SMALL-SIDED GAMES IN FOOTBALL: EFFECT OF FIELD SIZES ON TECHNICAL PARAMETERS

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Abstract

The aim of this study was to determine effects of field sizes on technical parameters of small-sided games in football players. Eight amateur football players (27.23 ± 3.08 years, heigth: 171.01 ± 5.36 cm, body weigth: 66.86± 4.54 kg, sports experience: 12.88 ± 3.28 years) performed 4-a-side small-sided games (SSG) with different field sizes. In SSGs, field sizes were 30 x 40 m and 26 m x 24 m. SSGs was conducted as a series of 3 bouts of 6 min with 5 min recovery durations. All SSGs were videorecorded using two digital video camcorder positioned on a tripot. Shoot on taget, passes, succesful passes, unsuccesful passes, dripling, tackle, possession in SSGs were counted by Mathball Match Analysis System. The effects of bouts on technical score were examined separately using a Friedman's test. Mann Whitney U test was applied to analyse differences between field sizes. There were no significant differences *in shoots on target, total pass, successful pass, tackle, interception, possession between bouts in 30 x 40 m field size (p>0.05). Unsuccessful pass in bout 3 for 30 x 40 m field size was lower than bout 1 and bout 2 (p<0.05) and dripling in bout 3 was lower than bout 2 (p<0.05). There was* no significant difference in technical actions between *bouts for 26 x 34 m field size (p>0.05).Shoot on target in SSG with 26 x 34 m field size was higher than SSG with 30 x 40 m field size (p<0.05). unsuccessful pass for 26 x 34 m field size in bout 3 was higher than SSG with 30 x 40 m field size (p<0.05). There was* no significant difference in technical actions between *field sizes (p>0.05). In conclusion; in this study demonstrates that technical actions in a-4-side SSG are not influenced by different field sizes (for 30 x 40 m and 26 x 34 m field sizes). This consequence is same for both total SSG time and each bout. Dripling and unsuccessful pass decrease in bout 3 during SSG in 30 x 40 m field size.*

Key Words: *Small-sided games; football; technical actions.*

INTRODUCTION

A football player is required to perform technical actions exclusive to football even under the difficult conditions (Karanfilci , 1998). After technical capability level of a football player is determined, technical trainings aimed at developing this level, strengthening the acquired movement skill and making it perfect are done (Özkara, 2002). In high performance sports, maximal benefits are obtained when training-activating factors are similar to the competition conditions (Bompa, 1983). In football trainings, training exercises are done by making the field sizes smaller and reducing the numbers of players in a team. Game drills which are used for trainings in the football literature, are given names such as small group games, tactical games, condition targeted games, and endurance targeted games (Impellizzeri, Marcora, Castagna, eilly, Sassi, laia 2006). Small sided games are commonly used for encouraging technical and tactical performance as well as many d; (Drust, Reilly & Cable 2000; Gabbet 2002; Gabbet 2005; Hill-Haas, Coutts, Rowsell, Dawson 2008; Hill-Haas, Coutts, Dawson, Rowsell 2010; RAmpinini et al., 2007; Reilly & Gilbourne 2003;Sainz &Cabello 2005; Sassi, Reilly & Impellizzeri, 2003).

Football is a visible talent sport which is described as a performance under the changing conditions, and performance is expected to the conditions based on any situation (Tessitore, Meeusen, Piacentini, Demarie & Capranica, 2006). .Today training units have focused on developing both physiological and technical-tactical aspects of the game through a general condition and exercises. In recent years, scientists have shown more interest in the small sided games as a type (method) of training (Aguiar, Botelho, Lago, Maças & Sampaio, 2012b). Indeed, many researches have been done about the changing factors such as shapes and sizes of the field, rules of the game andtrainer's encouragement, physiological reactions (e.g. blood lactate, heart rate, perceived effort level) and technical/ability conditions during the small sided games in football (Castagna, Impelizzeri, Cecchini, Rampinini & Alvarez, 2009; Casamichana & Castellano 2009; Dellal et al., 2008; Grant, Williams, Dodd &Johnson, 1999; Hill-Haas, Rowsell, Dawson & Coutts, 2009b; Impellizzeri et al., 2006; Katis & Kellis 2009; Little & Williams 2007; Mallo & Navarro 2008; Oven, Twist& Ford 2004; Rampinini et al., 2007; Tessitore, Meeusen, Piacentini, Demarie & Capranica, 2006). Feedback is an

