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Original Article

The influence of technical and tactical elements of water polo on victory and defeat in Champions League matches

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Abstract
Intoduction. Water polo is team, contact sport played in the swimming pool with a ball. It is characterized by dynamism, specific type of swimming in all directions, changing body position in the water, ball handling, passing and shooting at the goal and by unpredictable situations in the defense and attack phase. Game-related statistics are an integral part of water polo match analyses. They enable a special insight into reasons for winning or losing by comparing specific game parameters. *The aim of this research* is to determine the relationship between the technical and tactical parameters in regards to the results of the preliminary and final matches of the Champions League in water polo in the 2021 season. In view of that, the research also aims to clarify the relationship between the winning and losing teams in the preliminary and final stages of the competition. *Methods.* The sample used includes the analysis of 56 water polo games played within 14 rounds of the preliminary part of the league, and 12 games of the final F8 tournament in Belgrade. A total of 32 technical and tactical variables related to defense and attack were analyzed. They were obtained from the official statistical match reports. *Results*. Based on the descriptive statistic, manova and canonical discriminant analyses of water polo segments, seven variables from the model were found to be significant for winning a match in the Champions League of the 2020/21 season (total shot score, total shot %, extra player goal %, blocked shots, counterattack score, counterattack shoot and sprint), while the leading parameters were blocked shots and 20-second player exclusion in the center position. *Conclusion*. In this research, we determined that the outcome of a match can be scientifically explained with 91.9% accuracy, based on technical and tactical indicators.
Keywords: Champion league, technical elements, tactical elements, game statistics, performance, waterpolo

Introduction

Water polo is an acyclic team and contact sport played in the swimming pool with a ball, in which the winner is determined based on the total number of goals scored. Official water polo games are defined by rules, which may be adjusted in order to make the game more appealing for spectators. Water polo is characterized by dynamic actions, freestyle swimming in all directions, changes of body position in the water, ball handling, passing and shooting at the goal, and unpredictable situations in both defense and attack phase (Markovic & Milosevic, 2022 ; Markovic, 2019).

The game is played by six players and a goalkeeper on either side. During the game, the players perform various tasks in both attack and defense phase. Every player in both teams assumes the role primarily intended for him, however, during the game he may also take other roles, depending on specific situations or coach decision. Positions in water polo are center, winger (left and right), back, outside forward (left and right), and goalkeeper. Each of these positions requires specific morphological and motor characteristics (Lozovina et al., 2009).

Water polo is the oldest team sport in the history of the modern Olympic Games. It has been regularly included in the program of the Olympic Games since 1900. According to William Wilson (1876), who drafted the first rules, water polo is a rough sport in which technique and the rules are of secondary importance. Still, frequent rule changes increased game tempo, which made water polo appealing for spectators (Lozovina et al., 2009). Modern water polo is characterized by fast counterattacks, strong and precise shots towards the goal, and firm contact that requires good technical-tactical preparation and psychomotor skills of the players (Hraste et al., 2013). Relatively few studies have focused on the game analysis characteristics of water polo. Academic interest in the sport has been growing, however, as reflected by a large number of »notational water polo analyses« in recent years (Lupo et al., 2012 ; Özkolet al., 2013). The main objective of a match analysis is to identify the strengths and weaknesses of teams in order to improve their performance (Ordonez et al., 2016 ; Lupo et al., 2014).

Technical and tactical playing aspects are included in these analyses through game-related statistics, which are mainly based on frequencies and effectiveness percentages (Lozovina et al., 2009). Game analysis in team sports enables the assessment of basic individual and team characteristics, helping the coaching team to

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improve the training plan (Hatzimanouil et al., 2017). Game analyses may be used in research that aims to establish the predictors of competitive success (Zaric et al., 2021), for both teams and individuals.

