DIFFERENCES BETWEEN THE WINNING AND DEFEATED FEMALE HANDBALL TEAMS IN RELATION TO THE BEGGINING OF ATTACKS

Katarina Ohnjec, Dinko Vuleta and Dragan Milanović

Faculty of Kinesiology, University of Zagreb

Original scientific paper

Abstract
The aim of the research was to determine the difference between the winning and defeated teams according to the observed variables. From the video-records of the matches of the 2010 European Women's Handball Championships in Denmark and Norway, 2,710 attacks were extracted for the analysis. The sample of variables contains: beginning of attack (start throw, insertion of the ball, eject after the ball went out off the field, eject after the ball is positioned, stopped inside the goalkeeper area, a free throw as a result of opponent's errors usually in our side of the field, a free throw as a result of progressive punishment most often in the opponent's side of the field, winning the ball in our side of the field and winning the ball in opponent's side of the field). For the determination of differences between nominal variables χ2 – test for two independent samples which tests statistical significant differences between winning and defeated teams according to the beginnings of attack was used. χ2-test (χ2=18.65) implied that the winning and losing team significantly differ with considering on the beginning of the attack. The biggest difference was in start throw between defeated and winning teams (525 - 443). Also, differences existed in stealing the ball in their side of the field between defeated (221) and winning teams (277). Defined factors of situational efficiency have limited factors, especially by the technical complexity analysis in competition conditions and are determined by the antrophological characteristics of the female players.

Keywords*:structural analysis, performance (situational efficiency), notation analysis, handball, stage attacks*

Introduction

Handball, as a sport game according to classification of structure complexity, respectively by the complexity of the movement and situation structures, is classified as a multi-subject complex sport activity (Milanović, 2013). It is a system in which alternate combine phases of the attack and defence. Phases conversion (transitions) is like a generator of performing an attack or defence. Sequences of actions in the phases of transition, depending on the way of performance and finale, defined the structure of attack and defence. The attack in handball can be individually seen as a macro-event or decomposed segment of the game which combines series of events (Rogulj, 2009), starting in a different ways of arrivaling in possession of the ball. Based on rules, defined arrival in possession of the ball and thereby start of the attack refer to starting throw, then injection of the ball, ejection of the goalkeeper and free throws. At the same time when the ball is won in our or opponent's side of the field, the new attack can start. Determining the difference between handball teams classified by different criteria (winners or defeated, better or worse ranked team in official competition or any other criterion) was subject of many researches (Rogulj, 2000, Foretić, Rogulj & Trninić, 2010; Vuleta, Milanović et al., 2009; Foretić et al., 2011). This study was conducted with a goal of determining, to what extent registered values of the observed variables beginnings of the attack contribute to situational efficiency in the handball game, or what are the differences between successful and unsuccessful teams according to the observed variables.

Methods

Sample of entities in this research represents 2710 attacks registrated on European female handball championship 2010. in Denmark and Norway. Qualitative nominal variable *beggining of the attack* is described with different modalities which are further explained below: a)- the beginning of the attack by performing *the start throw* (ST) - at the beginning of the match, at the beginning of the second half, after a goal has been scored; b) - the beginning of the attack by performing *insertion of the ball* (IB) - as a result of errors of the opposing team; c) - the start of attacks by performing *ejection of the ball* (E) – performed by goalkeeper as a result of errors of the opposing team with submodalities: c_1) - *eject after the ball went out off the field* (E-BOF) (imprecise kicks off target, the rebound of the gatekeepers outside the neckline); c_2) - *eject after the ball is positioned, stopped inside the goalkeeper area* (E-BSIGA) - imprecise a pass, injuries goal area "transgression", the gatekeepers of the defense, the ball remains in the goal area, d) - the beginning of the attack as a *free -throw* (F-T) with submodalities: d_1) - *a free throw* as a result of opponent's errors usually in *our side of the field* - in the defense (FT - OSF); d_1) - *a free throw* as a result of progressive punishment most often *in the opponent 's side of the field* - in the attack (FT - OPSF), e) - starting the attack *by winning the ball* (WB) with submodalities: e_1) - winning the ball in our side of the field (WB - OSF) and e2) – winning the ball in opponent's side of the field (WB - OPSF).

