

## **Effectiveness analysis in shooting in European Beach Handball Tournament (EBT) 2016**

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## **ABSTRACT**

Beach Handball, is one of the most rapidly growing sports on the sand and has been accepted as an exhibition sport at the Youth Olympic Games 2018. This sport is more attack orientated game as related to Indoor Handball. Shooting attempts and their effectiveness is the main expression of the attack. This leads coaches and players to determine their tactics in attack, in accordance to an attack with the shooting through numerical superiority. The aim of the study had two folds. First, to present the effectiveness analysis of shooting in high level beach handball players (men & women), in a top level tournament in relation to the shooting position and goalkeepers' efficiency, and second, to compare gender differences with the effectiveness in shooting and with the goalkeepers' efficiency. The sample of the study was derived from the games at the finals of the 2016 European Beach Tournament (EBT), which took place from 20 till 22 May in Thessaloniki, Greece. The preferred method of reporting was video-analysis. Overall, 14 games were analyzed (7 games for men and 7 games for women) and the variables were the following: post-out shot, goal and goalkeeper's save in each game. The SPSS 22 statistical program was utilized for the analysis of the results and the method applied was descriptive and inferential statistic. The  $\chi^2$  test was used to compare the differences between playing positions, as regards to post-out shots, goals and goalkeeper's saves. Furthermore, the Mann-Whitney U test was used to compare differences between men and women with respect to the efficiency of shots taking into consideration the shooting positions. The results showed that, there are significant differences among the shooting positions, both in men and women and that, there are no significant differences between genders at the comparisons and the differences with respect to the efficiency of shots among shooting position. Conclusively the playing position affect the effectiveness in beach handball while it is obvious there is necessity of analyzing more games in this matter and in a bigger sample.

**Key Words:** Game analysis; performance; attack; tactic; save

## **Introduction**

Beach Handball is one of the most rapidly growing sports on the sand and in general. In Europe this sport appears to be very popular and one of the reasons is the simple way of setting up the playing field. Beach handball's growing popularity led the Olympic Committee to accept it as an exhibition sport at the Youth Olympic Games 2018 E.H.F. (2017a). Beach Handball is more attack orientated game as related to Indoor Handball. One reason is that on contrary to Indoor handball the physical contact is not permitted E.H.F. (2017b). Also, the main expression of attack, is, always, the shooting through numerical superiority. The numeric superiority is achieved through the "specialist" a player who is replacing the goalkeeper in attack (4 attacking players vs 3 defenders) Neukum, (2008). Shooting attempts and their effectiveness is the main expression of the attack. This leads coaches and players to determine their tactics in attack, in accordance to the aforementioned elements.

Because of the nature of the game beach handball is played between spring and early autumn. As a consequence, there are few big tournaments. This fact, leads beach handball players to have a short playing main season and a small amount of important games (Agulo Espina, 2009). Unlike to beach soccer and beach Volley, in beach handball there are not enough scientific researches up to day. More specifically, there is few existing data regarding high level tournaments. On the other side there is an increasing interest in beach handball community for information concerning the technical and tactical aspects of the game Rokavec (2009).

All these are leading to the aim of our study which has two folds. First, to present the effectiveness analysis of shooting in high level beach handball players (men & women), in a top level tournament, in relation to the shooting position and goalkeepers' efficiency, and second, to compare gender differences in all the above mentioned parameters.

## **Methods**

### **Material**

The sample of the study was derived from the games at the finals of the 2016 European Beach Tournament (EBT), which took place from the 20<sup>th</sup> till 22<sup>nd</sup> of May in Thessaloniki, Greece. The games that were taken in account, were in the phase of placement games, quarterfinals, semifinals and finals of men and women tournament. The preferred method of reporting was video-analysis. Overall, 14 games were analyzed (7 games for men and 7 games for women) and the variables were the following: post-out shot, goal and goalkeeper's save in each game. The above three variables, which were studied for offensive player positions, within the playing field, were taken into account. The SPSS 22 (IBM, USA) statistical program was utilized for the analysis of the results and the method applied was descriptive and inferential statistic. The  $\chi^2$  test was used to compare the differences between playing positions (left side, center and right side) as regards to post-out shots, goals and goalkeeper's saves. Furthermore, the Mann-Whitney U test, was used to compare differences between men and women with

respect to the efficiency of shots (post-out shots, goals and saves) taking into consideration the shooting positions (left side, center and right side). The level of significance was determined at 0.05.

