

EFFECTS OF APPLICATION OF GOALBALL AT CLASSES OF PHYSICAL EDUCATION ON SOME MOTORIC ABILITIES AND PHYSICAL CONSTITUTION OF SCHOOL AGE BOYS

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Original research:

Abstract

Physical education classes have been based on motoric activity of students, by which particular assignments of classes have been achieved. The objective of research has been to examine the effects of experimental program of goal ball, implemented at classes of physical education, on promoting motoric abilities and physical status in school age boys. 34 elementary school boys, aged 11 and 12 years. Experimental group (EG) has consisted of 18 students, while control group has been made of 16 students of the fifth class of elementary school. Multivariate and univariate analysis of covariance for determining the effects of experimental program has been used MANCOVA and ANCOVA. Experimental program has shown statistically significant result in the strength of fist muscle, measured by dynamometer. Statistically significant changes have been achieved at body mass index, percent body fat and body fat mass. The purpose of this scientific study reflects in the increase of a level of information during comparison of various program of physical education classes. The results obtained can be helpful during planning of transformational processes when it comes to physical status in the framework of upgrading of curriculum Plan and program.

Key words: physical education, goalball, motor abilities, body composition

Introduction

Physical education classes have been based on motoric activity of students; whereby particular assignments of education have been achieved. It has been essential that students are adequately involved, which entails, above all, scope and intensity of their motoric activity. Transformations of anthropometric status of students to desired direction may be expected only if incentives influencing on an organism are of optimal intensity and duration, and if repeated in a specified period (Pavlović, 2017). Only if students are active at a class can physical education have desired effects on anthropologic status of students and be in a function of forming of a base of an active life style. Acceptance in a group of classmates can also depend on motoric ability, particularly in boys. Unskilled children unwillingly engage in sport or active playing with their classmates are often subject to mockery and rejection which negatively influences their self-esteem as a future preference regarding doing sport and physical activity (Đorđić i Tubić, 2010). In planning and

programming of physical education classes a stress on efficiency of method and content of organized physical classes shall be put, or, in other words, on intensifying of physical education classes (Stojanović, Pavlović & Stojanović, 2012), as well as on creating favorable climate for implementation of classes, because one can only in this way work on strengthening of motivation in students. It is essential to carry out a certain analysis of implementation of physical education classes and its appropriate planning because the present-day students all the more express dissatisfaction towards a traditional training (Hardman, 2008; Šekeljić i Stamatović 2018). In this regard, the need arises for greater flexibilities of educational curriculum based on sport education and the meeting of the specific needs of students in the aim to increase the sense of satisfaction and a greater level of physical activity which influences self-concept development (Wallhead & Ntoumanis, 2004).

Development of motoric abilities is designed to be a part of educational process, above all, of a choice of educational contents. The selection of a content and its

use shall not be a purposeless exercise, but to focus on development of specific skills (Pejčić, 2002; Zrnzević & Zrnzević, 2018). On the other side, obesity is a limiting factor for physical activities of trained students, particularly for a high jump, run, and endurance. Obese children should be encouraged in participating in physical activities, and it is essential those activities are adapted to their abilities. It is necessary that obesity-influenced activities, due to limited implementation put into practice in obese students, can be replaced with adapted activities which would prevent injuries and lack of motivation. (Christodoulos, et al., 2004).

Goal ball is a popular Paralympics sport intended for the blind and the weak sighted. It is a team sport which belongs to the group of anaerobic-acyclic sports, which offers a possibility of gaining interest in children, and due to its specificity also with children who have no issue of optical impairment. Many researches indicate that implementation of goal ball program has positively influenced during a long time period on transformation of body status (Santos et al., 2007; Caliskan, et al., 2011; Scherer, et al., 2012). The objective of this research has been to compare two programs of physical education (experimental and current program of physical education) And their influence on promotion of motoric abilities and physical condition in school age boys.

Methods

Study Design and Procedures

Experimental program of training has been implemented in the framework of physical education classes in duration of three times per week. Content of introductory part of a class has been implemented through moving exercises, formations of accepted combinations of running and walking in experimental and control group with the aim and assignment of introducing of students in action through physiological and emotional preparation for greater strains. Preparatory part of a class has had a goal to prepare a body for physical exercise. The same means have mainly been used for both groups, but not the identical ones.