Table 1. Variable "Beginning of attack"

Variable "Beginning of attack"		
Variable	Code	Explanation
Beggining of attack	ST	Start throw
	IB	Insertion of the ball
	E-BOF	Eject after the ball went out off the field
	E-BSIGA	Eject after the ball is positioned, stopped inside the goalkeeper area
	FT-OSF	A free throw as a result of opponent's errors usually in our side of the field
	FT-OPSF	A free throw as a result of progressive punishment most often in the opponent's side of the field
	WB-OSF	Winning the ball in our side of the field
	WB-OPSF	Winning the ball in opponent's side of the field

The data were collected from the video recorded matches from female European handball championship 2011 in Denmark and Norway which were available on the official internet EHF (European Handball Federation) pages (http: //www.ehf-euro.com/Stream.2860.0.html). In the special constructed softwear (Match Analysis Sport) which enabled online statistical and video analysis of the matches in different sports (football, basketball, waterpolo) was also made special modality adapted for the handball matches. For the needs of this research, defined variables were tagged inside the programme, then video-records of the chosen matches of the championship were connected, whose examination of specific attacks were extracted. Each "cut out" of the attack attributed to the corresponding values for a defined set of variables, with each variable unambiguously defined. According to the defined goals and metric values of the variables, certain parametric and non-parametric statistical methods were used. Descriptive analysis of the nominal variable "beginning of the attack" was made by the multidimensional grouping of data. Obtained results were shown threw tables of contingency. Also, the same data were graphically shown in 3D histogram of frequencies and stracked graphs columns of vertical orientation. For the determination of differences between nominal variables, $\chi 2$ – test for two independent samples which tests statisticaly significant differences between winning and defeated teams according to the beginings of attack was used.

Results and Discussion

From a total of 2710 played attacks, winning teams played total of 1356 attacks, and defeated teams only 2 attacks lower, more specifically 1354 attacks. Recorded numerically, almost identical frequencies played attack for the winning and losing teams had a different structure due to the beginning of attack. ST-start throw; IB-insertion of the ball; E-BOF- Eject after the ball went out off the field; E-BSIGA-eject after the ball is positioned, stopped inside the goalkeeper area; FT- OSF -a free throw as a result of opponent's errors usually in our side of the field; FT-OPSF-a free throw as a result of progressive punishment most often in the opponent 's side of the field; WB-OSF-winning the ball in our side of the field; WB-OPSF-winning the ball in opponent's side of the field; WINN-winner teams; DEF-defeated teams

$$\chi^2 = 18{,}65,\ df = 7,\ p = 0{,}01$$

The calculated value of $\chi 2$-test ($\chi 2$=18.65) implied that the winning and losing team significantly differed with considering on the beginning of the attack.

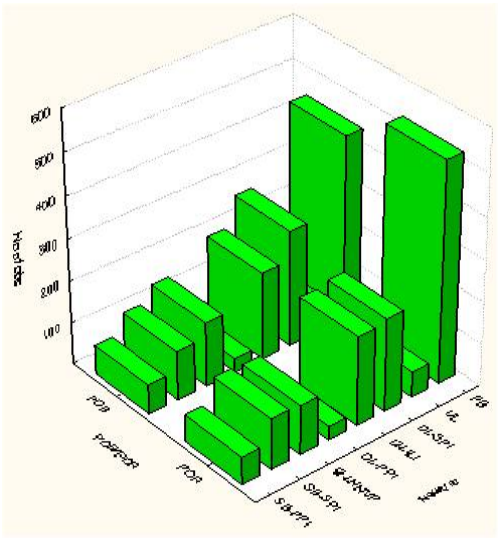

Figure 1. Bivariate distribution POB/POP
Distribution of different ways of the beginning of attacks (observed frequencies) for the winning and defeated teams

