

# CHARACTERIZATION OF WHEELCHAIR PARA-BADMINTON GAMES

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## Extended Abstract:

This study intends to characterize Para-Badminton (PBd) game in its TIME-SPACE-ACTION aspects. This research was funded by Badminton World Federation (BWF), which authorized the researcher to record wheelchair matches at 11th PBd World Championships, November 2017 in Ulsan, South Korea. The selection criteria of the games were: to be part of WH1 and WH2 categories, male single; in different stages of dispute, games in semifinal and final phases. Descriptive statistics composed of mean value and standard deviation (SD), Median (1st and 3rd quartile), confidence interval (95% CI) and frequency distribution (absolute and relative) were used to summarize the data. Effect size (ES) and percent delta ( $\Delta\%$ ) were calculated to indicate practical differences between variables. Kolmogorov-Smirnov test was used to analyze data normality. The Mann-Whitney test was used to compare rally time, number of strikes in the shuttle and the pause time between WH1 vs. WH2 classes. The comparison of strikes frequency between WH1 vs WH2 was performed using the chi-square test ( $\chi^2$ ). We consider the value of  $\alpha = 5\%$  to identify significant differences between classes. The mean value and standard deviation of total playing time of the game in WH1/WH2 categories are presented in Table 1.

Table 1. Total Playing Time

Variable	Classes	N (games)	Mean Value $\pm$ sd
Total Time (s)	WH1	10	1780.30 $\pm$ 573.05
	WH2	10	2012.30 $\pm$ 1098.03

Key: N = number of games; sd = standard deviation.

Table 2 presents the descriptive results of variables: rally time, number of strikes in the shuttle and pause time. There was a difference between the number of strikes in the shuttle and the pause time. These results indicate that WH2 class players perform more strikes in the shuttle and require shorter pause time than WH1 class players. It is pertinent to remember that WH1 players present more physical impairments than WH2.

Table 2: Descriptive Results and Comparison between Classes WH1 vs WH2

	Rally Time (min.)		Strikes in the Shuttle		Pause Time (min.)	
	WH1	WH2	WH1	WH2	WH1	WH2
Mean Value $\pm$ sd	10.19 $\pm$ 8.39	12.49 $\pm$ 12.47	8 $\pm$ 7	10 $\pm$ 10	15.06 $\pm$ 10.37	14.14 $\pm$ 10.57
CI95%	9.52 a 10.85	11.58 a 13.41	8 a 9	9 a 11	14.22 a 15.89	13.35 a 14.92
1st quartile	4.34	4.36	<u>4</u>	<u>4</u>	10.34	9.07
Median	7.95	8.57	<u>6</u>	<u>7</u>	12.54	11.21
3rd quartile	13.17	16.04	10	13	15.7	14.18
ES; $\Delta\%$	0.2 (small); 23%		0.3 (small); 27%		0.1 (trifling); -6%	
Mann-Whitney Test	Z = -1.942; p = 0.05		Z = -3.064; p = 0.002*		Z = -5.835; p < 0.001*	

Key: IC95% = confidence interval / ES = effect size /  $\Delta\%$  = delta percentage / \* difference (p < 0.05) between WH1 vs WH2.

The most frequent strikes performed by the players, shown in Table 3, were: Clear (n = 4617, 38.3%), Lob (n = 2333, 19.4%), Drop (n = 1839, 15.3%) and Net-shot (n = 1428, 11.8%), for

both functional classes, characterizing the game in strikes that require a lot of displacement in court. In relation of Drive, there is little use of strike in both categories, although with a higher incidence in WH2. Regarding services, we can see variation of four forms, with a greater use of backhand (6.6%) compared to the forehand (4.3%) (Table 3).

**Table 3: Absolute and Relative Frequency of Strikes Performed by Players**

Strikes	WH1	WH2	Total
Clear	1982 (40,6%)	2635 (36,7%)	4617 (38,3%)
Drive	23 (0,5%)	79 (1,1%)	102 (0,8%)
Drop	737 (15,1%)	1102 (15,4%)	1839 (15,3%)
Lob	870 (17,8%)	1463 (20,4%)	2333 (19,4%)
Net-shot	525 (10,8%)	903 (12,6%)	1428 (11,8%)
SOS	146 (3,0%)	197 (2,7%)	343 (2,8%)
LOS	118 (2,4%)	63 (0,9%)	181 (1,5%)
SCS	200 (4,1%)	336 (4,7%)	536 (4,4%)
LCS	150 (3,1%)	116 (1,6%)	266 (2,2%)
Smash	128 (2,6%)	281 (3,9%)	409 (3,4%)
<b>Total*</b>	<b>4879 (40,5%)</b>	<b>7175 (59,5%)</b>	<b>12054 (100,0%)</b>

**Key:** SOS = short open service (Forehand); LOS = long open service (Forehand); SCS = short close service (Backhand); LCS = long close service (Backhand).

\*Comparison of the frequency of actions between WH1 vs WH2:  $\chi^2 = 437.3$ ;  $df = 1$ ;  $p < 0.001$ .

In relation to the region of the court where most winners occurred, the front was the most frequent in both classes (WH1: 57.27%, WH2: 62.65%). Another important point are the winners (WH1: 33.98%, WH2: 33.38%), forced errors (WH1: 9.88%, WH2: 8.59%) and unforced errors (WH1: 56.14%, WH2: 58.03%). In this study, errors were more evident than winners in both functional classes. The efficiency of actions was analysed and the Smash was the most efficient in promoting winners in both functional classes (WH1: 10.16%; WH2: 10.68%), followed by Drop (9.63%), Net-shot (8.76%) and Lob (3.01%) for WH1 category, and Net-shot (6.98%), Drop (6.71%) and Lob (1.85%) for WH2 category. In relation to unforced errors, the off-court shuttles stood out (WH1: 71.2%, WH2: 63.09%), and forced errors were evidenced by the errors of reception (WH1: 49.50%, WH2: 49.21%). The analysis of temporal, spatial and technical aspects of Pbd games is fundamental for understanding the dynamics of the game and can be useful to build a teaching program and/or training program as well as providing guidance to appropriate tactics during games.