important factor in developing a sportsman's performance. Recent developments in technology quickly provide information during trainings and competitions to increase sportsmen's performances. In that way, information can be used for recording the game with the computer aided systems. By creating a data base of video options to the trainer, a mechanism is provided for evaluations such as feedback, performance development (Armatas & Yiannakos, 2010; Liebermann et al., 2002) .The interest for football match analysis develops to have game reports and analysis about players' physical performances (Di Salvo, Collins, McNeill & Cardinale, 2006). Match analysis is a proceeding for expressing the performances of a team and players with or without a ball in a field and studying success conditions. But the criteria used in dealing with the performances and evaluating successful situations vary by the capacity and goals of the team and the players and then the changing conditions during the match as well as the detailed characteristics of movements at first. Match analysis procedure is based on the study of the observed movements with all dimensions such as kick type, field, time, players; goes on evaluating the team behaviors by the movement group (Gören, 2011). The aim of the present study was to determine the effects of the small sided games on technical actions in the different dimensions of playing fields among the football players.

METHODS

The subjects of this study involved 8 football players playing football in the local amateur league and doing training at least for 5 days in a week and in the competition period. Football players had an averageage of 27.23 ± 3.08 years, an averageheight of 171.01 ± 5.36cm, an average body weight of 66.86± 4.54 kg and an average sport age of 12.88 ± 3.28 years. Each subject was informed in details about the relevant risks and troublesomes associated with the study before, they read and signed the volunteering form. The football players were divided into 2 teams, of 4 persons for each in accordance with the team coach's view and the Yo-Yo intermittent recovery test. This research was confirmed by the Board of Review, numbered 2012/22, dated 25.12.2012, at the School of Physical Education and Sport in the University of Selcuk.

*Yo-Yo Intermittent Recovery Test:*To determine the subjects' maximal oxygen consumption, the Yo-Yo Intermittent Recovery Test 1 was performed. For this test, the running track of 2 x 20 m and the recovery field of 5 m at the end of the track were given. The test protocol was applied with the help of audio signals from a CD via a computer. The starting running speed of the test was 10 km/h and the running speed increased in the test protocol. After each 2 x 20 m running, an active recovery was achieved in the recovery field of 5 m. The test was performed in a natural grass pitch as suggested by (Bangsbo , Iaia & Krustrup, 2008).

*Small Sided Games:*In the 4 versus4 small sided game, two different sizes of pitch were used. The first playing field was 34 meter length and 26 meter width. The second playing field was 40 meter length and 30 meter width. The 34x26 meter small sided applicatin consisted of 3 sets per 6 minutes and was done as a free game by targeting miniature goals, the players were given the recovery time of 5 minutes between the sets. In the 40x30 meter small sided game, the same application was done. The small side game was repeated in the pitch the sportsmen did trainings on the different days twice in every three days. Within the small side game applications, the pitch lines were given clearly and the standard miniature goals were used. When applying the small side application, enough balls were put on the pitch sides and inside the goals to prevent the game being stopped and minimise time loss. The offside rule was not applied in the games and the number of playing with a ball was not limited (Aguiar, Botelho, Gonçalves & Sampaio 2012a; Brandes, Heitmann & Müler, 2012; Castellano, Casamichana & Dellal, 2012; Rampinini et al., 2007).

Analysis of Small Side Games: Both small side games were spontaneously recorded with 2 digital cameras. The cameras were put on the fixed tripods positioned at almost 5 meter height, 10 meter away from the corner points of both goals at the same direction, and in parallel with the playing field. To have the required positions easily, evaluate the actions in the shortest time and classify the analysis criteria in the small sided games, the computer aided mathball match analysis hardware program (AlgoritmaInformation Processing Co.Ltd.)was used. With the computer notation technique, the actions in the small sided games were studied. Each player's technical actions were estimated and classified in 8 categories: goal kick, pass number, positive pass, negative pass, ball win, dribbling, bilateral struggle and playing time with a ball. The notation analysis of video records were done by the 2 researchers and 2 times. In evaluation the average of 4 measurements was used (Fanchini et al., 2011).

Analysis of Data: The variables to be measured during the small side games were given as standard deviations and averages. The normality analysis of data was studied with the Shapiro-Wilks test. In comparisons of technical parameters between the playing fields, the Mann Whitney U

test and in the analysis of changes between the game sets, the Friedman multiple comparison test were performed. In determination of the different groups, the Wilcoxon testwas used. The statistical significance level was regarded to be 0,05.In statistical evaluation of data the SPSS for Windows 17.0 package programwas used as well.