Structure of the beggining of attack was identical to the order of representation for the winning and losing team, but the difference was recorded in frequencies, or share in the overall structure for each of the forms of the beginning of the same. The biggest frequency had start throw which was mostly presented among the defeated (ST=525, or 38.77 %) than for the winning teams (ST = 443, or 32.67 %). Then followed by stealing the ball in their half of the field, and with greater frequency (WB-OSF=277) on the side of the victorious teams considering on the defeated (WB-OSF=221). By cutting off the ball after it left the ground began 208 attacks for the winning team, and on the same way defeated team started the 212 attacks. For the winning team, the goal of ejecting the balls from goalskeeper area in the 153 situation was the beginning of the attack, while for the defeated teams for such beginning was recorded 117 times. A free-throw in the opponent's half of the field began 70 attacks for the winning team and 65 attacks for defeated. The winning teams from inserting started 55 attacks, and defeated 61 attack. Steals in the opponent's half of the field began in 33 attacks for the winning team, and only one steal fewer began the defeated teams.

Table 2. The frequencies of the different origins of attack for the winning and losing team (observed, normalized by columns, normalized by columns)

	Observed frequencies			Columns %		Rows %		
Attack beggining	WINN	DEF	Total	WINN	DEF	WINN	DEF	
ST	443	525	968	32,67%	38,77%	45,76%	54,24%	100%
IB	55	61	116	4,06%	4,51%	47,41%	52,59%	100%
E-BOF	208	212	420	15,34%	15,66%	49,52%	50,48%	100%
E-BSIGA	153	117	270	11,28%	8,64%	56,67%	43,33%	100%
FT-OSF	117	121	238	8,63%	8,94%	49,16%	50,84%	100%
FT-OPSF	70	65	135	5,16%	4,80%	51,85%	48,15%	100%
WB-OSF	277	221	498	20,43%	16,32%	55,62%	44,38%	100%
WB-OPSF	33	32	65	2,43%	2,36%	50,77%	49,23%	100%
Total	1356	1354	2710	100%	100%			

