ISSN 1840 - 4413

FACULTY OF PHYSICAL EDUCATION AND SPORT
TUZLA UNIVERSITY

Sport

Scientific and Practical Aspects

International Journal of Kinesiology

Tuzla, June, 2009.

ISSN 1840-4413

SPORT SCIENTIFIC AND PRACTICAL ASPECTS

International Scientific Journal of Kinesiology

Vol. 6 (2009), issue 1

Contents:

Dear readers: **4**

Ivan Čuk, Almir Atiković
(Original scientific paper)
Are disciplines in all around men's artistic gymnastics equal? ……... **7-12**

Stevo Popović, Molnar Slavko, Bojan Mašanović
(Original scientific paper)
The differences in some anthropometric characteristics between top football players and recreational players ……..... **13-18**

Bašinac Ismet, Mikić Branimir, Haris Pojskić
(Original scientific paper)
Morphological characteristics of Bosnian first league female basketball players **19-24**

Elvir Kazazović, Vahida Kozić, Erko Solaković, Lejla Šebić-Zuhrić
(Original scientific paper)
The effects of iso-kinetic exercise program on the knee flexing strenght **25-30**

Vlatko Šeparović, Meho Alić – Partić, Edin Užičanin
(Original scientific paper)
Influence of standard indicators of situational effectiveness in basketball, in Bosnian league 6 and regional basketball league ……..... **31-37**

Alen Kapidžić, Ervin Bećirović, Jasmin Imamović
(Original scientific paper)
Situational efficiency analysis of the teams that participated in 2008 European football championship ……..... **38-42**

Danijela Bonacin, Dobromir Bonacin, Hadžib Salkić
(Original scientific paper)
The role of technological and programming skills in a long term processes regarding sport funding ……..... **43-47**

Enes Huseinagić, Adnan Hodžić
(Original scientific paper)
Basketball coaches as leaders
……..... **48-55**

Dževad Džibrić, Tarik Huremović, Damir Ahmić
(Original scientific paper)
Global quantity differences in motor abilities of pre-school boys **56-60**

Duško Bjelica
(Original scientific paper)
Difference in correct kicking of the soccer ball with rested week leg expressed with different intensity..... **61-66**

INSTRUCTIONS FOR AUTHORS **67-68**

ISSN 1840-4413

SPORT SCIENTIFIC AND PRACTICAL ASPECTS

Međunarodni naučni časopis iz kineziologije

Vol. 6 (2009), issue 1

Sadržaj:

Dragi čitaoci: **5**

Ivan Čuk, Almir Atiković
(Originalni naučni rad)
Da li su discipline u muškom gimnastičkom višeboju ravnopravne? **7-12**

Stevo Popović, Molnar Slavko, Bojan Mašanović
(Originalni naučni rad)
Razlike u nekim antropometrijskim karakteristikama vrhunskih fudbalera i rekreativaca **13-18**

Bašinac Ismet, Mikić Branimir, Haris Pojskić
(Originalni naučni rad)
Morfometrijske karakteristike košarkašica prve lige bosne i hercegovine **19-24**

Elvir Kazazović, Vahida Kozić, Erko Solaković, Lejla Šebić-Zuhrić
(Originalni naučni rad)
Efekti programa izokinetičkog vježbanja na jačinu fleksora koljena **25-30**

Vlatko Šeparović, Meho Alić – Partić, Edin Užičanin
(Originalni naučni rad)
Uticaj standarnih pokazatelja situacijske efikasnosti u košarkaškoj igri u BH Ligi 6 i regionalnoj košarkaškoj ligi **31-37**

Alen Kapidžić, Ervin Bećirović, Jasmin Imamović
(Originalni naučni rad)
Analiza situacione efikasnosti timova koji su učestvovali na Evropskom fudbalskom prvenstvu 2008. ..... **38-42**

Danijela Bonacin, Dobromir Bonacin, Hadžib Salkić
(Originalni naučni rad)
Uloga tehnoloških i informatičkih znanja u dugoročnim procesima vezanim za financiranje sporta **43-47**

Enes Huseinagić, Adnan Hodžić
(Originalni naučni rad)
Košarkaški treneri kao vođe **48-55**

Dževad Džibrić, Tarik Huremović, Damir Ahmić
(Originalni naučni rad)
Globalne kvantitativne razlike u motoričkim sposobnostima dječaka predškolskog uzrasta **56-60**

Duško Bjelica
(Original scientific paper)
Razlike u pravilnosti šutiranja fudbalske lopte odmornom slabijom nogom sa različitim intezitetom **61-66**

INSTRUKCIJE ZA AUTORE **67-68**

„The one, who wants to do something, finds the way, the one, who doesn't want to do anything, finds an excuse“.

Picasso

Dear readers,

After first successfully published number of journal in English with new international editorial board, we managed from among large number of received works to select the best ones and publish them in this June issue.

Also in this issue you can read researches done by domestic and foreign authors from different areas of kinesiology; from gymnastics, soccer, basketball, education of schoolchildren to the modern kinds of diagnosing and evaluating effects of different training isokinetic programmes and to the psychology and sport sociology.

We need to mention that unlike the last issue, this time the journal has been included into American Journal Base EBSCO SportDiscus that contains large number of academic and commercial sport journals, which contributed to the raising journal rating.

The conclusion that we all together go the right way and that journal becomes recognizable academic brand in the surroundings has been proved by the fact that every day we receive the letters of support for the work of journal as well as large number of your professional and scientific works, which all of them we cannot insert in one issue.

We are happy that we felt good vibrations from wider surroundings and that our journal has become known at international level. This resulted in cooperation with new reviewers and international editors from Russia and Rumania and in the future we intend to make all boards “stronger”.

At the end I can only say that without your cooperation and your qualitative work the journal couldn’t reach the level at which it is now. Our door is always open for your works and also for your remarks, suggestions, criticisms and praises. We are especially glad that younger researchers have recognised that our journal is appropriate place where they can publish their works and we’ll be very glad to see them in larger number in the future.

Editor-in-Chief

Prof. Branimir Mikić, Ph.D

"Ko hoće nešto da učini, nađe način, ko neće ništa da učini, nađe opravdanje."

Picasso

Dragi čitaoci,

Nakon prvog, uspješno publikovanog broja, na Engleskom jeziku, sa novim međunarodnim uredništvom časopisa, uspjeli smo da od velikog broja pristiglih radova selekcionišemo one najbolje, te da ih publikujemo u ovom junskom broju.

I u ovom broju možete pročitati istraživanja domaćih i stranih autora iz različitih oblasti kineziologije; od gimnastike, fudbala, košarke, rada u edukaciji sa školarcima pa do savremenih oblika dijagnosticiranja i vrednovanja efekata različitih trenažnih izokinetičkih programa, te psihologije i sociologije sporta.

Moramo napomenuti da u odnosu na prošli broj, časopis je uvršten u Američku bazu časopisa EBSCO SportDiscus, koja sadrži veliki broj akademskih i komercijalnih časopisa iz sporta, a što je omogućilo podizanje rejtinga časopisa.

O tome, da smo svi zajedno na dobrom putu, te da časopis postaje prepoznatljiv akademski brend u okruženju, govori i činjenica da svaki dan dobijamo pisma podrške o radu časopisa, kao i veliki broj vaših stručnih i naučnih radova, a koje sve nismo u mogućnosti objaviti u jednom broju.

Sretni smo da smo naišli na dobre vibracije šireg okruženja, te da se za naš časopis čulo i u međunarodnim okvirima. To je proizvelo i saradnju sa novim recenzentima i međunarodnim urednicima iz Rusije i Rumunije, a intencija nam je da u budućnosti još više „ojačamo“ sve odbore časopisa.

Na kraju mogu samo reći da bez vaše saradnje i vašeg kvalitetnog rada časopis ne bi dostigao nivo na kojem se sada nalazi. Naša su vrata stalno otvorena kako za vaše radove, tako i za vaše primjedbe, sugestije, kritike i pohvale. Posebno nam je drago da su mlađi istraživači prepoznali naš časopis kao pogodno mjesto za objavljivanje svojih radova, te će nam biti izuzetno drago da ih u buduće vidimo još više.

Glavni i odgovorni urednik
Prof.dr. Branimir Mikić

ARE DISCIPLINES IN ALL AROUND MEN'S ARTISTIC GYMNASTICS EQUAL?

Ivan Čuk[1], Almir Atiković[2]
[1]*Faculty of Sport, University of Ljubljana, Slovenia*
[2]*Faculty of Physical Education and Sport, University of Tuzla, Bosnia and Herzegovina*

Original scientific article

Abstract
On the sample of the 44 gymnasts who competed at the OG 2008 in Beijing in all around, the equality between disciplines was tested. Equality was tested for the achieved A scores on the disciplines of floor exercise, pommel horse, rings, vault, parallel bars and horizontal bar. Vault has the highest A scores, while pommel horse the lowest A scores. T-tests showed that those two disciplines significantly differ from other disciplines in average for 0,4 points. Factor analysis extracted 3 factors, with 67% of explained variance. On the 3rd factor vault on positive side and pommel horse on the negative side were loaded. According to the 2006 Code of points and gymnastics training theory, both have to be revised.

Key words*: male artistic gymnastics, Code of Points, Olympic Games, judging*

INTRODUCTION

After a huge affair at the OG 2004 where in all around USA gymnast won in front of Korean gymnast, many consequences made by FIG were done. One of it was also implementation of the new philosophy of open scoring system (Čuk, Forbes, 2006). Before 2006 all the disciplines were limited by maximum final score. During the past different maximum scores were allowed. Before the WWII maximum score was sometimes between 11 and 16 points; after the WWII maximum score was limited to 10 points (Čuk, 1998). As the development of the Code progressed it came to the point of no return. Despite many changes what 10 points means, in general 10 score is the mark of exercise content and exercise presentation. Proportion between those two factors was also changing; at the end it became equal to 50:50 percent. Exercise content was mostly characterized by difficulty (which was sometimes designed, later, and slightly open for bonus points for extreme difficulty elements or their combination) and special requirements (requirement for special group of elements, which emphasis character of apparatus). In the Code 2006 (FIG, 2006) the whole philosophy of evaluating gymnastics exercises changed. No more one maximum score was used for evaluating exercises. New rules defined A and B score, where A score means exercise content (difficulty, special requirement and bonus points) and B score means exercise presentation. A score goes from zero points upward according to what difficulty gymnast shows (calculating 10 most difficult elements), how exercise is constructed (exercise must include elements from all five element groups, not more than 4 from one group) and how difficult elements are connected (bonus) points. System for discipline specialist works excellent, more you show greater scores. However in all around the problem can exist. Problem is within equality between disciplines as vault has special rules, comparing to floor exercise, pommel horse, rings, parallel bars and horizontal bar. Gymnast on vault shows in all around one vault. Comparing to other disciplines vault is similar to one element from the exercise. Therefore on the vault for each vault the A score is known in advance (Čuk at all, 2007). As some disciplines (pommel horse, parallel bars) have no bonus points it is worth to consider how in practice are all disciplines for all around gymnasts equal.

In other Olympic sports e.g. decathlon or similar they use special tables to give for each result adequate points. The highest number of points is related to the best world results. However, the best decathlon athletes can not compete with best athletes in specific

disciplines. Same we can say according to the results of World Championship 2007 (FIG, 2007), where best all around gymnasts did not

have any huge impact on medals on apparatus finals.

At OG 2008 (FIG, 2008) competed the best all around gymnasts from the whole world, with time span of 2 years preparing for the best results in all around. In general at the OG the highest scores in Olympic cycles are always achieved (Novak, Čuk, 1985). With inspection into the equality of disciplines we can also receive trends of modern all around gymnasts. For above reasons it is worth to test how all around gymnasts solved problem of equality of disciplines.

METHODS

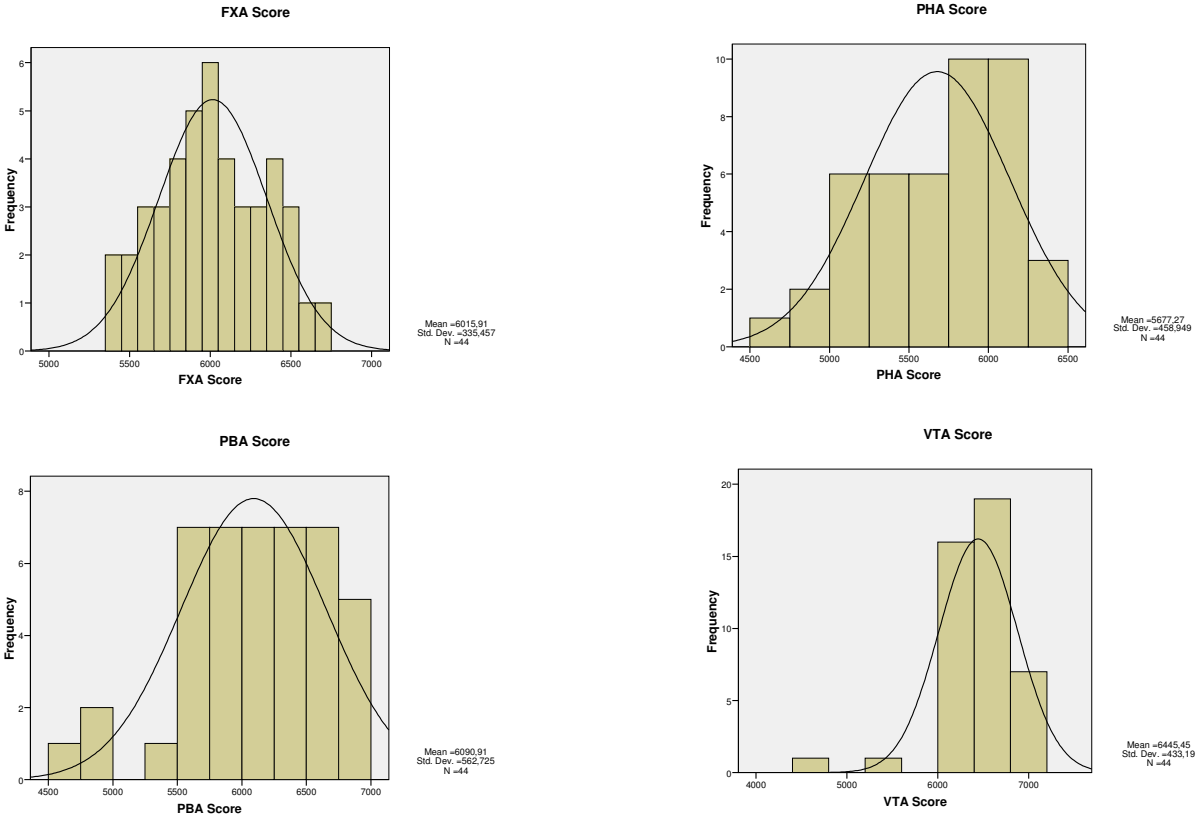
Our sample was composed of 44 all around gymnasts who competed at the OG in Beijing 2008 in qualification event. From official results we made 6 variables of A scores: FX (floor exercise), PH (pommel horse), RI (rings), VT (vault), PB (parallel bars) and HB (horizontal bar). For easier statistics presentation A score is multiplied by 1000; so A score of 6 points has value of 6000 in statistic tables. With SPSS 15.0 we calculated descriptive, Kolmogorov-Smirnov test, Pearson correlations, and pair wise t-test between A scores of all disciplines. At the end we did also factor analysis, with scree test we defined 3 important factors, and solution was rotated with Varimax method. For significance 5 percent level was considered for all statistic parameters.

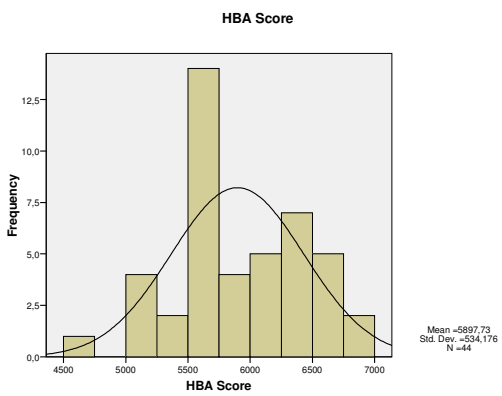
RESULTS

Table 1. Descriptive statistic

	N	Mean		Std. Dev	Skewness		Kurtosis	
		Stat.	Std. Er.	Stat.	Stat.	Std. Er	Stat.	Std. E
FXA Score	44	6015,91	50,572	335,457	,049	,357	-,753	,702
PHA Score	44	5677,27	69,189	458,949	-,226	,357	-,693	,702
RIA Score	44	5943,18	95,257	631,866	,123	,357	-,189	,702
VTA Score	44	6445,45	65,306	433,190	-1,918	,357	7,049	,702
PBA Score	44	6090,91	84,834	562,725	-,585	,357	,141	,702
HBA Score	44	5897,73	80,530	534,176	-,109	,357	-,328	,702

Graph 1. Histograms of all variables





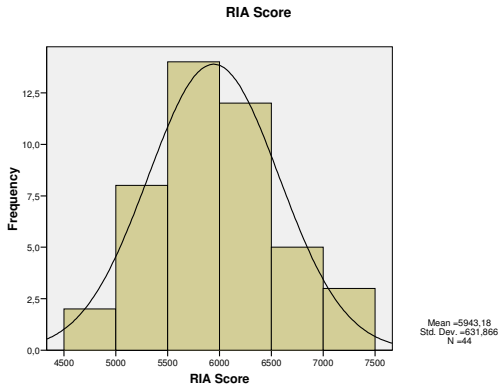


Table 2. Kolmogorov Smirnov test

		FXA Score	PHA Score	RIA Score	VTA Score	PBA Score	HBA Score
N		44	44	44	44	44	44
Normal Parameters a,b	Mean	6015,91	5677,27	5943,18	6445,45	6090,91	5897,73
	Std. D.	335,457	458,949	631,866	433,190	562,725	534,176
Most Extreme Differences	Absolute	,087	,133	,100	,240	,118	,122
	Positive	,087	,090	,093	,202	,061	,122
	Negative	-,078	-,133	-,100	-,240	-,118	-,099
Kolmogorov-Smirnov Z		,578	,885	,665	1,592	,781	,807
Asymp. Sig. (2-tailed)		,892	,414	,769	,013	,576	,533

a Test distribution is Normal.
b Calculated from data.

Table 3. T-test between all disciplines

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Dev.	Std. Error Mean	95% Confidence Interval of the Difference				
					Upper	Lower			
Pair 1	FXA Score - PHA Score	338,636	607,019	91,512	154,086	523,187	3,700	43	,001
Pair 2	FXA Score - RIA Score	72,727	750,926	113,206	-155,575	301,030	,642	43	,524
Pair 3	FXA Score - VTA Score	-429,545	511,532	77,116	-585,065	-274,026	-5,570	43	,000
Pair 4	FXA Score - PBA Score	-75,000	583,942	88,033	-252,535	102,535	-,852	43	,399
Pair 5	FXA Score - HBA Score	118,182	528,391	79,658	-42,464	278,827	1,484	43	,145
Pair 6	PHA Score - RIA Score	-265,909	749,866	113,047	-493,889	-37,929	-2,352	43	,023
Pair 7	PHA Score - VTA Score	-768,182	655,486	98,818	-967,468	-568,896	-7,774	43	,000
Pair 8	PHA Score - PBA Score	-413,636	647,927	97,679	-610,624	-216,648	-4,235	43	,000
Pair 9	PHA Score - HBA Score	-220,455	709,923	107,025	-436,291	-4,618	-2,060	43	,045
Pair 10	RIA Score - VTA Score	-502,273	743,495	112,086	-728,316	-276,229	-4,481	43	,000
Pair 11	RIA Score - PBA Score	-147,727	701,987	105,828	-361,151	65,696	-1,396	43	,170
Pair 12	RIA Score - HBA Score	45,455	822,490	123,995	-204,605	295,514	,367	43	,716
Pair 13	VTA Score - PBA Score	354,545	680,101	102,529	147,776	561,315	3,458	43	,001
Pair 14	VTA Score - HBA Score	547,727	666,294	100,448	345,155	750,299	5,453	43	,000
Pair 15	PBA Score - HBA Score	193,182	618,474	93,239	5,148	381,215	2,072	43	,044

Table 4. Pearson's Corellations

		N	Correlation	Sig.
Pair 1	FXA Score & PHA Score	44	-,147	,341
Pair 2	FXA Score & RIA Score	44	-,123	,427
Pair 3	FXA Score & VTA Score	44	,133	,391
Pair 4	FXA Score & PBA Score	44	,234	,127
Pair 5	FXA Score & HBA Score	44	,331	,028
Pair 6	PHA Score & RIA Score	44	,082	,596
Pair 7	PHA Score & VTA Score	44	-,079	,611
Pair 8	PHA Score & PBA Score	44	,208	,175
Pair 9	PHA Score & HBA Score	44	-,016	,916
Pair 10	RIA Score & VTA Score	44	,062	,688
Pair 11	RIA Score & PBA Score	44	,314	,038
Pair 12	RIA Score & HBA Score	44	,012	,938
Pair 13	VTA Score & PBA Score	44	,086	,580
Pair 14	VTA Score & HBA Score	44	,063	,686
Pair 15	PBA Score & HBA Score	44	,365	,015

Table 5. Factor analysis – explained variance – principal component analysis

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1,693	28,212	28,212	1,575	26,242	26,242
2	1,340	22,338	50,551	1,360	22,664	48,906
3	1,025	17,079	67,630	1,123	18,724	67,630

Table 6. Factor analysis – rotated component matrix – Varimax

	Component		
	1	2	3
FXA Score	,759	-,194	,242
PHA Score	-,021	,384	-,664
RIA Score	-,114	,830	,073
VTA Score	,073	,317	,770
PBA Score	,584	,617	-,155
HBA Score	,799	,074	-,044

DISCUSSION AND CONCLUSIONS

Descriptive statistics and Kolmogorov Smirnov test show all variables except vault A score are normal. Higher values kurtosis and skewnes are by vault A score what causes this variable hasn't normal distribution. Average A score values are on the vault the highest, while standard error is the second smallest. Series of t-tests shows the A scores on vault are significantly higher than on all other apparatus. Out of 15 t-tests only 5 are not significant. All pairs and differences between vault and other disciplines are significant; same is valid for pommel horse. While A scores for vault are the highest, the pommel horse A scores are the lowest, the difference between vault and pommel horse A score is 0,76818 points. If we translate it into the difficulty (each element in

the Code of Points has designed value, value of 0,1 is designed for the easiest element (also named A element); with increments of 0,1 point for next higher difficulty (named B, C,

D, E, F, G) vault is in average better rewarded for one C and one D element. Only 3 significant positive correlations were calculated; high bar A score is in a low correlation with floor exercise A score and parallel bars A score; parallel bars A score was also in low correlation with rings A score.

Factor analysis extracted 3 significant factors (by Kaiser Gutman criteria and scree test); orthogonal rotated factors have quite similar explained variance (26% the first factor, 22% the second factor and 19% the third factor). The first factor was loaded with floor exercise A score, parallel bars A score and horizontal bar A score. The second factor was loaded with rings A score and parallel bars A score.

The third factor was loaded with vault A score on the positive side and pommel horse A score on the negative side. As a conclusion we can say disciplines are not equal. Gymnasts have

the highest A score values on vault. According to simplicity of the vault (comparing to other disciplines, not stating vault is easy!) those who vault good have possibility of higher final

score of all around. Vault is according to the analysis of the training loads also discipline with the lowest amount of time spent (Čuk, Karacsony, 2004). On the other side the lowest A scores were on pommel horse; pommel horse is a discipline which requires the highest amount of time spent in training session. Interesting both disciplines formed joint factor, which shows, that in order to maximize all around scores it is better to work less on pommel horse and more on vault. While other disciplines are quite equal in sense of A scores and time spent during training session. At least what can be done in the next Code of Points is to lower A scores on vault for 0,4 points and to raise possibility to get similar A score on other apparatus.

