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ANALYSIS OF DIFFERENCES IN INTESITY AND MOVEMENT QUANTITY BETWEEN GUARD AND WING DURING THE WATER POLO GAME

Original scientific paper

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Abstract

On the sample of 320 water polo quarters, as entities in this investigation, 21 variables were performed and 8 derived variables were used in this research. Data processing methods have been brought into accord with the aims of this research. Basic statistical parameters as well as distribution of all the measured and derived variables have been calculated. The aim of this investigation was to confirm is the structure of the movement in the vertical and horizontal phase in a water polo, intensity, frequencies and time as equivalent for effort for two different positions (guard and wing) really different. Basic statistics was performed on z-scores, as well as analysis of variance (ANOVA) and F-test differences between the guard and the wing. Discriminate analysis was also performed and structure discriminate function was calculated. The results show: it is possible to register and define differences in the roles guard and wing in water polo that confirms the first hypothesis in this research. The guard position defines and discriminates of the wing: frequencies of duels and time spent in duels during the game. Conclusion is that quad position defines high level of work intensity in the vertical stage (phase) of the game through over maximal stress (duels). This is also the confirmation of the second hypothesis in this paper. The wing is defined, and it is different from the guard in: frequency of playing with an uneven number of players (player less / more), the frequency of action, and the time spent in the game with an uneven number of players and the total time spent in the game. That confirms the third hypothesis in this research. What makes the wing and guard no different are frequencies of action, overall swimming meters and frequencies of slowly swimming. Results of this research provide theoretical explanation of this less covered field in top sports, as well in water polo, and will be a base for the practice of water polo trainers in real work with centers and wings.

Keywords: *motor tests, z-scores, analysis of variance, discriminate analysis, water polo*

INTRODUCTION

Movements in all sport's activities is possibile to observe and analyse from two points of view. First one is energetic, where the amounts of movements, intensities and duration are analysed, second one is information, where the technices, tactics, strategies and teoretical knowledge of players are analysed. Both of these components are always present together and indivisible in real terms of game, but their relation is different in different situations. Every training has to begin with informations of at least two components: aim of these changes and features which we want to change. In order to use these inormation in training they have to be explicite defined in goal and objective characteristics which we change. Praxis in today's training metods, unfortunately, differs from this principles. Metods and modes of operation which are used to achive the final goal with training is possible to divide as: situational (situation training) and partial (auxiliary training). For each type of training is necessary to attain, with objective analysis of this sport activity, overlaping coefficients, because is the only condition to construct a good training. Considering tasks that players carry out in the game or their role in team, this relation varies and is different from role to role. In accordance with that claim it is neccesary to define special overlaping coefficients for each role in game, which means to construct different training for every role in game (Lozovina, 1984, 2009; Lozovina, V. & Lozovina, M., 2012). Water polo team dispose with 13 players which performe different roles i.e. tasks in game: goalkeeper, center, second line attacker, guard ang wing. Every mentioned role has own tipical tasks and metods how to resolve them during the attack and during the diffence. Each role and tasks within role are played in horizontal and vertical phase of game. Thereby each player dominantly play role which is intendent to the player in the game, but there comes the situation where players play parts of roles which are not intendent to them as basic. Also the players need to know how to play that as well. In movemet structure, during the water polo game players spend 35% of time in horizontal phase (all swimming with diferent intensities during the game), and 65% in vertical phase (vertical positions organized with leg work, water polo bicycle) resolving the tehnical and tactical tasks (Lozovina, 1984, 2009). A typical course of the game in water polo is such that after the attempted, and unrealized counter-attack, the team that is in possession organized positional attack, trying to accomplish a chance for a shot or take the lead. Attempted counter attack takes place in the horizontal phase, of course, on the move, and can be of different complexity. In top major league teams and national teams, on average, lasts 15 seconds. Essentially boils down to the game with players more / less with larger or smaller handicap of defense player (expressed in meters or the necessary time to the advantage of opposing team annul) that in real terms the game presents players more / less than 1:0 to 6:5 with handicap. The defensive task purpose and the way the game is exactly the opposite, which means do not allow the opponent to move the optimum lines so that more time spent in the action failed, and that the defensive player / and which remain annulled incurred handicap (Lozovina, 2009). Positional attack is formed so that one player (center) take a position on the 2-3m wide of the pole to the left or right relative to the center of the goal opponent. Two players (wings) are placed on the side in the height of 3-4m goal line 3m away from the goal pole. Their dominant role in the game is in the transmission and passing balls toward the center, as well as preventing the counter attack opponents when their team lost possession of the ball. The next three players are second line attackers (external attackers) which, with individual or simultaneous joint swimming towards the goal during the attack, trying to achieve a spatial advantage over the opponents who cover them to unimpeded received the ball, pass the free teammate in favorable position for a shot or shot themselves with ease. The team that defends, in tactical terms, can do that in three ways: act out a defense man-man, zone or combined defense (Lozovina, 2009). Authors Lozovina, Pavicic, & Sesartić, (2002; Lozovina, Pavicic, & Brakus, 2003; Lozovina & Pavicic, 2004) in the works of inaugurated the methodology for the assessment of vertical and horizontal components of the situational conditions of the game in water polo. Similar problem in terms of characteristics modeling activities water polo in a vertical position during the game dealt with and authors Bratuša, Matković, & Dopsaj (2003). Lozovina and Pavicic set a model to analyze the load of the game in situational conditions in relation to ways, intensity, frequency and time spent in the game as equivalent to load the game (Lozovina et al. 2002, 2003; (Lozovina, V., Gusić, Lozovina, M., 2006). In handball differences in extensity and intensity of the cyclic motion activities handball on different gaming sites in the game was treated by Šibila, Vuleta, & Pori, (2004). Data on capacity utilization are collected by a computer-supported system SAGIT. Output data are processed by a selected methods from Excel and SPSS. Significant differences between gaming groups with respect to the average distance traveled during the match. Most have ran up the wing, then external players, and pivot until at least porters. The differences are obtained for the average speed during the movement of the average speed in all the sections. For the second speed-category were no differences between the groups of foreign players, wings and pivot players, but these three groups differ significantly from the goalkeeper. Statistically significant differences were observed in all four groups, according to the average speed of movement.