RESULTS

It was seen that the football players had a sport experience of 12.88 ± 3.28 years and an oxygen consumption of 55.17 ± 1.53 ml/kg/min (Table 1).

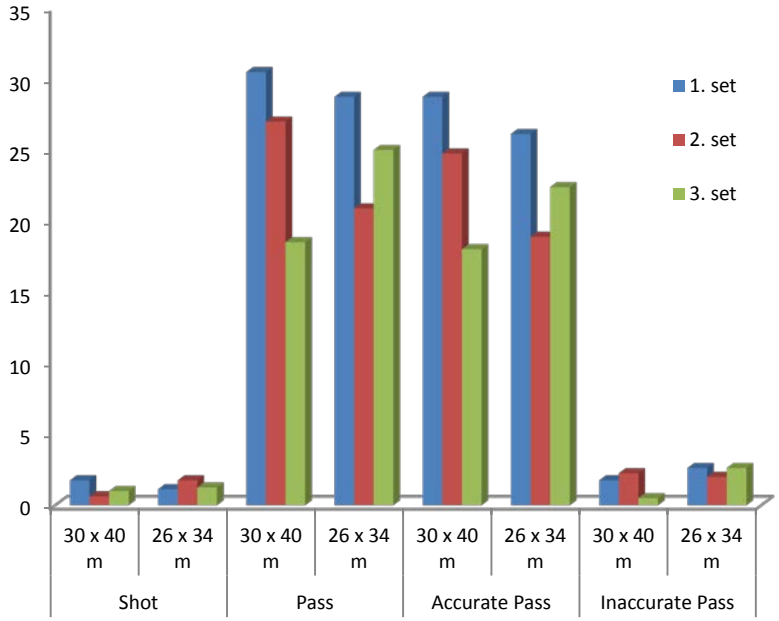
Table 1. Football players' descriptive statistics

	N	Mean	SD	Minimum	Maximum
Age (years)	8	27.23	3.08	23	32
Height (cm)	8	171.01	5.36	165	180
Body Weight (kg)	8	66.86	4.54	58.00	73.00
Sport Age (years)	8	12.88	3.28	7.0	18.0
MaxVO$_2$ (ml/kg/min	8	55.17	1.53	52.92	57.27

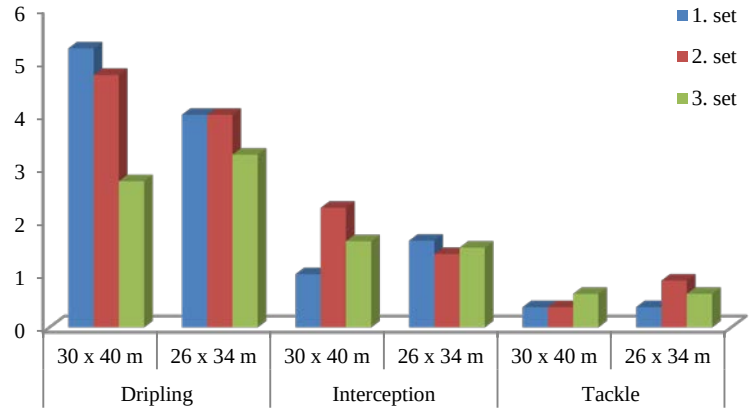
Table 2. Distribution of technical actions to sets in small sided games

Technical Actions	1st set	2nd set	3rd set
	Mean ± SD	Mean ± SD	Mean ± SD
Shot			
30x40 m Small Sided Game	1.75 ± 1.49	0.63 ± 1.06	1.00 ± 1.07
26x34 m Small Sided Game	1.13 ± 1.64	1.75 ± 1.39	1.25 ± 1.04
Pass Number			
30x40 m Small Sided Game	30.50 ± 14.63	27.00 ± 16.43	18.50 ± 4.10
26x34 m Small Sided Game	28.75 ± 10.48	20.88 ± 4.91	25.00 ± 11.41
Accurate Pass			
30x40 m Small Sided Game	28.75 ± 14.31	24.75 ± 14.46	18.00 ± 4.00
26x34 m Small Sided Game	26.13 ± 8.43	18.88 ± 4.40	22.38 ± 11.05
Inaccurate Pass			
30x40 m Small Sided Game	1.75 ± 1.61	2.25 ± 2.41	0.50 ± 0.89
26x34 m Small Sided Game	2.62 ± 3.14	2.00 ± 1.79	2.62 ± 1.71
Dribbling			
30x40 m Small Sided Game	5.25 ± 3.86	4.75 ± 3.86	2.75 ± 2.52
26x34 m Small Sided Game	4.00 ± 4.13	4.00 ± 2.07	3.25 ± 2.30
Interception			
30x40 m Small Sided Game	1.00 ± 1.46	2.25 ± 2.18	1.62 ± 1.02
26x34 m Small Sided Game	1.63 ± 2.06	1.38 ± 1.54	1.50 ± 2.26
Tackle			
30x40 m Small Sided Game	0.38 ± 0.50	0.38 ± 0.50	0.63 ± 0.72
26x34 m Small Sided Game	0.38 ± 0.72	0.88 ± 0.81	0.63 ± 1.02
Ball Possession (sec)			
30x40 m Small Sided Game	44.88 ± 26.73	74.63 ± 37.94	44.25 ± 32.76
26x34 m Small Sided Game	61.00 ± 35.62	48.63 ± 26.88	54.63 ± 39.20