LITERATURE

Čuk, I. (1998). Razvoj tekmovanj v športni gimnastiki od prvega mednarodnega nastopa Leona Štuklja leta 1924 do 1998. *Šport (Ljublj.)*, 1998, let. 46, št. 3, str. VI-VII.

Čuk, I., Bricelj, A., Bučar Pajek, M., Turšič, B., Atiković, A. (2007). Relationship between start value of vault and runway velocity in top level male artistic gymnastics. V: SMAJLOVIĆ, Nusret (ur.). *Zbornik naučnih i stručnih radova-dodatak*. Sarajevo: Univerzitet, Fakultet sporta i tjelesnog odgoja, 2007, str. 64-67, ilustr., tabele.

Čuk, I., Forbes, W. (2006). Kam greš, sojenje?. V: KOLAR, Edvard (ur.), PILETIČ, Sebastijan (ur.). *Gimnastika za trenerje in pedagoge 2*. Ljubljana: Gimnastična zveza Slovenije, 2006, str. 76-86, ilustr.

Čuk, I., Karacsony, I. (2004). *Vault : methods, ideas, curiosities, history*. Ljubljana: ŠTD Sangvinčki, 2004. 151 str., ilustr., graf. prikazi. ISBN 961-238-393-6.

FIG (2000). Code of Points MAG.

FIG (2006). Code of Points MAG.

FIG (2007). Results of World Championship in Stuttgart.

FIG (2008). Results of OG 2008 in Beijing.

Novak, D., Čuk, I. (1985). *Razvoj tekmovalnega rezultata v športni gimnastiki*, (Razvoj tekmovalnega rezultata v športni gimnastiki), (Proučevanje vpliva različnih kineziološkiih operatorjev na psihosomatične razsežnosti učencev, športnikov in odraslih oseb). Ljubljana: Fakulteta za telesno kulturo, Inštitut za kineziologijo, 1985. 126 f., graf. prikazi.

DA LI SU DISCIPLINE U MUŠKOM GIMNASTIČKOM VIŠEBOJU RAVNOPRAVNE?

Originalni naučni rad

Sažetak

Na uzorku od 44 gimnastičara, koji su se takmičili u Olimpijskim igrama 2008 u Pekingu u višeboju, testirana je ravnopravnost između disciplina. Jednakost je testirana za postignute rezultate dodjeljene od A sudijske komisije, za parter, konja sa hvtaljkama, krugove, preskok, razboj i vratilo. Ocjena na preskoku A sudijske komisije ima najvišu vrijednost, dok je ocejena na konju sa hvataljkama najmanja. T-testovi su pokazali da se ove dvije discipline bitno se razlikuju od drugih disciplina u prosjeku za 0,4 poena. Faktorska analiza izolovana 3 faktora, objašnjava 67% varijance. Na 3 faktoskrom svodu na pozitivnoj strani je preskok a konj sa hvataljkama na negativnoj strani bio učitan. Prema Pravilniku za ocjenjivanje iz 2006 godine i gimnastika teoriji treninga, moraju se revidirati.

Ključne riječi: *gimnastičari, olimpijske igre, suđenje*

Coresponding author:

Ph.D. Ivan Čuk, Professor,
Univerza v Ljubljani, Fakulteta za Šport,
Gortanova 22, 1000 Ljubljana,
Tel.: + 386 1 5207700,
Fax.: + 386 1 5207740,
e-mail: ivan.cuk@fsp.uni-lj.si

THE DIFFERENCES IN SOME ANTHROPOMETRIC CHARACTERISTICS BETWEEN TOP FOOTBALL PLAYERS AND RECREATIONAL PLAYERS

Stevo Popović[1], Molnar Slavko[1], Bojan Mašanović[2]
[1]The Faculty of Sport and Physical Education, Lovćenska 16, Novi Sad
[2]Agricultural High School, Subotički put, Bačka Topola

Original scientific paper

Abstract
This research was aimed at gaining relevant knowledge about important differences with respect to some anthropometric characteristics of the best football players and their peers who play football on a recreational basis. The sample included 56 respondents, aged 28 (±1 year) divided into two subsample groups. The first subsample group was comprised of 26 respondents who practice football at a Football Club "Vojvodina" from Novi Sad, while the other subsample included 30 respondents who play football recreationally. The sample of variables contained 20 anthropometric measures that defined longitudinal and transversal dimensionality of the skeleton, then the body mass and body volume as well as the subcutaneous adipose tissue. The results of the measuring were analyzed by means of a statistical procedure labeled a significance test of two arithmetic means conducted on independent samples or popularly known a t-test. Based on the results it was concluded that significant differences occur in the case of all the variables used to assess the subcutaneous adipose tissue, as well as in the case of most variables for assessing the body mass and body volume at a significance level of p=.05.

***Key words**: anthropometric characteristics, top football players, recreational players.*

INTRODUCTION

Physical culture is certainly not merely a top sport, even though according to the attention the sport gets in everyday life it is precisely what we might say about it. In its essence, physical culture is represented with another two parts, far more important as far as health is concerned: physical education and recreation. Just as the top sport is the most popular part of the physical culture, sports medicine is solely associated with the top players. It is, however, equally important for both the children engaged into physical education (but also into sport) and recreational players, i.e. for the population doing physical activities for fun or medical reasons. Top players should constantly be monitored by the teams of doctors of different specialties, as in the training or during the contests the players are exposed to physical pressure that may increase to very great extents. Recreational players represent a varied group of people doing physical exercise independently as much as they would do it within different recreational programs. In our country sports medicine does cover sufficiently recreational players, unlike in other countries where physical culture and culture of health are much more developed. Before every recreational exercise it is important to do a preventive medical check-up, where monitoring the heart under pressure represents the most important segment.

The aim of the research was to determine whether there were any differences and how prominent those differences were between anthropometric characteristics of the top sports people, i.e. the best football players and respondents of the same age who play sports on a recreational basis. Since anthropometrics, as a part of the science of man, deals with measuring of the human body, the goal of the research was to measure and describe as precisely and in as much detail as possible the morphological characteristics of respondents.

Researches in the morphological field are numerous, but most closely related to the topic of this research were the researches conducted by Molnar (1998), who compared morphological characteristics of football players and the boys who did not play sports all of them making up a sample of 240 boys, and Hamidović (2007) who compared anthropometric characteristics of football players and recreational players from Novi Pazar on a sample of 110 respondents.

METHOD

Participants

The sample included 56 male respondents aged 28 (± 1 year) divided into two subsamples. The first subsample included 25 respondents who were actively engaged at a Football Club "Vojvodina" from Novi Sad, competing in the Super League of Serbia, while the other subsample included 30 respondents who played sports recreationally in a place where they lived. The criteria for selecting footballers for the sample were as follows: being a member of the first team in the club for a year at least and having a good health condition, while for the other subsample the only criterion was not playing sports actively.

Instruments

For the data collecting the technique of anthropometric investigation was used. 20 anthropometric measures were taken altogether that defined longitudinal and transversal dimensionality of the skeleton, the body mass and the body volume, as well as the subcutaneous adipose tissue: body height (BODHEI), body mass (BODMAS), elbow diameter (ELBDIA), wrist diameter (WRIDIA), knee diameter (KNEDIA), ankle diameter (ANKDIA), minimum upper arm diameter (MINUAD), maximum upper arm diameter (MAXUAD), minimum forearm diameter (MINFAD), maximum forearm diameter (MAXFAD), minimum thigh diameter (MINTHD), maximum thigh diameter (MAXTHD), minimum calf diameter (MINCAD), maximum calf diameter (MAXCAD), triceps skinfold thickness (TRSKTH), forearm skinfold thickness (FASKTH), thigh skinfold thickness (THSKTH), calf skinfold thickness (CASKTH), chest skinfold thickness (CHSKTH) and abdominal skinfold thickness (ABSKTH). Anthropometric research was conducted according to the IBP standards respecting the basic rules and principles related to the parameter choice, standard conditions and measurement techniques, as well as the standard measuring instruments adjusted before measurement was carried out.

Procedure

The data obtained in the research were processed using the application statistics program SPSS 10.0 adjusted for the use on personal computers. Arithmetic means, standard deviation and standard errors of arithmetic means were first calculated, and then it was determined whether there was significance with respect to the difference between the arithmetic means in respondents actively playing football and the respondents playing sports recreationally, which was done testing the difference between the arithmetic means of independent samples, using the popularly known, t-test. The analysis provided the answers to the question of whether there was and how prominent was the difference between anthropometric characteristics in the top sports people, i.e. footballers and the respondents of the same age but engaging in sports on a recreational basis.

RESULTS AND DISCUSSION

This section offers the results of the central and dispersion parameters, as well as the results of discriminative analysis classified into two tables. The first table, in the first two columns contains the data on basic discriminative parameters for the analyzed variables (Variables) and entity group (Group). The third columns shows the number of respondents in both samples (N), and then the arithmetic means of both samples (M), the standard deviation (SD) in both samples (SD) and the standard errors of arithmetic means (SEM). The other table contains all the data related to the procedure of a t-test for independent samples. For each variable the results of Levene's test for equality of variances are given: its value (F), and significance (p). The remaining columns show the test results of equality of arithmetic means divide into two groups: t-test value (t), degrees of freedom (df), the significance level of two-way testing of the equality of arithmetic means (p), the difference between the arithmetic means (MD), the standard error of the difference (SED), the low interval limit (Min) and upper interval limit (Max) of the differences of p=.05.

Table 1: Group Statistics

Variables	Group	N	M	SD	SEM
BODHEI	footballers	26	182.112	6.732	1.320
	recreational players	30	183.620	7.709	1.408
BODMAS	footballers	26	80.10	7.13	1.40
	recreational players	30	86.90	14.78	2.70
ELBDIA	footballers	26	72.712	3.380	.663
	recreational players	30	71.370	3.484	.636
WRIDIA	footballers	26	58.096	3.434	.673
	recreational players	30	57.420	3.075	.561
KNEDIA	footballers	26	99.331	3.770	.739
	recreational players	30	101.350	5.474	.999
ANKDIA	footballers	26	75.72	3.22	.63
	recreational players	30	76.15	4.29	.78
MINUAD	footballers	26	30.31	2.46	.48
	recreational players	30	32.88	2.71	.50
MAXUAD	footballers	26	32.15	1.97	.39
	recreational players	30	34.73	2.59	.47
MINFAD	footballers	26	16.92	.89	.17
	recreational players	30	17.33	1.09	.20
MAXFAD	footballers	26	26.42	2.55	.50
	Recreational players	30	28.08	1.48	.27
MINTHD	footballers	26	41.27	2.63	.52
	recreational players	30	41.05	3.96	.72
MAXTHD	footballers	26	56.42	2.66	.52
	recreational players	30	59.53	6.07	1.11
MINCAD	footballers	26	24.35	1.20	.23
	recreational players	30	23.18	1.85	.34
MAXCAD	footballers	26	37.85	1.93	.38
	recreational players	30	38.72	3.40	.62
TRSKTH	footballers	26	4.208	1.155	.227
	recreational players	30	7.510	3.276	.598
FASKTH	footballers	26	4.835	.624	.122
	recreational players	30	7.767	3.462	.632
THSKTH	footballers	26	7.331	2.065	.405
	recreational players	30	15.027	5.829	1.064
CASKTH	footballers	26	6.142	1.530	.300
	recreational players	30	10.307	4.144	.757
CHSKTH	footballers	26	6.465	1.349	.265
	recreational players	30	16.543	7.011	1.280
ABSKTH	footballers	26	6.342	1.379	.270
	recreational players	30	15.347	7.954	1.452

Table 2: Independent Samples Test

Variables	F	p	t	df	p	MD	SED	Min	Max
BODHEI	.913	.343	-.774	54	.442	-1.508	1.949	-5.416	2.399
BODMAS	6.836	.012	-2.239	43.067	**.03***	-6.8	3.04	-12.93	-.68
ELBDIA	.032	.859	1.457	54	.151	1.342	.921	-.504	3.187
WRIDIA	.084	.774	0.777	54	.44	.676	.87	-1.068	2.42
KNEDIA	4.102	.048	-1.624	51.527	.11	-2.019	1.243	-4.514	.476
ANKDIA	4.821	.032	-.428	53.009	.67	-.43	1.01	-2.45	1.59
MINUAD	0.938	.337	-3.698	54	**.001***	-2.58	.7	-3.97	-1.18
MAXUAD	1.409	.24	-4.138	54	**.000***	-2.58	.62	-3.83	-1.33
MINFAD	1.509	.225	-1.524	54	.133	-.41	.27	-.95	.13
MAXFAD	.671	.416	-3.03	54	**.004**	-1.66	.55	-2.76	-.56
MINTHD	4.45	.04	0.247	50.789	.806	.22	.89	-1.56	2
MAXTHD	14.148	.000	-2.541	40.922	**.015***	-3.11	1.22	-5.58	-.64
MINCAD	2.556	.116	2.738	54	**.008***	1.16	.42	.31	2.01
MAXCAD	5.437	.023	-1.198	47.1	.237	-.87	.73	-2.33	.59
TRSKTH	22.887	.000	-5.164	37.04	**.000***	-3.302	.64	-4.598	-2.007
FASKTH	21.311	.000	-4.555	31.161	**.000***	-2.932	.644	-4.245	-1.619
THSKTH	15.546	.000	-6.759	37.103	**.000***	-7.696	1.139	-10.003	-5.389
CASKTH	14.757	.000	-5.116	37.755	**.000***	-4.164	.814	-5.813	-2.516
CHSKTH	68.877	.000	-7.71	31.465	**.000***	-10.078	1.307	-12.742	-7.414
ABSKTH	37.152	.000	-6.096	31.004	**.000***	-9.004	1.477	-12.017	-5.992

Examining the first table it is possible to spot the differences in central and dispersion parameters between the footballers and the respondents who play sports recreationally with respect to the accumulation of subcutaneous adipose tissue, while in the case of parameters regarding longitudinal and transversal dimensionality of the skeleton, the body mass and body volume these differences are not prominent as in the case of the parameters used for assessing subcutaneous adipose tissue. Based on the observed results it is obvious that the footballers manifest higher values regarding an elbow diameter and wrist diameter, as well as in the case of a minimal thigh circumference and minimal calf circumference. On the other hand, the respondents who play sports recreationally manifest higher values in the case of body height, body mass, knee diameter, ankle diameter, minimal and maximum upper arm circumference, minimal and maximum forearm circumference and maximum calf circumference.

The discriminative analysis procedure enabled determining significant differences between the footballers and the respondents playing sports recreationally (table 2). Based on the obtained results it was determined that the results of the subsamples differ to a considerable extent with respect to twelve anthropometric characteristics (body mass, minimal and maximum upper arm circumference, maximum forearm circumference, maximum thigh circumference, minimum calf circumference, triceps skinfold thickness, forearm skinfold thickness, thigh skinfold thickness, calf skinfold thickness, chest skinfold thickness and abdominal skinfold thickness).

By means of a discriminative analysis it was determined that anthropometric characteristics were more in favor of a group of respondent who actively played football in most cases, especially when it was the case of the parameters for assessing subcutaneous adipose tissue, also confirmed in some earlier researches (Bala, 1981; Sekereš, 1985; Siozios, 1985; Molnar, 1998; Molnar, Radosav and Smajić, 1999). Furthermore, it was also observed that skinfolds are considerably thicker in the respondents who played sports recreationally, and the difference was 3.302 mm in the case of upper arm skinfold thickness and 2.932 mm in the case of forearm skinfold thickness, 7.696 mm with respect to thigh skinfold thickness, 4.164 mm with respect to calf skinfold thickness, 10.078 mm with respect to chest

skinfold thickness, 9.004 mm with respect to abdominal skinfold thickness, which confirms the fact that physical education has a positive effect on the reduction of subcutaneous adipose tissue. Moreover, in some earlier researches carried out in different time period certain differences were observed with respect to subcutaneous adipose tissue both in the respondents who played sports actively and those who played sports recreationally (Sekereš, 1985; Siozios, 1985; Molnar, 1998). These researches also confirmed that the older the respondents are, the bigger the difference, and therefore the difference with respect to subcutaneous adipose tissue is smaller in the case of younger respondents, and on the other hand it gets bigger with age (Molnar, 1998). In addition to this, it was also determined that the respondents who play sports recreationally manifest considerably higher body mass values where a difference of 6.8 cm was observed, then a difference of 2.58 cm in the case of a minimum upper arm circumference and finally the identical difference in the case of a maximum upper arm circumference. In the case of maximum upper arm circumference the difference is 1.66 cm, while in the case of a maximum thigh circumference the difference was 3.11 cm in favor of the respondents who play sports recreationally. The only characteristic that was more prominent in the footballers was the minimum calf circumference and the difference was 1.16 cm. However, these differences were not observed in the previous researches and it could be considered that differences in these characteristics individual in character and cannot be uniform for the whole population.

CONCLUSION

In general, the obtained results show that active engagement in sports results in a decrease of subcutaneous adipose tissue. This is particularly indicated by a considerable difference in the case of all types of skinfold thickness among the subsamples. In most cases, a remarkably bigger difference is observed with respect to measures of circumference dimensions in favor of the respondents who play sports recreationally, and thus it can be concluded that considerably increased skinfolds have an impact on considerably increased volume. No significant differences were observed in the case of longitudinal and transversal dimensionality of the skeleton. The results also point out the necessity of further monitoring in changes of anthropometric characteristics in children in order to draw much more certain conclusions in the future.

LITERATURE

Bala, G. (1981). *Struktura i razvoj morfoloških i motoričkih dimenzija dece SAP Vojvodine* [*The Structure and Development of Morphological and Motor Dimensions in the Children in SAP Vojvodina].* Novi Sad: The Faculty of Sport and Physical Education.

Hamidović, M. (2007). *Komparativna analiza morfoloških karakteristika i motoričkih sposobnosti sportista fudbalera i nesportista* [*Comparative Analysis of Morphological Characteristics and Motor Abilities of Sportsmen - Football Players and Non-Sportsmen].* PhD Thesis. Novi Sad: The Faculty of Sport and Physical Education.

Molnar, S. (1998). *Morfološke karakteristike i motoričko-funkcionalne sposobnosti dece koja treniraju fudbal i dece koja se bave sportom* [*Morphological Characteristics and Motor-Functional Abilities in Children who Play Football and Children Who Play Sports].* Master Thesis, Novi Sad: The Faculty of Sport and Physical Education.

Molnar, S, Radosav, R., and Smajić, M. (1999). Analiza razlika između dečaka koji pohađaju fudbalsku sportsku školu i dečaka koji se ne bave sportom u morfološkim karakteristikama [The Difference Analysis Between the Boys Attending the School of Football and the Boys Not Playing Sports With Respect to Morphological Characteristics]. In *The Evaluation of Research Range in Sports (173).* Novi Sad: The Faculty of Sport and Physical Education.

Moreno, L. (2003). Body composition in young male football (soccer) players. *Nutrition Research,* 24 (3), 235-242.

Kymahugotis, H., Dulgeridis, P., and Panajotis P. (2005). Uticaj morfoloških karakteristika i bazično-motoričkih sposobnosti na specijalne motoričke sposobnosti fudbalera [The Effects of Morphological Characteristics and Basic Motor Skills to Specific Motor Skills in Football Players]. *The Herald of Anthropological Society of Yugoslavia*, 40, 275-282.

Stojanović, T., Nikolić M., Purašković R., and Milkić D. (2005). Uporedna analiza nekih antropometrijskih mera i motoričkih sposobnosti mladih odbojkaša i odbojkašica [Comparative

Analysis of Some Anthropometric Measures and Motor Abilities in Young Male and Female Volleyball Players]. *The Herald of Anthropological Society of Yugoslavia*, 40, 249-254.

Sekereš, S. (1985). *Relacije morfoloških karakteristika i motoričkih sposobnosti mladih fudbalera u SAP Vojvodini [The Relations between Morphological Characteristics and Motor Abilities in Young Football Players in SAP Vojvodina].* Master Thesis, Novi Sad: The Faculty of Sport and Physical Education.

Siozios, S. (1985). *Relacije između sistema morfoloških karakteristika, motoričkih sposobnosti i specifičnih motoričkih sposobnosti fudbalera uzrasta 15-18 godina [The Relations between the System of Morphological Characteristics and Motor Abilities and Specific Motor Abilities in Football Players aged 15-18].* Master Thesis, Novi Sad: The Faculty of Sport and Physical Education.

Špirtović, R. (1989). *Relacije između morfoloških, specifično-motoričkih, kognitivnih I konativnih dimenzija i uspeha u fudbalskj igri [Relations between Morphological, Specific Motor, Cognitive and Conative Dimensions and Efficiency in Football game].* PhD Thesis. Novi Sad: The Faculty of Sport and Physical Education.

RAZLIKE U NEKIM ANTROPOMETRIJSKIM KARAKTERISTIKAMA VRHUNSKIH FUDBALERA I REKREATIVACA

Originalni naučni rad

Sažetak

Cilj ovog istraživanja je dobijanje relevatnih znanja o značajnim razlikama u nekih antropometrijskim karakteristikama vrhunskih fudbalera i njihovih vršnjaka koji se bave sportom rekreativno. Uzorak ispitanika je obuhvatio 56 ispitanika muškog pola, uzrasta 28 godina (±1 godina) podeljenih na dva subuzorka. Prvi subuzorak je obuhvatio 26 ispitanika koji treniraju u Fudbalskom klubu "Vojvodina" iz Novog Sada dok je drugi subuzorak obuhvatio 30 ispitanika koji se bave sportom rekreativno. Uzorak varijabli je sadržao 20 antropometrijskih mera koje su definisale longitudinalnu i transverzalnu dimenzionalnost skeleta, zatim volumen i masu tela, kao i potkožno masno tkivo. Rezultati merenja su analizirani statističkom procedurom označenom kao testiranje značajnosti dve aritmetičke sredine na nezavisnim uzorcima ili popularno, t-testom. Na osnovu dobijenih rezultata zaključeno je da se značajne razlike pojavljuju kod svih varijabli za procenu potkožnog masnog tkiva, kao i kod većine varijabli za procenu volumena i mase tela na nivou značajnosti p=.05.

Ključne reči*: antropometrijske karakteristike, vrhunski fudbaleri, rekreativci*

Corresponding author:
The Faculty of Sport and Physical Education, the University of Novi Sad
Lovćenska 16, 21000 Novi Sad, Serbia
Tel.: +381 21 450 188, extension: 113
Fax: +381 21 450 199
E-mail: football@uns.ns.ac.yu

MORPHOLOGICAL CHARACTERISTICS OF BOSNIAN FIRST LEAGUE FEMALE BASKETBALL PLAYERS

Bašinac Ismet [1], Branimir Mikić [2], Haris Pojskić [2]

[1]*University of Travnik, Educational faculty*
[2]*Tuzla university, Faculty of physical education and sport*

Original scientific paper

Abstract
The aim of the research was estimation of anthropometric characteristics of female basketball players from six Bosnian first league teams and also identification of possible differences between the players that play at different positions in the teams. Forty three, actually health, players participated in this research. They were between nineteen and twenty four years old. For all eleven anthropometric characteristics, descriptive parameters have been calculated. For the identification of possible differences between the players that play at different positions in the teams multiple analysis of variance have been used. The obtained results show that there are not important differences between the players from different teams, but there are statistical significant differences between players that play at different team positions. They are expressed with all variables except one; lower leg length. Centers (big players) are dominantly with longer and wider skeleton dimensionality, as well as body mass. Values of these variables are bigger from players' position one to position five. Further researches should include more anthropometric variables especially those for body voluminosity and body fat estimation that will help coaches to indirectly evaluate fitness level of tested players.