Aim and hypothesis

The aim of this study is to determine whether the structure of the movement in the vertical and horizontal phase during the game in situational conditions with regard to methods, intensity, frequency and time, as equivalent for effort in the game, is it possible to determine the differences between the players who perform various tasks in the game defined by role of wing and guard.

H1 - It is assumed that it will be possible to establish differences in play of wing and guard in water polo with respect to the different tasks they perform during the game.

H 2 – It is assumed that the play of guard will be mainly defined by a vertical phase of the game, and the level of loading amount of movement therein.

H3 – It is assumed that the play of wing will be predominantly defined by horizontal phase in the game and the level of loading amount of movement therein.

METOHDS

Description of the experiment

In the experimental phase, the following were objectively registered during official water polo games: quantities, means, frequencies and intensities of players' activities in the roles of wing and guard. Data collection was carried out on the official games of the International Adriatic Water Polo League in the season 2009/10. Registration and data sampling was performed by five qualified surveyors, professors of kinesiology, and experienced water polo trainers. In the game, during the time the player spent playing, all his movements, intensities and positions of the body (horizontal and vertical) were recorded. The criteria for estimation of work intensity, namely ofburden, were: maximal, sub maximal and slight. They were determined on the basis of swimming speed in the course of actions. The vertical phase in the play was registered using frequencies and the time spent in duels as over-maximal load as well as frequencies and the time spent in man up/down situations as a maximal load. The measurers were trained in measuring the same player on 10 games. The survey was carried out only after a complete concordance among surveyors was achieved. They were positioned on high-visibility positions, which enabled optical coverage of the whole playing field. Standard water polo markers (2 m, 5 m, goal out line, center, etc.) enabled precise recording of swimming distances at various intensities of players. Each official recorded all activities of their designated player. At every moment, they had full view of the official time clock, which showed a down count of the official, clean game time and of smaller time clocks that showed ball possession and the attack time. Each official consecutively recorded every action taken by his designated player. In case a player was thrown out of the game or had not been in the game (excluding time or change of players), time was measured when the player exited the game and re-entered the game.