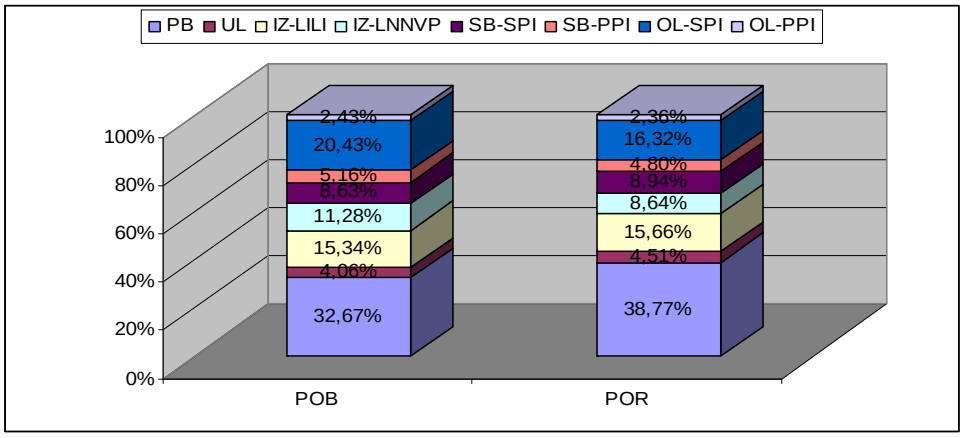

Figure 2. Winning and defeated teams-beginning of attack

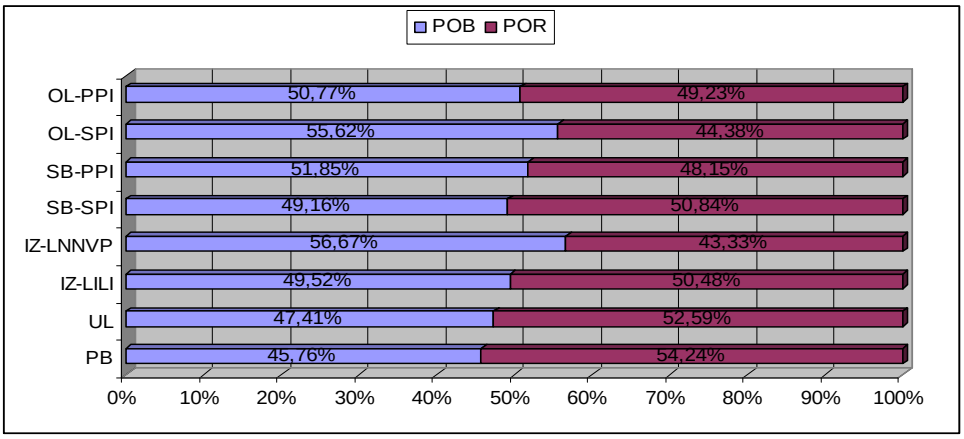

Figure 3. Beginning of attack-winning and defeated teams

After examining the structure of the origins of attack with respect to the maximum frequency it was possible to further specify and clarify the difference in successful and unsuccessful teams. The winning team in a larger number of cases were managed the attack that began as a transition and ended up as a transition, regardless of the outcome (positive, negative or neutral). Defeated had small number of cases in general, and to create conditions for making the transition attack (less steals in their half of the field, and to 44.38 % for the defeated, and 55.62 % for the winning, also less ejection ball after positioning the ball into the goal area for the defeated 43.33 % and the winning 56.67 % of total registered and throw the ball from the goal area; figure 3).

Also, when such assumptions were created, probably the diminished use of factors that would enable the same actions and complete the transition as it would after a few passes, their attack was "stabilized" and brought to the positioning frames. Some of these factors, if reactions were good, increased the initial potential transition attack, while in the opposite reduced, could be/often are: 1) good/bad players in the defense reaction in terms of seizure of the ball from the resulting individual, group or collective action in the implementation of counter-attack; 2) good/bad reactions of the goalkeeper or the gatekeeper of the first players who came into contact with the ball, followed by a good (accurate and fast) technique for throwing the ball to the

player in the most suitable position for the implementation of counter-attack; 3) anticipation of the game (good/bad), and the prediction of the situation conquest ball (defense gatekeepers, cutting the ball) and early outing players on the other side of the attack, which also reduced the stability of defense. The lower frequency of attacks in the implementation of transition among defeated refered to "poorer" and insufficient application of the factors from above, while the initial potential of timely, accurate and precise performance was characterized by a game of the winning team. Increased or decreased the potential development and implementation of the transition attack caused the other side and the activity of defensive players. Winning teams were probably by elaborate systems of return in defense (increased willingness to return to defense - anticipation and movement in defense while their player shoots), then distribution tasks ie. role in returning to defense (early action last players - the nearest own laundry, good reactions of the players nearest the ball at the time of the loss of the ball, etc.) by performing interruption of the game and prevented performance variant transition of the attack. The effective performance of the described factors of successful implementation and prevent counter-determined and a high level of fitness levels players. The manifestation of the special abilities through the reaction rate, the development of maximum speed, etc. in the construction/prevention counter allowed the players gaining the advantage over opponents in the performance counter, while the same determined the closure of the space according to our gate to prevent retaliation.

Components of power in this segment were reflected in contact game and stopping players performed counterstrike activities. Frequent repetition of the previous activity in the rapid changed (short intervals), requireed the necessary velocity-strong endurance. Coach reactions by giving additional instructions were also one of the possible factors to increase/decrease the starting potential development/prevention counter.

Conclusion

The research seeked to clarify situational efficiency in handball game by analyzing registered frequencies and values of the observed variables in relation on score efficiency in the match, determined the characteristics of winning and defeated teams, respectively. Competition efficiency observed threw the differences among winning and defeated teams showed that using larger amount of the beginnings of attack which had transitional less won balls in our side of the field, 44,38% for the defeated and 55,62% for the winners from total and less injection of the ball after the ball positioned inside the goalkeeper area for defeated 44,33% and for the winners 55,67% from total registrated injections of the ball from goalkeepers space in the biggest way contribute to the efficiency of the teams in competitions. The research of handball structure, as like defining factors of situational efficiency, are limited by the limited factors, specifically by the technical complexity analysis in competition conditions and determinate by the antrophological characteristics of the female players which determinating their values make difficult (Rogulj, 2003).

