Journal of Physical Education and Sport ® (JPES), 17(3), Art 194, pp. 1966 - 1969., 2017
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Determination of technical actions that differentiate winning from losing teams in woman's handball

ALEXIS KARASTERGIOS[1], VASILIS SKANDALIS[2], ILIAS ZAPARTIDIS[1], DIMITRIS HATZIMANOUIL[3]
[1]School of Physical Education and Sports Science, National and Kapodistrian University of Athens, GREECE
[2] Physical Education Teacher
[3] School of Physical Education and Sports Sciences, Aristotle University of Thessaloniki, GREECE

Published online: September 30, 2017
*(*Accepted for publication September 09, 2017
DOI:10.7752/jpes.2017.03194

Abstract:
The aim of this study, was to determine and explain the differences between winning and defeated A1 handball women's teams, based on the analysis of the final offensive and technical errors during games that ended up to three goals difference. Through the Mann-Whitney U test, between 20 matches, the main results are as follows: The winning teams showed a larger total number of throws, with more throws from 9m, and lateral side, more penetrations and more counterattacks. The final effectiveness of the goalkeepers of the winning teams differed significantly ($p < .001$) from those of the losing teams. Winning goalkeepers had an average of 1.8 more saves per match. The winning teams performed on average significantly more fouls than the losers ($p = .02$), recording 8.6 more per match. In addition, the winning teams made significant ($p = .03$) less breaches of regulations that change the possession of the ball, with losers registering an average of 2.2 more offenses per match. The defending actions (fouls), technical mistakes, and overall performance of the goalkeeper appear to be the main factors that separate the winners from the losers in women's matches between equal opponents.
Key words: physical condition, primary school children, physical education.

Introduction

A game's analysis and also individual players' actions analyses, is a research field that plays a very significant role at the statistical analysis of a game. This kind of analyses, provide players, with the necessary feedback so for the games as for the trainings, as well (Taylor *et al.*, 2004). Descriptive – statistical analysis, allows the comprehension of the relations among these factors that can lead to victory, providing a better perception of the outcome and the requirements of the game (Volossovitch, 2005). According to this, game's analysis provides with the evaluation ability of the basic individual and group characteristics of the team and helps the coach to interfere by comprehending advantages and disadvantages and consequently to amplify the training plan (Meletakos *et al.*, 2011; Ferrari *et al.*, 2014). Furthermore, in order to amplify the understanding of the game, an analysis that will allow us to comprehend better the relationship among different factors of the game is necessary, making , this way , the relation between the δυναμική of the game and the winning standard of the winning team (Ferrari *et al.*, 2014; Volossovitch, 2005). From this point of view, it's essential that coaches, as basic natural characteristics among others, consider also the ability of the player to interact with the environment, and in addition, the individual and group decision making, during a game. (Araújo, *et al.*, 2006). In team handball, the termination of an attacking activity is determined through shooting action (shoot) and the total result of this action, reveals not only, the total offensive activity of the team, but also, the rational activity of the defending team. On the other side, it is essential, within a game analysis, that, all these parameters that determine the playing activity are taken into consideration (rules of the game, tactics, game technique, mistakes, result, time, communication etc.). The so called 'close games' (the ones that give equal opportunity for victory to either one or the other team) seem to be a possible ingredient that determines the competitinvess level of a championship (Meletakos & Bayios, 2010). For example, in a confrontation between equal teams, it is obvious that exist more limitations of developing the game, because both teams claim the victory with equal terms, meanwhile in a non-balanced low level game, with great score difference, players' decisions do not play significant role at the final outcome.

The aim of the present study was to identify and explain the differences between the winning and defeated Greek A1 handball women's teams, based on the analysis of the final offensive actions and the technical errors in matches that ended up to three goals difference. It mainly targets the evaluation of the offensive process, the correlation of the effectiveness of the attack of the winning team and the analysis of those attack variables that differentiate victory from defeat.

Materials and Methods

Data collection and analysis

Corresponding Author: ILIAS ZAPARTIDIS, E-mail: elzapa@phed.uoa.gr

The data for this study was collected through observation using a DVD. Closed matches were selected for those who had the final score of up to three goals difference. There were observed 20 matches of the Greek women's A1 category championship during 2014-2017. To minimize any differences in analysis, each match was observed and recorded twice with a 15-day difference. In case of different data, a third observation of the match was made. Then, the data was entered into the Microsoft Excel program for use in the individual analyzes.
We selected the most important variables that in our opinion could distinguish the losing from the winning teams. Most of these variables have been used in various studies to find differences between winners and losers in team ball games.