## Results

The descriptive statistics of men players' shots and the overall goalkeepers' effectiveness are presented in Table 1.

*Table 1.* Descriptive statistics for men's player shots and goalkeepers' effectiveness

Position	Shots Total	Shot/ game	Goals Total	Goals/ game	Players Efficiency %	Missed shots	Missed shots (post-out)	Missed shots (GK save)	GK Efficiency %
LS	106	15.14	60	8.57	56.6	46	13	33	43.3
C	184	26.28	117	16.71	63.5	67	16	51	36.4
RS	102	14.57	66	9.42	64.7	36	12	24	35.2
Total	392	55.9	243	34.7	61.6	149	41	108	38.3

*Note.* LS: Left side; C: Center; RS: Right side; GK: Goalkeeper.

The descriptive statistics of women players' shots and the overall goalkeepers' effectiveness are presented in Table 2.

*Table 2.* Descriptive statistics for women's player shots and goalkeepers' effectiveness

Position	Shots Total	Shot/ game	Goals Total	Goals / game	Players Efficiency %	Missed Shots	Missed shots (post-out)	Missed shots (GK save)	GK Efficiency %
LS	113	16.14	56	8	49.5	57	19	38	50.4
C	171	24.42	103	14.71	60.2	68	28	40	39.7
RS	96	13.71	56	8	58.3	40	27	13	41.6
Total	380	54.2	215	30.71	56	165	74	91	43.9

*Note.* LS: Left side; C: Center; RS: Right side; GK: Goalkeeper.

Although shots from specialist players are included in all three shooting positions analysis (left side, center and right side), more specifically, men's specialist executed 95 total shots (13.57 per game) with 51 total goals (7.28 per game). These players had 53.6% efficiency while their missed shots were 44 (11 post/out and 33 goalkeeper's save). The goalkeeper's effectiveness in men's tournament and especially in men's specialist shots, was 46.3%.

In women's tournament women's specialist executed 110 total shots (15.7 per game) with 50 total goals (7.14 per game). These players had 45.4% efficiency while their missed shots were 60 (24 post/out

and 36 goalkeeper's save). The goalkeeper's effectiveness in women's tournament and especially in women's specialist shots, was 54.5%.

In Table 3 there is a description of ball's direction into the goal at men's shots.

*Table 3.* Descriptive statistics for men's shots and their direction to the goal

Goal position	Left	Center	Right
Upper	47 (10.4%)	27 (6%)	59 (13.1%)
Middle	51 (11.3%)	20 (4.4%)	55 (12.2%)
Low	65 (14.4%)	12 (2.7%)	62 (13.7%)

In Table 4 there is a description of ball's direction into the goal at women's shots.

*Table 4.* Descriptive statistics for women's shots and their direction to the goal

Goal position	Left	Center	Right
Upper	48 (10.5%)	25 (5.4%)	78 (17%)
Middle	60 (13.1%)	12 (2.6%)	58 (12.6%)
Low	47 (10.2%)	15 (3.3%)	45 (9.8%)

Table 5, reveal that, in men's tournament the comparison between shooting positions showed that, in total shots there were significant differences in all three positions. Furthermore there was the same results regarding the goals achieved. On the contrary as far as the saves are concerned there was significant differences only between left side shots saves and center shots saves. Finally the results showed that in post/out shots, there were no significant differences in all three positions.

*Table 5.* Differences in frequencies and their  $\chi^2$  significance test among shooting positions in men's tournament

Shooting position	Total shots	Goals	Saves	Post/Out
Left side shots vs Center shots	106 vs 184 ***	60 vs 117 ***	33 vs 51 *	13 vs 16 (ns)
Left side shots vs Right side shots	106 vs 102 ***	60 vs 66 **	33 vs 24 (ns)	13 vs 12 (ns)
Center shots vs Right side shots	184 vs 102 ***	117 vs 66 ***	51 vs 24 (ns)	16 vs 12 (ns)

*Note.* \* 0.05, \*\* 0.01, \*\*\* 0.001, (ns) no significant

Table 6, reveal that, in women's tournament the comparison between shooting positions showed that in total shots there were significant differences in all three positions. Furthermore, there was the same results regarding the goals achieved. On the contrary, as far as the saves are concerned, there was significant differences only between left side shots saves and center shots saves. Finally the results showed that in post/out shots, there were no significant differences in all three positions.

