TRANSFORMATION EFFECTS OF BASIC-MOTOR ABILITIES OF FOOTBALL PLAYERS 12 TO 14 YEARS OF AGE

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Abstract
The main purpose of the research is to determine whether the working program containing large number of specific exercises will contribute to higher dynamic growth among the experimental group participants comparing to the control group participants according to the variables for evaluation of basic-motor abilities. In order to evaluate basic-motor abilities of testing candidates a battery with 15 measuring instruments was used. The research testing group is consisted of 78 football players 12 to 14 years of age, members of soccer schools in football clubs "SLOBODA", "TUZLA" and "KLUB – 7" all from Tuzla. Attendees of all three soccer schools are members of pioneer competition selection within the football clubs they belong to. In order to reach purpose of the research, certain mathematical-statistical procedure has been used. Multivariate analysis of covariance was used in order to determine the effects, i.e. whether the experimental group expressed statistically significant effects after the program had been implemented comparing to the control group. Based on the results reached by Multivariate analysis of covariance, it has been determined that the experimental group achieved higher dynamic growth in four out of fifteen variables for evaluation of basic-motor abilities, including: MBFTAR – hand tapping, MFLBOS – side splits, MAGTUP – zig-zag test (running in the rectangular), MBAP2Z – both legs stand transversally on the bench with eyes closed. We have to emphasize that the working program containing both specific and acyclic exercises lead to statistically significant effects in the above mentioned variables. These data can contribute to more efficient selection of training means which would be applied in the work with football players of younger age groups.
Key words: *top fit soccer training program, multivariate analysis of covariance*

INTRODUCTION

From the aspect of its structure, football is a very complex sport activity in which quality of the game depends on a number of factors which significantly contribute to the success of a football game. One training period represents a transformation process, and the purpose of this process is to reach optimum effects for the shortest period of time possible. With the purpose of successful management of sport training process, it is very important to choose adequate training means and to apply those means in a proper manner and at a proper difficulty level. Technical preparation of football players is the main precondition for efficient motion performance. More precisely, technical preparation enables that motor potential of a soccer player reaches its maximum. We have to stress that further progress in terms of technical improvement of a soccer player is not possible without parallel work on development and maintenance of those motor abilities which are vital for the game of football (Smajić, M., Molnar, S., 2007).

All this requires precise programming based on individual needs of athletes, as well as controlling working effects and potential corrections based on gained data. Scientific contribution of this research is reflected exactly in solving the problem of adequate selection of training programs which were applied in the training process of football players12 to 14 years of age. Quarterly working program made for the purpose of this research (Ismaili, H. 2010), indicates that by making a more precise selection of training program one can expect faster

and better quality changes in basic-motor abilities of young football players.

The reason we decided to do this research is the fact that achieving good results in football depends exactly on certain basic-motor abilities (Molnar, S. 2003). Moreover, it is exactly in this age of football players (12-14) that such progress is possible and indicators of future achievements can be defined.
The program we used for work with this experimental group (Ismaili, H. 2010) mostly contains specific exercises, so we wanted to see what influence specific training exercises have on transformation of basic-motor abilities. Problem of this research is reflected in determining which of the two groups (experimental and control) has higher dynamic growth according to applied variables for assessment of basic-motor abilities after the experimental work program had been implemented. The object of this research is motor abilities of football players 12 to 14 years of age, and the purpose of this research is gaining data on how much and whether at all specific training exercises affect development of basic-motor abilities of young age football players.

METHODS

Participants
The research testing group consisted of 78 football players 12 to 14 years of age, members of football schools in football clubs FK "SLOBODA", NK "TUZLA" and NK "KLUB – 7" all from Tuzla. Attendees of all three football schools are members of pioneer competition selection within the football

clubs they belong to. All testing candidates underwent a systematic medical examination which is a standard procedure. Therefore, all the testing candidates are healthy and with no visible aberrations that might affect testing results in the research. The average age of testing candidates is 13±1. The main criterion for entering experimental group was that the testing candidates had not changed the soccer club they belonged to for the last year. The testing candidates were divided into two groups. The first group consisted of 39 testing candidates who formed control group, while the second group of 39 testing candidates represented experimental group.

