ORIGINAL

SHOOTING EFFECTIVENESS IN FOOTBALL 5-A-SIDE FOR THE BLIND AT THE 2016 PARALYMPIC GAMES

LA EFICACIA DEL LANZAMIENTO EN FA5 PARA PERSONAS CIEGAS EN LOS JJ.OO´2016

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ABSTRACT

The present study analysed all shots at goal (*n*=730) in football 5-a-side for the blind at the 2016 Paralympic Games. The instrument IOLF5C was used to analyse shooting effectiveness in football 5-a-side for the blind. It comprises 13 variables that define every shot. A descriptive study was carried out, and after analysing the significant relationships between all variables and effectiveness, the most effective type of shot was identified, as well as the most significant associations. The logistic regression analysis revealed the existence of two variables that predict shooting effectiveness: starting zone and type of contact. These results allowed for characterisation of football 5-a-side for the blind and its differentiation from other low-scoring sports regarding types of advancement, blocks and playing systems.

KEY WORDS: *football, shot, effectiveness, Paralympic Games.*

INTRODUCTION

Football 5-a-side for the blind and the partially sighted (F5) is a team sport (Hernández, 2005) that is played outdoors in order to provide the athletes with optimal acoustics. It is played by two teams of 5 players (one goalkeeper and four field players) and has become one of the most popular sports among this population. Research regarding F5 is scarce in the literature (Gamonales, 2017). Some studies analysed players' strategies related to match interpretation in F5 (Morato, Gomes, Duarte & De Almeida, 2011), training effects on physical fitness and body composition parameters (Campos et al., 2013), or cardiorespiratory changes and motor profile in national team F5 players (Campos et al., 2014). Other studies focused on assessing injury prevalence and characteristics in sports for the visually impaired, including F5 (Magno, Morato, Bilzon & Duarte, 2013). Besides, there are studies that compared the relationship between mental representation and sound direction in blind football players, blind non-athletes and sighted individuals (Velten, Bläsing, Portes, Hermann & Schack, 2014; Velten, Ugrinowitsch, Portes, Hermann & Bläsing, 2016). Suarez (2014) examined the guide's role in football for the blind and, lastly, Gorla et al. (2017) determined the body composition and somatotype of the Brazilian F5 team. Nevertheless, no study has specifically analysed sport performance in F5.

Sport performance analysis is one of the most relevant research areas within training and conditioning sciences. It is a growing area, which has relatively

recently gained popularity as a term among sport researchers and practitioners (Drust, 2010). The scientific analysis of sport performance aims at advancing in the understanding of game behaviour with a view to improving future outcomes (McGarry, 2009). According to Hughes and Bartlett (2002), all research that analyses sport performance either in real competition or during training may be included in sport performance analysis. But it is the interest in sport performance during real competition above any report about the athletes, laboratory test or information gathered by means of questionnaires, discussion groups and/or interviews what distinguishes it from other Sport Science disciplines (O'Donoghue, 2010). Thus, it has its own space within Sport Sciences, being very applicable to training and competition monitoring (Gómez-Ruano, 2017) and aiming to gain knowledge on how to predict and prescribe players and teams' performance based on the competition characteristics (O'Donoghue, 2015; Rein & Memmert, 2016).

Performance indicators are a selection or combination of movement variables which aim to define some or all performance aspects within a sport context. Analysts and coaches use performance indicators to assess performance of an individual, elements of a group or a team (Hughes & Bartlett, 2002).

The most frequently analysed action, considered as a maximal effectiveness indicator, is shooting (Ibáñez, Feu, García-Rubio, Parejo & Cañadas, 2009), given that it determines sport success. However, in other studies concerning performance analysis, the shooting zone (Reina-Gómez, Hernández-Mendo & Fernández-García, 2010), the role of players (Tsitskaris, Theoharopoulos, Galanis & Nikopoulou, 2002), defensive pressure and players' level (Ibáñez, Santos & García-Rubio, 2015) or actions during attacking situations (Álvarez, Puente, Manero & Manonelles, 2004; Lago-Peñas; Martín-Acero & Seirul-lo, 2007; Valez, Areces, Blanco & Arce, 2011) have been examined. There are also studies regarding the moment of scoring (García-Rubio, Gómez-Ruano, Lago-Peñas, & Ibáñez, 2017; Lago-Peñas, Lago-Ballestero, Dellal & Gómez-Ruano, 2010; Liu, Gómez-Ruano, Lago-Peñas & Sampaio, 2015), the number of shots (Tenga, Ronglan & Bahr, 2010), the shooter's situation (Caballero, García-Rubio & Ibáñez, 2017), or the end result (Castellano, Casamichana & Lago-Peñas, 2012; García-Rubio, Ibáñez, Gómez-Ruano & Sampaio, 2014; Gómez-Ruano, Gómez-López & Jiménez Sáiz, 2013; Hughes & Franks, 2005).