Key words*: morphology, differences, team position*

INTRODUCTION

Morphological characteristics are very important aspect of athlete's anthropological status. Some of them are very high genetically conditioned and consequently, they can not be affected by any sport activity or programmed exercise, but others are not so hereditary and it could be changed. This fact is can be essential in athlete's selection for specific sport. It can be said that every sport request specifically determined status of athlete's morphological profile, which is directly connected with success in specific sport activity. Big number of researchers dealt with anthropometric characteristics of high level sportsmen, trying to reveal optimal morphological profile for specific sport activity. Fleck S.J. (1983)[2] conducted his study on 525 male athletes participating in 26 Olympic events and 298 female athletes participating in 15 Olympic events. Obtained results showed that all athletes have lower percentage of body fat mass than student age population. The smallest body fat values have athletes involved in strictly aerobic activities, such as marathon running, while athletes involved in sports where body size is a definite advantage, such as basketball and volleyball tended to have a larger LBM (lean body mass).

Other researchers compared anthropometric characteristics of same age female and male athletes that were involved in same physical activity. Green J.J. at al. (1998)[3] conducted his research on sample of fifty-four female and sixty-one male subjects, from varsity basketball teams at high schools in order to reveal differences in their anthropometric characteristics and motor abilities. The male subjects were significantly taller and heavier, while the females had a significantly higher percentage of body fat. Performance testing revealed that the males were able to jump significantly higher and run the sprint significantly faster than the female subjects.

The aim of this research was to determine morphological profile of elite female basketball players that played in I Bosnian Basketball League, as well, to determine differences between the players that play at different team position. Similar studies conducted, but there are few in Bosnia and Herzegovina, what was the reason for this study. Ackland at al. (1997)[1] measured 168 players from 14 national teams using 38 anthropometric dimensions before the Women's World Basketball Championships held in Australia in 1994. Clear differences in

absolute size were found between guards, forwards and centers. La Monte M.J at al. (1999)[6] on sample of 46 female university basketball players got similar results. The centers were significantly taller and greater in mass than were the guards and forwards. The centers had significantly lower body density yet displayed higher fat-free mass than did the guards. Also, Jeličić M. at al. (2002)[5] confirmed differences of anthropometric characteristics of elite junior basketball that play at different team position. Centers were characterised by bigger transversal and longitudinal skeleton dimensionality, but they didn't have bigger body fat percentage than guards and forwards.

Also, previous studies confirmed correlation between anthropometric characteristics and motor and functional abilities. Only optimal athlete's morphometric status can provide optimal exposure of motor and fitness potential. Hoare D.G. (2000)[4] measured anthropometric and physiological attributes of 125 male and 123 female junior basketball players competing at the Australian Under 16 championships in 1998. Best players differed to rest players on a number of anthropometric and physiological variables for both males and females. Riezebos M.L. at al. (1983)[7] measured twenty women on physiological, anthropometric, motor fitness and skill related variables in order to provide a current profile of elite female basketball players. The factors which best discriminated between high and low performers were accuracy shooting, percent fat and VO2max.

METHODS

Participants

Forty three actually health (without any injury report) female basketball players from six Bosnian first league clubs, participated in this research. They were between nineteen and twenty four years old.

Instruments

For estimation of the players anthropometric characteristics, following variables were selected: Body height - height, body weight - weight, leg length – leg l. , upper leg length – upper leg l., lower leg length – lower leg l. , arm length – arm l. , upper arm length – upper arm l. , forearm length – fore arm l. , hand breadth - hand b. , biacromial breadth – biacromial b. , bicristal breadth – bicristal b.

RESULTS

Table 1 shows descriptive statistics of all eleven anthropometric characteristics of the forty three players. Comparing the results with data obtained by Fleck S.J. 1983.(basketball players: males, 84.1 ± 6.2 kg; females, 55.3 ± 4.9 kg) it is obvious that Bosnian players are heavier than female players in the Fleck's study.

Table 1. Descriptive statistics of the players' morfometric parameters

VARIABLES	Mean	Std Dev	Min	Max	N
Height	1776.19	89.23	1571	1950	43
Weight	698.42	93.82	502	881	43
Leg l.	1011.79	74.42	897	1170	43
Upper leg l.	476.95	54.78	370	580	43
Lower leg l.	534.84	46.19	447	697	43
Arm l.	798.05	56.05	676	912	43
Upper arm l.	342.26	23.26	296	387	43
Fore arm l.	258.81	21.91	214	308	43
Hand b.	196.98	14.68	166	221	43
Biacromial l.	365.91	21.72	315	410	43
Bicristal b.	294.44	24.34	254	360	43

Using MANOVA we try to determine if there are any significant differences in assessed morphological variables between the players that play in different teams (table 2). As it showed in table 3, there are differences between players from different teams, but statistically significant differences have only three variables: leg length, lower leg length and biacromial breadth.

Table 2. Multiple analysis of variance of the basketball players according to club affiliation

Test Name	Value	Aprox.F	Hypoth.DF	Error DF	Sig. of F
Pillais	2.42831	2.66105	55.00	155.00	.000
Hotellings	6.84490	3.16110	55.00	127.00	.000
Wilks	.02207	2.99039	55.00	128.56	.000
Roys	.74504				

Table 3. Univariate Tests of Significance

VARIABLES	Hypoth SS	Error SS	Hypoth.MS	Error MS	F	Sig. of F
Height	69615.98	264814.52	13923.19	7157.14	1.94536	.110
Weight	64930.41	304780.05	12986.08	8237.29	1.57650	.191
Leg l.	79144.38	153440.73	15828.87	4147.04	**3.81690**	**.007**
Upper leg l.	31040.95	95012.95	6208.19	2567.91	2.41760	.054
Lower leg l.	22572.74	67023.11	4514.54	1811.43	**2.49225**	**.048**
Arm l.	15366.30	116603.60	3073.26	3151.44	.97519	.446
Upper arm l.	3588.28	19137.89	717.65	517.24	1.38747	.251
Fore arm l.	3289.69	16870.81	657.93	455.96	1.44295	.232
Hand b.	1517.71	7527.26	303.54	203.43	1.49206	.216
Biacromial l.	4957.53	14856.09	991.50	401.51	**2.46941**	**.050**
Bicristal b.	4004.43	20884.17	800.88	564.43	1.41891	.240

Table 4. Descriptive statistics according to team affiliation

	Height		Weight		Leg l.		N
	SV	SD	SV	SD	SV	SD	
CLUB 1	1803	107	714	83	1049	81	9
CLUB 2	1845	61	757	40	1072	35	7
CLUB 3	1742	73	629	56	1013	96	6
CLUB 4	1753	47	719	103	945	26	7
CLUB 5	1720	107	669	92	973	70	6
CLUB 6	1774	87	685	130	1004	52	8
Average	*1776*	*89*	*698*	*94*	*1012*	*74*	*43*
	Upper leg l.		Lower leg l.		Arm l.		N
	SV	SD	SV	SD	SV	SD	
CLUB 1	485	52	565	33	809	72	9
CLUB 2	531	49	541	27	829	34	7
CLUB 3	463	49	549	81	780	49	6
CLUB 4	443	17	502	14	790	30	7
CLUB 5	468	70	505	35	769	73	6
CLUB 6	468	55	536	45	802	58	8
Average	477	55	535	46	798	56	*43*
	Upper arm l.		Fore arm l.		Hand b.		N
	SV	SD	SV	SD	SV	SD	
CLUB 1	351	30	270	27	189	18	9
CLUB 2	354	13	267	19	208	8	7
CLUB 3	330	21	250	20	199	12	6
CLUB 4	335	14	256	10	199	7	7
CLUB 5	332	27	244	28	193	19	6
CLUB 6	345	24	259	20	197	15	8
Average	342	23	*259*	*22*	*197*	*15*	*43*

Also, using multiple analysis of variance we tried to determine if there were any morphological differences between the players that play at different position in the teams. As it obvious, there are differences in anthropometric features between players that play at different

position in the teams (table 5). Table 6 shows that there are differences in all assessed variables except in one variable; lower leg length. Table 7 shows descriptive statistics of morphological characteristics for all five position in the teams: position 1- play maker, position 2 – guard shooter, position 3 –forward, position 4 – power forward, position 5 – centre.

.

Table 5. Multiple analysis of variance of the basketball players' morphological characteristics according to the position they play in their clubs.

Test Name	Value	Aprox.F	Hypoth.DF	Error DF	Sig. Of F
Pillais	1.41423	1.54134	44.00	124.00	.033
Hotellings	5.72436	3.44762	44.00	106.00	.000
Wilks	.08504	2.24221	44.00	109.08	.000
Roys	.8302				

Table 6. Univariate Tests of Significance

Variables	Hypoth SS	Error SS	Hypoth.MS	Error MS	F	Sig. of F
Height	206758.616	127671.896	51689.6539	3359.78674	**15.38480**	**.000**
Weight	125289.801	244420.664	31322.4503	6432.12273	**4.86969**	**.003**
Leg l.	106608.236	125976.880	26652.0590	3315.18106	**8.03940**	**.000**
Upper leg l.	60999.0643	65054.8427	15249.7661	1711.96955	**8.90773**	**.000**
Lower leg l.	7615.29192	81980.5685	1903.82298	2157.38338	.88247	.484
Arm l.	91050.1609	40919.7460	22762.5402	1076.83542	**21.13837**	**.000**
Upper arm l.	13160.8152	9565.37085	3290.20380	251.72029	**13.07087**	**.000**
Fore arm l.	13881.7584	6278.75325	3470.43960	165.23035	**21.00365**	**.000**
Hand b.	5342.12249	3702.85426	1335.53062	97.44353	**13.70569**	**.000**
Biacromial l.	8675.97711	11137.6508	2168.99428	293.09607	**7.40028**	**.000**
Bicristal b.	6443.36078	18445.2439	1610.84020	485.40115	**3.31858**	**.020**

Table 7. Descriptive statistics of morphological characteristics for every position in the teams

	Height		Weight		Leg l.	
	SV	SD	SV	SD	SV	SD
POSITION 1	1676	58	632	49	951	39
POSITION 2	1725	53	648	67	971	39
POSITION 3	1777	67	708	81	1004	67
POSITION 4	1810	59	712	102	1037	71
POSITION 5	1897	45	797	86	1104	56
Average	*1776*	*89*	*698*	*94*	*1012*	*74*

	Upper leg l.		Lower leg l.		Arm l.		Upper arm l.	
	SV	SD	SV	SD	SV	SD	SV	SD
POSITION 1	423	30	529	28	735	36	318	17
POSITION 2	452	40	519	22	764	30	331	11
POSITION 3	474	44	530	47	796	38	340	21
POSITION 4	496	50	540	74	819	31	350	14
POSITION 5	544	34	561	36	881	25	374	11
Average	*477*	*55*	*535*	*46*	*798*	*56*	*342*	*23*

	Fore arm l.		Hand l.		Biacromial b.		Bicristal l.	
	SV	SD	SV	SD	SV	SD	SV	SD
POSITION 1	237	13	179	1	343	18	278	18
POSITION 2	243	10	189	12	354	15	283	19
POSITION 3	259	14	198	10	369	22	295	24
POSITION 4	264	15	205	9	377	14	301	21
POSITION 5	293	12	214	5	384	13	316	28
Average	*259*	*22*	*197*	*15*	*366*	*22*	*294*	*24*

These results confirmed previous researches conducted by Ackland at al. (1997)[1], La Monte M.J at al. (1999)[6], Jeličić M. at al. (2002)[5]. There are statistically significant differences in morphological characteristics between players that play at different position in a team. Looking the data from table 7 it is obvious that values of all variables increase from team position 1 to team position 5. Centres tend to have the highest values of longitudinal and transversal skeleton dimensionality, as well as a body mass that closely correlates with body height. This kind of anthropometric profile provides them to efficiently play close to a basket, respectively to score from shorter distance and gives them more opportunities to make a lot of rebounds. Also, the profile helps them to set more efficiently screens, stopping defenders from catching up offensive players. Having bigger team is very often a big advantage, especially if you have players with good quickness and agility. Players on position 1, play makers, have the lowest values of all variables. They are the smallest and the lightest players in the teams. This fact gives them the best conditions to control the ball and consequently to organise their teams' offence. They are usually the quickest and fastest team players, what is directly connected with their lower body mass.

CONCLUSION

Conducting this research we determined morfometric profile of Bosnian elite female basketball players and we confirmed previous research about morphological differences between players that play at different team position. Centres tended to have the biggest values of all measured variables, while playmakers tended to have the lowest values. This is one of the first studies carried out in Bosnia on elite female basketball players and this is a good base for further estimation of their anthropometric profile. This kind of studies can be a fine indicator for basketball selection and also indirect sign of players' fitness level. Also, knowing the morphological profile of players can explain good or bad competitive performance.

LITERATURE

Ackland, T.R., Schreiner, A.B., Kerr, D.A. (1997). Absolute size and proportionality characteristics of World Championship female basketball players. *Journal of Sports Sciences.*Volume 15, Issue 5, Pages 485-490

Fleck, S.J. (1983). Body composition of elite American athletes. *American Journal of Sports Medicine.* Volume 11, Issue 6, 1983, Pages 398-403.

Greene, J.J., McGuine, T.A., Leverson, G., Best, T.M. (1998). Anthropometric and performance measures for high school basketball players. *Journal of Athletic Training.* Volume 33, Issue 3,Pages 229-232.

Hoare, D.G. (2000). Predicting success in junior elite baskethall players: the contribution of anthropometric and physiological attributes. Journalof Sports Science and Medicine, Dec; 3 (4): 391-405.

Jeličić, M., Sekulić, D., Marinović, M. (2002). Anthropometric characteristics of high level European junior basketball players. *Collegium Antropologicum*, 26 (2).

LaMonte, M.J., McKinney, J.T., Quinn, S.M., Bainbridge, C.N., Eisenman, P.A. (1999). Comparison of Physical and Physiological Variables for Female College Basketball Players. *Journal of Strength and Conditioning Research.* Volume 13, Issue 3, Pages 264-270.

Riezebos, M.L., Paterson, D.H., Hall, C.R., Yuhasz, M.S. (1983). Relationship of selected variables to performance in women's basketball. *Canadian journal of applied sport sciences*. Volume 8, Issue 1, Pages 34-40.

MORFOMETRIJSKE KARAKTERISTIKE KOŠARKAŠICA PRVE LIGE BOSNE I HERCEGOVINE

Originalni naučni rad

Sažetak

Cilj rada je estimacija morfološkog statusa košarkašica koje igraju u prvoj ligi Bosne i Hercegovine te utvrđivanje razlika u morfometrijskim karakteristikama igračica koje igraju na različitim pozicijama u timu. Istraživanje je obuhvatilo 43 košarkašice uzrasta 19-24 godine. Za svih jedanaest mjernih instrumenata za procjenu morfološkog statusa ispitanica izračunati su deskriptivni parametri. Za utvrđivanje razlika među ispitanicama iz različitih klubova, kao i razlika među igračicama koje igraju na različitim pozicijama u timu, korištena je višestruka analiza varijanse. Dobijeni rezultati pokazuju da postoje zanemarljive razlike između igračica koje igraju u različitim klubovima, tj. da su njihove morfometrijske karakteristike približno jednake. Statistički značajne razlike postoje među igračicama koje igraju na različitim pozicijama u timu. One su izražene u svim, osim u jednoj, mjerenoj varijabli (dužina potkoljenice). Centri pokazuju najizraženiju longitudinalnu i transverzalnu dimenzionalnost skeletal, kao i masu tijela. Primjetno je da vrijednosti mjerenih karakteristika rastu od pozicije 1 (playmaker) pa do pozicije 5 (centar). Daljnja istraživanja bi trebala uključiti mjerenja voluminoznosti tijela i količine potkožnog masnog tkiva koje je indirektni pokazatelj fizičke pripremljenosti sportista.

Ključne riječi: *antropometrija, razlike, pozicija u igri.*

Corespondence to:

Mr. Haris Pojskić MSc
Tuzla University,
Faculty of physical education and sport
2. Oktobra 1, 75 000 Tuzla, Bosnia and Herzegovina
Phone: +387 35 278 535
e-mail: haris.pojskic@untz.ba

THE EFFECTS OF ISO-KINETIC EXERCISE PROGRAM ON THE KNEE FLEXING STRENGHT

Elvir Kazazović, Vahida Kozić, Erko Solaković, Lejla Šebić-Zuhrić

Faculty of Sport and Physical Education Sarajevo

Original scientific paper

Abstract

The goal of this research is the study of the maximum force moment, the full function, as well as the average flex muscle strength of the dynamic knee stabilizers. Fifteen elite soccer players of the first division and thirteen amateur soccer players participated in this study. The researcher subjects who participated in this research are University of Sport and Physical Education, Sarajevo , students (40 students total). The estimate of changes observed based on iso-kinetic exercises (concentric and eccentric) on muscle stabilizers of the knee was performed on all 40 subjects. Research subjects were divided in two groups: experimental and control. The maximum strength of dynamic stabilizers of the knee has been tested on iso-kinetic instrument (machine Biodex 3) at degree speeds between 60 degrees/s and 180 degrees/s. In addition to their regular classes at the University, the experimental group spent in additional exercise programs on Biodex 3 machines, for 12 weeks, 3 times a week. The results will show that the additional iso-kinetic exercise program on the said machines effectively improve the strength of the flex muscles of the knee.

Keywords: *knee muscles, iso-kinetic training, effects*

INTRODUCTION

The demands of modern training in elite sports more and more ask for reaching better effects in as little time of training as possible, as well as the application of training methods that enable reaching hypotheses of specific advancements of athletes in different disciplines. Thus far, research shows that there was an absence of iso-kinetic training in the active athletes' training cicles. This study is concentrated on the program of iso-kinetic training for strengthening knee flexors. Moreover, different authors' reports (Brown, Le, et. al. 1994, Clarke, R., et al. 1998) show that the strength of lower extremity flexors is decreasing in relation to extensors, which lead to a less than ideal comparison between those two groups of muscles.

The iso-kinetic diagnosis represents a technologically advanced treatment for the evolution of relevant parameters of muscular-skeletal systems (Schlumberger i sur., 2006) (Zakas, 2006). The functional decrease of flexors in comparison with the extensors can be attributed to several problems. First, there is an increase in flexor rupture possibility. Even though there exist a few different variances of instruments and protocols for joint flexor treatments that are used (fitness machines), no machine has shown itself ideal for a fast development of this muscle group, nor for an estimate measurement between flexors and extensors. A combination of ecsentric and concentric contractions of muscles during training on iso-kinetic instruments results in more strength when compared to training protocols involving other instruments (fitness machine, etc.).

This study attempted to affirm the effect of iso-kinetic training on the strength of the knee flexor muscles. The analysis of the research subjects in two timing spots (t- test and discriminative analysis) affirmed the differences in variables in two research subject groups, which gives an objective picture of the program effects.

METHODS

Iso-kinetic testing: The research involves 40 subjects, students of University of Sport and Physical Education in Sarajevo (average age 21.1±3.6), divided into an experimental group (N=20), which besides the regular class attendance also attended additional training on Biodex 3 machine, and a control group (N=20), which only attended the regular

classes in athletics, handball, and basics of motorics.

The study was performed at the Institute of Sport in Sarajevo. Before the initial testing, the subjects spent two hours learning about the testing instruments and exercise protocols; they also had a warming up period, involving stretching lower extremity muscles and exercises on the bicycle machine.

The power of knee flexors was tested in the sitting position on the Biodex chair, where the subjects were strapped with belts around the stomach and thigh, in order to stabilize the area above the knee. The settings of tibial pads, dynamo-metric heights, and angles of the seats were recorded in order to maintain reliability and reproduction during the test.

Iso-kinetic testing protocol of knee flexors' strength was performed at 60 ° / s and 180 ° / s, with 5 repetitions on both speeds and a pause of 30s between repetitions. The same procedure was produced for the left and right leg (Madsen et al., 1996, Gleeson et al., 1996). These angular velocities were used by many researchers in order to measure the force of dynamic knee stabilizers (Kellis, Gerodimos, Kellis, Mano 2001; Dauty, Poriton-Joss, Rochcongar 2003; Ergun, Islegen, Taskiran 2004; Kazazovic, Radja, Dervisevic, Smith 2007). Knee joint movements were limited to values from 0 ° to 90 °. For further statistical processing, the automatically calculated values of maximum torque, total work, and average power of flexors on both speeds were recorded. Both groups were tested again after 12 - week training period using the same procedures iso-kinetic testing.

With the iso-kinetic measurements of the knee muscles, the following variables were gathered:

The maximum strength of the knee flexor muscles (speed 60 °/s)

FLXLEF60 (Nm) - The maximum torque of knee flexors in left leg

FLXRIG60 (Nm) - The maximum torque of knee flexors in right leg

FXLFTW60 (J) - The cumulative work of knee flexors in left leg

FXRGTW60 (J) - The cumulative work of knee flexors in right leg

AVGPLF60 (W) - Average strength of knee flexors in left leg

AVGPRG60 (W) - Average strength of knee flexors in right leg

The maximum strength of knee flexor muscles (speed 180 °/s)

FLXLEF180 (Nm) - The maximum torque of knee flexors in left leg

FLXRIG180 (Nm) - The maximum strength of knee flexors in right leg

FXLFTW180 (J) - Cumulative work of knee flexors in left leg

FXRGTW180 (J) - Cumulative work of knee flexors in right leg

AVGPLF180 (W) - Average strength of knee flexors in left leg

AVGPRG180 (W) - Average strength of knee flexors in right leg

The iso-kinetic exercise program.

The experimental group of subjects had an iso-kinetic program of exercise 3 times a week for 12 weeks, as follows:

Warming up on byciclogometer and stretching muscles of lower extremities (15 min).

1. 3 series x 4 - 6 repetitions with the left leg on the angular speed of 60 ° / s with pauses of 30-60s between the series
2. Pause between exercises at various speeds of 3 min.
3. 5 x 4 to 6 repetitions with the left leg on the angular speed of 180 ° / s with pauses of 30-60s between the series
4. 3 series x 4 - 6 repetitions with the right leg on the angular speed of 60 ° / s with pauses of 30-60s between the series
5. Pause between exercises at various speeds of 3 min.
6. 5 x 4 to 6 repetitions right foot on the corner speed of 180 ° / s with breaks of 30-60s between the series.

The training protocol was identical to the testing protocol in the instructions that were given to participants regarding their positions on the Biodex system. During this training period the control and experimental groups engaged in physical activities that are related to the regular classes or practical exercises in these subject areas: athletics, handball, and the introduction to motorics.

Methods of data processing. At the univariate level of data analysis for determining the differences between the groups at initial

testing, a T - test for independent samples was used. The same analysis was also used for determining the difference between groups at final measurements. At the multivariate level of analysis of variables, a discriminative analysis. was used After it was previously established that there are no differences between groups of subjects in the initial testing by discriminative analysis, on the final test the real effects of the two differently treated groups of subjects were affirmed. The criteria for making the conclusions about the effects of the program were the factors of Wilks Lambda, statistical relevance of discriminative functions and values of centroid groups at the initial and final testing.

RESULTS

For the purpose of analyzing the effects of iso-kinetic exercise program the following statistical procedures were used: descriptive statistics, t-test for determining the difference at univariate level of initial and final measurements, discriminative analysis in the initial and final state. Table 1 shows the results of these statistical analyses of results of experimental and control groups measured in two points in time (initial and final measurement).