Systematic monitoring and statistical analysis of the game helped the development of research in sports (Noutos et al., 2019; Zaric et al., 2021). Recent research on this topic has focused on analysing the differences in game statistics between winning and losing teams in terms of championship standard (Agudo et al., 2009), and game dynamic involving changes in speed and tempo (Stojmenovic et al.,2023), play situations (Lupo et al., 2012), types of shot (Vila et al., 2011), and championship phase (Escalante et al., 2013). Certain water polo factors were studied from the perspectives of physiology (Botonis et al., 2019) or notational analysis (Lupo et al., 2012). A few recent studies focused exclusively on field players, considering differences in the final score and the connection with specific situations, counterattack, power-play, and transition (Lupo et al., 2012). The variables analysed in those studies focused on attack, omitting goalkeeper-related statistics, which is significant in determining winning and losing in semi-finals and medal games in official competitions for men (Escalante et al., 2013).

Motor skills help in evaluating physical activity (Gadzic & Nikolic, 2020; Milosevic et al., 2021). Winning teams have better motor ability, better field dynamics, faster swimmers, and score a large number of goals from counter attacks (Mirvic et al., 2014).

Game-related statistics can be used to differentiate between winning and losing teams in each phase of international competitions (Trivun et al., 2019). The differentiating variables are both offensive and defensive, including action shots, sprints, goalkeeper-blocked shots, and goalkeeper-blocked action shots. However, a number of discriminatory variables decrease as the competition phase becomes more demanding and the teams become more equally matched (Escalante et al., 2013).

The differences between winning and losing men's teams can be in both defense and offense. In men's games, passing (assists), aggressive play (exclusions), centre position effectiveness (centre shots), and goalkeeper defence (goalkeeper-blocked shots from 5m) prevailed, and the most discriminated performance was goalkeeper-blocked shots (Escalante et al., 2011).

Winning teams were found to differ from losing teams in seven (offensive and defensive) variables in close games: 16 in lopsided games and 11 in highly lopsided games. In all three types of games, the statistical reliability related to the game is 85% or higher, with two variables determining the outcome of the game: shots and blocked shots by the goalkeeper (Saavedra et al., 2014).

In relation to these statistical examinations, this study aims to analyze the technical-tactical parameters of the LEN Champions League 2020-21 matches, and to identify offensive and defensive variables that influence winner prediction in a water polo match.

Materials and Methods

Participation

The research analyzed a sample of 68 mean water polo Champions League matches in the 2020/21 season. The sample includes the analysis of 56 water polo matches played within 14 rounds of the preliminary part of the league and 12 matches of the final F8 tournament in Belgrade that took place in June 2021. Data was retrieved from the official website "LEN Champions League" (the page contains statistical data from the Champions League in water polo for men).

Sample of variables

The sample of **predictors variables** was based on certain segments of the water polo game for men players in both offensive and defensive stages. These were: Total - goals statistics, % Total - total goal efficiency; A - Action Shoot, % A- Action shoot efficiency; C - Centre Shoot, % C- Centre shoot efficiency; X - Extra player shoot, %X - Extra player shoot efficiency ; 6m- 6 m shoot, %6m- 6m shoot efficiency; PS– Penalty shoot, % PS- Penalty shoot efficiency; CA - counter attack, % CA- Counter attack efficiency ; PSO- Penalty shoot out ; AS- Assistens ; TF- Turnover fouls ; ST- Steals ; BL- Blocked shots ; SP- Sprint (won/sprints); 20 C- 20 seconds exclusion in the centre position ; 20F - 20 second exclusion in the field ; 2 EX- Double exclusion; P- Penalty foul; EX- Exclusion, 4EX- 4 minutes exclusion. The sample of variables was taken from the official website "LEN Champions League" for season 2020/21, and percentage efficiency was calculated based on them.

The **criterion variables** were victory and defeat, as well as the competition stage in which the match was played. In total, 56 games of the preliminary part and 12 games of the final part of the competition were analyzed.

Statistic analysis

The analysis of this research was based on scores percentage which was calculated for TOTAL % , A%, C %, X %, 6m %, PS %, CA %. Descriptive statistical analysis, multiple analyses of variance, and canonical discrimination analysis were performed on the collected data using the SPSS 20 software.

Results

The results of the descriptive statistical analysis were performed at the level of the subsample of matches according to victory and defeat (Tables 1 and 2), as well as according to the stage of the competition (Tables 3 and 4).