Performance indicators applied to team sports allow us to learn about the game logics through technical-tactical factors (Gómez-Ruano, 2017; Reina-Gómez & Hernández-Mendo, 2012). That means describing specific variables, either offensive or defensive (Thomas, Fellingham & Vehrs, 2009; Ibáñez et al., 2009; Marcelino, Mesquita & Sampaio, 2011; Sampaio, Lago-Peñas, Casais & Leite, 2010), that allow coaches to better monitor training and competition (Gómez-Ruano, Ibáñez, Parejo & Furley, 2017).

In order to gain knowledge on the modality under study, F5 for the blind and the partially sighted, studies involving performance indicators must be considered, as well as all specific variables related with shooting in F5. Therefore, the main aims of this research were: i) to analyse the shots performed in F5 at the 2016 Paralympic Games; ii) to understand the relationships that determine shooting

effectiveness and, lastly, iii) to predict shooting effectiveness. This paper belongs to a series of studies on the *game process* that aim to gain technical-tactical knowledge on F5 (Ibáñez, Sampaio, Sáenz-López, Giménez & Janeira, 2003). It contributes to raise the interest from clubs, athletes, media, coaches and sport fans in understanding players' performance during competition and training and its possible explanations (O`Donoghue, 2015; Gómez-Ruano, 2017).

METHOD

Design

An empirical, quantitative design has been applied in this study, using an arbitrary observation code and conducted within a natural context (Montero & León, 2007).

Sample

All match-play shots (*n*=730) performed during the F5 matches (*n*=18) played at the 2016 Brazil Paralympic Games.

Variables

The definition of the study variables and their subcategories was addressed in a previous study that involved a group of experts composed of national and international-level F5 coaches; it was determined which variables should be observed (Gamonales, León, Muñoz, González-Espinosa & Ibáñez, 2018a). More specifically, all context, game and outcome variables that are included in group I of the IOLF5C instrument were analysed. This instrument was designed and validated for competition performance indicator assessment in football 5-a-side for the blind (Gamonales, Muñoz, León & Ibáñez, 2018b). These variables will be used as performance indicators in the analysis (O´Donoghue, 2010). Each of these variables underwent a numerical categorisation to facilitate their recording and subsequent statistical analysis. The recorded variables were:

Context variables: *competition round, time interval, shooter's situation, end result.*
Game variables: *starting zone, type of advancement, shooting zone, circumstances leading to shot, blocks/deflections, opposition to shot, body zone, type of contact.*
Outcome variables: *shot outcome.*

For predictive analysis, the variable *shot outcome* underwent a recoding process and it was called *recoded outcome*.

Procedure

The IOLF5C instrument (Gamonales et al., 2018a) was used to analyse shooting effectiveness in F5. A coder training process was applied with the aim to confirm whether the data were valid and reliable and they could be used for research. The coder training process was divided into four phases: preparatory phase, coder selection phase, observer training phase and, lastly, reliability phase, which yielded a Kappa value of 0.95 (Gamonales et al., 2018b). Once the coder training process was completed, the coders recorded individually all match-play shots performed during the competition (*n*=730), what provided the necessary data for statistical analysis.

Statistical analysis

A descriptive analysis, using frequencies and percentages, was conducted. *Chi squared (χ^2)* and *Cramer's Phi Coefficient (φc)* (Newell, Aitchison & Grant, 2014) were used to estimate the association between variables. The strength of association given by *Cramer's φc* was interpreted following Crewson (2006). The strength of association was analysed using the adjusted standardised residuals (ASR) of the contingency tables (Field, 2009) resulting from the relationships between the independent study variables (context and game variables) and the variable *shot outcome*.

In order to determine *effectiveness*, the variable *shot outcome* underwent a recoding process prior to going into the regression model, through which the categories were grouped for a more specific analysis. The independent variables included in the model were selected because they showed a statistically significant relationship in the *Chi-squared (χ^2)* test for inferential analysis. After the variable category recoding, they were introduced in the system according to the highest frequencies obtained in the univariate descriptive analysis, since there was no previous study in a sport context to be used as a reference for the hypothesis testing (Agresti & Finlay, 2009; Field, 2009).

