DIFFERENCES IN ATTACK SITUATIONAL ACTIVITY INDICATORS BETWEEN SUCCESSFUL AND LESS SUCCESSFUL TEAMS IN ELITE WOMEN`S HANDBALL

Sanja Bajgorić, Nenad Rogulj and Ines Gudelj Ceković

University of Split, Faculty of Kinesiology, Post Doc, Croatia

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Abstract

The aim of this work was to determine the differences in attack situational activity indicators between successful and less successful teams in elite men's handball. Overall, 1848 matches of Croatian women's Premier league were analysed. The differences in attack situational activity indicators were determined using a set of 21 variables. Descriptive statistics were calculated for all examined variables of successful and less successful teams. The statistical difference significance in the attack situational activity indicators was tested using the univariate variance analysis. The results showed statistically significant difference between successful and less successful teams in the eleven variables. The successful teams based their play on the efficient attack play, efficiency of shots from wing and back positions, successful realisation of 6 meter shots, efficiency of counterattack and half-counterattack as well as successful play in the sense of assistances, what resulted in victory, that is, positive result. The results of this research show that singled out variables significantly determine the attack situational activity indicators. The singled out variables of attack situational activity should be a starting point, taken into consideration when creating technical-tactical training processes, team's technical-tactical preparation for the match. Also it should represent more efficient managing and directing of technical-tactical activities in the situational-competitive conditions of a match.

Key words: handball, attack, situational activity, women, elite handball.

Introduction

Handball is a complex sports activity characterised by technical-tactical preparedness and joined actions of the whole team, but also by the individual abilities of each player. Handball is one of the most complex ball sports. It is a demanding, contact team sport whose structure consists of elementary movements such as running, jumping, sprinting, swinging, kicking, blocking and pushing, with an interactive contact with the opponent during the match (Vrbik, Čižmek and Gruić, 2011).

The most important aspect of the attack play is shooting at the goal, used to keep track the efficiency of the whole team. It is known that the game of handball was marked by clearly defined goal, which is achieving as many as possible and conceding as few as possible goals, in relation to opponent (Rogulj, 2003). The situation the efficiency represents one of the major predictors of successful final match result. The main task of attack player is to outplay the opponent, by moving with or without the goal, and to score a goal.

Handball match represents a collision of two opponents, that is, two teams, that are determined by ability levels, characteristics and knowledge that are used to achieve the best possible result, what means that collision of two opponents produces similar, but never the same development and result course of the match (Vuleta et al., 2005). The aim of this research was to analyse the differences in attack situational activity indicators between successful and less successful teams in elite women's handball.

Methods

Sample of entities

The basic carriers of information in this work (entities) were handball matches of Croatian women's Premier league. In total, 1848 matches of 2013/14 and 2014/15 2012/13, 2011/12, competitive seasons were analysed. The attack situational activity indicators were analysed for successful (better) and less successful (worse) teams in elite women's handball. The efficiency of teams was analysed in accumulation and in percentage.

The sample of variables

Twenty-one variables were used in this research. The variables were used to evaluate the situational activity during attack. The sample of variables was represented by: SHWA -Average number of shots from wing position, GOWA - Average number of goals from wing position, %_EFSHW- Percentage of wing shot efficiency (relation between directed and achieved goals from wing position), SHM7A -Average number of shots from 7 meters, GOM7A -Average number of goals from 7 meters, Percentage of 7 meters shot % EFSHM7 efficiency (relation between directed and achieved goals from 7 meters distance), SHM9A - Average number of shots from 9 meters, GOM9A - Average number of goals from 9 meters, %_EFSHM9 -Percentage of 9 meters shots efficiency (relation between directed and achieved goals from 9 meters distance), SHM6A - Average number of shots from 6 meters, GOM6A - Average number of goals from

6 meters, %_EFSHM6 - Percentage of 6 meters shot efficiency (relation between directed and achieved goals from 6 meters distance), SHCAA -Average number of shots from counter attack, GOCAA - Average number of goals from counter attack, %_EFSHCA - percentage of counterattack shot efficiency (relation between directed and achieved goals from counterattack), SHHCAA -Average number of shots from half-counter attack, GOHCAA - Average number of goals from halfcounter attack, % EFSHHCA- Percentage of halfcounterattack shot efficiency (relation between achieved qoals directed and from halfcounterattack), ANOA- Average number of assistances, ANO2ME - Average number of achieved 2-minute exclusions, ANOTE - Average number of technical errors.