Entity Sample

The basic information carriers in this experiment or entities are parts of a water polo match. According to the propositions, the water polo match duration is four quarters for eight minutes of pure play, or about 17 minutes of real time per quarter. Every quarter starts in the same way, swimming on the ball that the referee puts into the game at the center of the court, and ends with the announcement of the sound signal from the court table at the end of the time. For these reasons, a quarter can be treated as a closed whole, so it is justified to use it as a measurement entity, that is, the source of information in a methodological sense. The sample of entities in this study represents 283 water polo quarters.

Sample of variables

The activity of the players on the match is monitored by recording the amount and intensity of movement of the water polo player in different positions or roles in the game. This is achieved by recording frequencies, that is, the frequency of occurrence and the amount of playground space in meters. Different activities were realized in different swimming techniques (crawl, backstroke and breaststroke) as well as different intensities with modalities: light, submaximum and maximum. In addition to the above mentioned indicators, a game with a player more or less is recorded, as the number and duration of the duel. In the time spent by the water polo player in the game, the movements and intensity in the horizontal and vertical phase of the game were recorded successively.

Table 1. Authentic measured variables

Variables	
FKRMAX	Frequency unit crawl, maximal
FLEDMAX	Frequency unit backstroke, maximal
FKRSMAX	Frequency unit crawl, sub maximal
FLESMAX	Frequency unit backstroke, sub maximal
FKRLAG	Frequency unit crawl, easy
FLELAG	Frequency unit backstroke, easy
FPRLAG	Frequency unit breaststroke, easy
FDUEL	Frequency of duels
FIGVIS	Frequency of actions with players more
FIGMAN	Frequency of actions with players less
MKRMAX	Distance in crawl in maximal speed in meters
MLEMAX	Distance in backstroke in maximal speed in m
MKRSMAX	Distance in crawl in sub maximal speed in meters
MLESMX	Distance in backstroke in sub maximal speed (m)
MKRLAG	Distance in crawl at easy speed in meters
MLELAG	Distance in backstroke at easy speed in meters
MPRLAG	Distance in breaststroke at easy speed in meters
MDUEL	Time duration of duels in seconds
SIGVIS	Time duration with players more in seconds
SIGMAN	Time duration with players less in seconds
SUKUPNO	total time spent in play in seconds

The vertical component evaluation is performed over three indicators: Duel, defined as overweight load in the vertical phase, game with player more/less, defined as maximum load in the vertical phase of the game. The total time a player spent playing during the match was also recorded. Based on the directly measured variables, new variables were introduced relating to the intensity, frequency and time spent playing with the player more/less, the total number of actions and the total amount of distances in meters.

Table 2. Derived variables

FMXSMX=FKRMAX+FLEMAX+FKRSMAX+FLESMAX
Total of frequency units in crawl and backstroke in maximal and sub maximal
MMXSMX=MKRMAX+MLEMAX+MKRSMAX+ MLESMAX
Total distance in meters in crawl and backstroke at maximal and sub maximal
FLAGAN=FKRLAG+FLELAG+FPRLAG
Total frequency units in crawl, backstroke, and breaststroke at easy
MLAGAN=MKRLAG+MLELAG+MPRLAG
Total distance in meters in crawl, backstroke, and breaststroke at easy
FIGVM=FIGVIS+FIGMAN
Total frequency with players more or less during the quarter
SIGVM=SIGVIS+SIGMAN
Total seconds played with players more or less
FAKCIJA=FMXSMX+FLAG+FIGVM
Total frequency units of distances at sub maximal, maximal, and easy plus frequency with players more or less
METARA=MMXSMX+MLAGAN
Total distance in meters in maximal, sub maximal and easy intensities

