



International
Paralympic Committee

VISTA2015

Scientific Conference

Booklet

AC Hotel Palau de Bellavista
Girona, 7-10 October 2015



#110

Race analysis in swimmers with visual impairment at the 2012 London Paralympic Games using individual distances method

Almena A; Pérez-Tejero J; Veiga S; Navarro E.

Polytechnic University of Madrid (Spain)

Introduction

International Paralympic Committee (IPC) establishes a classification system for swimmers with visual impairments, categorizing them into three functional classes using as criteria the degree of visual acuity, field of vision and light perception (Daly, Malone, Burkett, Gabrys, & Satkunskiene, 2009; Malone, Sanders, Schiltz, & Steadward, 2001; International Paralympic Swimming Committee, 2005). Race analysis based on individual distances (Veiga, S., Cala, A., Mallo, J., & Navarro, E. (2013) provides the distances traveled by the swimmer in each of the race segments, having the emergence of the swimmer's head as a reference for analysis. The aim of this study was to examine the influence of functional classification on race performance parameters in Paralympic swimmers with visual impairment through the individual distances method.

Methods

24 male swimmers distributed along classes S11, S12 and S13 and 16 female distributed in class S11 and S12 classes in the 400 meters freestyle finals at the London 2012 Paralympic Games were studied. The 2D-DLT method was used to reconstruct the plane of motion during races. The variables analyzed were Dive distance (DD); Underwater distance (UD); Starting distance (SD); Free swimming distance (FSD); Turn in Distance (TinD); Turn out distance (TOutD); Finish distance (FD). Finally, total time (TT). A descriptive analysis of the variables was performed per gender and class. To evaluate the interclass differences, ANOVA plus post hoc Scheffé test were used for male swimmers and T Student for female swimmer. Significance level was set at $\alpha = 0.05$.

Results

A intraclass level for male gender the FSD increase linearly when the event progressed for the three classes. In TinD the observed trend was to maintained constant; and the value of TOutD were reducing with the pass of the event. On the other hand, for female swimmers, the FSD increase but not linearly. And the TinD and TOutD decrease not linearly over the event. Comparison between classes were conducted. In male swimmers the S11 class differed significantly with S12 in FSD8 and TT; and the classes S12 and S13 in FSD1 and TOutD7. For



female swimmers significant differences were found between classes S11-S12 in: FSD1, TInD1, TOutD1, FSD2, TOutD2, TInD3, TOutD4, TOutD5, TInD6, TInD7 and TT. Comparison between gender were conducted. In the class S11 differed significantly in DD, SD, FSD1, TOutD1, FSD2, TOutD2, TInD3, TOutD4, TOutD5, TInD7 and TT; and the class S12 in DD, UD, SD, FSD1, FSD3, TInD3, TOutD3, FSD4, TOutD4, FSD5, TOutD5, FSD6, TOutD6, FSD7, TOutD7, FSD8 and TT.