An analysis of the results of control and experimental groups in the initial state shows that the subjects do not differ in the initial state. The basic descriptive parameters and statistical relevance of the t - test values showed that there is no statistically significant difference between the two groups of subjects. The results of discriminative analysis for determining the level of significance of differences between groups of subjects confirmed the results of the t - test on the multivariate level. The significance of Box's M-test confirms that subjects belong to the same population, as well as values and significance of Wilks lambda, which confirms that at the initial state there exists no discriminative feature by which the groups of subjects would differ. With the analysis of the initial testing of subjects, we came to the conclusion that there is no difference in the strength of the knee stabilizers in the two groups of subjects. We made the conclusions about the effects of iso-kinetic program on the strength of the knee stabilizers based on the analysis of subject group differences in the final state. The results of T-test at the final measurements showed that the differences in all variables are statistically significant, even

	INITIAL MEASUREMENTS					FINAL MEASUREMENTS				
	AD K	AD E	ADK/ADE	p	R Structure	AD K	AD E	ADK/ADE	p	R **Structure**
FLXLEF60	122.91	118.87	4.03	.645	.129	133.10	164.84	-31.74	.000	**.432**
FLXRIG60	124.35	119.48	4.86	.568	.161	132.80	165.27	-32.46	.000	**.460**
FXLFTW60	621.14	574.06	47.08	.401	.237	696.23	870.01	-173.78	.000	**.460**
FXRGTW60	625.65	596.20	29.45	.574	.158	688.39	875.89	-187.50	.000	**.463**
AVGPLF60	87.79	86.42	1.36	.860	.049	100.26	126.66	-26.40	.000	**.551**
AVGPRG60	90.45	89.82	.62	.931	.024	100.83	124.50	-23.66	.000	**.448**
FLXLEF180	92.95	81.88	11.06	.149	.410	98.15	123.00	-24.85	.000	**.526**
FLXRIG180	94.03	87.60	6.43	.403	.236	98.66	124.55	-25.89	.000	**.526**
FXLFTW180	460.87	385.21	75.66	.112	.454	476.60	602.76	-126.16	.000	**.474**
FXRGTW180	474.62	418.82	55.79	.245	.329	494.49	628.16	-133.66	.000	**.485**
AVGPLF180	157.19	135.12	22.06	.172	.388	155.29	195.42	-40.13	.001	**.408**
AVGPRG180	162.74	150.38	12.35	.465	.206	166.88	204.26	-37.37	.001	**.371**
M (p)					.206					.005
W					.742					.320
p					**.680**					**.000**
CK					.560					-1.421
CE					-.590					1.421

Table 1. The basic descriptive characteristics, differences and value of discriminative functions in initial and final measurements (E, K = experimental, control group, AD K i AD E = arithmetic mid points of control and experimental groups, AD = difference of arithmetic mid points, p - level of relevance differences, R - structure of discriminative functions, CK - centroids of control group, EK - centroids of experimental group, M (p) - statistical relevance Box's M-test, W - Wilks Lambda, p - statistical relevance of Wilks Lambda)

to the .00 level, which leads us to the further evaluation of the procedure. The significance of Box's M-test confirms that there are differences between subjects, as well as the significance of Wilks Lambda, which indicates that in the final measurement there is a discriminative feature by which the two groups of respondents would differ. We have concluded that with the procedures of discriminative analysis a significant discriminative function at the level of significance .00 was noticed. With comparing the values of centroid groups at the initial and final test, it is obvious that there has been a separation of the groups. The conclusion is that at the final measurement, there are differences in the level of measurements, which was not the case in the initial measurement. This fact confirms the presence of practical effects of experimental programs. From the analysis of structure of the discriminative function, it is clear that all variables mainly contribute equally to discrimination of the groups. With its values, the following are worth noticing: the variables of FLXLEF180 - max torque of flexors in the left knee when the speed is 180 °, FLXRIG180 - max torque of knee flexors in the right leg at the speed of 180 °, AVGPLF60 - average power of left knee flexors in 60 °, and FXLFTW180 - cumulative work of left knee flexors at the speed of 180 °, FXRGTW180 - cumulative work of right knee flexors at the speed of 180 °.

DISCUSSION

By the analyses of the results of initial and final measurements, there have been shown to be significant differences in all parameters tested between control and experimental groups after the training period. The 10-week additional training on Biodex 3 significantly increased the strength of dynamic stabilizers of the knee in the experimental subject group. The largest increase in values of tested variables was in the variables of average left knee flexors strength at 60 °, which leads that the training, in which we worked on the isolated lower limb, impacted positively on the strength of that extremity, and to the values of force amplitudes during the entire duration of the work, which is a better indicator of function of the maximum muscle strength. In the midst of iso-kinetic training, the largest improvement was observed in the lower limb, which is trained now isolated, made capable by the technology of iso-kinetic training. The values of maximum torque and cumulative work of right and left knee flexors at the speed of 180 ° also show significant progress, which confirms the results of previous research (Agaard, P, et al 1998).

This research shows that a unique training protocol of additional training on the isokinetic instrument, the Biodex 3, produces a significant increase in strength of knee flexors, and its peak torque through the both angular velocities, either at 60 or 180 ° / s. Further analysis in relation to both angular velocities were confirmed by the changes in the strength of knee flexors. The most important observation is the large increase in the value of cumulative work of knee flexors in both legs.

This research shows us that the subjects who had additional training on Biodex 3 through the 12 weeks had a statistically significant increase in the strength of knee flexors, which further verified other research (Kazazovic, Radja, Dervisevic, Smith 2007; Kazazovic E., Tabaković M . 2008; Kazazovic, E., Hadžikadunić A., Kozić V. 2008)) that affirms that the exercise of continuous resistance, which isokinetic dynamometer entails, significantly increases the strength of dynamic knee flexors.

The research results confirm not only that the training protocol results in increased peak moment in ranging corner joints at the greatest biomechanical values, but also in increased cumulative work, as well as in the achieved strength in unit of time. The results show that strength increases through all three segments in both angular velocities tested.

CONCLUSION

By applying the statistical analysis of the results in the control and experimental groups, we evaluated the training protocol of iso-kinetic exercising and found that it caused the desired positive effects in increasing muscle strength of knee flexors. Additional exercise program on the iso-kinetic machines allows continuous resistance in all ranges of motions, which other exercise equipment (fitness equipment, etc.) do not allow. This feature is important not only to significantly increase muscle strength, but also to increase balancing the relations between muscle extensors and

flexors of dynamic knee stabilizers. The research results confirm the results of previous research on iso-kinetic training, and on that basis we recommend further research on the design of protocols of iso-kinetic exercise for the purpose of characterization of the expediency of iso-kinetic machines to enhance and preserve the strength of knee flexor muscles.

LITERATURE

Agaard, P, et al (1998) *A New Concept For Isokinetic Hamstring: Quadriceps Muscle Strength Ratio.* The American Journal of Sports Medicine 26:231-237.

Brown, LE, et al. (1994): *Effect of velocity on the bilateral deficit during dynamic knee extension flexion exercise in females.* Isokinetics Ex. Sci. 4(4) Biodex #91-231

Clarke, R, et al. (1998) *Effect of a 6-week slideboard training program on quadriceps and hamstrings peak torque, vertical jump, and agility.*The American J of Sports Medicine, Vol. 26, No. 2: 254-61, Biodex #93-199

Dauty M, et al. (2003) *Identification of previous hamstring muscle injury by isokinetic concentric and eccentric torque measurement in elite soccer players.* Isokinetic and Exercise Science 11(3): 139-144.

Ergun M, et al. (2004) *A cross-sectional analysis of sagittal knee laxity and isokinetic muscle strength in soccer players.* International Journal of Sports Medicine 25(8): 594-598.

Kellis S, et al. (2001) *Bilateral isokinetic concentric and eccentric strength profiles of the knee extensors and flexors in young soccer players.* Isokinetic and Exercise Science 9(1): 31-39.

Kazazović E, et al. (2007) ***U****ticaj trenažnih programa na povečanje max. jačine dinamičkih stabilizatora koljena kod aktivnih sportaša,* New technologies in sports, Sarajevo.

Kazazović E., Tabaković M. (2008). *Influence of the maximum strength of dynamic knee stabilizers on the field of movable balance, utjecaj maksimalne jačine dinamičkih stabilizatora koljena na motorički prostor ravnoteže*. 5 International scientific conference on kinesiology, Faculty of Kinesiology. Zagreb. Croatia. Septeber 10-14.

Kazazović, E., Hadžikadunić A., Kozić V. (2008) *Effects of additional exercise programme performed with Biodex apparatus at the maximal strength of the dynamic stabilization of knee muscles in active handball players*. Youth sport, 4th International Symposium, Ljubljana.

Kazazović, E., Kozić, V., Hadžikadunić, A. (2008), *Differences in dynamic knee stabilizers strength between football and handball players aged 18 to 22,* Međunarodna naučna konferencija, Teorijski, metodološki i metodički aspekti fizičkog vaspitanja, Beograd.

Gleeson, N.P., Mercer, T.H. (1996). *The utility of isokinetic dynamometry in the assessment of human muscle function.* Sports Medicine, 21(1), 18-34.

Madsen, O.R. (1996). *Torque, total work, power, torque acceleration energy andd acceleration time assessed on a dynamometer: reliability of knee and elbow extensor and flexor strength measurements.* European Journal of Applied Physiology, 74, 206- 210.

Schlumberger, A, et al. (2006.). *Muscle imbalances – fact or fiction?* Isokinetics & Exercise Science, 1(14), 3-11.

Zakas, A. (2006.). *Bilateral isokinetic peak torque of quadriceps and hamstring muscles in professional soccer players with dominance on one or both two sides.* The Journal Of Sports Medicine And Physical Fitness, 46 (1), 28-35.

EFEKTI PROGRAMA IZOKINETIČKOG VJEŽBANJA NA JAČINU FLEKSORA KOLJENA

Originalni naučni rad

Sažetak

Svrha ovog istraživanja je da ispita maksimalni moment sile, ukupni rad, kao i prosječnu snagu mišića fleksora dinamičkih stabilizatora koljena. Ispitanici koji su sudjelovali u ovom istraživanju su studenti Fakulteta sporta i tjelesnog odgoja u Sarajevu (40 studenata). Procjena promjena nastalih uslijed dodatnog programa vježbanja baziranog na izokinetičkim vježbama (koncentričnim i ekscentričnim) mišića stabilizatora koljena izvršena je na svih 40 ispitanika, podijeljenih na eksperimentalnu i kontrolnu grupu. Maksimalna jačina dinamičkih stabilizatora koljena testirana je na izokinetičkom instrumentariju (aparata Biodex 3) na ugaonim brzinama veličine 60°/s i 180 °/s. Pored redovne nastave na Fakultetu sporta i tjelesnog odgoja eksperimentalna grupa je provodila dodatni trenažni program na aparatu Biodex 3 u trajanju 3 puta sedmični kroz 12 sedmica. Rezultati istraživanja upućuju na to da dodatni program izokinetičkih vježbi na izokinetičkom instrumentariju efektno poboljšava jačinu mišća fleksora koljena.

Ključne riječi: *mišići koljena, izokinetički trening, efekti*

Correspondent :

Elvir Kazazović, MS.
Faculty of Sport and Physical Education,
Sarajevo university
71 000 Sarajevo, Bosnia and Herzegovina.
Tel. +38761 145590 Fax: +38733 634046
E-mail: kazazovice@yahoo.com

INFLUENCE OF STANDARD INDICATORS OF SITUATIONAL EFFECTIVENESS IN BASKETBALL, IN BOSNIAN LEAGUE 6 AND REGIONAL BASKETBALL LEAGUE

Vlatko Šeparović, Meho Alić-Partić, Edin Užičanin
Faculty of Physical Education and Sport, University of Tuzla, Bosnia and Herzegovina

Original scientific paper

Abstract
Research was conducted to determine relations among 15 standard indicators of situational effectiveness in basketball and the final score of a basketball game. Data was collected from 50 games in Bosnian League 6, final stage of basketball championships in Bosnia and Herzegovina (league which includes 6 teams who stay in contention for the championship trophy), and 20 games in Regional basketball league (Good Year League) where two teams from Bosnia and Herzegovina took part, "KK Bosna" from Sarajevo and "HKK Siroki" from Siroki Brijeg. Results of regression analysis showed that 3 variables have statistically significant influence on the final score of basketball games in Bosnian League, SO and OL on the level of 99%, and IL on the level of 95%. In Regional Basketball League, those variables are S3US, SBUS, SN, IL and OL, on the level of 99%, and S2US on the level of 95%. The difference among obtained results supports the fact of more consistent game in Regional Good Year League.

Key words: basketball, practice, situational indicators, entity, variable, success, regression analysis, prediction.

INTRODUCTION

Today, work in modern, top-quality basketball, as well as the modern technology of practice is aimed at accomplishing primary goal which can be explained by two fundamental tasks: making, producing top-quality players and making a top-quality achievement (Separovic,V. 2007). Realization of these two tasks is considerably related, since without top-quality players there is no top-quality achievement. Process of making a top-quality achievement is determined by making of a top-quality team which is defined by individual qualities of players.

More rational practice produces better results, because it includes all new rule implementations which should be the basis for optimal practice (Hajnal, L. 1990). Modern basketball is a game of detail and finesse. Practices, which players as individuals and teams as units go through, should be professionally and scientifically set up, from the early stage all the way to the top-quality performance.

Aim of this research is to determine the influence of 15 standard indicators of situational effectiveness in basketball on the final score of a basketball game in two levels of competition, Bosnian League 6 and Regional Basketball League.

RESEARCH METHODS

In this research, indicators of situational effectiveness which influence the success of basketball teams were analyzed. FIBA has standardized 13 indicators of situational effectiveness, which were expanded in this paper with two variables: 2pt field goal, layup – successful (Š2POUS), 2pt field goal, slam dunk – successful (Š2ZAUS). System of standard indicators of situational effectiveness in basketball was expanded because of assumptions for obtaining information of higher quality for more complete explanation of individual and team game, in segment of a successful 2pt field goal.

Entity sample

Sample comprises 50 basketball games (100 entities) played in two levels of competition, Bosnian League 6 played for Bosnian championship (30 games, 60 entities) and Regional Good Year League (20 games, 40 entities).

Variable sample

Situational or action effectiveness (Trninic, S. 1996) is developed by registering plays during a basketball game and in this way one gets indicators the game effectiveness, as well as parameters related to tactical responsibilities, involvement, discipline of players and teams, and other parameters interesting for the analysis of basketball.

Standard indicators of situational effectiveness (FIBA) are: 2 pt field goal, layup – successful (Š2POUS), 2 pt field goal, slam dunk – successful (Š2ZAUS), 2pt field goal from mid-range – successful (Š2PUS), 2pt filed goal from distance – unsuccessful (Š2NE), 3pt field goal – successful (Š3US), 3pt field goal – unsuccessful (Š3NE), free throws – successful (SBUS), free throws – unsuccessful (SBNE), offensive rebound (SN), defensive rebound (SO), assists (A), personal fouls (OG), turnovers (IL), steals (OL), blocks (B).

DATA PROCESSING METHODS

In this paper, we made regression analysis of the success of basketball teams in 2 leagues (Bosnian League 6 and Regional League) in the system of standard indicators of situational effectiveness. We also made estimation of regression coefficients B, their standard error, standardized coefficients t value for coefficients B, as well as the significance for t calculated in this way. Our calculations produced result of 95% reliance level for all regression coefficients. Linear regression analysis also includes variance analysis and it usually uses matrices of correlation and covariance.

Since we talk about linear regression (Dizdar, D. 2006), statistics of the quality of modeling by linear regression is shown: multiple correlation R, coefficient and corrected coefficient of determination R^2, standard estimation error and variance analysis table. Then we have F value and its significance. We also made diagnostics of collinearity, typical values of cross-product matrix, determination indicators, as well as variance decomposition proportions. For residuals we performed Durbin-Watson test for serial correlation of residuals and particular cases from game samples.

As the main criterion related dependent variable we chose variable POB that shows the final score of a game (0-defeat, 1-win). In correlational analysis, it was concluded that many variables are related on statistically significant level, and that correlations are not that high to have a dominant role in deciding the final score of games. Therefore it is reasonable to expect that chosen units of variables can perform better criterion variable prediction. Regression analysis was chosen as one of the ways, although nonlinear analysis could possibly be used through some of ligistic models which probably would produce similar results.

RESULTS AND DISCUSSION

Regression analysis of the success of basketball teams in Bosnian League 6

Analysis of results, which was together with situational variables, conducted on Bosnian League 6 games.

Table 1: Linear regression data using situational variables on Bosnian League games

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
0.800	0.639	0.516	0.351	0.639	5.198	15	44	9.1E-06	1.419

Table 2: Variance analysis in linear regression using situational variables on Bosnian League games

	Sum of Squares	df	Mean Square	F	Sig.
Regression	9.589	15	0.639	5.198	9E-06
Residual	5.411	44	0.123		
Total	15	59			

Table 3: B and β coefficients, standard errors and t-test results

Var	BETA	St. Err. of BETA	B	St. Err. of B	t(44)	p-level
Intercept			-0.5151	0.7417	-0.694	0.49105
S2US	0.1208	0.1569	0.0123	0.0160	0.770	0.44553
S2NE	-0.2494	0.1321	-0.0275	0.0146	-1.888	0.06561
S2PO	-0.0559	0.1336	-0.0080	0.0191	-0.418	0.67768
S2ZA	0.2353	0.1185	0.0706	0.0355	1.986	0.05325
S3US	0.2515	0.1410	0.0439	0.0246	1.784	0.08139
S3NE	-0.1923	0.1203	-0.0265	0.0166	-1.599	0.11695
SBUS	0.0529	0.1356	0.0046	0.0118	0.390	0.69846
SBNE	-0.0074	0.1109	-0.0011	0.0160	-0.067	0.94681
SN	0.2227	0.1170	0.0355	0.0187	1.904	0.06353
SO	0.2910	0.0991	0.0358	0.0122	2.935	***0.00528***
A	0.0753	0.1372	0.0083	0.0151	0.549	0.58578
OG	0.0316	0.1036	0.0036	0.0119	0.305	0.76165
IL	-0.2606	0.1078	-0.0307	0.0127	-2.417	**0.01986**
OL	0.3125	0.1135	0.0396	0.0144	2.753	***0.00854***
B	0.0569	0.1045	0.0204	0.0375	0.544	0.58901

Tables of significance show that multiple correlation coefficient is very high, which points to a possible high-grade final score prediction. However, 3 variables all together have statistically significant coefficient value (SO and OL on the level of 99% and IL on the level of 95%). It should be mentioned here that it is possible that no coefficients in regression analysis have to have statistically important coefficient value, but that overall result of regression has a high value. One can see here from the correlation results that regression is statistically significant, and that coefficients of variables S2NE, S2ZA, S3US and SN are also very significant, very close to the level of statistical significance. Significance of regression itself is derived from all these variables.

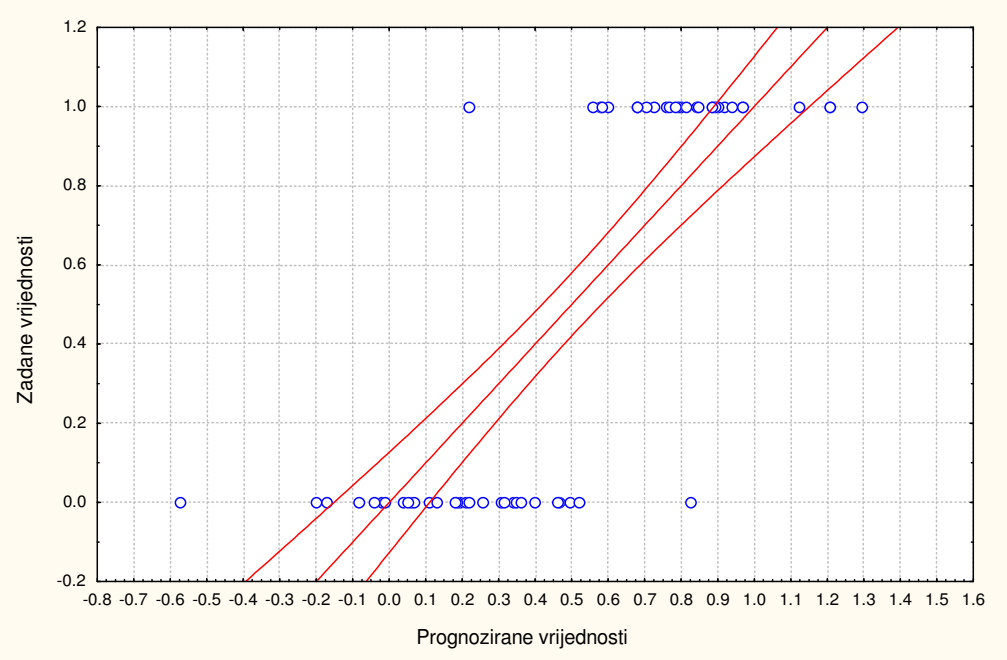
If estimation of the final scores of given basketball games for Bosnian League 6 is performed again, and after that evaluation of the final scores using obtained regression coefficients, than the diagram of given and calculated values will be just like the one on the following picture where there is also an interval of 95% reliance. We can see on the picture of the final score of games that two defeats are predicted by wins, and that only one win is predicted by a defeat (marginal value is 0.5). It can be concluded that it happened in three different games, so they could easily be detected in case of a real prediction.

Regression analysis of the success of basketball teams **in Bosnian League 6**

The following three tables offer regression analysis results performed by situational variables (FIBA) on the games of Regional Basketball League (Good Year League).

Table 4: Linear regression data using situational variables on the GY league games

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
0.924	0.853	0.762	0.247	0.853	9.303	15	24	1.2E-06	1.603



Picture 1: Prediction of the final score of a game as compared to given final scores

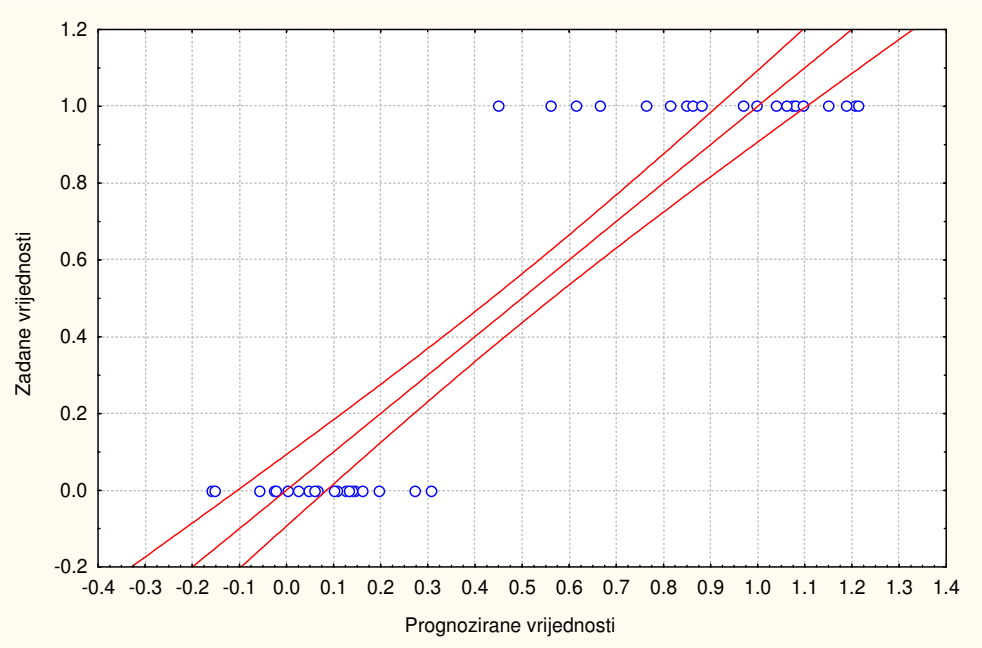
Table 5: Variance analysis in linear regression using situational variables on the GY league games

	Sum of Squares	df	Mean Square	F	Sig.
Regression	8.532	15	0.569	9.303	1E-06
Residual	1.468	24	0.061		
Total	10	39			

Table 6: B and β coefficients, standard errors and t-test results

Var	BETA	St. Err. of BETA	B	St. Err. of B	t(24)	p-level
Intercept			-1.8434	0.8559	-2.154	**0.04153**
S2US	0.3696	0.1429	0.0494	0.0191	2.586	**0.01620**
S2NE	-0.1358	0.1223	-0.0176	0.0158	-1.110	0.27796
S2PO	0.2283	0.1160	0.0447	0.0227	1.967	0.06081
S2ZA	0.0800	0.1107	0.0260	0.0359	0.723	0.47662
S3US	0.4934	0.1322	0.0843	0.0226	3.733	***0.00103***
S3NE	-0.2476	0.1248	-0.0279	0.0141	-1.984	0.05877
SBUS	0.3758	0.1109	0.0306	0.0090	3.390	***0.00242***
SBNE	0.1770	0.1315	0.0220	0.0163	1.346	0.19088
SN	0.5238	0.1172	0.0898	0.0201	4.471	***0.00016***
SO	0.2825	0.1399	0.0349	0.0173	2.019	0.05483
A	-0.0179	0.1367	-0.0026	0.0198	-0.131	0.89677
OG	-0.1733	0.1086	-0.0233	0.0146	-1.596	0.12357
IL	-0.3965	0.1107	-0.0595	0.0166	-3.582	***0.00151***
OL	0.3848	0.1009	0.0605	0.0159	3.814	***0.00084***
B	0.0494	0.1014	0.0211	0.0432	0.488	0.63025

From the significance table, one can also see that multiple correlation coefficient is very high here too, 0.924, which points to a possible final score prediction of a very good quality. Six variables have statistically significant coefficient value (S3US, SBUS, SN, IL and OL on the level of 99%, and S2US on the level of 95%). Free regression coefficient is also significant, on the level of 95%. Significance of regression itself is obtained from all these variables. The difference among obtained results supports the fact of more consistent game in Regional Basketball League (Good Year League). In Bosnian League 6, games were won and lost with very similar data on many variables. This could be the reason for higher number of significant regression analysis coefficients. If we also make here estimation of the final score of given basketball games for Regional Basketball GY League, and then make evaluation of the final scores using obtained regression coefficients, than the diagram of given and calculated values will be like the one on the following picture, where there is again an interval of 95% reliance.