Table 3. Variables retained for final analysis

FDUEL	Frequency of duels
MDUEL	Duration time of duels in seconds
SIGVM	Total seconds played with players more or less
SUKUPNO	Total time spent in play in seconds
FMXSMX	Total of frequency units in crawl and backstroke in maximal and sub maximal
MMXSMX	Total distance in meters in crawl and backstroke at maximal and sub maximal
FLAGAN	Total frequency units in crawl, backstroke, and breaststroke at easy
MLAGAN	Total distance in meters in crawl, backstroke, and breaststroke at easy
FIGVM	Total frequency with players more or less during the quarter
FAKCIJA	Total frequency units of distances at sub maximal, maximal, and easy plus frequency with players more or less
METARA	Total distance in meters in maximal, sub maximal and easy intensities

Data analysis

Statistics of all originally measured variables and 11 variables left in the final anaysis are calculated: arithmetic mean, standard deviation, skewness and kurtosis of all variables for the position of the guard and the wing in the game. Analysis of variance (ANOVA) was performed. An analysis of differences in z-scores for 11 variables retained was performed. The discriminatory canonical analysis was performed and the structure of the discriminatory function was calculated.

RESULTS

On the sample of 168 entities (quarters at the position of the guard in water polo), statistics of all originally measured variables (Table 4.) were calculated. Table 4. shows that variables FLEMAX, MLEMAX, and MLELAG are markedly moved from normal distribution due to their rare frequency in the game. The minimum results show that all directly measured variables have zero (0) results, which means they do not appear in each monitored quarter. The statistics of the groups of derived variables show a normal or approximate normal distribution. By the analysis of central and dispersion parameters it is possible to conclude that the guard in the game spends 272 seconds in the game per quarter or 18.13 minutes of pure play at the game. During that time a guard swimm, 665.56 meters total, of which 433.8 meters, with maximal and submaximal intensity i.e. 108.46 meters per quarter. With an easy intensity a guard swimm 231.7 meters or 57.9 meters per quarter. With a player more / less they play 32.5 seconds per quarter or 2.17 minutes throughout the game. In duels, the guard spend 20.1 seconds per quarter or a minute and twenty seconds throughout the game. At extremely high inensity in the vertical phase of the game guard spend 3.37 minutes. On average, in a quarter of a game, they spend 4.53 minutes of pure play.

On the sample of 115 entities (quarters at the position of the wing in the water polo), statistics of all originally measured variables (Table 5.) were calculated. Table 5. shows that variables FLEMAX, FLELAG, MLEMAX, MLESMAX and MLELAG are moved from normal distribution as a result of their rare frequency in the game. Other directly measured and derived variables have normal distribution. By analyzing the central and dispersion parameters it is possible to conclude that the wing in the game spends 339.19 seconds in play per quarter or 22.6 minutes of pure game total on the match. During that time, the wings swimms 818.88 meters in total, of which 520.8 meters with maximal and submaximal intensity i.e. 130.2 meters per quarter. With an easy intensity, the wing swimms 298.1 meters or 74.52 meters per quarter. In a play with player more /less they spends 42.21 seconds per quarter or 2.8 minutes throughout the game. In duels the wing spend only 6.05 seconds per quarter or 24.2 seconds overall during the whole match. At extremely high intensity in the vertical phase of the game wing spend 3.2 minutes throughout the game. On average, in a quarter of a game, they spend 5.67 minutes or 22.66 minutes of pure play during the entire game, which is slightly less than three-quarters of the total game duration.

Analysis of variance (ANOVA) was performed and z-scores for 11 variables retained were computed (Table 6.). Results indicate that all variables statistically significant differ the guard from wing at the significance level of 0,01.

The results of analysis of variance and the F-test at the significance level of 0,01 unequivocally indicate that the guards are defined and different from the wings by variables FDUEL and MDUEL. The wings are defined by variables FIGVM, FAKCIJA, SIGVM, SUKUPNO and FMXSMX. What distinguishes them but not that much as other variables are variables MMXSMX and MLAGAN, so it is possible to conclude that they are in common (Figure 1).