	Male						Female			
	S11		S12		S13		S11		S12	
	X	SD	X	SD	X	SD	X	SD	X	SD
DD	3,29	0,31	3,33	0,25	3,36	0,2	2,77	0,27	2,94	0,18
UD	5,84	1,78	7,72	1,26	7,17	1,47	4,83	1,18	6,11	1,6
SD	9,14	1,77	11,06	1,16	10,54	1,56	7,59	1,1	9,04	1,75
FSD1	38,89	1,64	36,46	1,21	37,5	1,71	40,72	1,25	38,58	1,68
TInD1	1,96	0,7	2,47	0,27	1,95	0,31	1,68	0,52	2,37	0,41
TOutD1	5,01	0,71	5,9	1,02	6,02	1,92	4,06	0,52	5,26	1,02
FSD2	43,28	1,02	41,85	1,07	41,71	2,09	44,28	0,71	42,8	1,07
TInD2	1,71	0,46	2,25	0,56	2,26	0,28	1,66	0,42	1,94	0,37
TOutD2	4,78	0,44	5,51	0,44	5,99	1,64	3,9	0,54	4,91	0,85
FSD3	43,18	0,65	42,12	0,54	42,01	1,53	41,84	5,08	43,19	0,58
TInD3	2,03	0,55	2,37	0,32	1,98	0,43	1,51	0,35	1,9	0,35
TOutD3	4,69	0,58	5,47	0,36	5,6	1,47	4,94	3,05	4,81	0,74
FSD4	43,24	0,86	42,26	0,53	42,18	1,62	43,2	5,25	43,17	0,99
TInD4	2,07	0,42	2,28	0,32	2,25	0,32	1,59	0,39	2,02	0,47
TOutD4	4,6	0,35	5,23	0,43	5,48	1,25	3,65	0,79	4,43	0,5
FSD5	43,65	0,88	42,65	0,48	42,59	1,34	43,46	3,27	43,57	0,45
TInD5	1,74	0,58	2,22	0,49	1,93	0,31	1,64	0,39	1,99	0,4
TOutD5	4,52	0,5	5,27	0,34	5,3	1,14	3,76	0,69	4,52	0,42
FSD6	43,71	0,86	42,54	0,74	42,69	1,36	42,35	4,86	43,58	0,38
TInD6	1,77	0,49	2,19	0,48	2,01	0,29	1,4	0,32	1,89	0,51
TOutD6	4,67	0,67	5,16	0,37	5,33	1,16	4,71	3,5	4,31	0,35
FSD7	43,25	0,85	42,7	0,57	42,69	1,16	42,79	3,95	43,93	3,27
TInD7	2,07	0,27	2,14	0,47	1,98	0,36	1,38	0,25	1,76	0,26
TOutD7	4,34	0,52	5,19	0,28	4,86	0,52	3,88	0,85	4,43	0,31
FSD8	44,51	0,8	43,5	0,43	43,5	0,6	44,72	1,05	44,37	0,31
FD	1,15	0,44	1,31	0,28	1,63	0,42	1,39	0,38	1,2	0,31
TT	289,22	10,75	263,71	9,63	253,57	8,8	340,09	25,3	288,88	8,08



Table 1: Mean, standard deviation and comparisons between classes for each of the analyzed variables for female and male

Discussion and conclusion

The different variables analyzed by the method of individualized distances showed differences between classes S11, S12 and S13. These differences were not always significant. With regard to the comparison between genders the values achieved by the male were higher than female. These differences were not always significant.

Keyword(s): race analysis, swimming performance, visual impairment, Paralympic Games.

References:

- Abdel-Aziz, Y. I., & Karar, H. M. (1971). Direct linear transformation from comparator coordinates into spacecoordinates in close range photogrammetry. Paper presented at the Symposium on close range photogrammetry, Falls-Church. E.E.U.U.
- Arellano, R., & Sánchez, J. A. (2002). El análisis de la competición: estudio de la situación actual, variables y metodología. In R. Arellano & A. Ferro (Eds.), *Análisis biomecánico de la técnica en natación : programa de control del deportista de alta competición* (pp. 9-50). Madrid: Consejo Superior de Deportes.
- Daly, D., Malone, L., Burkett, B., Gabrys, T., & Satkunskiene, D. (2009). Is sight the main deterrent to race performance in visually impaired competitive swimmers. *Physical Education and Sport*, 7(1), 1-15.
- Malone, L., Sanders, R., Schiltz, J., & Steadward, R. (2001). Effects of visual impairment on stroke parameters in Paralympic swimmers. [Comparative Study Research Support, Non-U.S. Gov't]. *Med Sci Sports Exerc*, 33(12), 2098-2103.
- Mallo, A., Navarro, E., Aranda, J., & Helsen, W. (2009). Activity profile of top-class association football referees in relation to fitness-test performance and match standard. *Journal of Sports Science*, 27, 9-17.
- Mallo, A., Navarro, E., Garcia-Aranda, J., Gilis, B., & Helsen, W. (2007). Activity profile of top-class association football referees in relation to performance in selected physical test. *Journal of Sport Science*, 25(805-813).
- Mallo, A., Veiga, S., López de Subijana, C., & Navarro, E. (2010). Activity profile of top-class female soccer refereeing in relation to the position of the ball. *Journal of Science & Medicine in Sport*, 13, 129 -132. IPC Swimming. (2005). *Swimming Classification Manual*.



Veiga, S., Cala, A., Mallo, J., & Navarro, E. (2013). A new procedure for race analysis in swimming based on individual distance measurements. [Research Support, Non-U.S. Gov't]. *J Sports Sci*, 31(2), 159-165. doi: 10.1080/02640414.2012.723130