Table 6. Differences between frequencies and their  $\chi^2$  significance test among women player's position

Shooting position	Total shots	Goals	Save	Post/Out
Left side shots vs Center shots	113 vs 171 ***	56 vs 103 ***	38 vs 40 *	19 vs 28 (ns)
Left side shots vs Right side shots	113 vs 96 ***	56 vs 56 **	38 vs 27 (ns)	19 vs 13 (ns)
Center shots vs Right side shots	171 vs 96 ***	103 vs 56 ***	40 vs 27 (ns)	28 vs 13 (ns)

Note. \* 0.05, \*\* 0.01, \*\*\* 0.001, (ns) no significant

Table 7 represents the mean standard deviation and mean rank of men's shots according to playing positions.

Table 7. Mean (sd) and mean rank of men shots according to shooting position.

	Left side		Center		Right side	
	M (sd)	Mean Rank	M (sd)	Mean Rank	M (sd)	Mean Rank
Total shots	0.2 (0.4)	453.32	0.3 (0.4)	462.92	0.2 (0.4)	459.79
Goal	0.1 (0.3)	458.46	0.2 (0.4)	463.91	0.1 (0.3)	461.51
Save	0.07 (0.2)	453.76	0.09 (0.2)	461.89	0.05 (0.2)	454.69
Post/ Out	0.03 (0.1)	453.1	0.04 (0.2)	450.12	0.02 (0.1)	455.59

Table 8 represents the mean standard deviation and mean rank of women's shots according to playing positions.

Table 8. Mean (sd) and mean rank of women shots according to shooting position.

	Left side		Center		Right side	
	M (sd)	Mean Rank	M (sd)	Mean Rank	M (sd)	Mean Rank
Total shots	0.2 (0.4)	458.64	0.3 (0.4)	448.2	0.2 (0.4)	452.27
Goal	0.1 (0.3)	453.57	0.2 (0.4)	448.21	0.1 (0.3)	450.57
Save	0.07 (0.2)	458.21	0.09 (0.2)	450.19	0.05 (0.2)	457.29
Post/ Out	0.03 (0.1)	458.36	0.04 (0.2)	461.79	0.02 (0.1)	456.40

The Mann-Whitney test and P values, for the comparisons and differences between men and women regarding shots efficiency, are presented at Table 9. More specifically there were no significant differences between men and women in every variable and all three positions.

Table 9. Mann-Whitney *U* test and (p) values for the comparisons and the differences between men and women with respect to the efficiency of shots among shooting position.

Shooting position	Men vs Women
Left side shots	102523 <sup>b</sup> (ns)
Left side Goal	102620 <sup>c</sup> (ns)
Left side Save	102719.5 <sup>b</sup> (ns)
Left side Post/Out	102423.5 <sup>b</sup> (ns)
Center shots	100152 <sup>c</sup> (ns)
Center Goal	100160.5 <sup>c</sup> (ns)
Center Save	101069.5 <sup>c</sup> (ns)
Center Post/Out	101078 <sup>b</sup> (ns)
Right side shots	102021 <sup>c</sup> (ns)
Right side Goal	101243 <sup>c</sup> (ns)
Right side Save	103140 <sup>b</sup> (ns)
Right side Post/Out	103550 <sup>b</sup> (ns)

Note. *b* exponent: negative classification; *c* exponent: positive classification.