Instruments

For evaluation of basic-motor abilities of testing groups, a battery of 15 measuring instruments was used (Kurelić, N. i sar. 1975). Selected variables cover the following segments of basic-motor abilities: segmentary speed, flexibility, agility, explosive force and balance.

The following tests were used for evaluation of segmentary speed: MBFTAR – hand tapping, MBFTAN – leg tapping and MBFTNZ – leg tapping against wall. Tests used for evaluation of flexibility are: MFLBOS – side splits, MFLPRK – touch-toe on the bench and MFLISK – body twist with rod. For evaluation of agility the following tests were used: MKOKUS – long steps aside, MKOONT – agility on the ground and MAGTUP – zig-zag test. For assessment of explosive force the following tests were used: MESSDM – standing long jump, MESTRO – standing triple jump and MES20V – running 20 m (sprint). Tests are applied for assessment of balance are: MBAU2O – standing on both legs on a balance bench line with eyes open, MBAU2Z – standing on both legs on a balance bench line with eyes closed and MBAP2Z – standing transversally on both legs on a balance bench with eyes closed.

We have to note that the testing of basic – motor abilities was performed in the afternoon hours, in the sports gym of the Faculty for Physical Education and Sport in Tuzla, and both groups were tested in the same period of time. Before the testing, testing candidates had a 10-minute warm-up exercise with coaches from the above mentioned football clubs. In this way we tried to give the same treatment to all testing candidates, so that we get as accurate testing results as possible.

For the purpose of this research, and in accordance with the research aim, multivariate analysis of covariance was used. Based on the results reached upon multivariate analysis of covariance it will be possible to determine whether there were any transformation effects after the testing program had been implemented.

Experimental program

As already noted, working program for this research includes training exercises for optimal improvement and development of young football players The program contained elements of „Football Aerobics", "Top fit" program and "Training of champions" which is something new in the football practice. Both groups of testing candidates had the same number of training sessions during one week, i.e. both groups trained three times a week and had the same number of football games in a three-month period.

RESULTS AND DISCUSSION

Based on the gained data, we can see from Table 1 that on a global level there are statistically significant differences between experimental and control group, which is .01 level of significance.

Table 1

	Value	p-level
Wilks' Lambda	0.52	
Rao R Form 2 (15, 46)	2.83	0.00
Pillai-Bartlett Trace	0.48	
V (15,46)	2.83	0.00

Based on the gained data we can see from Table 2 which of the applied basic-motor variables contributed the most to the determined difference in statistical significance on a global level. It is clearly evident that the following variables contributed the most to the reached results: MBFTAR – hand tapping, on the significance level (.05), MFLBOS – side splits, on the significance level (.01), MAGTUP – zig-zag test, on the significance level (.01), MBAU2O - standing on both legs on a balance bench line with eyes open, on the significance level (.05) and variable MBAP2Z - standing transversally on both legs on the balance bench with eyes closed, on the significance level (.01).

Table 2

Variables	Mean sqr effect	Mean sqr Error	F (df 1,2) 1,60	P-level
MBFTAR	11.11	2.47	4.49	**0.04**
MBFTAN	1.07	1.03	1.03	0.31
MBTNZ	0.02	1.65	0.01	0.91
MFLBOS	41.12	5.81	7.08	**0.01**
MFLPRK	3.56	3.85	0.93	0.34
MFLISK	5.15	22.04	0.23	0.63
MESSDM	39.70	52.86	0.75	0.39
MESTRO	4086.47	1862.65	2.19	0.14
MES20V	0.11	0.07	1.52	0.22
MAGKUS	0.04	0.33	0.12	0.73
MAGONT	11.76	9.64	1.22	0.27
MAGTUP	19.59	2.73	7.18	**0.01**
MBAU20	18.88	4.51	4.19	**0.05**
MBAU2Z	0.29	0.80	0.36	0.55
MBAP2Z	18.66	2.19	8.51	**0.00**

Tables 3a, 3b, 4a and 4b present the values of arithmetic means on the initial and final measuring

of the applied variables for assessment of basic-motor abilities of football players. Based on these indicators, it is clearly evident whether the values of arithmetic means are higher or lower for experimental or control group. By comparing arithmetic means on the initial and final measuring, and with the results from tables 5a and 5b, one can get a more precise insight on which group progressed more in the variables contributing to the determined global difference.