Data processing methods

Basic descriptive statistic parameters were calculated: M – arithmetic mean, Min – minimum result, Max – maximum result, SD – standard deviation, variability measure, Skewness –

Table 1. Basic descriptive statistics

curvature asymmetry coefficient, Kurtosis – curvature coefficient, MaxD – maximum differences between real and theoretical cumulative frequencies. The differences between successful and less successful teams were determined by univariate variance analysis (ANOVA).

Results

Table 1 shows the results of descriptive statistics for 21 variables in situational activity indicators of attack for successful and less successful teams.

The analysis of distributional parameters showed no significant deviances from the normal distribution in analysed variables, meaning that the variables are suitable for further statistical processing.

Table 2 shows the results of univariate variance analysis for successful and less successful teams. Out of 21 analysed variables the more successful teams were better on a statistically significant level in 11 variables.

Variable	AM	Min	Max	SD	Skew	Kurt	Max D
SHWA	7.88	4.13	11.62	1.46	-0.00	0.36	0.05*
GOWA	4.06	1.92	6.14	0.94	0.08	-0.27	0.07*
%_EFSHW	0.51	0.38	0.65	0.06	-0.04	-0.40	0.06*
SHM7A	4.31	2.62	7.00	0.89	0.82	0.50	0.16*
GOM7A	3.21	1.88	5.41	0.71	0.70	0.47	0.13*
%_EFSHM7	0.74	0.62	0.88	0.05	0.11	0.13	0.09*
SHM9A	19.55	13.00	26.41	3.20	-0.10	-0.64	0.08*
GOM9A	8.01	4.60	11.88	1.57	-0.07	-0.33	0.09*
%_EFSHM9	0.41	0.29	0.57	0.06	0.64	0.51	0.12*
SHM6A	10.43	5.32	22.48	2.58	2.18	8.91	0.15*
GOM6A	7.38	3.63	14.38	1.73	1.47	4.46	0.13*
%_EFSHM6	0.71	0.51	0.82	0.05	-0.86	4.32	0.10*
SHCAA	2.30	0.46	5.40	1.13	0.65	-0.13	0.12*
GOCAA	1.79	0.25	3.80	0.88	0.48	-0.65	0.11*
%_EFSHCA	0.78	0.55	0.90	0.08	-1.08	1.34	0.14*
SHHCAA	1.72	0.32	3.75	0.88	0.38	-0.74	0.11*
GOHCAA	1.33	0.24	3.25	0.72	0.63	-0.11	0.10*
%_EFSHHCA	0.78	0.59	0.95	0.08	0.02	-0.65	0.07*
ANOA	2.73	0.41	10.80	1.97	2.13	5.92	0.19*
ANO2ME	1.47	0.30	2.48	0.56	-0.09	-0.96	0.07*
ANOTE	10.02	5.04	14.08	2.24	-0.32	-0.77	0.10*

Legend: AM – Arithmetic mean; Min – Minimum value; Max – Maximum value; SD – Standard deviation Skew – Asymmetry coefficient; Kurt – distribution curvature coefficient; MaxD – Maximum difference between real and theoretic cumulative frequencies; Test value of KS test for MaxD on p<0.01/0.05 = 0.17/0.20 level

The analysis of differences of attack situational activity arithmetic means shows that successful teams had higher average values than less successful teams in the following variables:

SHWA - average number of shots from wing position GOWA - average number of goals from wing position, %_EFSHW - percentage of wing shot efficiency, %_EFSHM7 - Percentage of 7 meters shot efficiency, GOM9A - average number of goals from 9 meters, %_EFSHM9 - percentage of 9 meters shots efficiency, SHM6A - average number of shots from 6 meters, GOM6A - average number of goals from 6 meters, %_EFSHM6 - percentage of 6 meters shots efficiency, SHCAA - average number of shots from counterattack, GOCAA - average number of goals from counterattack, %_EFSHCA percentage of counterattack shot efficiency, SHHCAA - average number of shots from halfcounterattack, GOHCAA - average number of goals from half-counter attack, ANOA - average number of assistances, ANO2ME - average number of achieved 2-minute exclusions. Less successful teams had greater values of arithmetic means in the following variables: GOM7A - average number of goals from 7 meters, SHM9A - average number of shots from 9 meters, %_EFSHHCA- percentage of half-counterattack shot efficiency, ANOTE average number of technical errors. Based on the insight into the results statistically significant differences were determined in 11 out of 21 variables, in successful teams: GOWA - average