Picture 2: Prediction of the final score of a game as compared to given final scores

The picture of the final score prediction in relation to obtained coefficients shows that the mistake was made only in 1 out of 40 final scores (20 defeats and 20 wins). Only one win was marked as a defeat, although this value also was very close to a marginal value 0.5. Data insight shows that here we talk about the game from Regional Basketball GY League between Siroki and Bosna (79:68).

CONCLUSION

Aim of this research was to determine relation among indicators of standard effectiveness (FIBA, 15 variables) on the final score of basketball games, that is defined by binary variable win – defeat. Regression analysis is applied on 30 games of Bosnian League 6, final round of competition for the championship of Bosnia and Herzegovina, and 20 games of Regional Good Year Basketball League.

Results in the significance table, obtained from Bosnian League 6 games show that multiple correlation coefficient is very high (0,800) which points to a possible final score prediction of a good quality. However, 3 variables all together have statistically significant coefficient value (SO and OL on the level of 99% and IL on the level of 95%). One can see from the correlation results that regression is statistically significant, and that coefficients of variables S2NE, S2ZA, S3US and SN are significant and very close to the level of statistical significance. Significance of

regression itself is derived from all these variables.

Defensive rebound and steals are characteristic segments of basketball on the defensive end of the floor, and as a consequence of quality-defense one also recognizes situational indicator turnovers. We can conclude that defensive rebound is a consequence of an opponent's shot attempt after a good pressure on the ball which causes low shooting percentage which again offers possibility that defensive rebound has a very strong influence on the final success.

By quality-defense on a ball handler we ensure precondition for a good defense on the off-ball opponents (opposing team's players on the first, second and third pass), because help for a defensive player who guards a ball handler is not necessary and in this way ball movement is blocked, and number of opposing team's turnovers is increased. In Bosnian League 6, it is possible to dominate and be effective by quality-defensive pressure and organized defensive rebounding, which brings success – win in a basketball game.

From the significance table which explains data collected from Regional GY Basketball League games it can also be seen that multiple correlation coefficient is also very high here, 0,924. Six variables have statistically significant coefficient value (S3US, SBUS, SN, IL and OL on the level of 99%, and S2US on the level of 95%). Free regression coefficient is also significant, on the level of 95%. Significance of regression itself is obtained from all these variables.

It is noticeable that variables that explain the quality of successful offensive effectiveness, successful 3 point, 2 point, and free throw shooting, as well as offensive rebound, according to obtained results have the strongest and the best influence on the effectiveness in a basketball game (win or defeat) in Regional Basketball League. On this quality-level of basketball competition defensive effectiveness is constant, and the strongest influence on success have variables that determine shooting accuracy from mid-range, from distance, and free throw shooting accuracy, which are on this quality-level a consequence of intention to give maximum effort on the defensive end of the floor.

From the aspect of tactical influence we conclude that in Bosnian League 6, success is achieved by quality-defense, rebound and steals after which successful and effective fast breaks are developed, while in regional competition success is determined by shooting accuracy and offensive rebound aggressiveness, and it is implied that the level of defensive aggressiveness is high.

The difference between obtained results supports the fact of more consistent game in Regional Basketball League (Good Year League).

LITERATURE

Dizdar, D. (2006) Kvantitativne metode. Kineziološki fakultet Sveučilišta u Zagrebu. (Dizdar, D. (2006) Quantitative methods. College of Human Kinetics, Zagreb University.)

Hajnal, L. (1990) Košarka savremeni model igre. Edicija OKO, Novi Sad. *(*Hajnal, L. (1990) Basketball – modern game model. OKO edition, Novi Sad.)

Šeparović, V. (2007). Uspješnost košarkaških ekipa u prostoru situacionih pokazatelja primarnog tranzicijskog i pozicionog napada. Doktorska disertacija, Tuzla: Fakultet za tjelesni odgoj i sport Univerziteta u Tuzli. (Separovic, V. (2007). Success of basketball teams in area of situational indicators of a primary transition and set play. Doctoral dissertation, Tuzla: College of Physical Education and Sport, Tuzla University.)

Šeparović, V., Nuhanović, A. (2008). Nestandardni pokazatelji efikasnosti napada u košarci i uspješnost košarkaških ekipa. Sport Science, 1 (2), 7-11 (Separovic, V., Nuhanovic, A. (2008).

Nonstandard indicators of offense effectiveness in basketball and the success of basketball teams. Sport Science,1 (2), 7-11)

Trninić, S. (1996). Analiza i učenje košarkaške igre. VIKITA d.o.o, Pula 1996, Sveučilišni udžbenik. (Trninic,S. (1996). Analysis and study of the game of basketball. VIKITA d.o.o, Pula 1996, University textbook.)

Trninić, S., Milanović, D., Dizdar, D. (1997). Diskriminacijska analiza pobjedničkih i poraženih ekipa u prostoru standardnih pokazatelja situacijake efikasnosti u košarkaškoj igri. Leistung Sports (2997), 2:29-34. (Trninic, S., Milanovic,D., Dizdar, D. (1997). Discrimination of winning and losing team analyses in area of standard indicators of situational effectiveness in the game of basketball. Leistung Sports (2997), 2:29-34.)

UTICAJ STANDARNIH POKAZATELJA SITUACIJSKE EFIKASNOSTI U KOŠARKAŠKOJ IGRI U BH LIGI 6 I REGIONALNOJ KOŠARKAŠKOJ LIGI

Originalni naučni rad

Sažetak

Istraživanje je provedeno radi utvrđivanja relacija između 15 standardnih pokazatelja situacijske efikasnosti u košarci i konačnog rezultata u košarkaškoj utakmici. Podaci su prikupljeni na 50 utakmica u BH Lige 6 završnice prvenstva Bosne i Hercegovine (Liga za prvaka) i 20 utakmica Regionalne košarkaške Good Year lige u kojoj su se takmičila i dva kluba iz Bosne i Hercegovine, KK Bosna iz Sarajeva i HKK Široki iz Širokog Brijega. Rezultati regresijske analize pokazali su da statistički značajan uticaj na konačan rezultat utakmice u BH Ligi 6 imaju tri varijable, SO i OL na nivou od 99% i IL na nivou od 95%. U Regionalnoj ligi su to varijable S3US, SBUS, SN, IL i OL na nivou od 99%, a S2US na nivou od 95%. Razlika između dobijenih rezultata govori u prilog činjenici konzistentnije igre u Regionalnoj Good Year ligi.

Ključne riječi: *košarka, trening, situacijski pokazatelji, entitet, varijabla, uspješnost, regresijska analiza, predikcija*

Correspondence to:

Vlatko Šeparović Ph.D
Tuzla University,
Faculty of Physical Education and Sport
2. Oktobra 1,
75 000 Tuzla, Bosnia and Herzegovina
Phone: +387 35 278 535
E-mail: vlatko.separovic@untz.ba

SITUATIONAL EFFICIENCY ANALYSIS OF THE TEAMS THAT PARTICIPATED IN 2008 EUROPEAN FOOTBALL CHAMPIONSHIP

Alen Kapidžić[1], Ervin Bećirović[2], Jasmin Imamović[3]
[1]Faculty for Physical Education and Sport Tuzla University
[2] Sport club "Sportea", Tuzla
[3]JU X OŠ Bijela, Brčko-district

Original scientific paper

Abstract
We analyzed all European championship 2006 soccer games with basic aim to emphasize significant factors that have influence on success of soccer game. For examination we prepare following variables: ŠNGU16M – shots on goal in Penalty Area, ŠNGV16M – shots on goal outside Penalty Area, ŠPGU16M – shots wide in Penalty Area, ŠPGV16M – shots wide outside Penalty Area, BŠU16M – shots blocked in Penalty Area, BŠV16M – shots blocked outside Penalty Area, UPRPAS – Total passes completion, DUGPAS – Long passes, PRDUGPAS – Long passes completion, SREPAS – Medium passes, PRSREPAS – Medium passes completion, KRAPAS – Short passes, PRKRAPAS – Short passes completion. Criterion variable will be define by the number of shots that accomplish every team during the game. For determination variable, which have significant influence on success in soccer game, will be apply regression analysis.

Key words: *regression analysis, variables, entity, criterion variable*

INTRODUCTION

In present literature and research which are narrowly connected to this subject, you can see that not many researchers approached this problem. It's safe to say that researches of this type have task to advance football game from aspect of technical-tactical actions which are applied during one game. Although researches based on technical-tactical expressions are not standardized they still deliver important information for football game especially because this info has been obtained in situational conditions. These researches can be very useful for practice, because information obtained by this research can serve for football improvement in our country. Thereby we are trying to quantify football game, but we still can not talk about one real picture which for longer time of period will show implementation of technical-tactical action just because football game is growing and advancing very fast. Some obtained info in this research can serve in training process meaning choosing more adequate training means which would attribute to the improvement of the training efficiency itself and exponentially would develop better i.e. more efficient model of football game. Even though we said that this topic is not enough researched we'll mention some of authors who addressed this issue: Kapidžić, A., Mujanović, E. (2007)[2], Radoman, M. (2007)[3], Smajić, M., Molnar, S., Radoman, M. (2008)[4].

METHODS

Entity sample

For the purpose of this research we analyzed national team games in European football championship which was held in Austria and Switzerland in 2008. Entities represent teams on every of 31 played games on this football championship. Therefore inside this research we have 62 entities because every team on every game represents separate entity. Info about teams situational efficiency we got from www.euro2008.com official page, on which official statistics from this European championship were shown. Result is outcome of every game after 90 minutes of regular course of game or if there were overtimes or penalty kicks in the game itself. Following game outcomes were considered: victory, defeat and draw. We have to emphasize that elements of observation within this research are not games but the elements of the teams games which reached certain outcome i.e. victory, defeat and draw.

Variable sample

Variable in this research are features of game elements which were implemented by the teams during the game. These statistics indicators FIFA promotes for all competitions which are performed under FIFA tutorship. From all features that are analyzed and which are on official FIFA page, we analyzed following variables i.e. features: ŠNGU16M – shots on goal in Penalty Area, ŠNGV16M – shots on goal outside Penalty Area, ŠPGU16M – shots wide in Penalty Area, ŠPGV16M – shots wide outside Penalty Area, BŠU16M – shots blocked in Penalty Area, BŠV16M – shots blocked outside Penalty Area, UPRPAS – Total passes completion %, DUGPAS – Long passes, PRDUGPAS – Long passes completion %, SREPAS – Medium passes, PRSREPAS – Medium passes completion %, KRAPAS – Short passes, PRKRAPAS – Short passes completion %. These variables represented predictor system of variables.
Criteria variable is defined by number of goals scored by each team: UKUPGO – Total goals scored.

RESULTS AND DISCUSSION

Based on results we got in Tables 1 and 2, you can see that multiple correlation i.e. correlation of predicting system with criteria is R .60, with total explained variability R Square .36%, which is on .50 significant level. These results tell us that whole system of predicting variables is significant in prediction of the criteria variable.

Table 1

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.600[a]	.360	.187	1.324

a. *Predictors: (Constant), BŠV16M, ŠNGU16M, PRDUGPAS, ŠPGV16M, BŠU16M, KRAPAS, ŠNGV16M, ŠPGU16M, SREPAS, UPRPAS, DUGPAS, PRKRAPAS, PRSREPAS*

Table 2

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	47.355	13	3.643	2.078	.034[a]
	Residual	84.145	48	1.753		
	Total	131.500	61			

a. *Predictors: (Constant), BŠV16M, ŠNGU16M, PRDUGPAS, ŠPGV16M, BŠU16M, KRAPAS, ŠNGV16M, ŠPGU16M, SREPAS, UPRPAS, DUGPAS, PRKRAPAS, PRSREPAS*

b. *Dependent Variable: UKUPGO*

By analyzing individual influence (Table 3), we can see that only one variable has statistically significant influence on criteria and that is variable ŠNGU16M – shots on goal in Penalty Area. Beta coefficient is .44 for above mentioned variable, which is on .01 significant level. Also importance of this variable influence on criteria confirms T-test value which is 3.126.

Table 3

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.064	1.614		2.518	.015
	UPRPAS	-.005	.004	-.334	-1.392	.170
	DUGPAS	.011	.023	.126	.481	.633
	PRDUGPAS	-.004	.026	-.043	-.169	.866
	SREPAS	-.031	.024	-1.377	-1.272	.209
	PRSREPAS	.031	.026	1.358	1.177	.245
	KRAPAS	-.009	.032	-.118	-.273	.786
	PRKRAPAS	.005	.039	.052	.117	.908
	ŠNGU16M	.299	.096	.443	3.126	.003
	ŠNGV16M	.100	.084	.175	1.186	.241
	ŠPGU16M	.013	.118	.016	.106	.916
	ŠPGV16M	.001	.075	.002	.017	.986
	BŠU16M	-.063	.207	-.039	-.307	.761
	BŠV16M	.292	.170	.247	1.717	.092

a. *Dependent Variable: UKUPGO*

Because only variable ŠNGU16M – shots on goal in Penalty Area, indicated statistically significant individual influence, and the rest of variables don't have statistically important individual influence, we have to find reasons why we've gotten these indicators. Info attained this way mean nothing without some deeper analysis, so to explain these reactions of predicting system with criteria we will do it. First of all to shoot on goal in penalty area, we have to realize all factors which are necessary to get to penalty area of opponent team, and then to shoot on goal. Shooting in football is also linked to intellect of the player. To shoot well adopted technique is not the only important thing but perceptive capabilities which arise at all technical elements, even so more at shooting. Perceptive capabilities represent mental process in which feelings and experience are closely connected, which means, that every perception contains feelings which is it based on. Accordingly players with more experience notice more details. That means that players remember all previous similar situations that they've found themselves in, and when in certain moment they find themselves in similar situation they compare these previous situations with the current one they're in. Information is requisite for adequate analysis like the following: positioning of the player with regards to goal, positioning of the opponent players in front of the ball if there are any, positioning of the goalkeeper on the goal etc., all this information player compares to previous experience and is choosing the best way of shooting. Thus acquired results can be compared to results acquired in a research of Kapidžić, A., Mujanović, E., Nožinović, F. (2006)[1]. In this research authors reached results which revealed that shot on goal has significant influence on success of the teams in games i.e. materialization of the utmost objective – victory.

However, when we talk about shot on goal in penalty area, we have to say that very good shooting technique is needed for that. In order to shoot inside penalty area, very often we don't have enough time for the preparation of the shot i.e. establishing control, but shooting in most cases is executed from the first stroke. This way of shooting has a surprise effect because defense players don't have enough time to block a shot, and a goalkeeper has a very little time to position himself properly. Based on the results we can say that more successful teams in this championship had better individual and group tactics. By analyzing raw info we see that more successful teams had better number of total passes completion %, which tells us that teams have played through all three stadium areas

(defense, middle and offense). Confirmation of this is research of Smajić, M., Molnar, S., Radoman, M. (2008)[4] where author came to conclusion that difference between more successful teams and less successful teams is in ball activities. This game requires players with highly adopted technique which we won't discuss about here since all players have a high level of technical preparation. What separates players of more successful teams from the players of less successful teams are just individual and group tactics, because players have a good control over ball especially in offensive third, make good passes under pressure and have a good sense for running in the blank space for reception. It's certain that more successful teams on this championship had a technique which was more orientated on concept of the game then the teams that were less successful. This says that more successful teams had players which had better level of creativity. Results achieved in research of Kapidžić,A., Mujanović, E. (2007)[2] are in favour of such discussion, where authors concluded that teams that had more creative players had more success in played games.

CONCLUSION

From this research it's possible to obtain information to guide the process of preparing football players in our country, both, already established athletes as well as those in younger age groups. There are many reasons that may affect the results thus obtained, and it is impossible to number them all, but we have listed only those that we think are the most logical cause of the results thus obtained. For this research to have practical use especially in football in our country and not to stay only the theoretical discussion, we will list following suggestion by which should trainer go in work with football players for the better quality of their performance.

1. Therefore, we suggest that in training process it's taken into account the development of the cognitive abilities of young football players, which obviously leads to achieving better results in the opportunistic-motor skills, where results of this research also implied for. Practice games on both goals on smaller part of stadium can be used for development of perceptive abilities, then practice on smaller field with limited number of contacts with ball etc.
2. More experienced trainers should work with young athletes just because kids in this period of life are the most flexible for certain changes and if some mistakes are made then later it's very hard or almost impossible to correct them.
3. Young football players have to adopt well football technique, but should more and more apply and perfect that technique in situational conditions.
4. The major problem in Bosnia and Herzegovina (BH) football is a great delay in application of scientific achievements for the purpose of gaining excellent results, and therefore we believe that this work may be a small contribution to the promotion of football in our country.
5. Analysis of some matches at the European and world level, and based on the PRO-ZONE program, shows that the players during one game have an average speed of 2 m/s. When at that speed they have to implement any technical element, not even to mention the pressure of opponent players that tells us about level of technical readiness of these players. This can be achieved only if in competition period we pay great attention to training technique but also in situation conditions.

Finally we must say that the top success is only possible if the process of athletes preparation and sport itself is based on scientifically based tendencies, and that's probably the only and right way to direct our league competition according to contemporary acquisitions of football game.

LITERATURE

Kapidžić, A., Mujanović, E., Nožinović, F. (2006). Analiza igre u nogometu na svjetskom prvenstvu 2006 godine. Nacionalni naučni skup sa međunarodnim učešćem FIS KOMUNIKACIJE, str. 37-41. Niš. [2006 football world championship game analysis. National scientific meeting with international participation FIS COMMUNICATIONS, pg. 37-41. Niš.]

Kapidžić, A., Mujanović, E. (2007). Razlike učinka između pobjedničkih i poraženih ekipa na svjetskom nogometnom prvenstvu 2006. Časopis za sport, fizičko vaspitanje i zdravlje SPORT MONT, broj 12, 13, 14 / V, str. 297-303. Podgorica. [Performance differences between winning and defeated teams on 2006 football world championship. Magazine for sport, physical education and health SPORT MONT, no. 12, 13, 14 / V, pg. 297-303. Podgorica.]

Radoman, M. (2007). Evaluacija zvaničnih statističkih podataka FIFA World Cup-a u Nemačkoj 2006. godine. Magistarski rad, Fakultet za sport i turizam, Novi Sad. [Evaluation of official statics FIFA World Cup in Germany 2006. year. Master thesis, College for sport and tourism, Novi Sad.]

Smajić, M., Molnar, S., Radoman, M. (2008). The differences between winning and defeated football team while performing various activities with a ball. SPORT SCIENTIFIC & PRACTICAL ASPECTS. Vol. 5, str 7-12.

Smajić, M., Molnar, S. (2006). Razlike između pobjedničkih i poraženih ekipa u elementu primanja lopte. In Analitika i dijagnostika fizičke aktivnosti, str. 126-134. Fakultet za tjelesni odgoj i sport, Beograd. [The differences between winning and defeated teams in element of receiving a ball. In analytics and diagnostics of physical activity, pg. 126-134. College for physical education and sport, Beograd.]

ANALIZA SITUACIONE EFIKASNOSTI TIMOVA KOJI SU UČESTVOVALI NA EVROPSKOM FUDBALSKOM PRVENSTVU 2008.

Originalni naučni rad

Sažetak

Sa ciljem određivanja značajnih faktora koji ujteču na uspjeh igre u nogometu analizirali smo sve utakmice sa evropskog nogometnog prvenstva 2006 godine. Za istraživanje primjenili smo slijedeće varijable: ŠNGU16M – šut u okvir vrata unutar 16 metara, ŠNGV16M – šut u okvir vrata izvan 16 metara, ŠPGU16M – šut van okvira vrata unutar 16 metara, ŠPGV16M – šut van okvira vrata izvan 16 metara, BŠU16M – blokiran šut unutar 16 metara, BŠV16M – blokiran šut izvan 16 metara, UPRPAS – ukupno preciznih pasova, DUGPAS – dugi pasovi, PRDUGPAS – precizni dugi pasovi, SREPAS – pasovi na srednja rastojanja, PRSREPAS – precizni pasovi na srednja rastojanja, KRAPAS – pasovi na malim rastojanjima, PRKRAPAS – precizni pasovi na malim rastojanjima. Kriterijska varijabla bit će definisana na osnovu broja pogodaka koje je postigla svaka ekipa u utakmici. Za određivanje varijabli koje imaju značajan utjecaj na uspjeh igre u nogometu bit će primjenjena multipla regresiona analiza.

Ključne riječi: *regresiona analiza, varijable, entitet, kriterijska varijabla*

Correspondent:

Alen Kapidžić, Ph.D.
Tuzla University,
Faculty of Physical Education and Sport
2. Oktobra 1,
75 000 Tuzla, Bosnia and Herzegovina
Phone: +387 35 278 535
E-mail: alen.kapidzic@untz.ba

THE ROLE OF TECHNOLOGICAL AND PROGRAMMING SKILLS IN A LONG TERM PROCESSES REGARDING SPORT FUNDING

Danijela Bonacin[1], Dobromir Bonacin[1] i Hadžib Salkić[2]
[1] Faculty of Education, Travnik, BiH
[2] Elementary school, Travnik, BiH

Original scientific article

Abstract
Regarding management essentiality in today's world, where the quality and professionalism of managers is considered as a decisive factor that will lead organization into a group of a winners or a group of losers, is an evident reason why we selected high quality managers to be the aim of this research. The goal of this research was to determine correlation between active managers performance on the one hand and usage of technological and programming means on the other hand, in order to define the role of this skills in long term processes regarding sport financing. For this work purposes, we analyzed a sample of 72 high level sport managers from Bosnia and Herzegovina, described with 15 variables from technological, educational, IT, economic, management and sport's law sectors. Data were gathered through anonymous survey questionnaire based on Likert's scale. After normalization and basic statistics we conducted canonical correlation analysis in order to determine existence of specific mechanisms within analyzed sample. The results of analysis indicated there are two bipolar factors within mentioned sample. The general definition of first canonical factor would be ***the way to plan the work*** *which contains two types of performance; planning based on own experience and on the contrary elemental (uncontrollable) work and avoiding technological means. The general definition of the second canonical factor would be* ***the way to provide income*** *which contains two ways of income providing; with active work and modern tools and passive work with no desire to change.*

Key words: *planning, income, management, technological skills, IT skills*

INTRODUCTION

The first revolution that elevated humanity on this planet was tool (or weapon) revolution which enabled easier approach to food. During second revolution a man developed his own food resources which enabled planning of future. During third revolution a man organized social community structure which meant security, enough resources and enough time to rest, so sport appears as activity. The fifth revolution presents experience integration into IT systems and artificial intelligence and puts information into superior position regarding all other resources from human environment. According to some authors, sixth revolution is taking place – moral revolution (Bilić & Bonacin, 2007). Therefore, a man maximally used technology development, improving himself more and more, and since, it is not possible to stop comprehension continuity, then this process will continue for a long time. Thus, a man builds in himself everything new, his actions and entire society, its bits and activities that occur in this society. According to some authors, any activity with emphasized competing has sport features (Šoše, 2004), but deeper analyzing of this definition indicates how outspread this domain is and how many people, actions and resources it includes and what is its perspective. Besides entering political and other levels, essential and interesting is the influence of sports toward economical society level. That is what makes it interesting to research about how managers act – controllers and what type of technology and IT means they use in such delicate sector as sports, especially regarding its financing in times when it is hard to finance anything. What actually means to finance?