Table 3a: Values of arithmetic means for both groups on the initial measuring

GROUP	MBFTARI	MBFTANI	MBTNZI	MFLBOSI	MFLPRKI	MFLISKI	MESSDMI	MESTROI	MES20VI
1	29.80	18.89	20.97	153.83	19.00	77.97	160.14	489.49	3.94
2	29.81	21.69	23.45	162.12	16.57	81.57	165.29	573.86	4.16

Table 3b

GROUP	MAGKUSI	MAGONTI	MAGTUPI	MBAU20I	MBAU2ZI	MBAP2ZI
1	10.14	21.67	22.80	3.75	2.34	4.35
2	10.06	10.06	21.94	23.88	5.11	3.41

Table 4a: Values of arithmetic means for both groups on the final measuring

GROUP	Covar. MBFTARF	Covar. MBFTANF	Covar. MBTNZF	Covar. MFLBOSF	Covar. MFLPRKF	Covar. MFLISKF	Covar. MESSDMF	Covar. MESTROF	Covar. MES20VF
1	28.83	19.49	20.83	154.37	19.80	77.09	159.66	491.49	3.95
2	31.17	22.74	24.31	166.19	19.50	78.19	167.31	583.45	4.04

Table 4b

GROUP	Covar. MAGKUSF	Covar. MAGONTF	Covar. MAGTUPF	Covar. MBAU20F	Covar. MBAU2ZF	Covar. MBAP2ZF
1	10.02	20.51	22.70	3.80	2.90	3.39
2	9.72	9.72	20.25	22.14	5.30	4.57

Tables 5a and 5b show corrected arithmetic means indicating which of the two groups has a higher dynamic growth according to the analyzed variables. Based on the gained data it is evident that testing candidates of the experimental group (group 2) achieved higher dynamic growth upon completion of the working program. The experimental group achieved higher dynamic growth in the following variables: MBFTAR – hand tapping, MFLBOS – side splits, MAGTUP – zig –zag test and MBAP2Z – both legs stand transversally on the bench with eyes closed. Testing candidates of the controlled group (group 1) achieved higher dynamic growth in only one variable, MBAU2O – both legs stand on the bench line with eyes open.

Therefore we can conclude that the applied working program, which contained mostly specific training exercises, lead to statistically significant shifts in the mentioned variables for assessment of basic-motor abilities.

Looking at the segmentary speed and explosive force, we have to emphasize that these two abilities cannot be analyzed separately (Čoh, M. 2003), and we hold that these categories have the biggest influence on solving agility tasks. Furthermore, it is exactly agility that is crucial for solving situational – motor tasks. Further research in this field actually aimed at the possibility that testing candidates of this age solve all tasks based on explosive force, speed and segmentary speed (Eduardo Dominguez Lago, Luis Casais Martinez and Carlos Lago 2007).

Realization of training tasks within the working program requires coordinated work of arms and legs, as well as fast direction changes in moving with a ball. We believe that this fact is one of the reasons why statistically significant improvement was achieved in the variable MAGTUP – zig – zag test (running in a rectangle).

What is interesting, and can be noted from Tables 5a and 5b, is the results of balance variables where one can see that the first group made more progress in the variable MBAU2O – both legs stand on the balance bench line with eyes open, while the second group progressed more in the variable MBAP2Z – both legs stand transversally on the bench with eyes closed. Such outcome resulted from the selection of training exercises aimed exactly at development of balance. Balance condition and correcting of balance condition are of course extremely important for optimal and efficient solving of tasks set by the selection of training exercises. With regards to that, one can conclude that specific exercises have a very significant influence on raising the level of basic-motor abilities of football players (Young, W., Farrow, D. 2006).