Table 1. Descriptive statistics and MANOVA of attacking indicators for subsamples according to match outcome

	WIN				LOSE				MANOVA	
	Min	Max	Mean	Std. D	Min	Max	Mean	Std. D	F (3,135)	Sig.
TOTAL score	2.0	13.0	7.8	2.5	6.0	22.0	12.2	3.2	49.97	0.00
TOTAL shoot	16.0	35.0	27.1	4.2	21.0	36.0	29.3	3.9	4.87	0.03
%	9.1	47.8	29.0	9.6	25.0	67.9	41.8	9.9	34.47	0.00
A score	0.0	5.0	2.1	1.3	0.0	9.0	3.1	1.6	12.20	0.00
A shoot	3.0	18.0	9.0	3.1	3.0	20.0	9.8	3.6	0.32	0.57
A%	0.0	66.7	24.5	15.9	0.0	66.7	32.4	13.9	8.11	0.01
C score	0.0	4.0	0.6	0.8	0.0	6.0	1.2	1.2	6.08	0.01
C shoot	0.0	7.0	1.9	1.6	0.0	13.0	2.8	1.9	5.75	0.02
C%	0.0	100.0	30.5	39.5	0.0	100.0	40.5	33.6	1.63	0.20
X score	0.0	7.0	3.3	1.8	1.0	7.0	4.4	1.6	3.48	0.06
X shoot	4.0	16.0	8.4	2.6	3.0	14.0	8.0	2.6	2.72	0.10
X%	0.0	83.3	39.0	18.5	9.1	100.0	57.1	19.2	12.83	0.00
6m score	0.0	4.0	0.8	1.0	0.0	5.0	1.5	1.4	7.61	0.01
6m shoot	1.0	15.0	6.4	3.2	1.0	14.0	6.3	2.9	0.05	0.83
6m %	0.0	100.0	13.8	18.4	0.0	100.0	22.5	19.6	3.77	0.05
PS score	0.0	3.0	0.6	0.8	0.0	4.0	0.9	0.9	2.32	0.13
PS shoot	0.0	4.0	0.8	0.9	0.0	4.0	1.1	1.0	0.64	0.42
PS%	0.0	100.0	40.8	47.7	0.0	100.0	61.6	47.2	3.21	0.08
CA score	0.0	2.0	0.3	0.6	0.0	6.0	1.1	1.4	20.69	0.00
CA shoot	0.0	3.0	0.5	0.7	0.0	8.0	1.5	1.8	19.42	0.00
CA%	0.0	100.0	23.0	41.1	0.0	100.0	44.5	44.8	4.36	0.04
AS	0.0	5.0	1.7	1.3	0.0	7.0	2.7	1.6	8.46	0.00

The results of the descriptive statistical analysis of offense indicators for subsamples according to match outcome (Table 1) showed homogeneity only in the Total shots, while C score, 6m score, PS score, CA score (at most), CA shot and CA% stand out in their heterogeneity for both the subsample of the winner and the defeated. Significant difference between these two groups of subsamples tested by MANOVA (Table 1) is reflected in the following variables: TOTAL score, TOTAL shoot, TOTAL %, A score, A%, C score, C shoot, X %, 6m score and 6m %.

Table 2. Descriptive statistics and MANOVA of defensive indicators for subsamples according to match outcome

	WIN				LOSE				MANOVA	
	Min	Max	Mean	Std. D	Min	Max	Mean	Std. D	F (3,135)	Sig.
TF	0.0	7.0	3.2	1.7	1.0	10.0	4.1	1.8	1.61	0.21
ST	1.0	12.0	4.1	2.3	0.0	16.0	5.9	3.6	7.14	0.01
BL	0.0	7.0	2.5	1.6	0.0	9.0	3.9	2.0	27.76	0.00
SP	0.0	5.0	1.6	1.4	0.0	4.0	2.5	1.4	14.62	0.00
20C	3.0	13.0	7.1	2.2	1.0	14.0	7.5	2.6	3.71	0.06
20F	0.0	8.0	3.2	2.0	0.0	9.0	3.5	2.2	0.00	0.97
2EX	0.0	4.0	0.1	0.5	0.0	1.0	0.1	0.3	1.83	0.18
P	0.0	4.0	1.1	1.0	0.0	4.0	0.8	0.9	2.10	0.15
EX	0.0	3.0	1.0	0.9	0.0	3.0	1.1	1.0	0.87	0.35
4EX	0.0	2.0	0.0	0.2	0.0	0.0	0.0	0.0	0.21	0.65

The results of descriptive statistical analysis of defensive indicators for subsamples according to match outcome (Table 2) indicated heterogeneity of all variables (at most 2 EX) for the subsample of winners and defeated.