Statistical Analysis

Initially all technical variables were examined using descriptive statistics (mean and standard deviation). Then the Mann-Whitney U test was used to determine any differences between technical parameters (Ferrari et al., 2014). Statistical significance was tested at the α =.05 probability of type I error rate. Statistical analysis performed using SPSS 11.5 for Windows.

Results

Offensive performance

The Mann-Whitney test showed no statistically significant differences in any of the parameters of offensive activity between winning and defeated teams (Table 1 and 2). The winning teams showed a larger total number of throws, with more throws from 9m, and from the sides, had more penetration attempts and more counterattacks. The goals from a lateral side position showed a tendency for significance to appear (p = .08) in favor of the winning teams. The defeated teams had more throws from the line player position, and from penalties. The winning teams scored on average the most goals after penetration, followed by the 9m throws, while the defeated teams scored the most goals from the 9m, followed by penetrations.

Table 1. Descriptive statistics and results of the Mann-Whitney U test concerning number of shoots relative to total throws and goals in relation to the throws.

	Winners			Losers				
	mean	sd	Mean Rank	mean	sd	Mean Rank	*z*	*p*
Total Attempts	51.90	7.31	22.80	49.70	6.08	18.20	-1.247	.21
Total Goals	27.25	4.65	23.13	25.10	4.63	17.88	-1.412	.16
Attempts 9m	20.50	5.56	20.58	19.60	3.86	20.43	-.041	.96
Goals 9m	6.85	3.38	20.85	6.45	2.54	20.15	-.191	.85
Attempts 6m	4.85	2.74	18.77	5.80	3.20	22.23	-.939	.35
Goals 6m	3.20	2.17	18.50	3.85	1.98	22.50	-1.100	.27
Attempts Wings	6.60	3.14	22.60	6.00	3.63	18.40	-1.147	.25
Goals Wings	2.75	1.21	23.68	2.40	2.50	17.43	-1.756	.08
Attempts 7m	3.85	2.28	18.40	4.55	2.11	22.60	-1.148	.25
Goals 7m	2.90	1.55	20.02	3.25	1.89	20.98	-.263	.79
Break Through	9.85	3.31	21.68	9.25	3.08	19.33	-.639	.52
Goals Break Through	7.05	2.80	22.83	6.15	2.89	18.18	-1.268	.21
Fast Breaks	5.60	3.72	22.00	4.30	2.90	19.00	-.994	.32
Goals Fast Breaks	4.35	2.60	22.98	3.10	2.31	18.02	-1.353	.18

Table 2. Percentage of shoot type, efficacy of shoots and results of the Mann-Whitney U test in both winning and losing teams.

	Winners			Losers				
	mean	sd	Mean Rank	mean	sd	Mean Rank	*z*	*p*
% 9m	39.56	9.76	19.83	39.74	8.42	21.18	-.365	.71
% 6m	9.06	4.72	18.27	11.70	6.48	22.73	-1.204	.23
% Wings	12.65	5.56	22.58	12.03	6.99	18.43	-1.123	.26
% 7m	7.76	5.23	18.27	9.01	3.80	22.73	-1.204	.23
% Break Through	19.17	6.53	20.73	18.46	5.06	20.27	-.122	.90
% Fast Breaks	10.77	6.90	22.00	8.64	5.82	19.00	-.812	.42
% Goals 9m	32.02	11.02	20.50	32.73	11.05	20.50	.000	1.0
% Goals 6m	66.69	21.69	17.81	72.14	18.78	21.03	-.897	.37
% Goals Wings	44.26	15.88	22.84	35.23	20.22	17.30	-1.527	.13
% Goals 7m	79.15	25.74	22.53	73.30	20.30	18.48	-1.122	.26
% Goals Break Through	71.52	17.64	22.35	66.08	20.40	18.65	-1.002	.32
% Goals Fast Breaks	81.63	19.09	20.48	73.41	20.74	16.03	-1.286	.20
% Goals Total	52.67	6.62	23.13	50.36	5.91	17.88	-1.421	.16

Goalkeeper's effectiveness

Descriptive Statistics and results of the Mann-Whitney U test concerning goalkeeper's effectiveness represented at Table 3.