The predictive analysis had the purpose to determine whether there was a statistically significant function that related the independent variables established in this study to the dependent variable that defined effectiveness, similarly to other previous studies regarding match analysis in football (García-Rubio et al., 2017) or other team sports (Gómez-Ruano et al., 2017; Ibáñez et al., 2009). The variables that were introduced as candidates in the binary logistic regression analysis were *starting zone* and *type of contact*. The logistic regression analysis comprised two steps to establish a prediction model and led to the inclusion of both variables in the final model. The forward stepwise logistic regression method, based on *Wald's statistic*, was applied. The cut-off point was established using the *Receiver Operating Characteristic (ROC) curve*. Lastly, the goodness of fit of the data to the logistic regression model was assessed through the *Hosmer-Lemeshow test* for goodness of fit and the correlation matrix of the variables included in the final regression model (Agresti & Finlay, 2009; Field, 2009; Menard, 2002). The statistical package SPSS 24.0 (IBM SPSS Statistics 24.0, Chicago, IL, USA) was used to conduct the data analysis.

RESULTS

Figure 1 shows the shots performed in the different rounds of the football 5-a-side for the blind competition at the 2016 Paralympic Games.
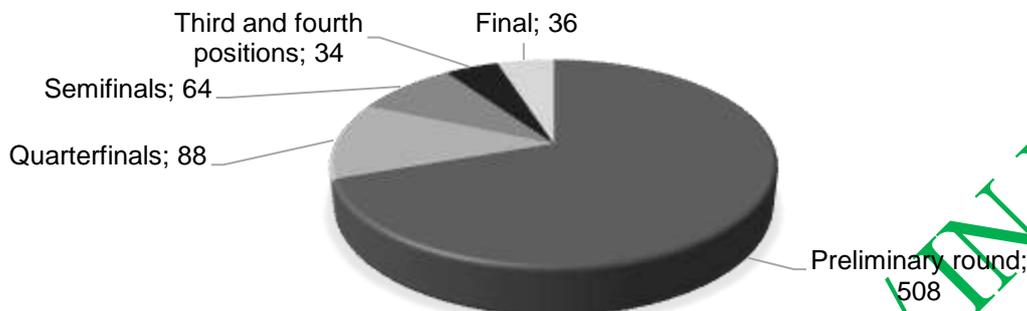
Figure 1. Shots performed in the different rounds of the F5 competition at the 2016 Paralympic Games.

Figure 2 shows the time intervals in which the shots were performed.
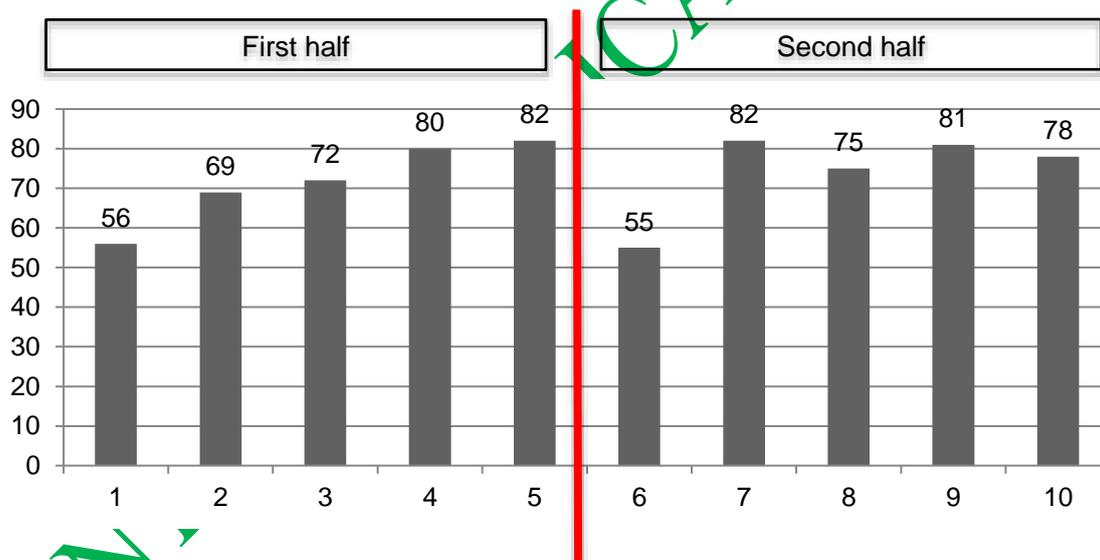
Figure 2. Time intervals in which shots were performed during the F5 competition at the 2016 Paralympic Games.

