significant for this program of measuring, is conducted by usage of the following measuring instruments:

1. Long jump from one place (MSDM),
2. Running 20 m from high start (M20M),
3. High jump from one place (MSRG).

Starting from the results from the previous researches in the area of motor abilities, which were gained by Kurelic, Stojanovic, Hosek, Momirovic, Gredelj, Metikos, Shturm and others, a block of parameters to which a special procedure is chosen for the check of their metric characteristics will not be applied. The mentioned authors checked the metric characteristics in most of the applied parameters by experimental procedures and on samples of examinees from the Yugoslav population (Kurelić, et. al., 1975).

Starting from the presumption that the modern physical education teaching does not contribute enough to the adequate transformation of the anthropological dimensions of students, the research of longitudinal character is conducted during the period of time of 36 weeks (one school year) within which the exercise of 45 minutes was conducted twice a week. Actually, two thirds of planned lecture hours for conducting the physical education teaching according to the current curriculum for elementary school education was enriched by implementation of the elements of basketball, so that those lessons resembled as sports training.

The experimental group consisted of students from the elementary school "Bubanjski heroji" in Nis, within the experimental program in the physical education teaching with the implemented elements of basketball. The control group which consisted of students from the elementary school "Radoje Domanovic" in Nis did not have the experimental treatment but did the regular physical education lessons according to the program of the Republic of Serbia.

Before the beginning of the experiment, the initial measuring of motor abilities which were monitored during the experiment was conducted in all the subjects of the experimental and control group. The final measuring of the relevant segments of motor space was conducted at the end of the school year, after the experimental treatment.

During the experiment, the activities of general physical preparation were applied, and they include: exercise of speed, strength, coordination, flexibility, endurance and balance.

For all the variables, which are subject of the re-

search, basic descriptive statistical parameters are determined:

- arithmetic mean (MEAN);
- standard deviation (ST. DEV);
- coefficient of variance (KV) and interval of trust;
- limits of span between the values of the minimal (MIN) and maximal (MAX) results;
- Skjunis, Kurtozis;
- Kolmogorov-Smirnov test of normal distribution.

In this research, multivariate procedures MANOVA, MANCOVA, and discriminative analysis will be used, and analysis ANOVA, ANCOVA and the interval of trust on the difference of the adjusted mean as univariate procedures.

## RESULTS

During the procedure of analyzing the final state, and by the application of multivariate analysis of the covariance (MANCOVA), it is determined that the analyzed groups of female students (experimental and control group) do not statistically significantly differ from each other in their motor abilities and that, after the neutralization of the differences in the initial measuring, there is some difference in the final measuring between the analyzed groups, but not statistically significant, which practically means that there are also no differences in the contribution of the treatment.

The analysis of the covariance (ANCOVA) confirmed the absence of the statistically significant difference between the students of the experimental and control group and for each variable of the motor space of the explosive strength.

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*Table 1. The significance of the difference among all groups of the examinees in relation to the final measuring of the explosive strength*

	n	F	p
MANCOVA	3	.597	.801

*Table 2. The significance of the difference among all groups of the examinees in relation to the single variables of the space of the explosive strength on the final measuring*

ANCOVA	F	p
Msdm	.426	.739
M20m	.634	.598
Msrc	1.579	.194

*Table 3. The significance of the difference between the experimental and control group according to the interval of trust of the adjusted means of the examinees in the evaluation of the explosive strength - final*

Groups	Variable	Adjusted means	Interval of trust
I Experim.	Control	Msdm	121.66    118.74    -2.05    7.89
I Experim.	Control	M20m	5.80    4.70    -2.15    4.34
I Experim.	Control	Msrc	23.71    22.57    -.07    2.35

the adjusted mean values of the results of the experimental and control group, we see that the difference does not appear after the treatment to which the experimental group was subjected.

Bearing on mind the previously mentioned results, we can conclude that the experimental treatment did not have a statistically significant influence on the transformation of the motor abilities of the explosive strength, but that those changes appeared under the influence of natural and genetic factors.

## CONCLUSION

It should be emphasized that the examinees are less in the position to influence the development of the explosive strength. In our research, the exercises which were planned for the experimental treatment did not considerably helped to improve these motor abilities. In a research which was conducted with the aim to have influence on the two motor abilities, the explosive strength and pliability, the gained results were similar to ours. Kincer and ass. (2008) showed the influence of different methods on the development of flexibility and the explosive strength in 11 year-old girls included in training. The equipment for the simultaneous vibration of 30 Hz of strength and 2 mm of movement and the equipment of 1000 Hz which, beside the vibrations of muscles, also achieves the strain were used. The gained results were analyzed by usage of the adapted paired Bofferoni *t*-tests. The conclusion of the author is that the simultaneous vibration and strain can greatly increase the flexibility ( $p=0.002$ ) while the explosive strength stays the same.

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