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**EFFECTS OF HIGH INTENSITY POWER  
IN THE THE FUNCTION OF THE ADAPTIVE PROCESS****Summary**

*The sample of respondents consisted of 40 High School male students from East Sarajevo, 16 and 17 ± 6 months old. From such well-defined pattern were formed two subsamples: the first sub-sample consisted of 20 students, aimed for the sport who apart from Physical Education were included also into training process classes in order to develop their explosive power of high intensity in the optional Physical Education, three times a week for 45 minutes, for a period of eight weeks. The control group was composed of 20 students who attended only regular classes of Physical Education three times a week for 45 minutes, for a period of eight weeks. The aim of this study was to determine the effects of explosive strength training with high intensity on the transformation processes of some motor skill dimensions (segmentary speed, explosive and repetitive force). The aim of this study was to determine the influence of Physical Education on the transformation processes of some motor skill dimensions (segmentary speed, explosive and repetitive force). For the assessment of these skills, nine tests of motor skills were applied. The obtained data were analyzed by multivariate analysis of covariance which achieved better results in the treated motor abilities at the end of the experimental procedure, compared to the initial measurement, the experimental group and compared to the control group of respondents.*

**Key words:** *students oriented for sports, kinesiology experiment, explosive power, repetitive power, segmentary speed, multivariate analysis of covariance*

**1. INTRODUCTION**

Explosive power and jumping ability is one of the main biomotorical skills in mono-structural, polistructural and complex sports. Genetic conditionality of this dimension is over 80%. The most important factors of explosive forces are nervous and muscular system and their mutual coherence. The muscular system is an important relationship between the red (slow twitch) and white (fast twitch) muscle fibers.

Explosive power size is determined by the possibilities of joint strain of a large number of muscle groups involved in the movement, dependent of the full intramuscular koordinacion and the most favorable relation compo-nents of speed and power.

One of the basic requirements for the modernization of the process of working with quality athletes is provided by using plyometric exercise in the work with athletes. For the specific training of explosive strength development in the training theory is used the term 'plyometric training " and a method of training is called" plyometric methods ". "Plyometrics is a speed-strenght training, a combiantion of strenght and speed" (Durakovic, 2008).

The basic principle in the application of plyometric method is the speed of the change the eccentric and concentric muscle contraction. Plyometric exercises are those in which the muscle stretches eccentrically and immediately thereafter concentrically. Fast eccentric muscle action stimulates the stretch reflex, which increases the force created during concentric contraction.

The use of vertical jumps to assess the explosive strength of legs is present in the professional literature, but also in sports practice, for over several years.

In studies of some researchers (CoH, 2003; Bompa, 2006; Cicović, 2008; Pržulj, 2012), it was confirmed that the height of the jump is a valid index of muscle strength regardless of the size of the body. The vertical jump is a struggle with gravity: as greater force acts is on the ground, the higher jump will be performed.

A large number of research has been established that athletes under the influence of adaptive training of explosive power achieve quantitatively greater value motor and functional abilities and technical knowledge at the final measurement (Bala, 1981; Bompa & Gregory, 2009; Babic and CoH, 2010).

The subject of research are motor skills of athletes together with the power of explosive training.

The aim of this study was to determine the effects of explosive strength training with high intensity on the transformation processes of some motor skills dimensions (segmentary speed, explosive and repetitive force). The aim of the research was to determine the influence of Physical Education on the transformation processes of some motor skills dimensions (segmentary speed, explosive and repetitive force).

## **2. METHOD OF RESEARCH**

### **2.1. The sample**

The sample of respondents included 40 High School male students from East Sarajevo, 16 and 17 years old.

The experimental group was made up of 20 students sport oriented, involved in explosive strength training with high intensity on additional classes of Physical Education, three times a week for 45 minutes, for a period of eight weeks.

The control group was made up also of 20 students. Respondents have attended only regular program of Physical Education classes, twice a week for 45 minutes, for a period of eight weeks.

Before the start of the teaching work and after its completion četvoromjesečnog in both groups, applied eight tests for the assessment of motor abilities: explosive power, repetitive power, and segment speed. The tests were selected based on guidelines and recommendations Kurelića et al. (1975).

For the evaluation of explosive power following tests were applied: vertical leap ("Sargent"), standing long jump (MSDM). For the assessment of flexibility following tests were applied: a deep forward bend on the bench (MDPK), twine (MSPA). To estimate the segment speed, following tests were applied: hand tapping (MTAP) and legs wall tapping (MTPZ). To estimate the repetitive strength, the following tests were applied: mixed chin-ups (MMZG) and lifting the hull for 30 sec. (MD30).

The data obtained from the applied tests at the beginning and at the end of two months of teaching students were processed by the method of multivariate analysis of covariance.