Figuration exercises have been applied in terms of a complex

whereby a special attention has been paid to presence of characters (strengthening, extension and loosening), schedule of exercises and a topological criterion. No intervention in the preparatory part of classes by an experimental program has been foreseen, so the means in both groups of examinees have been in function of meeting assignment of the second part of the classes. The main part of the classes has had a goal the exercising, perfecting of sporting-technical education of a goal ball game by using different methods of education, it is to say, a combination of methods of a live word, a method of obviousness and a method of practical exercising. Experimental treatment relates to the main part of the class. The final part of the class has not deviated from the standard part of the class. The control of intensity has been carried out measuring a heart frequency during situational exercises by a conventional method, palpation of index finger on a radial artery of left hand in duration of 10 seconds, so the value has been multiplied with 6 in order to receive a heart frequency in a minute. The present researches have showed that an intensity from 70 to 90% has given a significant progress (Gabbett, 2008). Intensity in situational

Table 1. Educational Plan and Program Schedule of experimental program

Month	Week	Exercise unit	EXERCISE UNIT
	I	1	Testing
October	II	2	Technical elements of goal ball: Passing and tossing
			<i>Holding a ball, passing a ball on spot and in motion: passing a ball with one and both hands.</i>
	III	3	Elements of goal ball: Positions and stances
			<i>Technique of movement and stance in defense and attack.</i>
	IV	4	Elements of goal ball game: Situational exercises 1
			<i>Performing of situational exercises, playing on two goals</i>
November	I	5	Technical elements of a goal ball: Passing and tossing
			<i>Passing a ball on spot and in motion: passing a ball with one and both hands on the run with a blindfold</i>
	II	6	Technical elements of a goal ball: Shooting
			<i>Frontal technique shooting, rotational technique shooting</i>
	III	7	Elements of a goal ball: Positions and stances
			<i>Position from squat? lateral step forward from push up, on the knees</i>
	IV	8	Elements of a goal ball game: Situational exercises 2
			<i>Performing situational exercises, playing on two goals? with special assignments</i>
December	I	9	Technical elements of a goal ball
			<i>Technique of blocking, technique sliding down the floor</i>
	II	10	Technical elements of goal ball: Shoots
			<i>Frontal technique shoots, rotational technical shoot, between the legs shoot technique</i>
	III	11	Tactical elements of a goal ball: Attack-defense
			<i>Penalty shoot-out; penalty defense</i>
	IV	12	Elements of goal ball game: Situational exercises 2
			<i>Performing situational exercises, playing on two goals, application of all techniques and rules</i>
January	I	13	Testing
	II	14	Testing

exercises has been controlled by a teacher thereby making an exercise even more demanding by getting the additional ball in, exchanging the technique itself of performing or changing the rules (shortening of game field and changing scoring system).

Examinees of the control group have had three classes a week, two classes of regular classes of physical education at school and one class of elective sport according to the Educational Plan and program of the Ministry of Education, „Službeni glasnik RS – Prosvetni glasnik “(2006).

All procedures during studies have been carried out in accordance to the Helsinki Declaration.

Participants

34 elementary school boys, aged from 11 to 12 years have participated in this research. All examinees in research have been students who have regularly attend classes of physical education in their schools according to the Educational Plan and program. Experimental group (EG) has comprised of 18 students, while the Control group(K) has been made of 16 students of the fifth class.

Measures

Table 2. Measurement instruments for assessment of anthropological traits and physical constitution

Anthropometric and physical constitution	Abbreviation	Measurement unit
Height	TVIS	cm
Weight	TMAS	kg
BMI (Body mass index)	BMI	kg/m ²
Basal metabolic rate	BMR	%
Percentage of body fat	PBF	%
Body fat mass	PFM	%
Skeletal muscle mass	SMM	%
Total water in the body	TBW	%

Measurement instruments for assessment of motoric abilities

For assessment of motoric abilities in school age males, motoric tests in accordance to the model of “EUROFIT” batteries of sport, prescribed by Council of Europe’s Committee for Development have been used (Council of Europe, 1993).