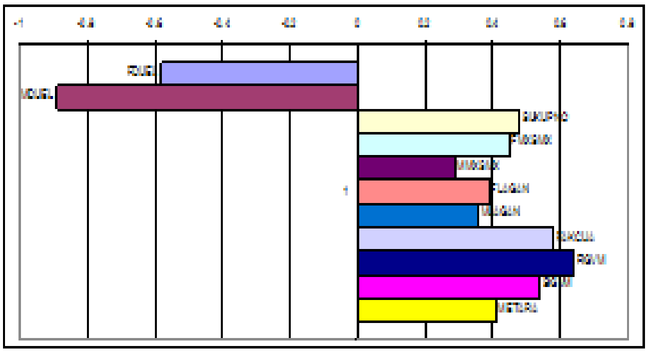

Figure 1. Differences between Guard and Wing (z – scores)

Table 4. Authentic measured variables - Descriptive Statistics for the position Guard

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Static	Static	Static	Static	Static	Static	Std. Error	Static	Std. Error
FKRMAX	168	0	13	2,5714	2,88413	1,591	0,187	2,319	0,373
FLEMAX	168	0	4	0,1786	0,48103	4,048	0,187	24,227	0,373
FKRSMAX	168	0	20	6,1429	4,3586	0,806	0,187	0,518	0,373
FLESMAX	168	0	5	0,4583	0,88807	2,334	0,187	5,957	0,373
FKRLAG	168	0	19	5,0476	4,01913	0,907	0,187	0,712	0,373
FLELAG	168	0	9	1,4286	1,77667	17,04	0,187	3,646	0,373
FPRLAG	168	0	7	1,2738	1,53093	1,464	0,187	1,865	0,373
FDUEL	168	0	9	2,8214	2,14259	0,586	0,187	-0,221	0,373
FIGVIS	168	0	5	0,9881	1,10518	1,074	0,187	0,687	0,373
FIGMAN	168	0	4	0,7202	0,85419	1,157	0,187	1,071	0,373
MKRMAX	168	0	191	28,4048	36,43914	2,14	0,187	4,894	0,373
MLEMAX	168	0	13	0,6071	1,7339	3,832	0,187	18,376	0,373
MKRSMAX	168	0	285	77,494	57,43468	0,818	0,187	0,53	0,373
MLESMAX	168	0	22	1,9524	4,19125	2,759	0,187	8,011	0,373
MKRLAG	168	0	166	45,1548	37,27194	0,819	0,187	0,084	0,373
MLELAG	168	0	58	6,7024	10,03441	2,57	0,187	8,579	0,373
MPRLAG	168	0	38	6,0714	7,39037	1,587	0,187	2,899	0,373
MDUEL	168	0	75	20,1071	16,94727	0,734	0,187	0,009	0,373
SIGVIS	168	0	106	14,8512	17,62029	1,513	0,187	3,661	0,373
SIGMAN	168	0	59	11,5417	14,22651	1,192	0,187	0,985	0,373
SUKUPNO	168	0	480	272,1131	147,83048	-0,236	0,187	-0,786	0,373
FMXSMX	168	0	28	9,3512	6,62796	0,674	0,187	-0,093	0,373
MMXSMX	168	0	379	108,4583	78,05164	0,876	0,187	0,771	0,373
FLAGAN	168	0	27	7,75	5,91128	0,839	0,187	0,448	0,373
MLAGAN	168	0	203	57,9286	44,62667	0,765	0,187	0,053	0,373
FAKCIJA	168	0	50	18,8095	11,19717	0,216	0,187	-0,346	0,373
METARA	168	0	474	166,3869	98,84082	0,291	0,187	-0,117	0,373