The work in the experimental group in the process of the additional Physical Education was based on the application of the following motor exercises to develop explosive high intensity power: the rhythmic jumping (jumping from foot to the rhythm of alternating lifting of legs with different amplituds movement, throwing a medicine ball from the breasts (throwing is made from the crouch and crouch of the stretching all segments of the body forward and up); leaps from the crouch (lateral, zigzag, back); two foot jumps (over small hurdle and then immediately hopped on the hills of varying heights, skip the lower barriers (both feet and one foot); one-leg jumps with the throwing of medicine ball, throwing a medicine ball over head (of the half squat spread hands and jerk medicine ball back and up) to complete quick jumps up from half squat (the left and right, forward and backward), jumping from foot to foot in and in the path, and then skip low and high in the movement.

The research of the efficiency of regular Physical Education teaching in the control group, was achieved on the basis of implementation of the existing curriculum. The structure of programs teaching students in this group, had a predominantly transformational character of the development of anthropological characteristics and on the increase the level of technical and tactical skills of respondents.

### 3. RESULTS

**Table 1.** *Multivariate analysis of covariance between the experimental and control groups in the specific motor skills in the final test with the neutralization of the difference in the initial testing*

Wilks' Lambda	F	df 1	df 2	P-level
.547	7.58	8	60	.000**

*Explanation: values of Bartlett's test (Wilks' Lambda), Rao Va F-aproximacion Rao's R significance level (P-Level)*

Table 1 shows the multivariate analysis of covariance which determines effects of experimental treatments on the development of motor experimental skills compared to the control group on the final test with the neutralization of the recorded difference in the initial

testing. There is a statistically significant difference in the multivariate level between the experimental and control groups at a significance level greater than .01 (P-level = .000 \*\*), which confirms the value of Wilks' Lambda test (.547) and F-test (7:58) . The current difference occurs under the influence of experimental treatment explosive power of high intensity, which has an effective impact on the development of motor skills of the experimental group.

**Table 2.** *Univariate analysis of motor skills variance between the experimental and control groups on the final measurement*

<b>Tests</b>	<b>Mean (ek)</b>	<b>Means (ko)</b>	<b>F-odnos</b>	<b>Q</b>
<b>MSAR</b>	38.40	30.22	5.87	<b>.000**</b>
<b>MSDM</b>	221.32	205.18	5.55	<b>.000**</b>
<b>MDPK</b>	46.72	42.84	1.34	.125
<b>MSPA</b>	171.79	164.26	1.46	.215
<b>MTAP</b>	43.25	34.57	7.82	<b>.000**</b>
<b>MTAZ</b>	29.26	26.85	1.06	.245
<b>MMZG</b>	16.27	11.36	6.10	<b>.000**</b>
<b>MD30s</b>	21.54	16.35	7.14	<b>.000**</b>

*Explanation: the arithmetic mean of the experimental group (Mean (ek), the arithmetic mean of the control group (Mean (when) the value of F-test (F-ratio) and the level of significance*

#### 4. DISCUSSION AND CONCLUSIONS

The study showed that the experimental group compared to the control group achieved statistically significant better results with the aid of which motor ability is evaluated – explosive power of high intensity: vertical leap ("Sargent") and long jump (MSDM). This group also achieved significantly better results in two tests repetitive strength (MMZG) and lifting the body in 30 seconds (MD30s). From a total of two tests to assess segment speed, only the hand tapping (MTAP) showed statistically significant results. In both tests of the dimensions of flexibility depth reach on (MDPK) and twine (MSPA) were not evaluated statistically significant results.

Generally speaking, experimental group of respondents who were conducted in two hours per week in regular Physical Education together with three additional hours of explosive strength training, showed more significantly success in their motor abilities (explosive power, repetitive power, and segment speed), than those respondents of the control group who attended just regular classes Physical Education to times per week.

The methods and means used in motoric explosive power exercise in the experimental group increased their capability of faster and more comprehensive motor control, which enabled increased activity of agonist muscle, and thus there was a positive and statistically significant changes of motor abilities.

A larger number of researchers (Bala, 1981; Matveyev, 200; Malacko, 2002 Malacko and Rađo 2004 Bompa, 2006; Milan, 2007), agree that the increase in the level of motor

skills and characteristics, the most appropriate if the load work corresponds to biological and psychological body characteristics of participants in sports activities. In addition, the researchers point out that in the selection of the content of training work is important to know the significance of the training exercises or complex of training activities in response of certain motor skills.

Statistically significant better results of motor skills were achieved among experimental group of respondents, compared to the control group. They are incurred as a result of the proper dosage, distribution and control of applied load in accordance with the authentic needs of respondents. In this way, positive changes have occurred in the body and the creation of appropriate adaptation processes in the experimental subjects groups.

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