Table 3. Measurement instruments for assessment of motoric abilities

Motoric tests	Abbreviation	Measurement unit
Dynamometer of fist	HGR	%
Flamingo Balance Test	FBL	Sec
Plate Tapping	PLT	Sec
Standing Broad Jump	SBJ	Cm
Sit Ups	SUP	Sec
Bent Arm Hang	BAH	Sec
20 m endurance shuttle-run	VO2max	Sec

Statistical Analysis

Statistic data processing has contained the calculation of descriptive statistic variants: arithmetic Mean (Mean), standard deviation (SD), minimal (Min) and maximal (Max) values of measurement results. Normal distribution of the obtained results has been examined on the grounds of the following coefficients: coefficient of curvature – Skewness; coefficient of roundness – Kurtosis. Multivariate and univariate analysis of covariance for determining the effects of experimental programs has been used (MANCOVA and ANCOVA). Parametric In the framework of the above-mentioned analysis, the following parameters have been calculated: Wilks' lambda – value of coefficient of the Wilks test for equality of centroid groups; F – value of coefficient of the F-test for significance of Wilks lambda; Effect df; Error df – deviation freedom; Q – coefficient of significance of differences in centroids; Adjusted means – adjusted values of arithmetic mean. Data will be processed by the Statistical package STATISTICA 10.0 for Windows (StatSoft, Inc., Tulsa).

Results

Effects of experimental programs of physical exercise

Table 4. Differences of effects of two programs of exercises on motoric abilities on multivariate level (MANCOVA)

Wilks Lambda	F	Effect - df	Error - df	Q
0.680	1.28	7	19	0.312

Legend: Wilks lambda –value of coefficient of the Wilks test for equality of centroids of groups; F –coefficient F-test for significance of the Wilks lambda; Effect df; Error df – deviation freedom; Q –coefficient of significance of differences of centroids

Results of differences in effects of experimental programs of physical exercising on motoric abilities at a multivariate level shown in the Table 16, suggest that there is no statistically significant difference, considering it having a value Q = 0.312.

Table 5. Difference of effects of two programs of exercises on motoric abilities at a univariate level (ANCOVA)

	Adj. EKS	Mean	Adj. KON	Mean	F (1; 25)	p
HGR	34.2		32.6		8.47	0.007*
FBL	1.47		1.34		0.25	0.622
PLT	18.7		17.5		2.49	0.127
SBJ	149.7		146.4		0.66	0.425
SUP	22.3		21.4		0.44	0.511
BAH	22.6		19.4		1.08	0.310
VO2max	44.9		44.1		0.42	0.521

Legend: Adjusted means –adjusted value of arithmetic mean; F –value of coefficient of the F-test; * – statistically significant differences

One can observe that that statistically significant differences in variables (HGR = 0.007) at a univariate level (Table 5) have occurred. Other variables show no statistical significance.

Table 6. Differences of effects of two programs of exercises on physical structure at a multivariate level (MANCOVA)

Wilks Lambda	F	Effect - df	Error - df	Q
0.391	3.31	8	17	0.018*

Legend: Wilks lambda –value of coefficient of the Wilks test for equality of centroids of groups;
 F –coefficient F-test for significance of the Wilks lambda; Effect df;
 Error df – deviation freedom; Q –coefficient of significance of differences of centroids.

Results of differences in effects of experimental programs of physical exercise on physical constitution shown in the table 6 suggest that there are statistically significant differences, considering that the T-test value amounts 3.31 with significance at a level of Q = 0.018.

Table 7. Differences of effects of two programs of exercises on physical constitution at a univariate level (MANCOVA)

	Adj. Mean EKS	Adj. Mean KON	F (1; 24)	p
TVIS	155.2	152.9	10.22	0.004*
TMAS	46.3	48.1	1.57	0.223
BMI	18.9	20.3	8.17	0.009*
BMR	1131	1125	0.23	0.639
PBF	21.4	25.5	7.31	0.012*
BFM	10.8	12.8	4.58	0.043*
SMM	19.1	18.7	1.49	0.234
TBW	24.7	25.4	0.19	0.667

Adjusted means –adjusted value of arithmetic mean;
 F –value of coefficient of the F-test;
 * – statistically significant differences.