At Table 2, the distributions concerning technical actions in each set in the 30 x 40 m and 26 x 34 m small sided games were given, At figure 1, 2 and 3, the distributions of technical actions in the small sided games to the sets were seen as well.



Figüre 1. Distribution of goal kick and pass numbers to sets



Figüre 2. Distribution of dribbling, ball win and bilateral struggle numbers to sets

It was found that there were no differences in shot, pass number, accurate pass, interception, tackle and ball possession between the sets during the 30 x 40 m small sided game applied for the research ($p>0.05$). Also, it was observed that the inaccurate pass number (Chi-Square=6.435; $p<0.05$) and the dribbling number (Chi-Square=8,444; $p<0.05$) had significant differences between the sets, the inaccurate pass number in the 3rd set was significantly less than the ones in the 1st and2nd sets, the dribbling number in the 3rd set was lower than the 2nd set. When compared to the technical actions between the sets during the 26 x 34 m small sided game, any significant differences were not found out ($p>0.05$).

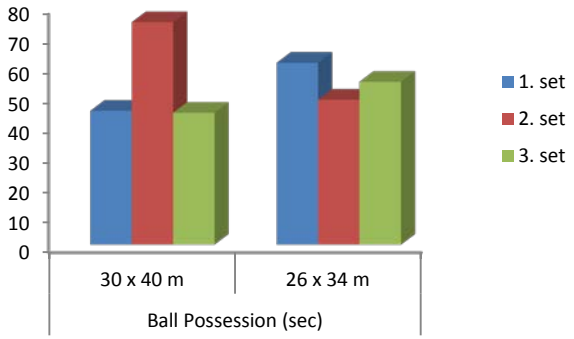


Figure 3. Distribution of playing time with ball to sets

The comparisons of technical actions in the 1st set of the 30 x 40 m and 26 x 34 m small sided games were shown in Table 4 within this research. There were no significant differences between the technical actions in the 1st set of both small sided games (p>0.05).

At Table5, the technical actions in the 2nd sets of the small sided games were compared. It was observed that the goal kick numbers were significantly different in the 2nd sets of the 30 x 40 m and 26 x 34 m small sided games (U=48,000; p<0.05),and that shot in the 26 x 34 m small sided game was higher than the30 x 40 m small sided game. No significant differences were found in the other technical actions of the small-sided games during the 2nd set (p>0.05).

The comparisons of technical actions in the 3rd sets of the 30 x 40 m and 26 x 34 m playing fields were given at Table 6. As a result of the statistical analysis, inaccurate pass number in the 3rd set of the 26 x 34 small sided game was higher than the30 x 40 m small sided game (U=36.000; p<0.05). There were no significant differences between the other technical actions in the 3rd set of the small-sided games(p>0.05).

