



## Analysis of Throwing Performance in Elite Women's Beach Handball

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### Cite this article:

Dol, G., Onetto, V., Carbonell, V., & González-Ramírez, A. (2020). AAnalysis of Throwing Performance in Elite Women's Beach Handball. *Apunts. Educación Física y Deportes*, 141, 49-54. [https://doi.org/10.5672/apunts.2014-0983.es.\(2020/3\).141.06](https://doi.org/10.5672/apunts.2014-0983.es.(2020/3).141.06)

### Editor:

© Generalitat de Catalunya  
Departament de la Presidència  
Institut Nacional d'Educació  
Física de Catalunya (INEFC)

ISSN: 2014-0983

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### Section:

Sports Training

### Original language:

Spanish

### Received:

14 November 2019

### Accepted:

19 March 2020

### Published:

1 July 2020

### Cover:

New Olympic Sports  
for Tokyo 2020. Surf.  
Photo: Gabriel Medina (BRA)  
riding a wave at Supertubes  
beach 2018 WSL Championship  
held in Peniche, Portugal.  
REUTERS / Pedro Nunes.

### Abstract

The objective of this study was to ascertain the differences in throwing performance between winning and losing elite female beach handball teams. An observational methodology was used, and an ad hoc instrument was created for data collection. The sample consisted of 2,160 throws in 38 matches of the Women's Senior Beach Handball World Championships in Kazan in 2018. The results showed significant differences in the number of goals, goalkeeper saves and blocking between winners and losers ( $p < 0.01$ ). Spectacular throws were more numerous than simple throws. The spin shot was the resource most utilised by both winners and losers, although there were significant performance differences in favour of the winners ( $p < 0.01$ ). The winning teams executed a greater number of in-flight shots ( $p < 0.01$ ), more effectively and scoring a greater number of points ( $p < 0.01$ ) with this type of shot.

**Keyword:** notational analysis, spectacular throws, performance

## Introduction

Ever since its beginnings, from the end of the 20th century until the present day, beach handball has been regarded as a growing sport, both regionally and in the rest of the world (Morillo *et al.*, 2015; Zapardiel, 2018a; Zapardiel, 2018b). This modality has major differences with court handball and is regarded as a new sport (Crispim *et al.*, 2010; Gomes da Silva *et al.*, 2017; Morillo *et al.*, 2015). According to Morillo (2009, page 34), “for these and other reasons, both the offensive and defensive tactics of beach handball are significantly different to those of court handball. Beach handball is not handball played on the beach”.

Beach handball features a wide variety of throws, some of which are used in court handball, as well as others that are exclusive to this modality. According to rule 9:2 of the 2014 Rules of the Game of the International Handball Federation (IHF), goals scored by means of the so-called creative or spectacular shots, which include spin and in-flight (T) shots, are awarded two points. The former is “specific to beach handball, since performing such a shot on a court makes no sense, as no extra points are awarded for it” (Morillo, 2009, page 45). This shot is executed by means of a full-body turn in the air followed by a shot on goal. “The only requirement is that the spin be full-body and that the player’s feet and hips be facing the centre of the goal when the throw is made” (Real Federación Española de Balonmano, RFEB, 2014a, page 1). Moreover, the in-flight throw is one in which “a player throws the ball into the air for her teammate, who jumps when the ball is already in the air, to catch and shoot before touching the ground” (RFEB, 2014b, page 1). This type of throw is similar to the one used in court handball.

Another one of the specific techniques and rules of beach handball, and which distinguishes the latter from court handball, is the permanent situation of numerical superiority of the attacking team. In the attacking phase, the goalkeeper is replaced by a fourth player called the “specialist”, whose goals are also worth two points (Crispim *et al.*, 2010; Gomes da Silva *et al.*, 2017; Morillo *et al.*, 2015).

Concluding attacking moves in collective sports, and more particularly in beach handball, is decisive in matches, since it will determine success or failure and will bring an influence to bear on each team’s final placement in the tournament. For this reason, effective throwing is an essential variable to performance. Effectiveness is defined as the number of shots on- or off-target, depending on the partial objectives of each match (Lozano *et al.*, 2016; Pascual *et al.*, 2010). There is an abundance of studies addressing attacking effectiveness, and more particularly on the effectiveness of throws in handball. On the contrary, the body of research dealing with effectiveness analysis in beach handball is still scant, particularly in women’s beach handball (Lara & Sánchez, 2018; Morillo *et al.*, 2015; Morillo *et al.*, 2016; Zapardiel a and b, 2018).

For this reason, this study set out to determine the differences in throwing performance between winning and losing teams in elite female beach handball.