Table 1 contains the results of the rest of variables of this F5 study.

Table 1. Description of context and game variables in F5.

Variables	Categories		
Shooter's situation	Winning	Losing	Tied
n	167	110	453
%	22.9	15.1	62.1
End result	Win	Loss	Tie
n	342	200	188

%	46.8	27.4	25.8		
Starting zone	Defensive zone	Predefensive zone	Preoffensive zone	Offensive zone	
n	232	134	136	228	
%	31.8	18.4	18.6	31.2	
Type of advancement	Combination	Direct	Quick		
n	104	283	343		
%	14.2	38.8	47.0		
Shooting zone	Defensive zone	Predefensive zone	Preoffensive zone	Offensive zone	
n	15	19	45	651	
%	2.1	2.6	6.2	89.2	
Circumstances leading to shot	Pass – control – shot	Pass – shot	Control – shot	Other	
n	56	64	536	74	
%	7.7	8.8	73.4	10.1	
Blocks/deflections	No deflection	Deflection in front of the shot	Deflection at same height of shot	Deflection from behind the shot	Other
n	583	111	24	6	6
%	79.9	15.2	3.3	0.8	0.8
Opposition to shot	Without opposition	Goalkeeper	Distant opposition	Nearby opposition	Other
n	4	44	175	490	17
%	0.5	6.0	24.0	67.1	2.3
Body zone	Right foot	Left foot	Other		
n	617	92	21		
%	84.5	12.6	2.9		
Type of contact	Inside of foot	Instep / Toe kick	Outside of foot	Backheel	Other
n	236	439	3	3	45
%	32.3	60.6	0.4	0.4	6.2
Shot outcome	Success. Goal	Success. On goal, not scored, ball cleared	Failure. On goal, not scored, ball not cleared	Failure. Out of goal	Other
n	21	147	286	269	7
%	2.9	20.1	39.2	36.8	1.0

The results of the inferential analysis regarding the association between *shot outcome, recoded outcome (RO)* and the rest of variables of the study are shown in table 2.

Table 2. Relationship between *shot outcome* and the independent variables of the study.

	Shot outcome (SO)					Recoded outcome (RO)				
Variables	*χ2*	df	*Sig.*		*φc*	*Sig.*	*χ2*	df	*Sig.*		*φc*	*Sig.*
Comp. Round	11.517	16	0.777		0.063	0.777	4.704	4	0.319		0.080	0.319
Team	66.035	32	**0.000**	*	0.151	0.000	31.359	8	**0.000**	*	0.208	0.000
Time interval	52.365	36	**0.038**	*	0.134	0.038	7.276	9	0.608		0.100	0.608

Shooter's sit.	52.858	8	**0.000**	*	0.270	0.000	8.022	2	**0.018**	*	0.105	0.018
End result	27.604	8	**0.001**	*	0.138	0.001	15.567	2	**0.000**	*	0.146	0.000
Starting zone	24.163	12	**0.019**	*	0.105	0.019	10.353	3	**0.016**	*	0.119	0.016
T. Advancement	4.865	8	0.772		0.058	0.772	1.606	2	0.448		0.047	0.448
Shooting zone	17.400	12	0.135		0.089	0.135	7.236	3	0.065		0.100	0.065
Circ. shot	11.247	12	0.508		0.072	0.508	4.581	3	0.205		0.079	0.205
Blocks	34.309	16	**0.005**	*	0.109	0.005	6.399	4	0.171		0.094	0.171
Oppos. to shot	12.121	12	0.436		0.075	0.436	4.228	3	0.238		0.076	0.238
Body zone	6.581	8	0.582		0.067	0.582	0.630	2	0.730		0.029	0.730
Type of contact	43.171	16	**0.000**	*	0.122	0.000	11.964	4	**0.018**	*	0.128	0.018

Comp. Round: Competition round
Shooter's sit.: Shooter's situation
T. Advancement: Type of advancement
Circ. shot: Circumstances leading to shot
Oppos. to shot: Opposition to shot

Low strength of association (φc=0.208; p<0.05) was found between the variables *recoded outcome (RO)* and *team* (χ^2=31.359; *df*=8; p<0.05). The results revealed that the probability that the shots performed by the Brazilian and the Chinese teams were successful was higher than expected (*ASR=4.4; n=142 and ASR=2.5; n=27, respectively*). In contrast, the probability that the Iranian team missed their shots was higher than expected (*ASR=2.5; n=69*).