Table 3. Results of the Mann-Whitney U test concerning goalkeeper's effectiveness

	Winners			Losers				
	mean	sd	Mean Rank	mean	sd	Mean Rank	*z*	*p*
Saves	14.60	3.28	23.93	12.80	3.72	17.08	-1.862	.06
% 9m	57.27	11.05	20.53	57.98	11.02	20.48	-.014	.99
% 6m	27.86	18.77	17.93	33.31	21.70	21.25	-.927	.35
% Wings	54.76	20.22	22.85	45.74	15.88	17.00	-1.610	.11
% 7m	26.70	20.97	22.53	20.85	25.74	18.48	-1.122	.26
% Break Through	33.92	20.40	22.40	28.48	17.64	18.60	-1.029	.30
% Fast Breaks	26.58	20.74	20.97	18.37	19.10	16.52	-1.286	.20
% Total	49.63	5.91	29.23	35.69	6.77	11.78	-4.721	<.001

Table 4. Descriptive Statistics and results of the Mann-Whitney U test concerning turnovers and breaches.

	Winners			Losers				
	mean	sd	Mean Rank	mean	sd	Mean Rank	*z*	*p*
Fouls	38.30	11.03	24.73	27.00	10.96	16.27	-2.288	.02
2min. Suspension	3.55	2.01	19.58	3.95	1.99	21.43	-.506	.61
Turnovers	4.40	2.14	20.85	4.50	2.86	20.15	-.192	.85
Ball stealing	6.00	2.60	22.63	4.95	2.14	18.38	-1.160	.25
Breaches of regulations	6.20	3.02	16.52	8.40	2.82	24.48	-2.163	.03

The overall effectiveness of the goalkeepers of the winning teams differed significantly (p <.001) from that, of the teams who lost the match. Although, there were, no statistically significant differences in the effectiveness of goalkeepers from different throwing positions, in absolute, winner goalkeepers excelled losers in all kinds of shooting except to the 6m, where the losers goalkeepers, performed better (Table 3). In addition, winning goalkeepers had an average of 1.8 more saves per match, a difference that tends to become significant (p = .06)

Turnovers and breaches of regulations

The descriptive characteristics and results of the statistical analysis are shown in Table 4. The winning teams performed significantly more fouls than the losers (p = .02), recording 8.6 more per match. In addition, the winning teams underwent significant (p = .03) less breaches of regulations that change possession of the ball (steps, line, legs, passive play), with losers registering an average of 2.2 more offenses per match. No significant differences were found in the two-minute suspension, turnovers and ball stealing parameters.

Discussion

In the present study, an attempt was made to determine which parameters of offensive actions and mistakes separate the winner from the defeated team among equal opponents. The analysis of the data did not reveal statistically significant differences with the type of shooting and their effectiveness between winners and losers, highlighting the equal capacity of the teams in these parameters. However, the winning teams showed, in absolute numbers, a higher total number of throws, more throws from 9 meters and a lateral position, and had more penetration and counterattack attempts. Earlier studies that looked at the effectiveness of shots in teams of both men and women concluded that the scoring diversity in organized attacks, as well as effectiveness from 9 meters, 7 meters and counterattacks, determined the winners in matches that ended with a small difference in the score (Gomez et al, 2014, Ferrari et al., 2014). Yamada et al., (2014) add that, the counterattack rates and organized attack effectiveness were significantly lower for the defeated teams, as well as the lower the number of shots and the effectiveness from the 6 meters as well as the total number of penetrations. Additionally, (Foretic et al, 2010) indicate that, when the players of the teams that reached the victory could choose the position from which the shot could take place through the use of tactics, was more effective in shooting and had better transition in defense. Nevertheless, in their study more shots from 9 meters made by the defeated teams. However, as reported by (Srhoj et al, 2001) the success of the attack does not depend on the quantity but the quality of shots and emphasize the importance of direct and indirect counterattacks as the significant factor for the final outcome of the match. Volossovitch and Gonçalves (2003), propose three variables that appear to significantly affect the outcome of the game: the effectiveness of the goalkeeper, the effectiveness of shooting and the effectiveness of counter-attack.

In the current study, the winning teams performed on average significantly more fouls than the losers, performing 8.6 more per match. The tactical error (foul) in defense and the fewest mistakes in the attack seem to be the main factors that separate the winners from the losers among equal opponents. In handball, the foul is aimed at stopping the offensive activity of the opponent and stopping the attacker's move that becomes threatening to the goal. Given that handball is characterized by a large number of strong physical contacts, since their application is permitted by the rules of the game, attacks and defensive actions are extremely important for