## Methodology

The sample was comprised of 2,160 throws corresponding to 38 matches from the 2018 Women's Senior Beach Handball World Championships held in Kazan (Hernández *et al.*, 2014). All the throws executed in the matches directly involving teams classified in the Main Round were analysed: Brazil, Chinese Taipei, Denmark, Spain, Greece, Norway, Paraguay, Poland, Russia, Thailand, Uruguay and Vietnam.

The observational methodology was used, with an ideographic, punctual and multidimensional design (Anguera & Hernández-Mendo, 2013). Data collection was performed by means of an ad hoc observation instrument comprised of a combination of field forms and a system of categories designed specifically for this research (Table 1). The study was approved by the Research Ethics Committee of the IUACJ (CEIUACJ).

The recording instrument used was the Lince software (Gabín *et al.*, 2012). The data obtained were exported to the Microsoft Excel and SPSS 25 computing applications, which were used for the statistical analysis.

**Table 1**

*Systems of categories in the observation instrument for the beach handball throw study.*

Criteria	Categories
Match	Each one of the matches selected in the sample.
Team	Teams selected for this study (GRE, NOR, BRA, ESP, TPE, THA, PAR, POL, VIE, RUS, DEN, URU).
Type of throw	In-flight (FLY), spin (SPN), dive shot (DS), jump shot (JS) and standing shot (SS).
Shot value	One point (1), two points (2) or zero points (0).
Effectiveness	Goal (GOL), goalkeeper save (GS), shot deflected (SD) and block (BLO).
Final result	Winner (WIN) and loser (LOS).

**Table 2**

Differences between winners and losers in shot effectiveness. Significant differences (\*) ( $p < 0.05$ ) and (\*\*) ( $p < 0.01$ ).

Final result		Goal	Block	Goalkeeper save	Out of play	Total
Winners	Count	752	25	224	112	1113
	Relative frequency	67,6%	2,2%	20,1%	10,1%	100,0%
	Corrected residual	5,4 **	-4,0 **	-3,6 **	-1,1	
Losers	Count	589	58	279	121	1047
	Relative frequency	56,3%	5,5%	26,6%	11,6%	100,0%
	Corrected residual	-5,4 **	4,0 **	3,6 **	1,1	
Total	Count	1341	83	503	233	2160
	Relative frequency	62,1%	3,8%	23,3%	10,8%	100,0%

To guarantee data quality, inter-observer and intra-observer concordance was confirmed with Cohen's Kappa, with results above 0.80 obtained in all the criteria.

The results were processed by means of central tendency statistical tests, as well as the chi-square test of association between variables and corrected residuals. The Shapiro-Wilk and Mann-Whitney U tests were used for the normality study.

## Results

Significant differences were observed between the winning and losing teams in throwing effectiveness

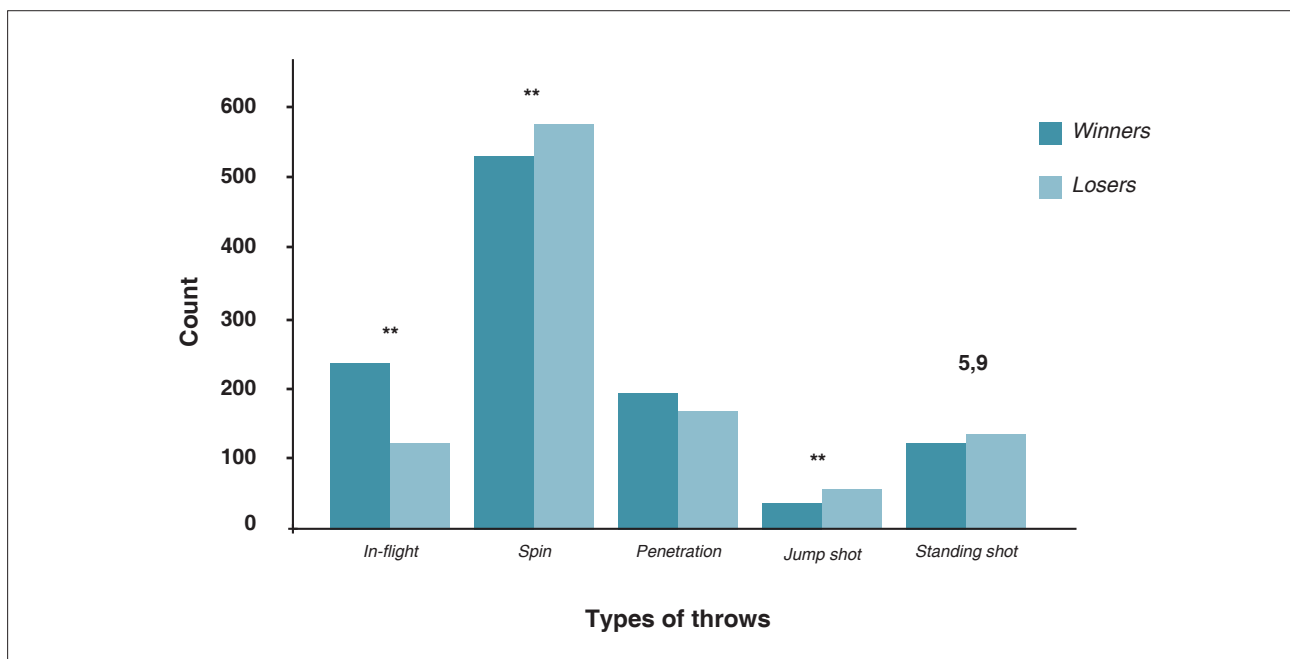
( $p < 0.01$ ). The winning teams scored a greater number of goals and a lower number of their shots ended in goalkeeper saves and blocks ( $p < 0.01$ ) (Table 2).