The variables *recoded outcome* and *shooter's situation* (χ^2=8.022; *df*=2; p<0.05) showed low strength of association (φc=0.101; p<0.05). The results revealed that the team who was winning had higher probability than expected of performing successful shots (*ASR=2.6; n=54*).

There was low strength of association between the variables *recoded outcome (RO)* and *end result* (χ^2=15.567; *df*=2; p<0.05; φc=0.146; p<0.05). The probability that winning teams performed successful shots was higher than expected in all competition rounds (*ASR=3.9; n=103*). Nevertheless, the probability that losing teams missed their shots was higher than expected (*ASR=2.7; n=166*).

The strength of association between the variables *recoded outcome* (RO) and *starting zone* (χ^2=10.353; *df*=3; p<0.05) was found to be low (φc=0.119; p<0.05). There was higher probability than expected that shooting actions that started in the offensive (*ASR=2.4; n=168*) or the preoffensive (*ASR=2.0; n=114*) zones were successful.

Low strength of association (φc=0.128; p<0.05) was found between the variables *recoded outcome (RO)* and *type of contact* (χ^2=11.964; *df*=4; p<0.05). The results revealed that the probability that shots performed with the instep and toes (*ASR=2.3; n=291*) or with the outside of the foot (*ASR=2.0; n=2*) were successful was higher than expected. The probability that shots performed with the inside of the foot were successful was lower than expected (*ASR=-2.0; n=1*).

Table 3 shows the results obtained until the second step of the logistic

regression analysis to determine the prediction model.

Table 3. Variables included in the logistic regression model for F5 competition.

Variable / Category	B	S.E.	Wald	df	Sig.		Exp(B)
Starting zone			10.789	3	0.013	*	
Defensive zone (Reference variable)							
Predefensive zone	0.562	0.284	3.926	1	0.048	*	1.755
Preoffensive zone	0.637	0.285	5.007	1	0.025	*	1.891
Offensive zone	-0.090	0.217	0.172	1	0.678		0.914
Type of contact			11.709	4	0.020	*	
Instep / Toe kick (Reference variable)							
Inside of foot	-0.555	0.207	7.172	1	0.007	*	0.574
Outside of foot	-0.704	1.239	0.323	1	0.570		0.495
Backheel	-2.509	1.254	4.002	1	0.045	*	0.081
Other	0.152	0.450	0.114	1	0.736		1.164
Constant	1.427	0.209	46.570	1	0.000		4.167

* Significant at $p<0.05$

The results of the logistic regression analysis revealed the existence of two variables with optimal significance level ($p<0.05$), what allows for establishing a prediction model for shooting in the sport context under study. Depending on the zone where the action starts (*starting zone*), it can be predicted whether the shot would be on goal or not, regardless of the outcome (*Wald χ^2*=10.789; p=0.013). More specifically, when the shooting action starts in the preoffensive zone, the *odds ratio* (Exp(B)) that a shot will be performed is 189% (*B*=0.637; *Wald χ^2*=5.007; p=0.025; *Exp(B)*=1.891) compared to when the action starts in the defensive zone (reference zone). The model allows for prediction of the action outcome based on the variable *type of contact* (*Wald X^2*=11.709; p=0.020). Thus, the probability that a player kicks the ball towards the goal using the inside of the foot decreases by 57% (*B*=-0.555; *Wald χ^2*=7.172; p=0.007; *Exp(B)*=0.574). The results regarding the prediction model validity are displayed in Table 4.

Table 4. Classification (confusion matrix). Prediction model for the shooting action.

Observed		Predicted		
		Recoded outcome (RO)		% correct
		Success	Failure	
Recoded outcome (RO)	Success	97	67	59.1
	Failure	244	318	56.6
Total percentage				57.2

The cut-off value is 0.799.

The previous table shows the results of the case classification, also called confusion matrix. The cut-off point, calculated through the ROC curve and the Youden index (Fluss, Faraggi & Reiser, 2005), was 0.799. Globally, the model classified 57.2% of the cases correctly (sensitivity=56.6% and specificity=59.6%). The *Hosmer-Lemeshow test* for goodness of fit yielded the following values: χ^2=1.492(7); p=0.983. The null hypothesis of equality was rejected, assuming that the model fit the data (Field, 2009).