According to Bahtijarevic – Šiber et al. (2001) financing are all measures and activities of managing entire organization capital: its providing and usage as well as maintaining optimal partial relations between some types of capital which also includes individual financing (internal and external) and other's

people funding; short-term, mid-term and long-term.

Financial recourses imply all fund recourses (including non-distributed profit and amortization) but we actually talk about planning the best combinations of fund resources especially when it comes to planning of optimal long-term resources between available liabilities and equity. In financial investment planning, relevant evidence, measures and explanations that will help realization of accomplished financial results, have to be defined in planning of evidence material and setting and managing adequate financial policies (Njuhović, 2000). To make everything function in harmony and according to some norms we certainly need a legal frame for this domain, so on 16th of February 2008. in Bosnia and Herzegovina was adopted law "On Sport" that contains relevant data for certain domain and also constitutes sport financing (Kenović & Kovačević, 2008).

Subject and purpose

If we consider that managers are people that perform all business activities in the frame of suitable business-organizational type, engaging all necessary recourses, with the aim to ensure the right balance between efficiency and effectiveness in short and long term (Šunje, 2002) so if we consider that management quality and professionalism is decisive factor whether the organization will enter the group of winners or losers, e.g. even 15% of success is due to operative management (Bahtijarević–Šiber et al., 2001). It is obvious why high quality managers are the aim of this research. The goal of this research was to determine correlation between active managers performance on the one hand and usage of technological and programming means on the other hand, in order to define the role of these skills in long term processes regarding sport financing.

METHODS

For this work purposes, we analyzed a sample of 72 high level sport managers from Bosnia and Herzegovina, described with 15 variables from technological (technological information), educational, (school degree, life long learning) IT (computer at work, programming skills, internet at work) and economic sector (Ministry funding, funding through sponsors, funding through donations, self support funding, other funding) as well as management (sport strategy as a solution, possessing development strategy, possessing business plan) and sports law sectors (the law on sport as a solution). Data was gathered through anonymous survey questionnaire based on Likert's scale (author MSc. D. Mujkić). After normalization and basic statistics we conducted canonical correlation analysis in order to determine existence of specific mechanisms within analyzed sample.

RESULTS AND DISCUSSION

Results of analysis indicate (table 1) that there are two bipolar factors within control sample. In the first bipolar factor, in the sphere of activity, some actions are isolated that support their own strategy and business plan, and it the sphere of knowledge and technology the ones which support school degree and IT knowledge. At the same time within the same factor in the sphere of activity some actions were isolated according which sport strategy and The sports law are not the solution, and shouldn't be funded by sponsors or donations , while the actions in sphere of knowledge and technology do not support computer and internet at work, life long learning or technological information. The general definition of first canonical factor would be **the way to plan the work** which contains two types of performance; planning based on own experience and on the contrary elemental (uncontrollable) work and avoiding technological means. Within second bipolar factor, in activity sphere actions were isolated that support self support with donations and business plan, while in the sphere of knowledge and technology were isolated actions that support school degree, computer at work and technological information. At the same time within the same factor in the sphere of activity some actions were isolated according which sport strategy and The sports law are not the solution. In the sphere of knowledge and technology we isolated the ones that don't support life long learning or IT skills. The general definition of this canonical factor would be **the way to provide income**

which contains two ways of income providing; with active work and modern tools and passive work with no desire to change.

Table1. Results of canonical correlation analysis

	KAN-1	KAN-2
Sports law as a solution	-0.21	**-0.25**
Sports strategy as a solution	**-0.55**	-0.26
Ministry funding	**-0.11**	**-0.33**
Funding through sponsors	**-0.31**	**0.01**
Funding through donations	-0.40	**0.46**
Self support funding	**-0.03**	**0.57**
Other funding	**-0.12**	**0.07**
Possessing development strategy	**0.43**	**0.13**
Possessing business plan	**0.37**	0.24
School degree	0.47	**0.70**
Life long learning	**-0.46**	-0.22
Technological information	-0.19	**0.36**
Computer at work	**-0.62**	0.59
IT knowledge	**0.26**	**-0.14**
Internet at work	**-0.46**	**-0.02**
Canonical determination	**0.67**	**0.58**
Canonical correlation	**0.45**	**0.34**
Hi-2 test	**93.86**	**56.66**
DF	**54.00**	**40.00**
Wilks lambda	**0.22**	**0.40**
Probability	**0.001**	**0.046**

KAN-1,2 = canonical factors

The results of some other research on this sample (Bonacin Da. et al., 2007) revealed two approaches to funding, what placed managers into sable; the ones who exploit already established communication network in financial flows, and unstable; who have tendency of finding new and modern sport organization funding resources. Other researches identified structure and individual roles of managers within sport organization, (Rađo, Bonacin et al., 2008), and also proved with replacing individual on the top (top level manager), relations in organization are also changed which can result with change in structure and the way of acting (Bonacin Da. i Bonacin, 2008). It is obvious that the sample is representative; data of different researches on this one sample support each other and all together points out the importance and role of mangers as well as complexity of the sector he performs in. A man is a multi complex same as what he is included in and as something he can not be divided from. Therefore, the illusion of neglecting certain information from any sector can be performed only under assumption of clearly defined goals with an integrated set of comprehensions, which for specific conclusion realization doesn't have to be elaborated, which leads into hierarchic conclusion with stated priorities. (Bonacin et al., 2008).

The results of this research verified the importance of this two segments – mechanisms that exist in the sample and are following; the way to plan the work and the way to provide income. Planning is thinking ahead, preparing periodization and resources, predicting possible solutions and results as well as a possible point with critical advents and consequences (Bilić & Bonacin 2007). That is deliberate directing of activity, where every peace of social and economic system and its subsystems, all directions of its actions and every human activity part possess clear mark of a will and priors to all other managers (Ferizović, 2005). Income presents growth of economic profit that originates as an asset increase or liability decreasing, and the result is asset growth and can be business income, financing income and outside income (Bahtijarević–Šiber et al., 2001). At first sight, correlation between these two terms can be recognized, since it is necessary to plan so we provide income, which is one of the goals, maybe even the only goal of any today's organization.

CONCLUSION

First of all, it should be noted that (even though it seems different sometimes), the

entity where managers act and everything that comes out of it, is a complex matter that needs to be reviewed from different aspects and because it is totality , all its segments we should take into consideration. The results of such selected sample analysis showed existence of two complex mechanisms (consist of smaller submechanisms of managers acting). The first mechanism would be **the way to plan the work** which contains two types of performance; planning based on own experience and on the contrary elemental (uncontrollable) work and avoiding technological means and the second would be **the way to provide income** which contains two ways of income providing; with active work and modern tools and passive work with no desire to change. On the one hand we have planning with vision and conservative acting and on the other hand creative and destructive, all together active in given legal and other frameworks. Comparing obtained with results of previous researches, connecting and explaining uncovered information we have a chance to see and understand more clearly and more complex picture of the domain where sport managers are acting, and according to that we can apply it to our goals. At the same time we must not forget that the managers are only people, that continuously learn and discover (or they should), and all these knowledge about technology, IT or other, have a large impact on them and certainly change the way they think and act.

LITERATURE

Bahtijarević – Šiber F., & Sikavica, P. (2001) *Leksikon menadžmenta.* [*Lexicon of Management*]. /In Croatian/, Zagreb: Masmedia.

Bonacin, Da., & Bonacin, D. (2008). Sistemska procjena posljedica mogućih promjena u vrhu upravljačkog segmenta sustava. [Systematic assessment of possible changes in the top of managing system segment]. /In Croatian/, U Đ. Nićin (Ur.) *IV Međunarodna konferencija „Menadžment u sportu"*. Beograd, 2008. (pp.141-149).

Bonacin, D., Bilić, Ž, & Bonacin, Da. (2008). *Uvod u antropološku analizu*. [*Introduction to anthropological analysis*]. /In Croatian/, Travnik: Kineziološki fakultet.

Bonacin, Da., Mujkić, D., & Rađo, I. (2007). Relacije značajki sportskih menadžera viših razina i izvora financiranja sportskih organizacija. [Characteristic relations of top level sport managers and sport organization funding resources]. *Acta Kinesiologica* 1, 2:7-11.

Bonacin, D., & Bilić, Ž. (2007). *Uvod u kineziološku rekreaciju*. [Introduction to kinesiological recreation]. /In Croatian/, Mostar: Fakultet prirodoslovno – matematičkih i odgojnih znanosti.

Ferizović, M. (2005). *Strateški menadžment*. [*Strategic management*]. /In Bosnian/, Bihać: Grafičar.

Kenović, M., & Kovačević, S. (2008). *Sport i sportsko pravo*. [*Sport and sports law*]. /In Bosnian/, Kiseljak: Pravni fakultet.

Njuhović, Z. (2000). *Financijski menadžment u praksi.* [*Financial management in practice*]. /In Bosnian/, Sarajevo: Ferkomerc.

Verunica, Z. (2007). Virtualni čovjek u kineziologiji i fiziologiji sporta. [Virtual man in kinesiology and sport physiology]. /In Bosnian/, *II internacionalni simpozij Nove tehnologije u sportu*. Sarajevo (pp.269-270).

Rađo, I., Bonacin, D., Bonacin Da., Bilić, Ž., & Manić, G. (2008). Identifying structure of organization and individual roles at the example of sport managers. In D.Milanović & F. Prot (Ur) *5th international scientific conference on kionesiology „Kinesiology research trends and applications"*. Zagreb 2008. (pp. 345-348).

Šoše, H. (2000). *Teorija sporta*. [*Sports theory*]. /In Bosnian/,Sarajevo: Fakultet sporta i tjelesnog odgoja.

Šunje, A. (2002). *Top menadžer, vizionar i strateg*. [*Top manager, visionary and strategic expert*]. /In Bosnian/, Sarajevo: Tirada.

ULOGA TEHNOLOŠKIH I INFORMATIČKIH ZNANJA U DUGOROČNIM PROCESIMA VEZANIM ZA FINANCIRANJE SPORTA

Originalni naučni rad

Sažetak

S obzirom na važnost menadžmenta u današnjem svijetu, gdje se kvaliteta i profesionalnost menadžera smatra odlučujućim faktorom ulaska organizacije u grupu dobitnika ili gubitnika očito je zbog čega su vrhunski menadžeri predmet ovog rada. Cilj rada bio je utvrditi odnos između aktivnih djelovanja menadžera s jedne strane i korištenja tehnoloških te informatičkih sredstava s druge strane a u svrhu definiranja uloge tih znanja u dugoročnim procesima vezanim za financiranje sporta. Za potrebe rada analiziran je uzorak od 72 vrhunska sportska menadžera iz BiH, opisan sa 15 varijabli iz područja tehnoloških, edukacijskih, informatičkih i ekonomskih područja te menadžmenta i sportskog prava. Podaci su prikupljeni anonimnim anketnim upitnikom na bazi Likertove skale. Nakon normalizacije i osnovne statistike napravljena je kanonička korelacijska analiza kako bi utvrdilo postojanje specifičnih mehanizama unutar analiziranog uzorka. Rezultati analize su pokazali kako unutar uzetog uzorka postoje dva bipolarna faktora. Opća definicija prvog kanoničkog faktora bila bi ***način planiranja rada*** *unutar kojeg postoje dvije vrste djelovanja: planiranje temeljeno na vlastitom znanju te nasuprot tome stihijski rad i izbjegavanje tehnoloških sredstava. Opća definicija drugog kanoničkog faktora bila bi* ***način osiguranja prihoda*** *unutar kojeg postoje dva načina osiguravanja prihoda: aktivnim radom s modernim alatima te pasivnim radom bez želje za promjenom.*

Ključne riječi: *planiranje, prihodi, menadžment, tehnološka znanja, informatička znanja*

Correspondence to:

Danijela Bonacin
University of Travnik,
Faculty of Kinesiology,
Kalibunar bb,
72 270 Travnik
Bosnia and Herzegovina
Phone: +387 61 475-922
E-mail: danijela.bonacin@st.t-com.hr

BASKETBALL COACHES AS LEADERS

Enes Huseinagić, Adnan Hodžić
Primary school "Jala", Tuzla, Bosnia and Herzegovina

Original scientific paper

Abstract
Sport organization is a social structure, into which, by similarity, are social groups integrated. As every human group has its leader, that is how leading affects the productivity of the organization itself. As this work is dedicated to leading, its aim is projected into coaches' leading of young players (groups) in Tuzla. Research conducted among basketball coaches of young groups in Tuzla is provided trough 10 key areas, especially important in leading of sport teams. Those are (not in order of importance): vision, selecting priorities, motivation (communication to people), political sensibility, emotional resistance, and charisma, ability to risk, flexibility and resolution. However, (Questionnaire/ Local Government Training Board) has measured sport team "heartbeats" considering key areas, and has checked the coach's success in leading the young groups. Aim of this work is to get the image of leading-the sport groups, to pay attention on areas in which work is done well and in those humble ones.

Key words: *leaders, leading, leaders' skills, and capability*

INTRODUCTION

Considering understanding of all general systems, sport systems too are a collection of inter depending and connected ideas and people, whose acting has one aim for developing wide sector of multiple values. In the first place, those are health, biological, cultural, pedagogical and in the end economic value.

Organization in general, and so id sport organization, is a social structure, in which, by the similarity principle, are social groups integrated. Social groups are collection of smaller or bigger number of individuals among who exist clear system of relationships, roles and forms of behavior, for succeeding social or personal goals, because of what they were built. As every human group has its leader, that is how leading affects the productivity of the organization itself. As this work is dedicated to leading, its aim is projected into coaches' leading of young players (groups) in Tuzla. Research conducted among basketball coaches of young groups in Tuzla is provided trough 10 key areas, especially important in leading of sport teams. Those are (not in order of importance): vision, selecting priorities, motivation (communication to people), political sensibility, emotional resistance, and charisma, ability to risk, flexibility and resolution. However, (questionnaire/ Local Government Training Board) has measured sport team "heartbeats" considering key areas, and has checked the coach's success in leading the young groups.

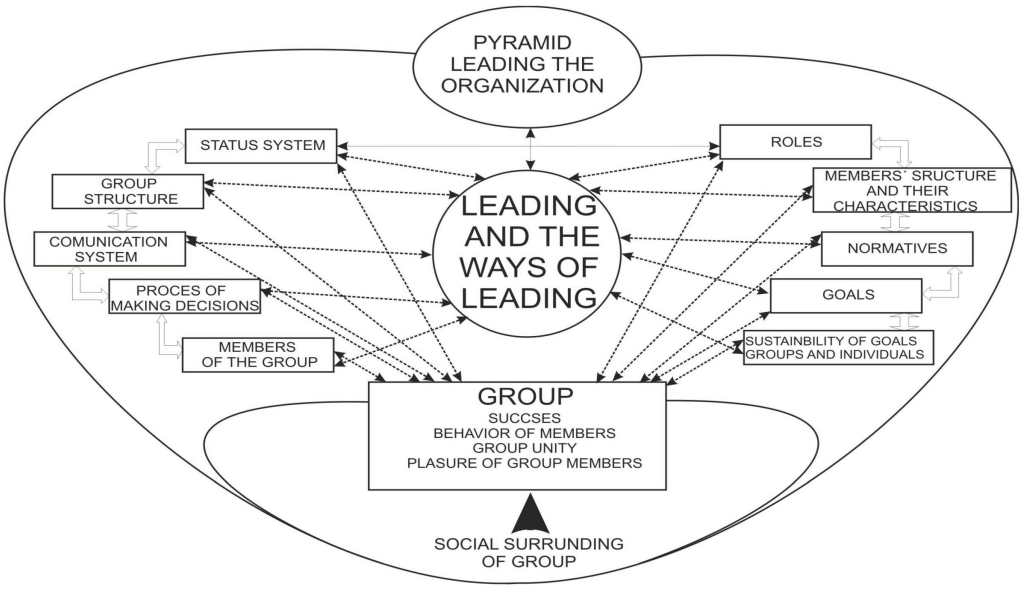
Aim of this work is to get the image of leading-the sport groups, to pay attention on areas in which work is done well and in those humble ones.
Of course, trough this research we won't just give the diagnosis, in the end we will give suggestions for improving.

Leading social groups

Leading is a process of planning, starting, conducting actions in social circumstances, and developing cooperation among social group at the same time

(Dahms, in Thomasy, 1983). This leads to projecting two principles, leading as process in which active subjects, leader/coach puts in the move passive machinery (group, team, people in the group), and leading as activity that takes certain place an which is why it has specific role (Čuturić, 2005). Rot under

ways, methods, things and situations in which to expose his influence on players, by that is not like that. Leader as a person and phenomena is only a part of bigger influence and relationships in the group in around it. Leaders are leaded by those factors. In the picture (Picture 1, Macro



Picture 1. Macro-social determination of leading (Čuturić, 2005).

leader in a structure group considers person who has a position of a ''leader '', conducts role that comes with that role and that is how affects the members' behavior that is important to sustaining the group and making goals come true (Rot, 1980).

It's a clear that we will recognize the leader by the way he affects other members in the group while doing tasks more then anyone else. General opinion is that a leader is independent in choosing

society determination of leading) is seen '' surrounding of the group'', or social system affects all his groups and makes macro-social factors of leading.

In the picture is also seen, that macro-social character of political system will not only determine formative area of leading (roles, forms, goals, etc), but also all processes in any group (status, structure, communication, determining, etc).

Characteristics, abilities and skills of a leader

One of the most early approaches to studying leading was a personal approach, which represented that, seeing some characteristic one can see if a person is going to be a leader and will that person be successful? The line of individual attributes considers this term characteristic, which includes aspects of personality, temperament, needs, motives and values. Aspects of personality by Yukl

(2006:179) are relatively stable for certain forms of behavior. E.g. includes confidence, extraversion, emotional stability and energy level.

Term ability is the possibility of doing something effectively. As characteristics, so studying and heritage together determine abilities. Abilities can be defined on different abstract levels, reduced from general, widely defined abilities (e.g. intelligence, interpersonal abilities) to short and specific (verbal judging, ability of assuring) Katz 81995)

and Mann (1965), in Yukl 2006, put abilities in these categories:

1. Technical – Knowing methods, process, procedures and techniques to conduct some specialized activities, and skills to use the tools and equipment relevant to that activity;
2. Interpersonal – Knowing human behavior and interpersonal processes, abilities to understand feelings, attitudes and motives of other people on what they say and do (empathy, social sensitivity), ability to communicate clear and efficient (fluent speech, persuading) and ability to set up successful and cooperating relations (tactical, diplomatic, listening, knowledge of acceptable social behaviors);
3. Conceptual – general analytic ability, logical opinion, successful learning of terms and conceptualizing complicated different ones, creativity in generalizing ideas and solving problem, ability to analyze events and overlooking trends, anticipating changes and recognizing opportunities and potential problems (inductive and deductive judging).
4.

Some authors (Hunt, 1991) make fourth ability category called administrative abilities, which are defined as abilities to perform specific leading functions (e.g. planning, negotiating, and teaching). They are usually defined like combination of technical, thinking and interpersonal abilities.

Research – leading evaluation

The goal of research is to grade the basketball coaches leading of young groups in Tuzla. From determined results we can make plan for developing leading area, or changes made in that area. Authors of the questionnaire (Local Government Training Board) have determined 10 key areas, which are especially important in leading the organization. Areas treated by questionnaire (Exhibit A) are: vision, priority tasks, motivation, skills among people (good communication to people), political sensitivity, (emotional) resistance, charisma, ability to risk, flexibility and determination. However questionnaire has measured sport team "heartbeats" considering key areas, and has checked the coach's success in leading the young groups.

Aim of this questionnaire is:

- To get a picture of a team from leading view
- To pay attention to areas in which is work done well and those where work is done less good
- To suggest the ways of overcoming the mistakes in leading, or at least partially decrease them.

Research techniques will be conducted trough the questionnaire (Exhibit A). This method (Mužić, 1973) was used to research opinion and attitudes of the smaller population (basketball coaches in Tuzla).

There are 4 basketball clubs in the area of Tuzla, with 22 coaches (younger selections, BC “Iskra”, BC “Magic”, BC “Falcons” and BC “Sloboda Dita”). To conduct this research we selected 15 coaches. We selected them in a way “for the purpose”, and specific purpose are coaches of younger selections in Tuzla. This population is typical because there are only coaches of younger selections, considering that questionnaire is made for all coaches in Tuzla. Research place is BiH, Tuzla Canton, and city of Tuzla.

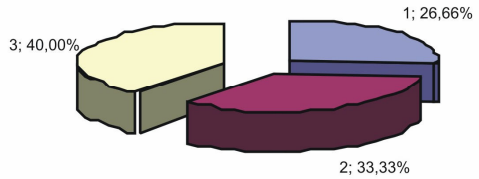
Time of realization is February and March 2009. For making data is used statistical form with techniques of making tables and description, and also graphical tables and conclusions. Limits are that not all coaches took part because if the population were larger, research would be more valid. Questionnaire in our research wasn’t very precise because the organization of every club is different.

In general, research results will make progress in sociable, pedagogical, psychological and method meaning, leading area, explaining the process of phenomena trough the influence on people, and also to building the organization theory asserting the structure

of sport team. Social consideration comes from role importance of the coach in modern sport activities. BiH makes efforts in creating the social, political and economical surrounding for conducting strategically changes in sport.

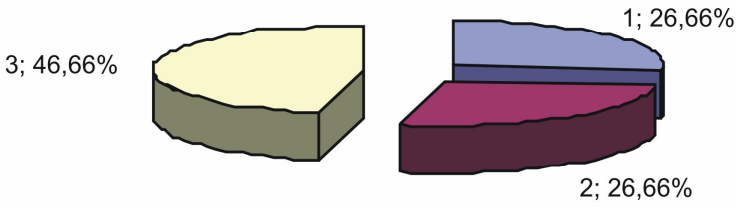
RESULTS AND DISCUSSION

From all given abilities coaches should have chosen those they think are most important, and considering that make a decision. Area of vision hypothetically they saw in these values: 4 of them or 26,66% has a problem of saying where players don't take tasks interesting, challenging and important, so they don't set higher goals but where exists trust in coach and where they see him as intellectual stimulation; 5 of them or 33,33% have acceptable attitudes and opinions while 40% of coaches or 6 of them have acceptable attitudes and set up higher goals for them selves and for players, and so players see coach as a person as inspiration, which later affects the quality of players. See graphic below



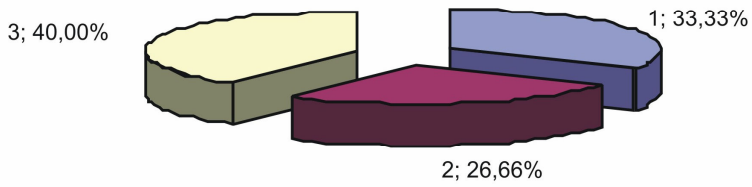
Legend of hypothetical explanation for Characteristic "VISION":
1. Problem!!! 2. Acceptable, still to improve 3. Seems like not a problem

Aspect "priority tasks" itself is well shown because 80% of questioned coaches has non- problematic and acceptable explanation with tendency to improve it. 20% has problem with these attitudes. Aspects themselves for "motivation" are positively articulated because 11 coaches or 73, 33% of them give hypothetical explanation as acceptable and non-problematic.