A significant difference between these two groups of subsamples tested by MANOVA (Table 2) is reflected in the following variables: ST, BL and SP.

Table 3. Descriptive statistics and MANOVA of attacking indicators for subsamples by stage of competition

	Preliminars				Finals				MANOVA	
	Min	Max	Mean	Std. D	Min	Max	Mean	Std. D	F (3,135)	Sig.
TOTAL score	2.00	19.00	9.62	3.56	6.00	22.00	11.67	3.67	10.50	0.00
TOTAL shoot	16.00	36.00	27.82	4.22	22.00	36.00	29.88	3.69	5.20	0.02
TOTAL %	9.09	67.86	34.60	11.61	21.43	63.64	39.07	11.08	4.23	0.04
A score	0.00	9.00	2.63	1.56	0.00	7.00	2.54	1.61	0.06	0.80
A shoot	3.00	20.00	9.64	3.40	3.00	15.00	8.38	2.79	2.91	0.09
A%	0.00	66.67	27.69	14.78	0.00	66.67	31.89	17.95	1.56	0.21
C score	0.00	6.00	0.93	1.05	0.00	4.00	0.92	1.14	0.00	0.96
C shoot	0.00	13.00	2.38	1.81	0.00	7.00	2.38	1.88	0.00	0.98
C%	0.00	100.00	35.92	37.32	0.00	100.00	33.49	35.33	0.09	0.77
X score	0.00	7.00	3.65	1.65	2.00	7.00	4.63	1.93	7.23	0.01
X shoot	3.00	16.00	7.88	2.58	5.00	14.00	9.67	2.22	9.95	0.00
X%	0.00	100.00	47.79	20.81	18.18	100.00	49.19	21.42	0.11	0.74
6m score	0.00	5.00	1.17	1.30	0.00	3.00	1.25	1.15	0.08	0.77
6m shoot	1.00	15.00	6.29	3.15	1.00	12.00	6.42	2.59	0.03	0.86
6m %	0.00	100.00	18.24	20.20	0.00	40.00	17.69	15.78	0.02	0.90
PS score	0.00	4.00	0.72	0.83	0.00	3.00	0.96	1.04	1.47	0.23
PS shoot	0.00	4.00	0.90	0.93	0.00	3.00	1.08	1.02	0.74	0.39
PS%	0.00	100.00	49.70	48.07	0.00	100.00	58.33	50.36	0.65	0.42
CA score	0.00	5.00	0.54	0.90	0.00	6.00	1.38	1.64	14.23	0.00
CA shoot	0.00	5.00	0.79	1.18	0.00	8.00	1.96	2.18	15.69	0.00
CA %	0.00	100.00	30.21	43.55	0.00	100.00	50.51	44.05	4.49	0.04
AS	0.00	6.00	1.96	1.42	0.00	7.00	3.33	1.55	19.64	0.00

The results of descriptive statistical analysis of the offense indicators for subsamples by stage of competition (Table 3) indicate considerable heterogeneity of the following processed variables: C score, C%, 6m score, 6m%, PS score, PS shot, CA score, CA shot and CA% for both subsamples (preliminary and final part). Again, the homogenous variable is only Total shot. Significant difference between two stages of competition subsamples is reflected in the following variables: TOTAL score, TOTAL shoot, TOTAL %, X score, X shoot, CA score, CA shoot, CA% and AS (Table 3).