DISCUSSION

The main aim of this study was to analyse the shots performed in football for the blind at the 2016 Paralympic Games, with the purpose to examine shooting effectiveness by studying the relationships among the variables involved and to predict shooting effectiveness. It was found that the teams who initiated the action in the preoffensive zone had higher probability of being successful, and even higher when the shot was performed with the instep or toes. Furthermore, relationships were established between effectiveness and the variables defined for every shot, what allowed for prediction of success.

In the existing literature, various authors have addressed the study of several performance indicators or factors in order to improve training and competition. These models, applied to team sports, allow for understanding of the game logics through technical-tactical factors (Reina-Gómez & Hernández-Mendo, 2012). To this purpose, specific variables, either offensive or defensive, are usually described (Thomas et al., 2009; Ibáñez et al., 2015; Marcelino et al., 2011; Sampaio et al., 2010), generating high-quality research that allows this area of knowledge to advance based on its methodology and within the general sport context (Drust, 2010). The understanding of performance indicators can help determine a team's strategy and tactics (Petersen, Pyne, Portus, Cordy & Dawson, 2008).

The results of the descriptive analysis in F5 at the 2016 Paralympic Games yielded relevant information for coaches. In general, this sport contains a quite reduced variety of technical-tactical actions due to the sport modality characteristics, in which all players have limited vision, except the goalkeeper. Due to the competition format, the majority of shots were performed during the preliminary round, followed by the quarterfinals. Shots were mainly performed between minutes 20:01 and 25:00 of the first half and between minutes 30:01 and 35:00 of the second half. This is logical, given the effect of fatigue, which makes teams less organized and the game faster, with frequent transitions from one side of the field to the other (Tsitskaris et al., 2002). F5 is a very demanding sport as regards concentration capacity in order to keep the tactical plan (Suarez, 2014). The moment of the match, fouls and cards shown may have an influence on the end result (García-Rubio et al., 2014; Reina-Gómez & Hernández-Mendo, 2012), as well as on the game flow, as it happens in basketball (Gómez-Ruano et al., 2017).

The score at the moment of shooting was mostly draw. The number of goals in these matches is usually low and the difficulty to score is high due to the continuous contact with the opponent and the fact that eight players (four per team) compete for the ball in a small-sized pitch (Suárez, 2014). Kickboards are placed all over the touch lines in order to avoid game interruptions.

Regarding the *end result*, the team who shot most times was the one who ended up winning the match. These results are similar to those from other studies in which football 11-a-side World Championships were analysed and the relevance of shooting was highlighted. Such studies revealed, on one side, that

in contexts where both teams had similar probability to win given the tight score, their playing systems were based on fast transitions, offensive actions close to the penalty area and an increased number of shots (Gómez-Ruano, et al., 2013). On the other side, it was found that these were the teams that achieved the best results in competition (García-Rubio et al., 2017; Liu, et al., 2015). The winning teams showed greater ball possession than the losing ones when the former were still losing or drawing, while there were no differences when the score was already favourable for the winning teams (Lago, Martín-Acero & Seirul-lo, 2007). Player displacements in F5 are fast and in a zigzag to generate disorganisation in the defending team. Therefore, the play outcome, regardless of its consequence, is in itself a game indicator (Reina-Gómez & Hernández-Mendo, 2012).

As regards the *starting zone* of the action that ends with a shot at goal, the data showed that actions started with a goal kick by the goalkeeper to a player in the *defensive zone* or with a ball recovery in the *offensive zone* as a result of pressure. In either case, the player with the ball would try to take it to the scoring zone and to finish the action with a shot on goal. The shots or throws performed closest to the goal or basket have the highest probability to score (Prieto, Pérez & Gómez-Ruano, 2013; Ibáñez et al., 2009) and they can be quantified. The play outcome, regardless of its consequence, is in itself a game indicator (Gómez-Ruano, 2017).

The most frequent *types of advancement* used by players were quick or direct transitions. F5 teams tend to reach the scoring zone as fast as possible with the purpose to finish the action with a shot on goal. Exceptionally, they complete combination actions. Quick transitions are the result of F5 sport context features, which determine the effectiveness of the final action. This also happens in other team sports such as field hockey (Piñero, 2008) or floorball (Prieto et al., 2013), where the shot depends on previous technical actions like the pass. The results showed that counterattacks were more effective than more elaborated attacks, similar to what studies involving conventional football reported (Tenga et al., 2010). Consequently, it is difficult to play F5, since the players are distributed all over the pitch, in a small-sized field of play with kickboards over the touch lines, without being able to see where their team mates are.