## Discussion

From the results, it is showed the effectiveness in men's shooting and also goalkeeper's effectiveness. It reveals that, men had 34.7goals per game. Similar results (36. 08 goals per game) were found by Gehrer and Posada (2010) from the 4<sup>th</sup> World Championships Beach Handball in Antalya 2010 while Tezcan (2013) reported 38.77 goals per game from 2013 European Championship. From all three positions, the most effective was the right side shooting position (RS) with a 64.7 %, although, the biggest amount of shooting, came from the center positon ( C ), with an overall of 181 shots, 26.28 per game. It seems that the use of left-handers in that right side shooting position, leads to better results in scoring. The lowest percentage was at the left side shooting position with a 56. 6%. On the contrary, goalkeepers' efficiency reaches its best, at the left side shooting position with 43.3 %. In total, we can observe that men in this tournament had a 61.6% efficiency in shooting, from all three positions and goalkeepers have 38.3% efficiency while Gehrer & Posada found a total 48.85 % efficiency.

The results also revealed for women, a total of 215 goals, 30.71 per game and a 56% of total effectiveness which shows a difference in accordance with the corresponding results from Antalya 2010 in women's tournament where Gehrer & Posada (2010) found 36.17 goals per game, but also a great similarity with what Tezcan (2013) found (30.69 goals per game). In women, the most efficient shooting position appears to be the center (C) with a 60.2% and a total amount of 103 goals, 14.71 per game. We can assume that, the frequent use of the 'specialist' in the center of the attack leads to these results. Goalkeepers perform at 43. 9% efficiency, and the best percentage comes from the left side shooting position with 50.5%.

As mentioned before the position of the “specialist” in beach handball is of a great importance, because of its ability to score twopointers without attempting spin shots or inflight shots. That gives a great advantage to the specific player and makes him or her the most dangerous player of the attack. In all three shooting positions analysis (left side, center and right side), more specifically, men’s specialist executed 95 total shots (13.57 per game) with 51 total goals (7.28 per game). Men specialists had 53.6% efficiency while goalkeeper’s effectiveness in men’s specialist shots, was 46.3%, while Gehrler & Posada (2010) at Antalya found only 30.93% efficiency. In women’s tournament specialist executed 110 total shots (15.7 per game) with 50 total goals (7.14 per game). Women specialists had 45.4% efficiency, while Gehrler & Posada (2010) at Antalya the result was 31.28%. The goalkeeper’s effectiveness in women’s specialist’s shots, was 54.5%.

From the results we can observe the directions of men’s shots at the goal. For that purpose the goal was divided in 9 parts, that is upper right, middle right, low right, upper center, middle center, low center, upper left, middle left and low left part of the goal. We can see that the biggest amount of shots were headed to left side of the goal and to its low part and more specifically 65 shots, 14.4% of overall shots. The shooting at the right side of the goal follows, more accurate, in the low part with 62 shots (13.7%) and at the central part of the goal, the most frequent was the middle part with 20 shots (4.4%). As an explanation to the predominance of the right and left sides of the goal is that the goalkeepers usually cover the corner, closer to the attacking player, when the shot comes from the left or right side shooting position with the block covering the far side, and when the shot comes from the center they cover the central part of the goal leaving the two sides rather uncovered.

Moreover from the results we can observe that as far as women shooting concerns, we have almost the same results with men but with the difference that the right side of the goal is the most frequent side of shooting and especially in its upper part with 78 shots (17%) of overall shooting, then the left side but in its middle part with 60 shots (13.1%) and 25 shots (2.6%) at the central part of the goal in the middle part. These results show that women also look for the far side of the goal but they don’t seem to prefer the low parts of the goal. An assumption for that could be the height of the women goalkeepers which is lower than the men respectfully, leaving more space to shoot at the upper part of the goal.

In our study the  $\chi^2$  test is used in order to compare and determine the differences between playing positions and their destination to the goal namely, post/out shots, goals and goalkeepers saves. More specifically, at the comparison between left side shots vs center shots we had significant differences in total shots, in goals achieved, saves but not in post/out shots. Accordingly, comparing left side shots vs right side shots we had significant differences in total shots and goals achieved, but not in saves and post/out shots. Finally, at the right shots vs center shots comparison, we had significant differences in total shots, goals achieved but not in goalkeepers’ saves and post/out shots.