Table 5. Authentic measured variables - Descriptive Statistics – Wing

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Static	Static	Static	Static	Static	Static	Std. Error	Static	Std. Error
FKRMAX	115	0	17	3,4261	3,0466	1,535	0,226	3,114	0,447
FLEMAX	115	0	4	0,2435	0,72052	4,036	0,226	17,91	0,447
FKRSMAX	115	0	20	7,8435	4,2727	0,696	0,226	0,341	0,447
FLESMAX	115	0	6	0,9565	1,39165	1,53	0,226	1,649	0,447
FKRLAG	115	0	20	6,6087	3,93967	0,535	0,226	0,46	0,447
FLELAG	115	0	10	1,8696	1,96246	1,617	0,226	3,162	0,447
FPRLAG	115	0	12	1,6174	2,09671	2,107	0,226	5,96	0,447
FDUEL	115	0	10	1,5304	2,10397	2,01	0,226	4,338	0,447
FIGVIS	115	0	7	1,687	1,27984	0,838	0,226	1,419	0,447
FIGMAN	115	0	4	1,1739	0,97568	0,623	0,226	-0,028	0,447
MKRMAX	115	0	166	32,9913	31,76793	1,705	0,226	3,389	0,447
MLEMAX	115	0	20	0,7826	2,54014	5,183	0,226	32,801	0,447
MKRSMAX	115	0	265	92,687	52,13854	0,666	0,226	0,45	0,447
MLESMAX	115	0	25	3,7391	5,74164	1,789	0,226	2,825	0,447
MKRLAG	115	0	159	58,4348	39,59867	0,67	0,226	-0,243	0,447
MLELAG	115	0	51	7,9826	9,12869	1,957	0,226	4,933	0,447
MPRLAG	115	0	47	8,1043	9,92018	1,437	0,226	1,845	0,447
MDUEL	115	0	46	6,0522	9,06395	2,307	0,226	5,787	0,447
SIGVIS	115	0	69	24,5304	19,52655	0,492	0,226	-0,726	0,447
SIGMAN	115	0	77	17,6783	17,25787	0,931	0,226	0,751	0,447
SUKUPNO	115	71	480	339,1913	117,55483	-0,338	0,226	-1,008	0,447
FMXSMX	115	0	42	12,4696	6,98284	1,037	0,226	2,076	0,447
MMXSMX	115	0	345	130,2	65,42281	0,678	0,226	0,579	0,447
FLAGAN	115	0	29	10,0957	5,79923	0,641	0,226	0,291	0,447
MLAGAN	115	0	199	74,5217	46,53038	0,562	0,226	-0,33	0,447
FAKCIJA	115	6	73	25,4261	10,57808	0,949	0,226	2,595	0,447
METARA	115	33	441	204,7217	79,46461	0,495	0,226	0,229	0,447

Table 6. Statistic, Analysis of variance (F-test), difference between Wing and Guard compute on z-scores

	GUARD						WING									
	MIN	MAX	MEAN	S.D.	A_3	A_4	MIN	MAX	MEAN	S.D.	A_3	A_4	Wilks	F-test	p	z
FDUEL	0	10	1,53	2,1	2,01	4,34	0	9	2,82	2,14	0,59	-0,22	0,92	25,15	0	-0,58
MDUEL	0	46	6,05	9,06	2,31	5,79	0	75	20,11	16,95	0,73	0,01	0,81	66,1	0	-0,89
SUKUPNO	71	480	339,19	117,55	-0,34	-1,01	0	480	272,11	147,83	-0,24	-0,79	0,94	16,52	0	0,48
FMXSMX	0	42	12,47	6,98	1,04	2,08	0	28	9,35	6,63	0,67	-0,09	0,95	14,47	0	0,45
MMXSMX	0	345	130,2	65,42	0,68	0,58	0	379	108,46	78,05	0,88	0,77	0,98	6,02	0,015	0,29
FLAGAN	0	29	10,1	5,8	0,64	0,29	0	27	7,75	5,91	0,84	0,45	0,96	10,91	0,001	0,39
MLAGAN	0	199	74,52	46,53	0,56	-0,33	0	203	57,93	44,63	0,77	0,05	0,97	9,12	0,003	0,36
FAKCIJA	6	73	25,43	10,58	0,95	2,6	0	50	18,81	11,2	0,22	-0,35	0,92	24,93	0	0,58
FIGVM	0	9	2,86	1,78	0,62	0,29	0	7	1,71	1,65	0,91	0,43	0,9	31,29	0	0,64
SIGVM	0	144	42,21	29,79	0,68	0,15	0	129	26,39	26,89	1,14	1,52	0,93	21,63	0	0,54
METARA	33	441	204,73	79,46	0,5	0,23	0	474	166,39	98,84	0,29	-0,12	0,96	11,99	0,001	0,41
	N=168						N=115									