In regard to the *shooting zone* where the offensive action was finished, the data showed higher probability of finishing from the *offensive* and *preoffensive zones*. Shots performed from the *defensive* and *predefensive zones* were occasional and occurred by chance. Therefore, broader measures of offensive effectiveness, such as scoring opportunities and shots at goal, are commonly used as an alternative to goals scored due to the naturally low probability of scoring in football (Tenga et al., 2010). These parameters led to the conclusion that shot quality is more important than quantity (Lago-Peñas et al., 2010). Technical staff must prepare training sessions to work on quick transitions from defence to attack, strong pressure, shooting speed, as well as set-plays within the scoring area. Task difficulty should increase progressively. General standard exercises should be used first, followed by

exercises that involve auditory information and, subsequently, by exercises involving ball handling (Gamonales, 2017). The first training phase should include hearing exercises, followed by exercises with ball and an auditory component (passes and/or shots at goal) and, lastly, real-game situations or exercises in big groups (Campos et al., 2013). Therefore, it is advisable to know how players can perform both in competition and training (O`Donoghue, 2015). Performance analysis in Sport Sciences allows for prediction of player and team's performance based on the characteristics of the sport modality.

Among the possible *circumstances leading to shot*, F5 players mostly used the *control-shot* sequence. This is the basic technical-tactical action used to take the ball from the recovery or *defensive zone* to the scoring zone. In conventional football, long passing sequences lead to more goals scored per ball possession than short ones (Hughes & Franks, 2005; Lago-Peñas et al., 2007). In F5, *pass-control-shot* was the least frequent action. Possession was not achieved through passes, but through keeping the ball. F5 players perform the following technical-tactical actions: keeping the ball, control, dribble and shot at goal.

Most attacking actions were executed without the attacking players blocking the defenders. The few blocks performed took place *in front of the shot*. Teams used mainly quick transition actions. Therefore, *no blocks* were performed. These results are in line with conventional football, where counterattacks are more effective than more elaborated attacks (Tenga et al., 2010). Nevertheless, there are big differences with other sport modalities for the disabled, such as wheelchair basketball, where blocks in front of a throw occur very often (Molik et al., 2009).

The variable *opposition to shot* revealed that most shots were performed with *nearby opposition*, followed by *distant opposition*, *goalkeeper opposition*, *other* types of opposition and, finally, *without opposition*. The reason why the opposing players stay close to each other is that players in F5 orient themselves through the sound of a leather ball, as well as the instructions provided by the goalkeeper, the coach and the guide in their corresponding area, who should always be coordinated (Suarez, 2014). Furthermore, it is usual in F5 to have players in the ball trajectory to the goal, due to the zigzag movements made by the attacking players. At the moment of the shot, there are defending players trying to intercept the ball, as it occurs in basketball (Ibáñez et al., 2009), where effectiveness increases considerably when the defensive pressure is low or does not exist. Thus, F5 players orient themselves thanks to the sound of the ball and the instructions of coaches and guides, who are distributed by zones and also need to train in order to be able to contribute to their team's success.

As regards the *body zone*, F5 players hit the ball mainly with the right foot. The most frequent *type of contact* in the shots at goal was with the *instep or toes*, followed by the *inside of the foot*, *other* parts, the *outside of the foot* and, lastly, the *backheel*. The data were very similar to other previous studies on conventional football, which reported that shots were made from the offensive zone with the instep, toes and inside of the foot (Álvarez et al., 2004; Lapresa et

al., 2013).

With regard to the *shot outcome*, only 21 goals were scored out of 730 match-play shots. These results proved that high-level F5 teams have low offensive effectiveness. Goals are scored after fast plays, but not after actions comprising several passes or involving more than two players. This is in contrast with conventional football or futsal, where most goals are scored after team plays or plays involving one or two players. The better the defence is organised, the higher the number of passes and players needed by the opposing team to reach the offensive zone (Álvarez et al., 2004; Lapresa et al., 2013; Liu et al., 2015).

The results of the inferential analysis confirmed that the variable *recoded outcome (RO)* was related to some variables included in the study. The data obtained were similar to those reported by studies involving other high-level sport modalities that used the observational analysis methodology, such as the ones authored by Ibáñez et al. (2009) in basketball or Piñero (2008) in field hockey. These studies analysed the relationships among variables that had been defined based on the sport context and the study's particular aims.