More or less, we found the same results also in women  $\chi^2$  test. At the comparison between left side shots vs center shots we had significant differences in total shots, in goals achieved, saves but not in post/out shots. Accordingly, comparing left side shots vs right side shots we had significant differences



in total shots and goals achieved, but not in saves and post/out shots. Finally, at the right shots vs center shots comparison, we had significant differences in total shots, goals achieved but not in goalkeepers' saves and post/out shots.

In all the data comparing men and women we can see no big difference in results, a fact that can be verified by the Mann-Whitney *U* test for the comparisons and the differences between men and women with respect to the efficiency of shots among shooting positions. Consequently, we can find that in all shooting positions there is no significant difference between genders.

## **Conclusion**

As a conclusion, at the first part of our study, we can say, that, there are indeed significant differences among shooting positions, both in men and women and that, there are better results in scoring in relation with the 4th Beach Handball World Championships 2010 in Antalya and with the Beach Handball European Championships 2013 in Randers, two high level tournaments. As for the second part of our study we found that there are no significant differences between genders at the comparisons and the differences with respect to the efficiency of shots among shooting positions.

## **Practical Application**

In all data provided by various references and studies about Beach Handball, we find that, in all shooting analyses, the main variables focus more on the technique of shooting (Spinshot, Inflight shot etc.) and not the space from where the shot was executed or their direction to the goal. Our study, focuses, mainly on that and, hopefully, gives a useful tool to coaches, in order to adapt their tactics in attack and also in defense. We, strongly believe that, more studies in this point of view, should be done in the future.

## **References**

- E.H.F.** (2017a). Beach handball enters Youth Olympics. Retrieved July 1, 2017, from <http://www.eurohandball.com/article/021606/Beach+handball+enters+Youth+Olympics>
- E.H.F.** (2017b). Beach handball. Rules of the game. *Statutes, Regulations & Legal Publications*. Retrieved July 1, 2017, from [http://www.ihf.info/files/Uploads/NewsAttachments/0\\_09%20-%20Spielregeln%20Beach%20Handball\\_GB.pdf](http://www.ihf.info/files/Uploads/NewsAttachments/0_09%20-%20Spielregeln%20Beach%20Handball_GB.pdf)
- Neukum, T.** (2008). Beach handball vs. indoor handball. *Web Periodicals*. Retrieved July 1, 2017, from [http://www.eurohandball.com/ehf\\_files/Publikation/WP\\_Neukum\\_Beach%20Handball%20vs%20Handball\\_E.pdf](http://www.eurohandball.com/ehf_files/Publikation/WP_Neukum_Beach%20Handball%20vs%20Handball_E.pdf)
- Agulo Espina, J.J.** (2009). The evolution of beach handball, its contribution to indoor handball and the advantages of its practice. *Publications/Bibliography*. Retrieved July 1, 2017, from [http://www.eurohandball.com/ehf\\_files/Publikation/WP\\_Espina\\_EvolutionBeachHB.pdf](http://www.eurohandball.com/ehf_files/Publikation/WP_Espina_EvolutionBeachHB.pdf)

**Rokavec, D.** (2009). Beach Handball: application and influence on indoor handball. *Publications*.

Retrieved July 1, 2017, from

[http://home.eurohandball.com/ehf\\_files/Publikation/WP\\_Rokavec\\_BH%20application%20and%20influence%20on%20indoor%20handball\\_090313.pdf](http://home.eurohandball.com/ehf_files/Publikation/WP_Rokavec_BH%20application%20and%20influence%20on%20indoor%20handball_090313.pdf)

**Gehrer, A. & Posada F.** (2010). Statistics from the 4th Beach Handball World Championships 2010 in Antalya. Retrieved July 5, 2017, from <http://www.ihf.info/files/Uploads/Documents/9490>

[Antalya 2010\\_Statistics.pdf](http://www.ihf.info/files/Uploads/Documents/9490_Antalya_2010_Statistics.pdf)

**Tezcan, B.** (2013). Beach handball European championships qualitative analysis. *European handball activities. Beach handball*. Retrieved July 4, 2017, from

[http://www.eurohandball.com/ehf\\_files/Publikation/2013%20BH%20EChs%20-%20analysis.pdf](http://www.eurohandball.com/ehf_files/Publikation/2013%20BH%20EChs%20-%20analysis.pdf)