Legend of hypothetical explanation for characteristic "MOTIVATION"
1. Problem!!! 2. Acceptable, still to improve 3. Seems like not a problem

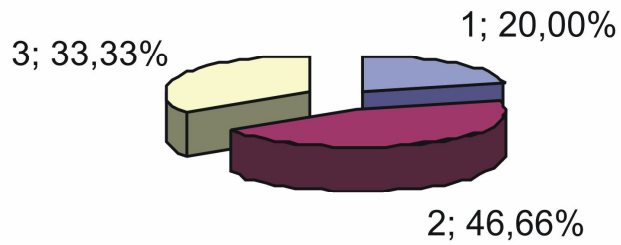
"Skills among people" shows that 5 coaches or 33, 33 % has a problem and this is relatively large number concerning it very delicate population (young players). In graphic it looks like this:



Legend of hypothetical explanation for characteristic "SKILLS AMONG PEOPLE"
1. Problem!!! 2. Acceptable, still to improve 3. Seems like not a problem

In the area of ''Political sensibility'' results show that 10 coaches or 66, 66% of them has acceptable and non-problematic attitudes.

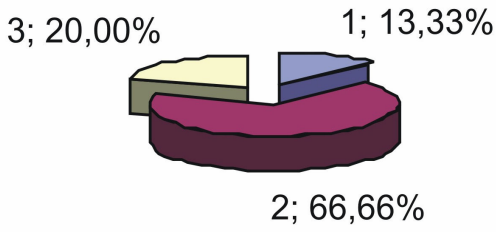
"Resistance" as a common subject in individuals and organizations can come from many reasons that are not inner connected. This could be explained trough lack of trust, beliefs that e.g. changes are unnecessary , that something can't be done, economic treat, fear of personal failure with players, loss of power and status… 12 of them or 80% doesn't have problems with this dimension or it is non-problematic, which is very important in sport.



Legend of hypothetical explanation for characteristic "RESISTANCE"
1. Problem!!! 2. Acceptable, still to improve 3. Seems like not a problem

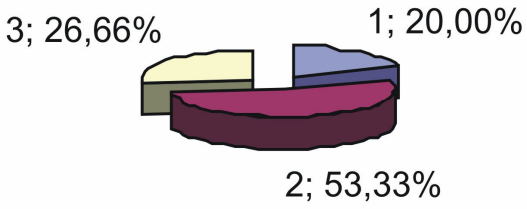
"Charisma" is a Greek word which means "divinely inspired gift", like ability to perform miracles or see future events. (Yukl, 2006:248). Weber (1947:98) used this term to describe a form of influence which is not founded in tradition or formal authority, but on inheritance perception that their leader is gifted with overwhelming abilities. Those after him experience certain success as a vision, so they start seeing leader as a remarkable person. 12 of them or 80% show this dimension as acceptable with some corrections towards better and in general non-problematic.

"Taking risks" as a subjective attitude, coaches experience as the most acceptable dimension and very common in sport. That is 13 coaches or 86,66% of them



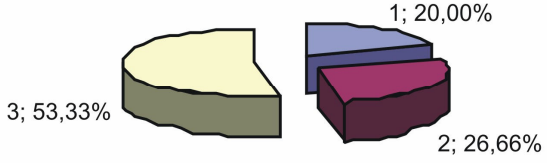
Legend of hypothetical explanation for characteristic "TAKING RISKS"
1. Problem!!! 2. Acceptable, still to improve 3. Seems like not a problem

"Flexibility" and "determination", as compatible values (12 coaches) 80 % of them, are in the area of acceptable and with chances of non-problematic. Flexibility assumes if leader should change his attitude trying to compact it with situation demands or should he be determined to his leading style that he already uses. This question has its answer, that leading model demands a leader with all suitable competences. In order to successfully accomplish his role in a wide specter of tasks, leader needs certain competences which are named as coaches' standards, standards of competence or basketball coach competence profile. For Trninić, among everything else, they articulate them selves by abilities to give knowledge, ability to communicate, to motivate, constructive relationship towards sport players, confidence and empathy (Trninić, 2006:333).



Legend of hypothetical explanation for characteristic "FLEXIBILITY"
1. Problem!!! 2. Acceptable, still to improve 3. Seems like not a problem

"Determination", as an important sport variable reflects trough the choice of playing model that suits team potential and some players. It refers to modeling in training process and to real games with opponents (Trninić, 2006:334).



Legend of hypothetical explanation for characteristic "DETERMINATION"
1. Problem!!! 2. Acceptable, still to improve 3. Seems like not a problem

Although it was expected, statistic data analysis doesn't confirm connection of hypothetical explanations by skills, characteristic and abilities. Today, successful

coach assumes proactive work and anticipation of the problem and also it's solving before problems become appear. Mataja says that Professionals as coaches mustn't only satisfy the form in which members take part with interdisciplinary work they offer, but they have to do it with work demanded by coach as a leader, who personally has to know what to ask or expect (Mataja, 2003:286). Further, Mataja says that main personality of sport can only be the coach who is capable to integrate meanings of science dimensions which lead to complicity of human acting. However, research was conducted among basketball coaches of young selections, so we can see it's about leaders and not managers because all answers were projected on people that are players of young selections. Coaches characterizes determination to clear vision, orientation to future, veal to change, veal to risk, accessibility to his men and veal to motivate.

Over 50% of coaches, or 8 of them saw "determination" as dominant dimension in their coaching existing. Determination in sport as a category expresses it self in different circumstances or conditions. However, just like in research determination in conditions of risk (both dimensions were measured) is a determination where results aren't exactly safe but possibilities for different results are known.

Conclusion taken from results is that the most problematic areas and discharges coaches should work on are "skills among people", and fairly "motivation" as the most important variable in work with young generations. To these good results sure suits the fact that over 70% of coaches are educated in universities.

CONCLUSION

Results given by the questionnaires (Local Government Training Board) in which are incorporated 10 key areas which are very important in leading the organizations, in our case sport teams, we have "discovered" hidden problems and good sides in treated area. Huge discharges from coach to coach did not appear, and mostly their understandings are compatible considering leaders and players. Former researches, as Samuel C. Cetro says, show that a good leader can only be the one born with talent to lead, because it can't be learned, modern approach to leading is based on assumption that leading is more complex question, and that successful leading contains combination leaders them selves, the ones after them and specific situations concerning leading (Sikavica P. in Bahtijarević-Šiber, F. 2004:31). Research shows that leading articulates players' preparation to put them selves in the game, what coach wants they do it. That gathers activities in vision, priority tasks, motivation, skills among people, political sensibility, charisma, risking, flexibility and determination which are all into interaction between coaches and members of the team. The most important thing in leading is coaches' ability to influence the ones he trains so they could make progress to the team, club and their goals.

Measures which would give the efficiency in treated area are continuous professional education of basketball coaches with young selections. In developed countries of EU they pay big attention to this dimension. Approach they like is that everybody should be first professionally educated and then be places like a coach, and also continue education while coaching.

Research gave image of the team from the view of leading, articulated areas where job is done well and less good, paid attention to areas where job is done well and less good, and of course clubs them selves together with coaches should suggest measures for overcoming the mistakes in leading or even partial decreasing them.

LITERATURE

Čuturić, S. 2005. *Rukovođenje – činioci uspeha u vođenju organizacije.* Beograd: Grafika Bojs.
Hunt, J.G. 1991. *Ledareship: A new synthesis.* Newbury Park, CA: Sage.
Mataja, Ž. 2003. *Život za sport i od sporta.* Zagreb:Nakladni zavod matice Hrvatske.
Mužić, V., 1973. *Metodologija pedagoških istraživanja.* Sarajevo: Zavod za izdavanje udžbenika.
Rot, N. 1980. *Socijalna interakcija I*. Beograd: Savez društava psihologa.
Sikavica, P. i Bahtijarević-Šiber, F. 2004. *Menadžment.* Zagreb: Masmedia.
Thomas, M. 1983. *Militärisches Füren und Entscheiden.* Decker's Verlag, G. Scheneck.
Trninić, S. 2006. *Selekcija, priprema i vođenje košarkaša i momčadi.* Zagreb: Vikta-Marko doo.
Weber, M. 1947. *The theory of social and economic organizations.* Translated by T. Parsons. New York: Free Oress.
Yukl, G. 2006. *Leadership in Organizations, 6 th Edition.* New Jersey: Pearson Education.

KOŠARKAŠKI TRENERI KAO VOĐE

Originalni naučni rad

Sažetak
Sportska organizacija je društvena struktura u koju su, po nekom principu sličnosti, integrisane društvene grupe. Kako svaka ljudska skupina ima vođu (leader) tako i vođenje ima uticaj na učinkovitost same organizacije. Kako je ovaj rad posvećen vođenju, cilj je projeciran na trenerovo vođenje mlađih košarkaških selekcija u Tuzli. Istraživanje koje je provedeno među košarkaškim trenerima mlađih selekcija u Tuzli je osmišljeno u okviru 10 ključnih područja koja su naročito važni prilikom vođenja sportskih ekipa. To su (nisu poredana po redoslijedu važnosti): vizija, određivanje prioritetnih zadataka, motiviranje, spretnosti među osobama (u smislu dobre komunikacije sa ljudima – op.prev.), politička osjetljivost (emocionalna) otpornost, karizma, sposobnost reskiranja, elastičnost i odlučnost. Zapravo, (Upitnik/Local Government Training Board) izmjerio se „puls“ sportske ekipe uzimajući u obzir spomenuta područja i tako provjerio uspješnost košarkaških trenera, mlađih selekcija u vođenju ekipe.
Cilj ovog rada je da se dobije slika organizacije-sportske ekipe sa gledišta vođenja, da se usmjeri pozornost na područja na kojima se radi dobro a i ona gdje su skromnija.

Ključne riječi: vođe, vođenje, osobine, sposobnosti, vještine vođe

---

Correspondence to:
Enes Huseinagić,
Tuzla, JU OŠ “Jala” Tuzla
Muharema fizovića br. 2
75000 Tuzla
Phone: 061 178-800
Email: huseinagic_e@hotmail.com

GLOBAL QUANTITY DIFFERENCES IN MOTOR ABILITIES OF PRE-SCHOOL BOYS

Dževad Džibrić, Tarik Huremović, Damir Ahmić
Faculty of physical education and sport, University of Tuzla, Bosnia and Herzegovina

Original scientific article

Abstract
Based on the sample of 58 male respondents (30 respondents were a part of experimental group and 28 of control group) age from five to five and a half years old, initial and final measuring was conducted with the aim to determine global quantitative changes in motor abilities between these two groups. Experimental group carried out specially designed physical education program suitable for pre-school children that lasted for three days, weekly totally 60 minutes in the Gym managed by physical education professor, while control group followed current program for pre-school education in the classroom (playground) managed by kindergarten teacher. Possible differences were determined between experimental and control group in initial and final measuring in a period of three months participation in physical education program To test motor abilities we applied 6 tests. We applied canonic discriminative analysis to determine global quantitative differences between these two groups in the area of motor abilities. Obtained results indicate there are no differences between groups in initial measuring, but in final measuring we noticed statistically significant differences regarding experimental group which means there has been some positive transformations in motor abilities of this group. Possible reason lies in program organized for experimental group as well as different approach to realization of treatment and material working conditions where the classes were carried out.

Key words: *motor abilities, boys, canonic discriminative analysis*

INTRODUCTION

A child of a pre-school age, for healthy psycho-physical development requires satisfaction of basic human needs and the movement is one of the most important needs. During pre-school age the basic of healthy body constitution and positive attitude toward sports is being formed, because abilities and knowledge that are not accepted on time are much more difficult to accept later. (Videmšek, 2002).

For child's optimum development, especially during pre-school age, professional and systematic sports education is necessary that has to be based on scientific and professional discoveries since that is the only way we can develop a child's motor abilities.
Most of motor abilities and habits is being developed and accepted only during childhood and they can be developed or positively influenced in a pre-school age, i.e. from four to seven years of a child's life. During this period, a structure of a motor space according to genetic and environmental factors that influence overall growth and development of children is being formed. (Bala, Kiš, Popović, 1996).

If we want to study motor development of pre-school children scientifically it is necessary to have reliable and valid measuring procedures specialized for children of that age. (Trajkovski Višić, 2004). Motor behavior of pre-school children, as well as their motor abilities has general character but still for manifesting ability of performing motor activities we used terms that are justified for motor abilities of older children and adults. For that reason the sample of motor tests in this research was derived according to the model of motor abilities of older children and teenagers (Kurelić, Momirović, Stojanović, Šturm, Radojević i Viskić-Štalec, 1975; Gredelj, Metikoš, Hošek i

Momirović, 1975). Description of motor tests is presented in Sport schol – development of children's motor behavior handbook. (Bala, 1996), and smaller modifications specialized for mentioned age as well as reliability of presented motor tests can be found at the same author's works (1999). The main goal of this research is to determine global quantity differences in motor abilities of these two groups of respondent's pre-school boys.

METHODS

Participants

The sample of examinees was 58 boys from pre-school centers in Lukavac and Tuzla, age from five to five and a half. They were separated into two groups. Experimental group consist of 30 boys from kindergarten „Lukavac"in Lukavac. Control group consisted of 28 respondents from Kindergarten "Naše dijete" in Tuzla. Program lasted for 3 months, three times a week 60 minutes each time. Initial and final measuring for both groups was conducted.

Instruments

Measuring instruments used for this research were: hand tapping (MBFTAP), forward bow with legs stretched in a sitting position (MFLPRE), long jump from a position (MFESDM), held part in the hang (MSAVIS), sit-ups (MRCLES) and polygon backwards (MREPOL).

Table 1

	Teaching scope	Teaching Unit	Number of frequencies
1 i 2 week	Walking and running	Walking and running alternate, fast, and slow with proper posture. Walking in front of the foot, on the outside of the foot.	3
		Running with high knees in the starting side, with the disavowal legs back. Walking with crossing legs. Running and walking backwards. Fast free 20 m run.	3
3 i 4 week	Jumping and skipping	Skipping bars lined on the floor; Skipping rope with two foot bounce; Two foot bounce over long rope turned by boys; Approach and one bounce on the low bench then landing.	3
		Running long jump with one foot bounce on the mat. Long jump over the "channel" (two lines); High jump, running, one foot bounces, legs clenched and soft landing feet together on the mat.	3
5 i 6 week	Throwing and catching	Throwing the ball far (with stronger and weaker arm); Throwing ball into the basket; Throwing ball using both hands into the air and catching with clapping.	3
		Dribbling standing and moving. Passing the ball with one and two hands in pair (in the level of the chest and over the head; Throwing the hoop up and catching.	3
7 i 8 week	Pulling and pushing	In pairs: pulling and pushing over the line, pushing with hands to move off the position; With bats; pulling and pushing over the line.	3
		Stick: pulling and pushing over the line more pupils at the same time; Rope: pulling in two sides or in the circle.	3
9 i 10 week	Crawling. Squeezing through and climbing	Crawling on the stomach, side and back; Squeezing through ladder frame straight and wriggling. Squeezing through the hoop from above down and the other way around.	3
		Squeezing through the hoop vertically set; Climbing poles, up ladder bars.	3
11 i 12 week	Lifting, carrying and hanging	Carrying ball in many ways. Carrying balls and hoops in many ways. Carrying objects in pair and in group.	3
		Hanging on the high bar and moving left and right with assistance. Hanging on the high bar with legs clenched.	3

Experimental program

Program lasted for 3 months (3 times a week, 60 minutes). Control group managed by kindergarten teacher their current physical education program carried out in the classroom-playground. Experimental group managed by physical education professor carried out specially constructed program of physical education in the Gym. Observing training constructed by physical education professor we could conclude following: suggested experimental program with accent on offered content, better working organization in the beginning, preparing and finish part of a class, as well as applying complex methodic-organization types of work during additional exercise increased class quality. This resulted with more engagement and participant independent work, usage of space, apparatus in the gym, equipment etc. Also, we specially focused on satisfying and development of general and basic motor manipulation) and acceptance of specific motor skills from certain kinesiology activities.

Table 2

Eigenvalues

Function	Eigenvalue	Can.Correl.
Initial	**.047[a]**	**.211**
Final	**.326[a]**	**.496**

Table 3

Wilks' Lambda

Measur.	Wilks' L	Chi-sq	df	Sig.
Initial	**.955**	**2.422**	**6**	**.877**
Final	**.754**	**14.936**	**6**	**.021**

skills (space mastering, overcoming obstacles, overcoming resistance and object

RESULTS

For determination of global quantity variations between these two groups of respondents in the field of motor abilities canonic discriminative analysis in manifest area was applied. The results of discriminative canonic analysis in Table 2 and 3 indicate that in initial measuring there is no statistically significant difference between groups (.877), but in final

measuring there is statistic moment (.021). The results of Bartlett's $\chi 2$ test indicate that statistically significant (.021), obtained discriminative function of final measuring considerably, differs these two researched groups according to selected tests where the value of canonic correlation coefficient is (.496), which explains 24,60% of total variance (0,496 x 0,496 x 100).

Table 4

Functions at Group Centroids	
	Function
Group	1
Experimental	**.542**
Control	**-.580**

The results in Table 4 indicate position of centroid groups in discriminative function. On the negative half of discriminative function there are results of control group and on the positive the results of experimental group.

According to the results in Table 5 the variables that influence the differences between the gorups are following: sit-ups (MRCLES), hand tapping (MBFTAP), held part in the hang (MSAVIS), It is also obvious that negative half is defined with one variable, polygon backwards (MREPOL), that represents control group. However, better results in this variable achieved experimental group since that is the time test where the time signifies better result.

Table 5

Structure Matrix (The final assessment)		
Group	**Variables**	**Function 1**
Experimental	**MRCLES-f**	**.716**
	MBFTAP-f	**.404**
	MSAVIS-f	**.358**
	MFLPRE-f	**.157**
	MFESDM-f	**.004**
Control	**MREPOL-f**	**-.194**

DISCUSSION

Obtained results confirm hypothesis that three month program managed by physical education professor will cause differences between researched groups, in other words better improvement in motor abilities will result in experimental group regarding control group. Obtained differences can be attributed to applied physical education experimental program constructed and realized by physical education professor. Considering earlier surveys we determined both groups had approximately same living conditions and same habits.

According to obtained results it is obvious that experimental group displayed better values in all tested variables. The biggest differences appeared in variables sit-ups (MRCLES), hand tapping (MBFTAP) and held part in the hang (MSAVIS). The reason for so obtained variables is in the structure and presented content of the suggested program. Besides, as additional exercise of the main part of the hour, we used stomach and back exercises; push-ups and dribbling the ball standing. That is one of the reasons the first three variables did not result with statistical significance. In the rest of variables differences were noticed but not statistically significant.

This research only reaffirms previous researches (Živčić, Trajkovski Višić, & Senterdi, 2008), where differences were attained in all motor ability assessment variables in the area of repetitive static strength (MRCLES, MSAVIS).

CONCLUSION

Result analysis in initial and final measuring points out that experimental group regarding control group displayed significant differences in all applied motor ability assessment tests.

According to the obtained results we can conclude that positive influence on motor abilities of pre-school children can be achieved only with well thought, organized and managed programs of physical exercise constructed by educated specialist – physical education professors. Professionally planned and maintained physical education in pre-school institution is extremely significant element in process of child's integral development with variety of impacts on a child's development in their early age (Schmidt & Lee, 1999). Therefore, we should be aware of the fact; if we fail to use the advantage of some psychomatic dimension developments in child's early age it is hard to compensate it later.

LITERATURE

Bala, G. (1996). Sports school – children's motor behavior development. Novi sad. Kinesis.

Bala, G. (1999). Some problems and suggestions in measuring motor behavior of pre-school children. Kinesiologia Slovenica, 5 (1-2):5-10.

Bala, G. (2007). Anthropological characteristics and abilities of pre-school children. Novi Sad, University of Novi Sad, Faculty of physical education.

Bala, G., Kiš, M., Popović, B. (1996). Training in small children motor behavior development. Almanac, 8, 83-87, Belgrade: Faculty of physical education.

Gredelj, M., Metikoš, D., Hošek, A., & Momirović, K.(1975). Hierarchy motor ability structure model. 1. Results obtained applying one uncommon procedure for latent dimension estimation. Kinesiology, 5 (5), 7-81.

Kurelić, N., Momirović, K., Stojanović, M., Šturm, J., Radojević, Đ., & Viskić-Štalec, N. (1975). Structure and development of morphological and motor dimensions in youth. Beograd: Institute for Scientific research of Faculty of physical education.

Schmidt, R.A., & Lee, T. D. (1999). Motor control and learning: A behavioral emphasis. Champaign: Human Kinetics.

Trajkovski Višić, B. (2004). The influence of sport program on morphological and motor characteristic changes of children four years of age (masters work) Faculty of Kinesiology in Zagreb.

Videmšek, M., Jovan, N. (2002). The miracle world of playing in sports. Ljubljana: Universitet v Ljubljanji, Fakultet za šport, Institut za šport.

Videmšek, M., Karpljuk, D., Štihec, J., Kropej, V. (2003). Comparison of efficiency of two training programs for developing selected motor abilities of children in kindergarten. Kinesiologia Slovenica, 9, 2, 67-73.

Živčić, K., Trajkovski Višić, B., Senterdi, M. (2008). Changes in some motor abilities of pre-school children. Facta Universitatis, 6(1):41-50.

GLOBALNE KVANTITATIVNE RAZLIKE U MOTORIČKIM SPOSOBNOSTIMA DJEČAKA PREDŠKOLSKOG UZRASTA

Originalni naučni rad

Sažetak

Na uzorku od 58 ispitanika muškog pola (30 ispitanika sačinjavalo je eksperimentalnu grupu i 28 ispitanika kontrolnu grupu) starosne dobi 5 – 5,5 godina sprovedeno je inicijalno i finalno merenje s ciljem utvrđivanja globalnih kvantitativnih razlika u motoričkim sposobnostima između ove dvije grupe ispitanika. Eksperimentalna grupa je sprovodila posebno konstruisan program tjelesnog odgoja primjeren djeci predškolskog uzrasta, u trajanju od tri dana, sedmično po 60 minuta, u sportskoj dvorani i pod rukovodstvom profesora tjelesnog odgoja, dok je kontrolna grupa radila po aktuelnom programu za predškolski odgoj u učionici (igraonici) pod rukovodstvom odgajateljice. Utvrđivane su moguće razlike u motoričkim sposobnostima između eksperimentalne i kontrolne grupe na inicijalnom i finalnom merenju u periodu tromjesečnog učestvovanja u programu nastave tjelesnog odgoja. Za provjeru motoričkih sposobnosti primijenjeno je 6 testova. Za utvrđivanje globalnih kvantitativnih razlika između ove dvije grupe ispitanika u prostoru motoričkih sposobnosti primijenjena je kanonička diskriminativna analiza. Dobijeni rezultati ukazuju da nema razlika između grupa na inicijalnom mjerenju dok je na finalnom mjerenju došlo do statistički značajne razlike u korist eksperimentalne grupe, što znači da je došlo do pozitivnih transformascija motoričkih sposobnosti u ovoj grupi. Vjerovatni razlog tome jeste u programu koji je napravljen za eksperimentalnu grupu, kao i različit pristup realizaciji tretmana i materijalnih uslova rada gdje se nastava realizovala.

Ključne riječi: *motoričke sposobnosti, dječaci, kanonička diskriminativna analiza*

Correspondence to:

Dževad Džibrić MSc
University of Tuzla
Faculty of Physical Education and Sport
2.Oktobra br.1, 75000 Tuzla, BiH
Phone: +387(0)35 278 535
E-mail: dzevad.dzibric@untz.ba

DIFFERENCE IN CORRECT KICKING OF THE SOCCER BALL WITH RESTED WEEK LEG EXPRESSED WITH DIFFERENT INTENSITY

Duško Bjelica
Crnogorska sportska akademija – Podgorica, Crna gora

Original scientific paper

Abstract
(This sample is valid only for research where 3 and 4 variables were treated)
Group of young soccer professionals was hitting goal in the same way from the same distance. Each respondent kicked with both legs for ten times. In the first case the kick was performed with rested week leg with optimal intensity for 10 times, and after special program of relaxation in order to let them rest the muscles that are engaged the most in kicking the ball, other 10 kicks was performed with rested strong leg with maximal intensity. After statistic procedure processing, we determined that maximal intensity significantly influenced decrease in accuracy of hitting goal, which confirmed criteria hypothesis.