Spectacular (spin and in-flight) throws accounted for 67.4% of the total. The spin shot was by far the most-used type by winning and losing teams alike (Figure 1). A significant association was observed between the final result and throw-type variables ( $p < 0.01$ ). More specifically, the winners made twice as many in-flight throws as the losers ( $p < 0.01$ ). On the other hand, the losers performed a greater number of spin and jump shots ( $p < 0.01$ ) (Figure 1).

91.3% of the goals obtained were 2-point throws,

**Figure 1.**

Differences between winners and losers in terms of the use of different types of throws. Significant differences (\*\*) ( $p < 0.01$ ).



**Table 3**

Differences between winners and losers in points scored from the different types of shot. Significant differences (\*\*) ( $p < 0.01$ ).

Resultal		In-flight	Spin	Dive shot	Jump shot	Standing shot	Total
Winners	Total points	314	660	237	42	181	1434
	Percentage of total points	21,9% **	46,0% **	16,5%	3,0%	12,6%	100,0%
Losers	Total points	137	607	186	45	157	1132
	Percentage of total points	12,1% **	53,6% **	16,4%	4,0%	13,9%	100,0%

distributed as follows: spin shots 45.8%, in-flight 16.3%, specialist 17.9%, goalkeeper 1.8% and penalties 9.5%. With regard to the teams' scores, there was also a significant association between the end result and points obtained variables ( $p < 0.01$ ). The most important differences were observed in the number of points obtained from spin shots by the losers and the in-flight shots by the winners ( $p < 0.01$ ) (Table 3).

Despite the greater use of the spin shot and its importance in the total number of points scored by the losing

teams, the effectiveness of these shots was significantly lower compared to the winning teams ( $p < 0.01$ ) (Table 4). There were also significant differences in jump and standing shots ( $p < 0.05$ ) (Table 4).

The differences in the effectiveness of the throws were also reflected in terms of the points scored by the teams with the different types of shot. These differences were significant in both the spin shot ( $p < 0.01$ ) and in the standing shot ( $p < 0.05$ ) (Table 5).

**Table 4**

Differences between winners and losers in effectiveness by type of shot. Significant differences (\*) ( $p < 0.05$ ) and (\*\*) ( $p < 0.01$ ).

Type of throw	Final result	Goal	Block	Goalkeeper save	Out of play	Total
In-flight	Winners	69,4%	0,9%	19,4%	10,3%	100,0%
	Losers	59,7%	0,8%	26,9%	12,6%	100,0%
Spin	Winners	64,1% **	3,9% *	21,1% *	10,9%	100,0%
	Losers	54,4% **	7,0% *	26,7% *	12,0%	100,0%
Dive shot	Winners	71,9%	0,5%	19,8%	7,8%	100,0%
	Losers	63,0%	3,0%	24,8%	9,1%	100,0%
Jump shot	Winners	63,6% *	0,0%	21,2%	15,2%	100,0%
	Losers	41,1% *	8,9%	33,9%	16,1%	100,0%
Standing shot	Winners	73,4% *	0,8% *	17,7%	8,1%	100,0%
	Losers	59,4% *	5,3% *	25,6%	9,8%	100,0%

**Table 5**

Means and medians (in brackets) of performance obtained per match for the different types of shot. Significant differences (\*) ( $p < 0.05$ ) and (\*\*) ( $p < 0.01$ ) based on the Mann-Whitney U test.