References

Dizdar, D. (2006). *Quantitative methods.* Zagreb: Faculty of Kinesiology, University of Zagreb.

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.

Foretić, N., Rogulj, N., Srhoj, V., Burger, A., & Raković, K. (2011). Differences in situation efficiency parameters between top men and woman handball teams. In *Proceedings of EHF Scientific Conference 2011 „Science and Analytical Expertise in Handball*" (pp. 243-274). Vienna: EHF.

Milanović, D. (2010). *Theory of training: applied kinesiology in sport*. 2nd. Updated and changed edition. Zagreb: Social Science of Polytechnic of Zagreb, Faculty of Kinesiology, University of Zagreb.

Rogulj, N. (2003). *The efficiency of tactical models in handball* /Doctoral dissertation/. Zagreb: Faculty of Kinesiology, University of Zagreb.

Rogulj, N. (2009). *Modeli taktike u rukometu* [Handball tactic models. In Croatian.]. Split: Grifon.

Rogulj, N. (2000). Differences in situation-related indicators of the handball game in relation to the achieved competitive results of teams at 1999 World Championship in Egyp*t. Kinesiology*, *32*(2), 63-74.

Vuleta, D., Milanović, D., et al. (2009). *Science in handball.* Zagreb: Faculty of Kinesiology, University of Zagreb.

* * * (2010). /UHRS/. *Rules of handball game* /on line/. From the network retrieve 10th of November 2010. From addres: http://www.uhrs.hr.

* * * (2015). http://www.ehf-euro.com/Stream.2860.0.html. From the network retrieve 15th of November 2014.

RAZLIKE IZMEĐU POBJEDNIČKIH I PORAŽENIH ŽENSKIH RUKOMETNIH MOMČADI U ODNOSU NA POČETAK NAPADA

Sažetak

Cilj istraživanja bio je utvrditi razlike između uspješnih i neuspješnih timova prema promatranim varijablama. Iz video-zapisa utakmica 2010. europskog ženskog rukometnog prvenstva u Danskoj i Norveškoj, 2.710 napada su izvađena za analizu. Uzorak varijabli sadrži: početak napada (početnog bacanja, ubacivanja, izbacivanje nakon što je lopta izašla izvan igrališta, izbacivanje nakon što se lopta pozicionirala i zaustavila unutar vratarevog prostora, slobodno bacanje kao posljedica pogreške protivničke ekipe najčešće u svojoj polovici igrališta, slobodno bacanje kao posljedica progresivnog kažnjavanja najčešće u protivničkoj polovici igrališta, osvojena lopta u svojoj polovici igrališta i osvojena lopta u protivničkoj polovici igrališta). Za određivanje razlike između nominalnih varijabli koristio se χ2 - test za dva neovisna uzorka koji testira statistički značajne razlike između uspješnih i neuspješnih ekipa u skladu s počecima napada. Dobiveni χ2-test (χ2=18,65) utvrđeno je da se pobjednici od poraženih ekipa značajno razlikuju s obzirom na početak napada. Najveća razlika je u početnom bacanju između pobjednika i poraženih timova (525-443). Također, razlika postoji u presjecanju lopti u svom dijelu terena između poraženi (221) i pobjedničkih timovi (277). Definirani čimbenici situacijske učinkovitosti imaju ograničene čimbenike, naročito zbog tehničke složenosti analize u uvjetima natjecanja i određuje se po antropološkim karakteristikama sportaša.

Ključne riječi*: strukturna analiza, izvedba (situacijska učinkovitost), notacijska analiza, rukomet, razine napada*

Received: September 22, 2014
Accepted: April 20, 2015
Correspondence to:
Prof.Dinko Vuleta, PhD.
University of Zagreb
Faculty of Kinesiology
10000 Zagreb, Horvaćanski zavoj 15, Croatia
Phone: 00385 (0)1 3658 666
E-mail: dinko.vuleta@kif.hr