One can observe that statistically significant differences in variables have occurred at an univariate level shown in the Table 7 (TVIS = 0.004), (BMI = 0.009), (BFP = 0.012), (BFM = 0.043). Variables (TMAS, BMR, SMM and TBW) show no statistically significant differences

Discussion

This study has been carried out to examine the effects of experimental program of a goal ball, implemented at classes of physical education, on enhancing motoric abilities and physical status in school age boys. Two different programs on motoric abilities assessed by standardized tests “EUROFIT” batteries through analysis of effects, used by (Katanić, 2014; Pelemiš et al., 2014; Bajrić, et al., 2019), have shown statistically significant change only in a variable (HGR) which shows the strength of the hand muscle. Considering

that there has been a lot of catching and tossing in experimental program at physical education classes one can say that this is the result which has been progressing as it has been expected. Some motoric abilities, in larger part, depend on genetic predilections, it has been particularly apparent in hand movement frequency, explosive strength, therefore, a longer time period for a study is necessary in order to achieve the results which would be more realistic and reliable in making conclusions, because the 12 months period isn't sufficient for bringing solid and reliable conclusions. (Arnautović, 1978). On the other side, it has to be taken into account that a specific programmed classes for testing students is a novelty, because their motoric constitution is too complex one, and therefore, students struggle to master it. Besides, the influence on motoric abilities in school age is very complex and complicated one, taking into account a disproportional growth and development, therefore, it requires individualization in approach of programming and exercising.

Corrections made in the main part of the class, with an appropriate use of organizational-methodical shapes of work, different material-technical conditions, appropriate facility for implementing physical classes, as well as a way of organization, have shown significant improvements regarding motoric abilities and physical condition. (Arunović, 1978; Popović, 2004; Petrović, 2010; Stojanović, Pavlović, & Stojanović, 2012; Katanić, 2014; Kostić et al., 2020). The mentioned researches have been a starting point for this research, whose accent has been on the main part of the class somewhat more different than the others, and the results obtained on account of physical condition have been in correlation with the respective researches.

One can say for positive results in variables (TVIS) of experimental group of boys to be apparently the consequence of growth, development and ripening, which has been conditioned by genetic inheritance, and therefore, the program couldn't have certain significant influence regarding the length of duration (Krstulović, 2010; Pelemiš et al., 2014). Regarding variables of body mass index (BMI), percent body fat (PBF) and body fat mass (BFM), by which also statistically significant changes have occurred and they describe morphological traits which, in large part, haven't been genetically determined, which means that they are very liable to external exogenous impacts, that is physical activity. The listed variables show percentages in kilograms of fat tissue, all this indicating that an applied experimental program has an advantage in comparison to a standard classis of physical education. Correction of curriculum program of physical education with stress laid on a continued

increase of physical activity at every class is necessary in order to decrease fat tissue (Siyong-Xia, 2004).

Conclusion

Experimental program of physical education has been designed under the influence of a goal ball game with the aim to raise interest at regular classes for its specificity, motivate children, upgrade their motoric space and enhance their physical constitution.

The results obtained in motoric abilities of analyzed sample in part have been the consequence of an overall ripening treatment effects, while the other part include condition of muscular, osseous, ankle, cardiovascular, respiratory, nervous and endocrinology systems. The very duration of the treatment is insufficiently long to cause serious changes in motoric abilities considering age. It is important to ensure the preconditions and criteria for an objective and valid assessment of individual treatments, taking into account transformational effects. Application of complex motoric assignments is recommended based on the results obtained in the aim of optimization of development of an overall anthropologic status. These results may prove helpful in planning transformational processes when it comes to physical status considering positive changes the treatments have achieved at this age. Motivation of students has been recorded by no test, and it has been at an enviable level considering that children have experienced a new type of sport in relation to what they have accustomed to. Therewith, it can be added to future researches on the issue of upgrading of classical physical education.

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Submitted: 17.05.2022.

Accepted: 01.06.2022.