Table 5a: Values of corrected arithmetic means

GROUP	MBFTARI	MBFTANI	MBTNZI	MFLBOSI	MFLPRKI	MFLISKI	MESSDMI	MESTROI	MES20VI
1	28.95	20.55	22.25	156.33	17.30	80.35	161.10	548.03	4.14
2	**30.66**	20.02	22.18	**159.61**	18.27	79.19	164.33	515.31	3.97

Table 5b

GROUP	MAGKUSI	MAGONTI	MAGTUPI	MBAU20I	MBAU2ZI	MBAP2ZI
1	10.15	22.68	24.47	**5.54**	3.01	2.97
2	10.05	20.93	**22.21**	3.32	2.73	**5.18**

CONCLUSION AND APPLICABILITY IN PRACTICE

Based on the research data, it can be concluded that the testing candidates from the experimental group, for which the three-month working program was designed, progressed more in certain variables for evaluation of basic-motor abilities than the testing candidates from the control group who worked in accordance with already existing football school program. The applied experimental program contributed the most to the development of those motor abilities that probably significantly affect the level of technical preparation. However, we have to emphasize that further increase of technical preparation level is impossible without parallel work on development of basic-motor abilities. We hold that the results of this research can contribute to safer and more efficient planning and programming of training work with footballers of young age, so we will list some of proposals that we believe can improve training process:

1. The designed program contains acyclic exercises which positively affect development of cognitive abilities, and also result in development of specific coordination of young footballers. That is exactly what the results of this research have indicated, because statistically significant progress was achieved in the variable MAGTUP – zig-zag test. This test can be considered specific for footballers because in its structure there are certain models of moving that require changes in moving direction. In addition, in other agility tests statistically significant progress was not achieved, and we know that coordination does not have a big influence on solving specific tasks, since it only starts to develop at the age of 16 with the culmination point at the age of 25.

2. Results of this research have shown that precise selection of specific training exercises can lead to higher effects of training process for shorter period of time, which is the aim of transformation process.

3. The research provided data that specific training exercises can influence development of basic-motor abilities and that technical preparation, which is very important for solving situational tasks, significantly depends on these motor abilities. However, we hold that some other anthropological categories should be included in this type of research in order to reach more objective scientific data.

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TRANSFORMACIONI EFEKTI BAZIČNO – MOTORIČKIH SPOSOBNOSTI NOGOMETAŠA UZRASTA 12-14 GODINA

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Sažetak

Osnovni cilj ovog istraživanja jeste da se utvrdi hoće li program rada, u kjem je sadržan veliki broj vježbi specifičnog karakltera, doprinjeti da ispitanici ekpsrimentalne grupe ostvare veći dinamički prirast u varijablama za procjenu bazično-motoričkih sposobnosti od ispitanika kontrolne grupe. Za procjenu bazično-motoričkih sposobnosti ispitanika korištena je baterija od 15 mjernih instrumenata. Uzorak ispitanika u ovom istraživanju predstavlja 78 nogometaša uzrasta 12 – 14 godina, polaznika škole nogometa u klubovima FK ''Sloboda'', NK ''Tuzla'' i NK ''KLUB-7'' koji su sa sjedištem u Tuzli. Polaznici sve tri nogometne škole su članovi pionirske takmičarske selekcije u pomenutim nogometnim klubovima. Da bi se rasvijetlio cilj ovog istraživanja korištena je određena matematičko-statistička procedura. Multivarijanta analiza kovarijanse korištena je u svrhu utvrđivanja efekata, tj. da li je kod eksprimentalne grupe došlo do statistički značajnih efekata nakon provednog programa u odnosu na kontrolnu grupu. Na sonovu dobijenih rezultata Multivarijantne analize kovarijase došlo se do pokazatelja da je od petnaest varijabli za procjenu bazično – motoričkih sposobnosti eksprimentalna grupa veći dinamički prirast ostvarila u četiri varijable: MBFTAR – taping rukom, MFLBOS – bočna špaga, MAGTUP – trčanje u pravokutniku i MBAP2Z - stajanje na dvije noge poprečno na klupici za ravnotežu sa zatvorenim očima. Moramo naglasiti da je program rada koji je sadržavo vježebe specifičnog karaktera kao i vježbe acikličnog tipa doveo do statistički značajnih efekata kod gore vađenih varijabli. Ove informacije mogu doprinjeti efikasnijem odabiru trenažnih sredstava koja bi se primjenjivala u radu sa mladim nogometašima.
Ključne riječi: top fit trening nogometaša, multivarijatna analiza kovarijanse

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