The association between the variable *recoded outcome (RO)* and the independent context variables *team*, *shooter's situation* and *end result* revealed that these may affect success. As regards teams' performance, a significant relationship was found between the final ranking and shooting effectiveness. Brazil, the tournament's winning team, stood out for its better offensive performance compared to other teams who also ranked in the first positions. The actions that are most likely to end in a goal are the most frequently performed ones by the winning teams (Gómez-Ruano et al., 2013). These results agree with studies concerning other sports such as basketball (Ibáñez et al., 2009; Sampaio et al., 2010), which showed a similar relationship between ranking and sport performance. Argentina, despite achieving high performance during the competition, did not qualify for the final (Brazil – Iran). Qualifying or not was determined by the previous qualifying rounds (Ibáñez et al., 2003), where losing a match led to elimination, no matter if the performance indicators were good. Consequently, not all teams followed the same playing system or aimed to control the same aspects of the match (Reina-Gómez & Hernández-Mendo, 2012). The end result of every match may be influenced by a referee decision or a change in the line-up, which can have a large effect on the game (Caballero et al., 2017; Lago-Peñas et al., 2010), by specific F5 technical-tactical requirements (Morato et at., 2011), by the guide's instructions (Suarez, 2014) or even by the trip to the match venue (García-Rubio et al., 2014).

The relationship with the variable *shooter's situation* showed that the team who was winning at the moment of the shot had higher probability of missing. This is in contrast to some high-scoring team sports (basketball or handball), where the end result is the consequence of the effectiveness in every possession (Reina-Gómez & Hernández-Mendo, 2012) and the different success or failure factors may be quantified and has a clear effect on the final score (Álvarez et al., 2004). By contrast, in low-scoring sports like football, it is much more difficult to find the right performance indicators that represent the game, since scoring is in itself

an indicator of success in the game (Reina-Gómez & Hernández-Mendo, 2012). This happens in F5, which is a complex sport despite comprising simple technical-tactical actions such as keeping the ball, control, dribble or shot at goal.

In regard to the relationship between the variables *recoded outcome* (RO) and *end result*, the results showed that the winning teams had higher probability of missing the shot, despite being the teams who performed the highest number of shots. Therefore, the number of shots cannot be considered as a key variable to explain a team's performance. The competition format may affect winning teams' characteristics. Both offensive and defensive performance indicators determine a match's end result (Castellano et al., 2012; Gómez-Ruano et al., 2013).

The results revealed the existence of other game variables (*starting zone* and *type of contact*) that may have an influence on shooting performance. Regarding the zone where the action starts in elite F5 competition, the offensive zone may be considered as the zone of highest effectiveness and lowest risk of failure when shooting at goal. The results were similar to previous studies involving other sports like floorball (Prieto et al., 2013) or basketball (Ibáñez et al., 2009), which showed that the shots performed closest to the target (basket or goal) are the ones with highest success rate. This was the consequence of starting the action in the defensive zone with a goal kick to one of the players, who lost the ball in a dangerous area. The opponents recover the ball possession in the offensive area as a result of pressure. Coaches should include exercises to train high pressure, as well as how to start a playing action from the goal area in order to avoid losing the ball in a dangerous area, always following the rules. Shots at goal were performed with the instep or toes of the right foot. The probability of success was higher than expected, since this type of shot is usually used in either close or far shots. These data confirmed the results of previous studies on futsal (Álvarez et al., 2004; Lapresa et al., 2013).

The predictive analysis results, as it occurred in other team sport modalities like basketball (Ibáñez et al., 2009) or football (Taylor, Mellalieu, James & Shearer, 2008), allowed for match-play goal prediction in F5. It is a simple prediction model that may be applied to sports for the blind or the visually impaired. It can be stated that, in elite F5, starting the action prior to the shot close to the scoring zone (offensive or preoffensive zones) considerably increases the probability of scoring a goal. Moreover, executing a shot from further zones, as well as using a type of contact other than the instep or toes, decreases the probability of scoring.

CONCLUSION

F5 is a low-scoring, invasion sport with specific features that differentiate it from the rest of football modalities. Some of these features are the technical-tactical actions performed by players, such as the types of advancement, blocks or playing systems, which directly affect the shots at goal during match-play. The most successful play in the analysed championship was to recover the ball in

the preoffensive zone, continue with a quick transition to the opposite goal and finish with a powerful shot with the instep or toes.

The shooting outcome is determined by the preceding actions, which define the most effective playing system in every competition of this sport modality, depending on the participating teams and the competition format. The teams use different playing systems. To score first increases the success rate in subsequent shots at goal. To have a favourable score during the match will predict the match's end result.

F5 coaches must design training exercises where effective game sequences are applied, as well as defensive situations that foster fast ball recovery in zones close to the goal followed by direct transitions.

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