Table 4. Descriptive statistics and MANOVA of defensive indicators for subsamples by stage of competition

	Preliminarns				Finals				MANOVA	
	Min	Max	Mean	Std. D	Min	Max	Mean	Std. D	F (3,135)	Sig.
TF	0.00	10.00	3.62	1.82	0.00	7.00	3.75	1.87	0.11	0.74
ST	0.00	16.00	5.22	3.27	1.00	10.00	3.88	2.15	4.03	0.05
BL	0.00	9.00	3.06	1.83	1.00	9.00	3.88	2.19	4.36	0.04
SP	0.00	5.00	2.06	1.48	0.00	4.00	2.00	1.35	0.04	0.84
20C	1.00	14.00	7.19	2.41	4.00	12.00	7.83	2.48	1.44	0.23
20F	0.00	9.00	3.15	2.10	2.00	7.00	4.38	1.76	7.05	0.01
2EX	0.00	1.00	0.05	0.23	0.00	4.00	0.29	0.86	6.64	0.01
P	0.00	4.00	0.90	0.92	0.00	4.00	1.21	1.18	2.02	0.16
EX	0.00	3.00	0.96	0.87	0.00	3.00	1.50	1.10	6.91	0.01
4EX	0.00	2.00	0.02	0.19	0.00	0.00	0.00	0.00	0.21	0.65

The results of descriptive statistical analysis of defensive indicators for subsamples by competition stage (Table 4) are also indicative of the heterogeneity of all the processed variables (at most 2 EX). Significant difference between these two subsamples (Table 4) is reflected in the following variables: ST, BL, 20F, EX and 2EX. Performed MANOVA also showed the existence of two significant interactions of the competition phase and match outcome on BL (Figure 1) and 20C (Figure 2).

Figure 1. Interaction of competition phase and match outcome factors on BL

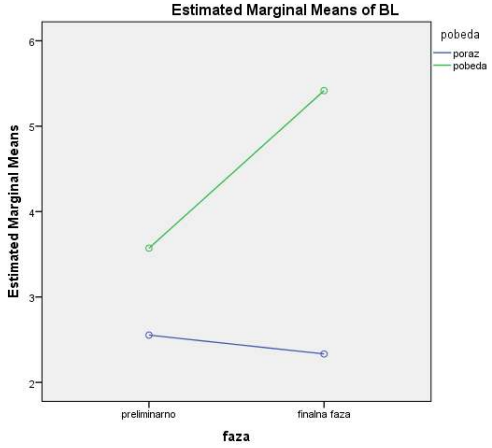
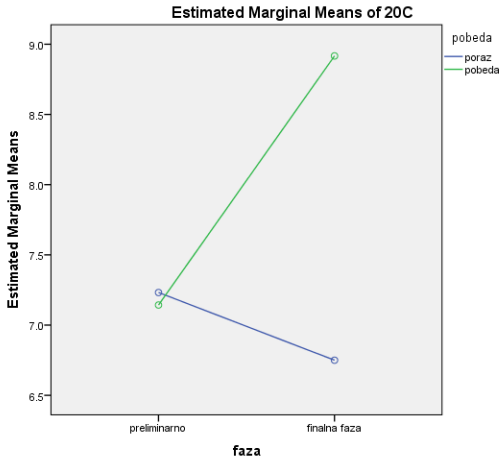


Figure 2. Interaction of competition phase and match outcome factors on 20C



The results of the canonical discriminative analysis show the existence of a statistically significant ($p<0.001$) discriminative function. The expressiveness of the difference between the groups on the discriminative function is also significant (Table 5).

Table 5. Significance of the discriminant function and canonical correlation

Wilks' Lambda	Chi-square	Df	Sig	Canonic correlation
.412	104.609	32	.000	.767

The structure of the discriminative function shows that the discriminative function is determined by seven variables that correlate with the function with coefficients whose absolute value is greater than 0.3 (Table 5). The most significant variables for the discrimination of winners and losers according to the results of the analysis are TOTAL score, TOTAL %, X%, with the fact that the correlation of P %, X shoot, 4EX, 2EX, 6m shots with the negative discriminative function.

Table 6. Matrix structure of the discriminative function

	Discriminative function
TOTAL score	.648
TOTAL %	.552
X%	.405
BL	.326
CA score	.305
CA shoot	.303

SP	.302
A score	.288
AS	.272
X score	.270
ST	.256
CA score	.255
6m score	.248
TOTAL shoot	.234
A%	.223
C%	.211
C shoot	.210
TF	.198
6m %	.191
PS%	.185
PS score	.159
P %	-.155
PS shoot	.126
C%	.114
A shoot	.095
X shoot	-.074
4EX	-.072
20F	.059
20C	.054
EX	.046
2EX	-.044
6m shoot	-.010

The results of the canonical discriminant analysis (Table 7) show that, based on the discriminative function, 91.9% of match outcomes can be correctly classified into home group acording to the team match statistics.