number of goals from wing position, %_EFSHW percentage of wing shot efficiency, GOM9A average number of goals from 9 meters, %_EFSHM9 - percentage of 9 meters shots efficiency, GOM6A - average number of goals from 6 meters, %_EFSHM6 - percentage of 6 meters shots efficiency, SHCAA - average number of shots from counterattack, GOCAA - average number of goals from counterattack, SHHCAA - average number of shots from half-counterattack, GOHCAA - average number of goals from half-counter attack, ANOA - average number of assistances.

Table 2. Results of univariate variance analysis of successful and less successful teams' attack

VARIABLE	AS WEAKER	AS STRONGER	F	р
SHWA	7.85	7.91	0.02	0.89
GOWA	3.78	4.31	4.47	0.04
%_EFSHW	0.48	0.54	18.28	0.00
SHM7A	4.50	4.13	2.30	0.14
GOM7A	3.33	3.10	1.34	0.25
%_EFSHM7	0.74	0.75	0.34	0.56
SHM9A	19.71	19.40	0.13	0.72
GOM9A	7.29	8.68	12.72	0.00
%_EFSHM9	0.37	0.45	47.81	0.00
SHM6A	10.15	10.69	0.57	0.45
GOM6A	6.88	7.85	4.59	0.04
%_EFSHM6	0.69	0.73	13.34	0.00
SHCAA	1.83	2.74	10.40	0.00
GOCAA	1.42	2.14	10.72	0.00
%_EFSHCA	0.77	0.79	1.20	0.28
SHHCAA	1.16	2.24	32.11	0.00
GOHCAA	0.88	1.75	29.97	0.00
%_EFSHHCA	0.79	0.77	0.35	0.56
ANOA	2.17	3.26	4.42	0.04
ANO2ME	1.46	1.49	0.04	0.84
ANOTE	10.36	9.71	1.12	0.29

Discussion

The research was conducted with the aim of determining differences in attack situational activity indicators between successful and less successful women's handball teams. Twenty-one elite variables were analysed in this research. The results showed that successful teams differed from less successful ones in 11 variables, while statistically significant differences were determined as well. Successful teams were more efficient on wing positions than the less successful teams. The basic task of wing players, besides the one of initiating the attack by deep penetrations and thrusting, is to maintain the attack width, and to endanger the goalkeeper by entering his area, trying to score a goal. Regarding the body frame, they are the shortest and lightest players of positional attack (Zapartidis et al., 2009). Shooting from wing position is specific due to size of the angle from which the shot is performed, but also due to the shot performance, that depends on the technical-tactical preparedness of the player. Also, this situation is connected to the frequency and efficiency of the characteristic shooting style of wing players, that perform the shots by run up from the very angle of the field and strong jump into the goalkeeper's area, when there is no defence player in front of them (Rogulj et al., 2005). However, according to the average number of goals and 9 meters shot efficiency the winning teams were better. In relation to other players, the outer players keep the ball longer, what enables them to shoot towards the goal more often. Besides the technical-tactical preparedness (contact play, 1:1 play) the outer players play is mostly based on 9 meters shots.

Each of three outer attack players has to play on all three outer positions, that is, left, right and central outer position, and each of them has to be dangerous for the opponents' goal (Vuleta, D., et al., 2003; Gruić et al., 2006; Vuleta D. ml. and Vuleta, V, 2008). If the outer players have bad shot realisation, through defence player and its actions (Michalsik et al., 2011/a; Michalsik et al., 2011/b), it means that those are isolated individual actions, often haste and without control, that are not welcome on this playing position since they can result in counterattack. The more successful teams were better in 6 meters shots, as well as efficiency and achieved goals from 6 meters line. Knowing the type and position of shooting – distance from the goal and the goalkeeper, it is obvious that more successful teams had efficient individual actions that ended with 6 meters, followed by poor movement and playing of defeated team's defence. According to the average number of counterattack shots, goals and efficiency, the winning teams were better than the defeated teams, while worse teams were in average better in efficiency. Counterattack and half-counterattack represent the easiest way of scoring a goal. The performance of counterattack and half-counterattack depends on the successful defence players` actions who, using their mobility and cooperation take advantage of technicaltactical flaws of the attacking team, with the intention of stealing the ball and realising counterattack or half-counterattack. The analysis of situational efficiency indicators of Croatian men's handball team at the 20th World Championship in Germany (Perkovac et al., 2009) showed that the percentage of 7 meters shot efficiency was 81%, and shot efficiency from counter-attack was 77%.