	In-flight	Spin	Dive shot	Jump shot	Standing shot	Total, general
Winners	1,25 (1,33)	1,27 (1,25) **	1,01 (1,00)	1,01 (1,00)	1,47 (1,73) *	1,29 (1,30)
Losers	1,16 (1,20)	1,05 (1,02) **	0,58 (0,45)	0,58 (0,45)	1,18 (1,00) *	1,08 (1,08)
Total	1,21 (1,33)	1,16 (1,17)	0,77 (0,63)	0,77 (0,63)	1,32 (1,33)	1,19 (1,19)

## Discussion

With regard to the objective of ascertaining throwing performance, it transpired that the levels of effectiveness in the throws executed by winners and losers alike slightly surpassed the previous studies performed in European beach handball, in which values of 53% and 54% were obtained in 2013 and 2015 (Lara & Sánchez, 2018) and 55.5% in 2017 (Zapardiel, 2018a).

Moreover, the results were better than those obtained in court handball (Blanco, 2012; Cabrera & González, 2015; Montoya, 2010). This is clearly due to the situations of the constant numerical superiority of the attacking team over the defending team in beach handball (Morillo, 2009), generating offensive openings, since the space-player ratio is greater, affording greater freedom of action to each one of the players, which translates into greater mobility for movements (Crispim *et al.*, 2010). In turn, comparing the situations of numerical superiority to court handball, the results were slightly greater than those observed in the World Championships held in Serbia in 2013, where the average of means between winners and losers was 60.6% in shots in the situation of superiority (Trejo & Planas, 2018).

A comparison between winners and losers yields significant differences in the number of goals, goalkeeper saves and blocks. These results reveal the greater offensive capacity of winning teams over losing teams. At the same time, defensive pressure, coupled with goalkeeper effectiveness, is conducive to a greater likelihood of winning (González *et al.*, 2017; Jiménez *et al.*, 2017; Teles & Volossovitch, 2015).

Creative or spectacular shots outnumbered simple shots. The spin shot was clearly the priority type of throw in both winners and losers and may be regarded as the main offensive resource used in positional attacks (Morillo *et al.*, 2015; Lara *et al.*, 2018; Lara & Sánchez, 2018).

The significant differences in the use of in-flight shots by winners and the spin shot by losers may be related to the technical difficulties involved in the execution of these shots. In this regard, Morillo (2009, page 46) refers to the importance of the pass leading up to the in-flight shot, where the “relationships established by two players beforehand” are essential to the proper execution of this technical move. Moreover, major technical and tactical difficulties are involved, since the ball must be controlled in the air and be thrown very quickly before the player touches the ground (RFEB, 2014b). On the other hand, the spin shot involves greater ball control when the ball is actually thrown.

In the simple throws, jump shots are used significantly more by the losing teams, which may be due

to the greater difficulty involved in achieving optimal shot circumstances, i.e., a good zone, good body position and dodging opponents as far as possible. This difficulty would constitute the defensive strong point of the winners, who present fewer gaps in their defensive structure and greater opposition in their individual defensive technical and tactical actions (Laguna, 2005).

The greater use made of the spin shot by losers and of the in-flight shot by winners is also mirrored in the distribution of these shots in the total points obtained, where significant differences are observed (Table 3). It should be noted that more than half of all the points scored by the losers come from spin shots (Lara & Sánchez, 2018). The use of the spin shot by the losers and its relevance in point-scoring contrasts with the effectiveness of this type of shot, which is significantly lower than in the winners. Clearly lower values were observed in goals scored, goalkeeper saves and blocks received.

One noteworthy point refers to throwing performance (table 5), where 91.3% of the goals scored were double points, thus fulfilling the objective referred to by Morillo, which “[...] is geared towards obtaining a double-point throwing situation, or in other words, a throw by the double goalkeeper or a spin or in-flight shot by the other players” (2009, page 38).

Once again, significant differences are found in the points obtained through spin shots, where the mean value obtained by the losers was very low, namely 1.05 points per shot, compared to the 1.27 obtained by the winners. Moreover, in the simple shots, the differences lay in the standing shots, where the winners performed better, essentially through goals scored from penalties and full-court goals scored by goalkeepers.

## Conclusions

In women's beach handball, the creative or spectacular shots were the most frequent throws, with the spin shot prevailing over the in-flight shot. The winning teams evinced a greater offensive capacity, and significant differences were observed between winners and losers in the use of the different types of throws, as well as in their effectiveness and performance in terms of points scored. These results may constitute a contribution in training in concluding moves successfully, particularly in female beach handball, in which there are fewer studies. One limitation of this study is the fact that the results only come from this competition and cannot be mainstreamed. Further studies that continue to develop research into technique and tactics in women's beach handball are called for.

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**Conflict of Interests:** No conflict of interest was reported by the authors.



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