Table 7. Prediction of group membership based on the discriminant function

			Predicted Group Membership		
			lose	win	Total
Original	Count	lose	64	4	68
		win	7	61	68
	%	lose	94.1	5.9	100.0
		Win	10.3	89.7	100.0

Discussion

Success in water polo is influenced by many important factors, such as physiological, physical, biomechanical, technical, tactical and anthropometric factors (Lozovina et al., 2009). The statistical data related to the water polo game helps coaches to better prepare for matches by improving themselves and technical-tactical qualities of the players (Escalante et al., 2013).

In this research, according to the criterion of the competition level on offense, the teams showed homogeneity in shooting (in the final phase there is better homogeneity and less heterogeneity), which indicated a higher quality and efficiency on offense during the final phase of the competition. Heterogeneity was present in almost all offense (highest CA score) and defense variables (highest 2EX), which shows that all teams (winners and losers) differ tactically in relation to the implementation of counterattacks and the number of exclusions in 20 seconds. Statistical differences in play existed in both winning and losing men's teams, particularly in defense in the following situations: exclusion and defense of penalties, and in attack (shots from the center position and in game assists) (Escalante et al., 2011).

Our research showed that significant differences in the preliminary and final stages of the competition were found in the following offense parameters: total shots, goals scored from an action, from the center, from 6m and with a player more. This indicates a different organization and realization of the attack, while the defense parameters are significantly different variables, such as steals, blocked lines and swimming efficiency, indicating different defensive aggressiveness and swimming skills in the initial sprint in the first quarter of a match. In other research, Escalante et al. (2013) found that game-related statistics differ between winning and losing teams in each phase of the international championship, on offense (goals from the center, counterattack goals, assists, sprints won) and defense (blocked shots from players and goalkeepers, steals balls, and saved penalties).

On the other hand, in this research, significant heterogeneity of the attack variables in both phases of the competition shows the difference in players position and the penalties achieved on offense. This was also confirmed in the research by Saavedra et al. (2016), who determined that penalty goals differentiate between winners and losers in close matches. The only homogeneous parameter in the final phase of our research is the number of total shots on goal and shots with an extra player, which shows that this is a decisive parameter for victory in this phase of the competition. The parameters that best distinguished the seasons were counterattacks and shots from the center position (Inglesias et al., 2016). This indicates a trend towards fast-paced games and a greater importance of the center position.

The results of this research show that the biggest difference on offense between the preliminary and the final phase of the competition was in the parameters of attempts and realization of total shots. In addition, a marked difference was noticed in shots with an extra player and shots from the counterattack. The homogeneity of the group of parameters on offense increased with the level of the competition (the ratio of preliminary and final games in attack phase is 80/69). In regard to defensive variables, the heterogeneity of the processed variables was the highest in the variable double exclusion, and the homogeneity in the variable 20C. This shows that the number of exclusions was different and the exclusion in the center as a tactical parameter was the same in both competitive phases. The biggest difference of the defense in favor of the final compared to the preliminary stage of the competition was in the parameters ST, BL, 20F, EX and 2EX, which shows a more aggressive and efficient defensive game. The values of all the parameters were significantly higher in the preliminary phase, which means that the teams in the final phase were more uniform and showed a higher quality of play (the ratio of preliminary and final games on defense was 111/85). Lupo et al. (2012) showed that the level of competition affects different quality of technical-tactical indicators, especially in uncertain matches, counterattacks and difficult shots. Here the winners performed better in faster actions, with more efficient passes that led to goals (Lupo et al., 2014). While Garcia et al. (2015) concluded that the winners have significantly better counterattacks and shots (from zones 5 and 6, next to and in front of the goal), while the defeated had fewer attacks and long-distance shots.