Key words: foot kick on the ball, inner foot, week leg; strong leg, state of rest, fatigue state, optimal intensity, maximal intensity, accuracy, correlation, arithmetic means significant difference.

INTRODUCTION

Hypothetical space includes unknown term in a form of a question does accuracy of the kick depends on its intensity, if the kick is performed with the week leg in optimum state of warm up. On this occasion the author used data from macro - project where relations of accuracy level in different states of kicking the ball into goal with strong and week leg in different states of fatigue and intensity were enclosed. According to that the author decided to research the efficacy of shooting the ball in goal with young football professionals, but this time satisfying the conditions of the research and isolating following variables and their correlations:

- The accuracy of the kick with inner foot of week leg in state of a rest with medium intensity (VAR.3).
- The accuracy of the kick with inner foot of a week leg in state of a rest with maximal intensity (VAR.4).
-

For this research we selected only three terms:
ACURACY in football, according to general convention, represents series of kicks closest to the determined goal, which is usually placed in the center of shooting area. STRONG LEG is the leg that is capable to shoot better, and we also call it favorable leg. In most cases that is the right leg. It is called strong leg because the kick with that leg is better and the leg is used more then the other leg. WEEK LEG is the other leg, usually left, that is not used so often if high level of efficacy is required.

According to selected variables we can conclude that the main goal of this study includes mental but also physiological area. The problematic of impact on accuracy of the kick with inner foot using week leg with different intensity in that sense forming suitable hypothetic space.

There are only two factors treated in this research. Does bigger impact on the accuracy of the kick with inner foot using week leg makes optimal intensity or maximal intensity. Related to this we set following hypotheses: On the accuracy of the kick with inner foot with week leg bigger influence has optimal intensity (H1). On the accuracy of the kick with inner foot with week leg bigger influence has maximal intensity (H2). There is significant correlation between accuracy of the kick with inner foot using week rested leg with medium intensity and the accuracy of the kick with inner foot using week rested leg with maximal intensity (H3). There is no significant correlation between accuracy of the kick with inner foot using week rested leg with medium intensity and the accuracy of the kick with inner foot using week rested leg with maximal intensity (H4).

METHOD

Participants

This partial sample was presented to youth of football club in Federal League. Everyone took regular medical examination and was healthy. Not

even one respondent had physical or mental defect. Each respondent was subject to many years of systematic training in the club managed by qualified coach. After elimination of individuals that could not take this test for objective or subjective reasons, the sample was reduced to entity of 20 respondents.

Instruments

This sample included two ways of kicking the ball with foot and shooting at goal, which can be effectively used in situations of football game:

Leg: Week.
State: Rested.
Intensity: Optimal.
(VAR No.3)

Leg: Week.
State: Rested.
Intensity: Maximum.
(VAR No.4)

The weather was favorable; worm, sunny, no wind. The humidity and atmospheric pressures were normal. It was outdoors, grass court, grass mown and dry earth. Distance from the goal was 20 m. Spacing line was marked. The place for the ball was also marked. The respondents were wearing sports outfit, dressed in sports shorts and dress and football shoes. The balls used for an experiment were according to Federal Association regulations.

For this experiment on a solid vertical field we drew goal according to standard dimensions (7, 32 x 3, 44 m). Entire surface of the goal was divided into 4 equal quadrants with two interrelated lines. These two lines were crossing in the middle of the goal. From the crossing point, actually from vertical goal projection we drew concentric circles. The first circle was the size of soccer ball diameter (22, 1 cm). All other circles were placed on the mutual distance for a size of a soccer ball diameter. From central circle which was the size of soccer ball projection left and right we marked 16 distances of soccer ball diameter. From central circle up and down 11 such distances were marked. Central circle totals 17 points which was maximum points for one kick and peripheral circles left and right total 1 point. As closer to the center points were they total more points. Each miss was 0 points

RESULTS

Twenty respondents performed ten kicks with inner foot in two relevant ways, with the aim to hit the firs (central) concentric circle on the goal surface, with circle diameter equal to diameter of a soccer ball.

In table 1 we presented raw results for entire sample of 20 respondents. All respondent's results were noted, and each performed 10 kicks with inner foot using week leg in rested state with optimal intensity.

In table 2. we presented raw results for entire sample of 20 respondents. All respondent's results were noted, and each performed 10 kicks with inner foot using week leg in rested state with maximal intensity

Tabel 1. First horizontal: Frequencies. First vertical: Entity

	1	2	3	4	5	6	7	8	9	10
P.V.	5,00	,00	,00	11,00	13,00	13,00	11,00	12,00	12,00	9,00
G.I.	5,00	3,00	9,00	2,00	10,00	44,00	,00	11,00	11,00	8,00
K.M.	8,00	11,00	5,00	7,00	11,00	8,00	7,00	9,00	7,00	13,00
N.S.	12,00	11,00	17,00	5,00	17,00	7,00	11,00	11,00	10,00	1,00
D.Đ.	10,00	4,00	6,00	10,00	14,00	8,00	3,00	,00	13,00	6,00
M.M	10,00	13,00	7,00	,00	11,00	8,00	1,00	13,00	2,00	4,00
Đ.I.	10,00	10,00	10,00	15,00	3,00	,00	17,00	12,00	7,00	3,00
D.G.	7,00	3,00	8,00	,00	14,00	14,00	9,00	7,00	15,00	15,00
S.P.	3,00	9,00	5,00	4,00	1,00	14,00	11,00	7,00	3,00	7,00
J.S.	13,00	11,00	8,00	9,00	13,00	14,00	5,00	,00	1,00	6,00
I.S.	5,00	,00	,00	11,00	13,00	13,00	11,00	12,00	12,00	9,00
V.P.	5,00	3,00	9,00	2,00	10,00	44,00	,00	11,00	11,00	8,00
I.G.	8,00	11,00	5,00	7,00	11,00	8,00	7,00	9,00	7,00	13,00
M.K.	12,00	11,00	17,00	5,00	17,00	7,00	11,00	11,00	10,00	1,00
S.N.	10,00	4,00	6,00	10,00	14,00	8,00	3,00	,00	13,00	6,00
D.D.	10,00	13,00	7,00	,00	11,00	8,00	1,00	13,00	2,00	4,00
S.M.	10,00	10,00	10,00	15,00	3,00	,00	17,00	12,00	7,00	3,00
I.D.	7,00	3,00	8,00	,00	14,00	14,00	9,00	7,00	15,00	15,00
G.D.	3,00	9,00	5,00	4,00	1,00	14,00	11,00	7,00	3,00	7,00
P.S.	13,00	11,00	8,00	9,00	13,00	14,00	5,00	,00	1,00	6,00

In table 1. we presented raw results for entire sample of 20 respondents. All respondent's results were noted, and each performed 10 kicks with inner foot using week leg in fatigue state with optimal intensity.

Table 2 First horizontal: Frequencies. First vertical: Entity.

	1	2	3	4	5	6	7	8	9	10
P.V.	7,00	4,00	12,00	12,00	7,00	,00	,00	7,00	1,00	,00
G.I.	,00	7,00	,00	,00	6,00	,00	12,00	,00	9,00	,00
K.M.	12,00	1,00	14,00	8,00	11,00	3,00	12,00	9,00	4,00	12,00
N.S.	12,00	,00	,00	,00	2,00	,00	,00	14,00	,00	2,00
D.Đ.	5,00	,00	8,00	16,00	1,00	,00	12,00	12,00	11,00	,00
M.M	,00	,00	6,00	8,00	3,00	12,00	,00	10,00	10,00	9,00
Đ.I.	14,00	,00	,00	7,00	,00	4,00	8,00	13,00	7,00	,00
D.G.	,00	16,00	,00	,00	15,00	,00	5,00	9,00	,00	4,00
S.P.	,00	,00	1,00	,00	,00	,00	,00	,00	16,00	,00
J.S.	15,00	12,00	3,00	6,00	5,00	1,00	10,00	11,00	,00	1,00
I.S.	7,00	4,00	12,00	12,00	7,00	,00	,00	7,00	1,00	,00
V.P.	,00	7,00	,00	,00	6,00	,00	12,00	,00	9,00	,00
I.G.	12,00	1,00	14,00	8,00	11,00	3,00	12,00	9,00	4,00	12,00
M.K.	12,00	,00	,00	,00	2,00	,00	,00	14,00	,00	2,00
S.N.	5,00	,00	8,00	16,00	1,00	,00	12,00	12,00	11,00	,00
D.D.	,00	,00	6,00	8,00	3,00	12,00	,00	10,00	10,00	9,00
S.M.	14,00	,00	,00	7,00	,00	4,00	8,00	13,00	7,00	,00
I.D.	,00	16,00	,00	,00	15,00	,00	5,00	9,00	,00	4,00
G.D.	,00	,00	1,00	,00	,00	,00	,00	,00	16,00	,00
P.S.	15,00	12,00	3,00	6,00	5,00	1,00	10,00	11,00	,00	1,00

In table 2. we presented raw results for entire sample of 20 respondents. All respondent's results were noted, and each performed 10 kicks with inner foot using week rested leg and maximal intensity.

Table 3.The measures of central tendency and frequency distribution for variable No. 3. (week leg, rested state, intensity optimal)

Arithmetic mean	**X-BAR**	8.03
Standard error	Sx	0.33
Variance	VAR	21.13
Standard deviation	SD	4.60
Variation coefficient	CV	56.86
Minimal values in sequence	MIN	0
Maximal values in sequence	MAX	17
Variation width	RANG	17
Asymmetry	SKEW	-0.20
Flatness	KURT	-0.88
Reliability coefficient	%	95

Table No 4. Measures of central tendency and frequency distribution for variable 4. (week leg, fatigue state, intensity optimal)

Arithmetic mean	**X-BAR**	4.47
Standard error	Sx	0.47
Variance	VAR	28.14
Standard deviation	SD	6.71
Variation coefficient	CV	107.29
Minimal values in sequence	MIN	0
Maximal values in sequence	MAX	16
Variation width	RANG	16
Asymmetry	SKEW	0.59
Flatness	KURT	-1.11
Reliability coefficient	%	95

Table No. 5 Statistic procedures of variable pairs: Variable 3 (week leg, state rested, intensity optimal), Variable 4(week leg, state rested, intensity maximal)

Arithmetic mean	X-BAR	3.15
Standard error	Sx	0.52
Standard deviation	SD	7.37
t-test for small independent samples	t-mn	6.04
Correlation coefficient	R	-0.10

INTERPRETATION AND DISCUSSION

To make results of the research with statistical methods reliable, it is necessary to previously determine "behavior" of series of numbers, i.e. determination of their disposition, their quantity relations and their grouping. Measures of central tendentcy and frequency distribution, presented in the tables 3 and 4, provide enough data according which we can define picture of Gause's curve, which can further determine the conclusion reliability level, summarized in this research.

The third and fourth moments were necessary for calculating flatness and asymmetry of Gaus's curve;

Asymmetry (scewX,scewY) =	-.20	0.59
Flatness (curtX,curtY) =	-.88	-1.11

Obtained values do not exceed conventional frames, so the values of both frequencies can be considered as correct for further research. Frequency distribution (SD,VS,varX,varY,CV,Sx i Sy) present grouping of measured values around arithmetic means, separately for each data sequence:

Standard deviation (SD)	4.60	5.30
Variation width (VS)	17	17
Variance(M2) (varX,varY)	21.13	28.14
Variation coefficient (CV)	56.86	107.29
Standard error (Sx,Sy)	0.33	0.38

Grouping of calculated values determines correct Gause's curve and confirms result reliability which will be calculated with certain statistical method. As the goal of this research was to determine whether there is statistically significant difference in a kick accuracy with week leg in state of fatigue regarding to kick accuracy with week leg in rested state and whether are this two series of data in correlation,

the values of t- test and correlation coefficient are calculated:

t-test, SMALL, INDEPENDENT SAMPLES	(TN)	6.04
CORRELATION COEFFICIENT	(r)	-0.10

In table 3, we presented individual results (number of points) of all respondents, totally 200 data. After statistic processing, the following relations are determined:

Variance (VAR=21.13) is bigger then variation width (VŠ=17) so data variability is heterogenic.

Standard deviation (SD=4.60) is smaller then variation width (VŠ=17) and we can say there is higher level of similarity of statistical units in this variable.

Variation coefficient (CV=56.86) with its size indicates that data distribution of this set is moderately homogenous.

Asymmetry (SKEW=-0.2) has negative sign which means Gause's curve is "aslope" toward bigger set values. Asymmetry of Gause's curve moves in a tolerant range from -2 to +2 and we can consider that positioning of the results in this set slightly asymmetric.
Flatness (KURT=-0.88) has negative sign so Gause's curve shows slight platicurticness. All the values of this set are in range (from '3 to -3) and we can consider that positioning of the results in this set is acceptable

Measures of central tendency and frequency distribution of all respondent results, where each of them performed 10 kicks with inner foot using week leg, in rested state with maximal intensity, give affirmative answer that this set can further be a subject to standard statistic procedures.

In table 4. we presented individual results (scores) of all respondents, totally 200 data. After statistic processing the following relations are determined:

Variance (VAR=28.14) is bigger then variation width (VŠ=16) so data variability is not acceptable.

Standard deviation (SD=5.30) is smaller then variation width (VŠ=16) and we can say there is a higher level of similarity of statistical units in this variable.

Variation coefficient (CV=107.29) with its size indicates that the data distribution of this set is extremely heterogenic.

Asymmetry (SKEW=0.59) has positive sigh which means that Gause's curve is "aslope" toward lower set values. Asymmetry of Gause's curve moves in a tolerant range from -2 to +2 and we can consider that positioning of the results in this set slightly asymmetric.

Flatness (KURT=-1.11) has negative sign so Gause's curve shows slight platicurticness. All the values of this set are in range (from +3 to -3) and we can consider that positioning of the results in this set is acceptable

Measures of central tendency and frequency distribution of all respondent results, where each of them performed 10 kicks with inner foot using week leg, in rested state with maximal intensity, give affirmative answer that this set can further be a subject to standard statistic procedures.

The individual results of all respondents, totally 400 data, were paired and presented in tables 1 and 2. After statistic procedures processing the following relations were determined:

For this sample (20+20-2=38) with the level of reliability 95%, conventional bound value of t-test for small, independent samples equals **2.021**. In this case **t-test** = 6.04 so we can conclude that between variable No. 3: kick with week leg in rested state with optimal intensity and variable No. 4: kick with week leg in rested state with maximal intensity, there is significant difference in favor of variable 3 which confirms hypothesis (H1).

Correlation coefficient for this pair of variables equals **r** = -0,1 and since bound value of Pirson's coefficient of simple linear correlation for this sample determined with convention to the level **0.444,** between variable No. 3 and variable No 4 we conclude there is no significant correlation, which confirms hypothesis (H4).

CONCLUSION

Generally we can conclude that in the moment of causing impulse with maximal intensity with earlier obtained dynamic stereotype, the level of coordination decreases. Since, in this study we research complex variables, relevant for

situational sector in soccer; we can also conclude that from all relevant simple variables, in confirming extracted factor **accuracy,** the most important simple variable **intensity** regarding simple variable **fatigue level.**

LITERATURA

Aleksić, V. (1995). FUDBAL '95[Football '95] . Fakultet fizičke kulture, Beograd.

Bjelica,D. (2006). Sportski trening, [Sports training] CSA,Podgorica.

Bjelica, D. (2008). Glavne komponente tačnosti udarca nogom po lopti u fudbalskom sportu, [Main components of kick on the ball accuracy in football] CSA,Podgorica.

Jelušić, D.V. (1995). Međuzavisnost specifičnih aspekata zamora i situacione efikasnosti vrhunskih jugoslovenskih fudbalera. [Interdependence of specific fatigue aspects and situational efficiency of high quality Yugoslav football players] Diseracija, Beograd.

Opavsky, P. (1996). Planiranje i programiranje treninga u fudbalskom klubu. [Planning and programming of training in football club] Izdanje autora, Beograd.

Perić, D. (1996). Statističke aplikacije u istraživanjima fizičke kulture. [Statistical applications in physical culture reseraches] Autorsko izdanje, Beograd

Verhošanskij, J.V. (1988). Osnovi specijalne pripreme sportista. [Special sportsmen preparation basis], Moskva.

RAZLIKE U PRAVILNOSTI ŠUTIRANJA FUDBALSKE LOPTE ODMORNOM SLABIJOM NOGOM RAZLIČITIM INTEZITETOM

Originalni naučni rad

Sažetak:
(ovaj primer važi samo za rad gde su tretirane samo varijable 3 i 4)
Grupa mladih fudbalskih profesionalaca je na isti način i sa istog rastojanja pogađala određeni cilj. Svaki ispitanik je izvršio udarac dva put po deset puta. U prvom slučaju izvršeno je deset udaraca neprotežiranom nogom u odmorenom stanju i sa optimalnim intenzitetom, i nakon posebnog programa relaksacionih vežbi sa ciljem da se što više odmore mišići koji najviše učestvuju u udarcu nogom po lopti, izvršeno je ponovo deset udaraca neprotežiranom nogom u odmorenom stanju, ali sada sa maksimalnim intenzitetom. Nakon odgovarajuće statističke obrade, utvrđeno je da je maksimalni intenzitet statistički značajno uticao na smanjenje tačnosti pogađanje cilja, čime je potvrđena kriterijumska hipoteza.

Ključne reči: udarac nogom po lopti; unutrašnja strana hrpta stopala; protežirana noga; neprotežirana noga; stanje odmorenosti; stanje zamorenosti; optimalni intenzitet; maksimalni intenzitet; tačnost; korelacija; značajnost razlika aritmetičkih sredina.

Correspondent:

Duško Bjelica, PhD.
Džordža Vašingtona br.445 (IV / 4)
81 000 Podgorica, Crna Gora
Fax: ++382 20 235 256
e-mail:sportmont©t-com.me

THE GUIDELINES FOR AUTHORS

AIM AND SCOPE OF THE JOURNAL

Sport Scientific And Practical Aspects is an international journal of sport science and kinesiology. The journal publishes scientific, theoretical and empirical articles and other written material related to following kinesiology sections: Biomechanics, Kinesiology Assessment, Training theory, Management in Sport, Education, Methodology, Statistics and Research Methods, Sport and Health, Adaptive Physical Activity, Sport. The aim and intention of the journal is to increase theoretical and practical knowledge of above mentioned kinesiology fields.

GENERAL PUBLISHING POLICY

The journal is published by Faculty of physical education and sport, Tuzla University, twice a year (June and December). All received articles will be evaluated by the journal editors, using several criteria: the adequacy of the theme and content for the journal; the preparation and format of manuscript; and general satisfaction. If the criteria are satisfied, the article will be sent on a blind (without information about authors) review evaluation to at least two recognized, independent and anonymous reviewers. If an article is not prepared in a recommended way the article will be sent back to author without scientific estimation. The review process usually takes up to 4 weeks. After the revision procedure, all authors will be informed by e-mail about sent article (acceptance, revision or rejection of the manuscript). Only the manuscript that receives positive reviews will be accepted. If there are one negative and one positive review, the article will be sent to third reviewer. The reviewers will determine if articles belong to some of following categories: Original scientific article, Preliminary communication, Review article, or Professional paper.

Authors are responsible for the scientific and professional context and legal aspects of the articles. All authors will be ask to sign the statement in order to guarantee that the article has not been published previously, or it is not under consideration for publication elsewhere, either in part or in whole, and if the article is accepted it will not be published elsewhere in the same form, in English or in any other language. The Editorial board can make necessary changes to manuscript in accordance to the recommended instructions. Author's rights remain, but journal can freely dispose with article in sense of reprint or other types of publication distributions. Each author has right for one printed copy of journal. All other questions stand in order with standard law presumptions in scientific society. The author's attitudes and opinions expressed in the article need not correspond to the opinion of the Editorial Board.

PREPARATION OF THE ARTICLES

Text files should be in Microsoft Word 6.O and later versions. The manuscripts should be submitted in Times New Roman font, 12-point type, double-spaced with 3 cm margins on all sides. Any manuscript should not exceed 7 pages including the abstract, references, and all the tables and illustrations; otherwise the author can be informed about additional payment for printing costs (from 8. to 10. pages 50€, from 11 to 15 pages 75€, 16. page and more 100€ per page). Expected size is 12000 characters without tables and figures (exceptionally 14000). All tables should be standardized (e.g. Excel) and photos and other illustrations made in vector format for good printing resolution (minimum 300 dpi). Journal takes rights to manage illustration for printing preparation, and author will be informed by e-mail.

The title page of the manuscript should include following information: short and understandable title in English and Bosnian, the authors' names (without degrees), the authors' *institutions and their locations, the name and address of the corresponding author (must include title, degree and position of the corresponding author, telephone and fax numbers and e-mail address).* **The Abstract** *must be prepared in English and in Bosnian (for non-Bosnian speaking authors it will be prepared by the*

*Journal Editorial Board). I*t should *contain between 150-250 words.* **The key words** *(in order to assist indexing the journal use up to six key words not used in a title of article).*

The text of the articles is recommended to be divided in following chapters: ***Introduction*** (the reasons for the research, problem and aim of the study, and the relevant findings of previous studies), ***Method*** (including participants, instruments - and procedure - u*nits of measurement, symbols and abbreviations must conform to international standards*), ***Results and Discussion*** (evaluate and interpret the implications of results, connect them with the aim, compare your work with prior research presented), ***Conclusion*** *and* ***Literature*** (may contain only the authors quoted in the text). The reference style used by the Journal is the Harvard System of referencing (*Publication Manual of the American Psychological Association, 5th edition, 2001*).

Manuscripts that do not obey the Guidelines for authors will not enter review process and will be immediately returned to authors.

ARTICLES SUBMISSION

Articles should be sent in an electronic form (**exclusively by e-mail**) to:
Sport Scientific And Practical Aspects – the Journal Coordinator: Haris Pojskić, MSc
E-mail: haris.pojskic@untz.ba , or
to the Journal Executive Editor: Vlatko Šeparović, PhD
E-mail: vlatko.separovic@untz.ba

The Journal Management office:
Faculty of physical education and sport,
Tuzla University
2. Oktobra 1,
75 000 Tuzla, Bosnia and Herzegovina.
Tel: 00 387 35 278 536
Fax: 00 387 35 278 536
http/ www.sportspa.com.ba

LANGUAGE AND OTHER
Sport Scientific And Practical Aspects publishes articles **in English with abstracts in English and Bosnian.** Issue price: 20 €, Overseas: 30 € + postal fee. Journal copyright and distribution according to Copy rights law of Republic Bosnia and Herzegovina.

Publisher account NLB- Tuzlanska banka:

DEUTSCHE BANK AG FRANKFURT BIC: DEUTDEFF **F57**: Account with Institution ACC 936272410 EUR- NLB TUZLANSKA BANKA DD TUZLA BIC: TBTUBA 22 F59: Beneficiary Customer: IBAN: BA **39 132 10 100 867 249 43** TUZLANSKI KANTON DEP.RN TURALIBEGOVA 40, TUZLA ZA UNIVERZITET U TUZLI FAKULTET ZA TJELESNI ODGOJ I SPORT NLB TUZLANSKA BANKA DD TUZLA	Transakcijski račun: **1321 000 256 0000 80** Adresa: Univerzitet u Tuzli**,** **Fakultet za tjelesni odgoj i sport** 2. Oktobra br. 1, 75 000 Tuzla, Bosna i Hercegovina ID broj: **4209 444 710 153** Budžetska organizacija: **240 400 13** Poziv na broj: **701 300 0000** Vrsta prihoda: **722 631** Općina: **094**