Table 7. Significance of canonic discrimination function

Testof Function (s)	Eigen value	% of Variance	Canonical R	Wilks' Lambda	Chi-square	Detemination R2	df	Sig,
1	0,624	100	0,613	0,624	130,567	0,3177	9	0,00

Table 8. Structure of discrimination function

Variables	Function 1
MDUEL	0,624
FIGVM	-0,430
FDUEL	0,385
FAKCIJA	-0,383
SIGVM	-0,357
SUKUPNO	-0,312
FMXSMX	-0,292
METARA	-0,266
FLAGAN	-0,254
MLAGAN	-0,232
MMXSMX	-0,188

A canonical discriminative analysis is performed (Table 7.). Results are showing that one discriminant function significantly differs guards and wings at the significance level of 0,01. The eigenvalue of 0.624 indicates that the amount of variance that one set of variables shares with the canonical component obtained from that set and determines how many original variables explain the given canonical component. The coefficient of canonical correlation represents the maximum possible correlation of two sets of variables. In our case it is high and the sums (0, 613). If the p value is less than 0.05 it can be concluded that the discriminatory function has clearly explained the affiliation of the group which is certainly concluded in our case.

The matrix of the discrimination structure is calculated (Table 8.) which explains the correlation between each variable in the model and the discriminatory function. The results of the discriminatory canonical analysis confirm the results obtained by the analysis of variance. From the matrix of the structure of discriminating function six variables (MDUEL, FIGVM, FDUEL, FAKCIJA, SIGVM and SUKUPNO) all with coefficients greater than 0,30 define guard (MDUEL with coefficient of participation (0,624) and FDUEL, with coefficient of participation (0,385)) i.e. vertical component in its game, thus distinguishing it from the wing defined by the negative number sign (FIGVM, with coefficient of participation (-0,430), FAKCIJA (-0,383), SIGVM (-0,357) and SUKUPNO with coefficient of participation (-0,312). Following this wing game is defined and distinguished from guard game by frequency of the action that is conditioned by the total time spent in the game as well as the game with player more/less that is again conditioned by the more time spent in the immediate play.

CONCLUSION

The representative sample of the entities in this study is made up of 283 water polo quarters. According to the propositions, the water polo game consists of four quarts per eight minutes of pure game, i.e. about 17 minutes of real time per quarter. Every quarter starts equally, swiming at ball that referee throw in at center of the playing field, and ending with the sound signal from the court table at the end of time. That is why one quarter can be treated as a closed whole, and in the methodological sense it is justified to use it as a measurement entity and source of information. The sample of variables consisted of 21 originally measured variables and 8 derived. Basic statistics were calculated on all variables. After the analysis of central and dispersion parameters, primary interpretations were performed. For the final analysis 11 variables with normal or approximate normal distribution were retained. The aim of this study was to determine whether the structure of the movement in the vertical and horizontal phase during the game in situational conditions with regard to methods, intensity, frequency and time, as equivalent for effort in the game, is possible to determine the differences between the players who perform various tasks in the game defined by role of wing and guard was achieved. The results of the analysis confirmed that by measuring the events in situ conditions, in relation to the vertical and horizontal phases of the game, movements, intensity, frequency and time as the equivalent of the load in the game, was possible to register and determine the differences in the game (role) of the wing and the guard in the water polo, which is also the confirmation of H1 set out in this paper. What defines and differs guard from the wing is: frequency of duel and time spent in the duels during the match. It is possible to conclude that what defines a guard is the high level of intensity of the work in the vertical phase of the game through the overweight load (duels), which is also confirmes the H2 set in this work. What defines and differ a wing from the guard is: frequency of play with an uneven number of players (player less /more), frequency of action, time spent playing with an uneven number of players and the total time spent in the game. The obtained results have confirmed H3 set out in this paper. Where does the wing and the guard do not differ is in the frequency of the maximal and submaximal swimmed distances, the total amount of the swimmed distances in meters expressed through frequency and meters of easy swimming and meters swimmed with maximal and submaximal intensity. The results of this work will contribute to the theoretical explanation of this otherwise less elaborate and explained area of top sports and will be a basic information for the practical approach to water polo coaches in work with the guards and wings.

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