The successful teams had greater number of assistances in relation to less successful teams. The assistances represent technical-tactical element that enables the players to fully express their technical preparedness in outplaying the opponent. Assistance performance depends on many factors: weak mobility of opponent's defence, bad cooperation of defence players, low quality of defence players' taking over, poor timing of attack players' exit, etc., but also on the attack player's ability of deciding to perform this technical-tactical element on time.

Conclusion

The aim of this research was to determine differences in attack situational activity indicators between successful and less successful teams in elite women's handball. Therefore, in order to analyse the situational activity indicators of one team it was necessary to define and observe certain situational activity indicators, that would be analysed with the purpose of obtaining better result. Previous research on situational efficiency in handball dealt with efficiency regarding the playing positions (Gruić et al., 2006; Ohnjec et al., 2008), efficiency regarding zones of shooting (Pokrajac, 2008; Rogulj, 2000), and efficiency in relation to different shooting styles (Delija 1994; Vuleta et al.,

2003). Twenty-one variables were analysed in this research, and based on the obtained results it can be concluded that successful teams differed from less successful ones in 11 variables, while statistically significant differences were determined as well: average number of goals from wing position, percentage of wing shot efficiency, average number of goals from 9 meters, percentage of 9 meters shots efficiency, average number of goals from 6 meters, percentage of 6 meters shots efficiency, average number of shots and qoals from counterattack and halfcounterattack and average number of assistances. The successful teams based their play on the efficient attack play, efficiency of shots from wing and back positions, successful realisation of 6 meter shots, efficiency of counterattack and halfcounterattack as well as successful play in the sense of assistances, what resulted in victory, that is, positive result. The results of this research show that singled out variables significantly determine the attack situational activity indicators. The singled out variables of attack situational activity should be a starting point, taken into consideration when creating technical-tactical training processes, team's technical-tactical preparation for the match. Also it should represent more efficient managing and directing of technical-tactical activities in the situational-competitive conditions of a match.

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RAZLIKE U INDIKATORIMA SITUACIJSKE AKTIVNOSTI U NAPADU IZMEĐU USPJEŠNIH I MANJE USPJEŠNIH EKIPA U VRHUNSKOM ŽENSKOM RUKOMETU

Sažetak

Cilj ovog rada je utvrditi razlike u indikatorima situacijske aktivnosti u napadu između uspješnih i neuspješnih ekipa u vrhunskom ženskom rukometu. Ukupno je analizirano 1848 utakmica Hrvatske ženske premijer lige. Razlike u indikatorima situacijske aktivnosti u napadu su utvrđene skupom od 21 varijable. Za sve ispitivane varijable uspješnih i neuspješnih ekipa izračunata je deskriptivna statistika. Statistička značajnost razlika u indikatorima situacione aktivnosti u napadu testirana je univarijatnom analizom varijabli. Uspješnije ekipe svoju su igru bazirale na efikasnoj igri u napadu, efikasnosti šutiranja sa krilnih i bekovskih pozicija, uspješnoj realizaciji šuta sa šest metara, efikasnost u realizaciji kontra napada i polukontra napada kao i uspješno razigravanje igrača u vidu asistencija što je rezultiralo pobjedi odnosno pozitivnom rezultatu. Rezultati ovog istraživanja upućuju da izdvojene varijable značajno određuju indikatore situacijske aktivnosti u napadu. Izdvojene varijable situacijske učinkovitosti u napadu bi trebale da budu polazna osnova na šta treba da se obrati pozornost u kreiranju tehničko-taktičkih trenažnih procesa, tehničko-taktičkih aktivnosti u situacijsko-natjecateljskim uvjetima same utakmice.

Ključne riječi: rukomet, napad, situacijska aktivnost, žene, vrhunski rukomet.

Received: April 10, 2016 Accepted: December 15, 2016 Correspondence to: Nenad Rogulj, PhD University of Split Faculty of Kinesiology Teslina 6, 21 000 Split, Croatia tel:00385 (0) 958353195 e-mail: nrogulj@kifst.hr