taking or not the best position to score (Gómez, et al. 2014) In this way, the defensive tactic based on the many fouls brings frustration and confusion to the attacking team and leads to hasty throwing attempts as the attacking pace of the opposing team is stopped. In this sense, defensive players, in addition to their pursuit of not receiving a goal, aim at limiting any offensive activity. In this, we can say that the general physical condition of the players of the winning team (immediate reaction, speed of execution, timing of the defending movement), psychological characteristics (prediction and adaptation of the opponent's movement, determination, etc.), and on the other hand more quality cooperation and more methodical preparation of the athletes. The winning teams have made significantly fewer breaches of regulations that change the possession of the ball (steps, line, legs, passive play), with losers registering an average of 2.2 more offenses per match. The possession changing of the ball allows the team that has the ball, more attacks and therefore more opportunities to score. At the 2003 World Championships for men and women, both the winning and the defeated teams made a large number of turnovers, but in women the defeated teams had an average of 5 more turnovers than the winners (Ohnjec, et al., 2008) and in men 2.3 more mean errors (Gruić, et al., 2006). The performance of the goalkeepers, as recorded with the general efficiency and interventions, seems to have played a decisive role in winning. The winning goalkeepers had 1.8 more saves per match and 13.9% higher overall efficiency from the losers. Goalkeeper is the most important element of the team's defense system since it is the player who is the main person responsible for avoiding a goal from the opposing team and therefore his performance may also partly determine the final result. Most studies highlight the effect on the final outcome of a game, both of the effectiveness of the goalkeepers and of the effectiveness of the shooting by the attacking players (Foretic et al, 2010, Rogulj, et al., 2004; Ohnjec, et al., 2008).

Conclusion

Active defending (foul), technical mistakes, and the overall performance of the goalkeeper, seem to be the main factors that, separate the winners from the losers in matches between equal opponents. The fact that, there were no statistically significant differences in the parameters of offensive activity, as expressed by the type of throws and their effectiveness, suggests that, other factors may be responsible for the final outcome of a match. The application of different defensive and offensive formations, and the general tactic in the game, should also significantly affect its final outcome. A kind of study that would be interesting, could be the one, which in addition to the specific data of the present study, looked at the tactical characteristics of the teams.

References

Araújo, D., Davids, K. & Hristovski, R. (2006). The ecological dynamics of decision making in sport. *Psychology of sport and exercise 7(6)*, 653-676.

Ferrari, W.J., Valente dos Santos, J., Simoes Vaz, V.P. (2014). Offensive process analysis in handball: Identification of game actions that differentiate winning from losing teams. *American Journal of Sports Science, 2(4)*, 92-96.

Foretić, N., Rogulj N., Trninić M. (2010). The influence of situation efficiency on the result of a handball match, *Sport Science 3(2*), 45-51.

Gómez, M.A., Lago-Peñas, C., Viaño, J. & González-Garcia, I. (2014). Effects of game location, team quality and final outcome on game-related statistics in professional handball close games. *Kinesiology, 46(2)*, 249-257.

Gruić, I., Vuleta, D. & Milanović, D. (2006). Performance indicators of teams at the 2003 men's World handball championship in Portugal. *Kinesiology, 38(2)*, 164-175.

Meletakos P., Bayios I. (2010). General Trends in European Men's Handball: A Longitudinal Study. *International Journal of Performance Analysis of Sports*, *10*, 221-228

Meletakos P., Vagenas G., Bayios I. (2011). A multivariate assessment of offensive performance indicators in Men's Handball: Trends and differences in the World Championships. *International Journal of Performance Analysis of Sports*, *11(2)*, 285-295.

Ohnjec, K., Vuleta, D., Milanovic, D., Gruic, I. (2008) Performance indicators of teams at the 2003 world handball championship for women in Croatia. *Kinesiology*, 40, 69-79.

Rogulj N., Srhoj V., Srhoj L. (2004). The contribution of collective attack tactics in differentiating handball score efficiency. *Collegium Antropologicum, 28(2)*, 739-46.

Srhoj, V., Rogulj, N., Katić, R. (2001). Influence of the attack end conduction on match result in handball. *Collegium Antropologicum*, *25(2),* 611-617.

Taylor, S. E., Sherman, D. K., Kim, H. S., Jarcho, J., Takagi, K., & Dunagan, M. S. (2004). Culture and social support: Who seeks it and why? *Journal of Personality and Social Psychology, 87*, 354-362.

Volossovitch, A., & Gonçalves, I. (2003). The significance of game indicators for winning and losing team in handball. E. Müller, H. Schwameder, G. Zallinger & V. Fastenbauer (Eds.), Proceedings of the 8th Annual Congress of European College of Sport Science (pp. 335)

Volossovitch A. (2005). Analysis of the performance in handball: perspectives and tendencies. *Technical Handball Magazine, 3*, 16-20.

Yamada E., Aida H., Fujimoto H., Nakagawa A. (2014). Comparison of Game Performance among European National Women's Handball Teams. *International Journal of Sport and Health Science, 12,* 1-10.