Significant difference between the preliminary and final level of the 2020/21 Champions League competition on offense tested by MANOVA was reflected in the following variables: the number of total shots and goals with the player up, from counterattacks and assists, including the following defensive phase action: steals, blocked shots, halftime shootouts, shootouts and double shootouts. This shows a different implementation of the attack and the aggressiveness of the defense, which points to two key components that determine the outcome of the game: counterattack efficiency (higher ranked teams score more goals) and teams' ability to defend with a player less (better teams are more successful in defending the goal).

In addition to numerous significant differences in the factor of victory and defeat. as well as a particular competition stage (Tables 1, 2, 3, 4), MANOVA also showed the existence of two very significant interactions: BL and 20C. In the preliminary phase, the number of blocks and exclusions in the central position was similar for the losers and the winners, which shows uniformity in the offensive and defensive tactics, while the ratio increased drastically in favor of the winning teams in the final phase of the competition. This indicates a greater defensive aggressiveness in the center of the opponent (the key was in defensive efficiency) and a greater number of blocking players on offense (the key for reducing the efficiency of the attacker's shot attempt and winning the ball) in this phase of the competition. In the research Saavedra et al. (2020), ten variables distinguished winning and losing teams (ES $\geq$ 0.80): four of them were related to shooting efficiency, three to goalkeeping efficiency, and three to other actions, and the decision Tree correctly classified 83.9% of teams with GB shots variables, action goals, time-outs and steals.

The results of the canonical discriminant analysis show the existence of a statistically significant ($p<0.001$) discriminative function, while the difference between the groups in terms of the discriminative function was pronounced (Table 5). The structure of the discriminant function shows that the discriminant function is determined by several variables that are most significant for the discrimination between winners and defeated. According to the results of the discriminant function in this research, the winners are determined by the following variables: TOTAL score, TOTAL %, X %, BL, CA score, CA shot and SP. The defeated, on the other hand, are determined by these variables: P%, X shots, 6m shot, 2EX and 4EX with the negative discriminant function (Table 6). In the research by Trivun et al. (2019), the winners were more dominant in almost all variants related to shooting efficiency. They had a more efficient goalkeeper, more blocked shots, efficient use of more players, and successful swimming for the ball. Statistically significant differences in the variables were not found in the following categories: lost balls, shots from 5 meters and the total number of fouls in the game.

The results of the canonical discriminant analysis of the survey (Table 7) show that, based on the discriminant function, the outcome of 91.9% of matches can be accurately determined. The performance in all phases was researched by Escalante et al. (2013), relying on the analysis of the in-game statistics (preliminary, qualifying and final), which can also be predicted with high percentages (91, 90 and 73%).

Conclusion

Water polo match statistics are crucial for the analysis of the matches played and the preparation of each subsequent match. Based on the defensive and offensive parameters, we can evaluate the performance of

the whole team and individual players, and accurately determine crucial statistical factors for the outcome of matches. Therefore, the question arises: how accurately can the winning and losing teams be classified based on the indicators of the game?

This research showed that the key difference on offense between winners and losers was the effectiveness of shots from different positions (Table 1). Better defense is characterized by more balls won and blocked shots (Table 2).

The biggest differences in the offense parameters between the preliminary and final stages of the 2020/21 Champions League competition are in the following categories (Table 3): total shots, shots with more players and counterattack efficiency, with the following categories in defense (Table 4): steals, shot blocks and exclusion number, which shows a more aggressive and efficient game in defense and offense in the final phase of a match.

The structure of the discriminative function (table 6) determines several variables that are most significant for the winner (Total score, Tatal %, X%, BL, CA score, CA shot and SP), and for the defeated (P%, X shot, 6m shot, 2EX and 4EX). In the conclusion of the research by Lupo et al. (2012), the winner showed a better ability to perform faster actions, with more efficient passes that led to more goals.

The performed MANOVA also showed the existence of two significant interactions between the competition phase and the outcome of a match, which is an important conclusion of this research. Two highly significant factors were indicated as contributing to victory and/or defeat in different phases of the competition: shot blocks and player exclusion in the center position. It is also concluded that, with the help of the results of canonical discrimination analysis and based on game indicators, we can determine the key factors for the outcome of games with an accuracy of 91.9% (Table 7).

The results of this research emphasize the crucial parameters for winning water polo matches, which can help coaches to create a more efficient training process.

Conflict of interest

There is no conflict of interest with any person, company, or institution.

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