Total numbers of the technical actions in both small sided games applied for the research were presented at

Table 3. *Total number of technical actions in 30 x 40 m and 26 x 34 m playing fields.*

	Technical Actions	Mean	SD
Shot			
	30 x 40 m Small Sided Game	3.38	2.53
	26 x 34 m Small Sided Game	4.13	2.75
Pass Number			
	30 x 40 m Small Sided Game	76.00	29.61
	26 x 34 m Small Sided Game	74.63	20.84
Accurate Pass			
	30 x 40 m Small Sided Game	71.50	27.07
	26 x 34 m Small Sided Game	67.38	17.78
Inaccurate Pass			
	30 x 40 m Small Sided Game	4.50	3.83
	26 x 34 m Small Sided Game	7.25	4.16
Dribbling			
	30 x 40 m Small Sided Game	12.75	7.08
	26 x 34 m Small Sided Game	11.25	6.19
Interception			
	30 x 40 m Small Sided Game	4.88	3.07
	26 x 34 m Small Sided Game	4.50	2.63
Tackle			
	30 x 40 m Small Sided Game	1.38	0.72
	26 x 34 m Small Sided Game	1.88	1.31
Ball Possession			
	30 x 40 m Small Sided Game	163.75	59.55
	26 x 34 m Small Sided Game	164.25	32.79

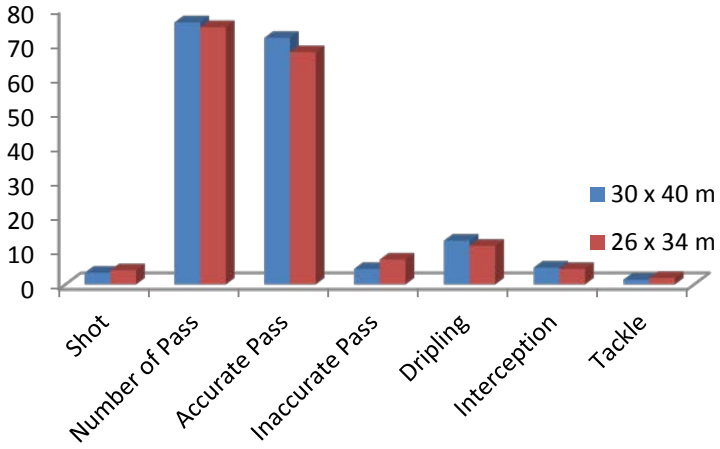


Figure 4. Distribution of technical actions in small sided games

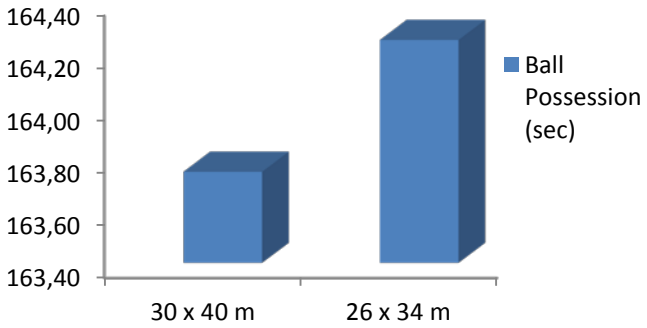


Figure 5. Playing time with ball in small sided games

Looking at the statistical analysis results of the 30 x 40 m and 26 x 34 m small sided games, the total numbers of the technical actions showed significant differences ($p>0.05$).

DISCUSSION

In this research, the results of some technical parameters from the small sided games using the different sizes of pitch were studied. These parameters were limited in accurate pass, inaccurate pass, ball possession, interception, dribbling, tackle, shot and total pass.
The results of the study suggest that shot, pass number, accuratepass, interception, tackle and ball possession in each set of the 30 x 40 m small sided game do not change. When considered the sets applied in the 30 x 40 m small sided game, the players' inaccurate pass number decreases during the game, in a similar way, the dribbling number decreases. But the technical actions do not change between the sets in the 26 x 34 m small sided game.
High intensity efforts become lower towards the end of the football match (Mohr , Krustrup & Bansgbo, 2005).This situation can reduce the frequency of technical actions and the remaining time for the ball during the game (Kelly & Drust, 2009).

Fanchini et al. (2011) declared that as indicators of decreases in the technical skills at the 3rd set of the small side games with the different playing time (2 min, 4 min and 6 min) and the recovery ranges of 4 minutes, the pass number and any decrease in successful pass numbers were given.

In this research, the small sided games were applied as 3 sets and in 6 minutes for each set. The recovery range of 5 minutes was given between the sets (Kelly & Drust, 2009). Performed the small sided games as 4 sets of 4 min in the 3 different dimensions of playing field (20 x 30 m, 30 x 40 m

and 40 x 50 m) and gave the recovery time of 2 minutes. They observed that the number of technical actions was higher in the first 2 sets. This situation suggested that tiredness during the small side game led to decreases in the numbers of technical actions (Kelly & Drust, 2009).

They informed that the dimensions of playing field caused some changes in the technical activities especially such as ball win, shooting (Kelly & Drust, 2009). Technicalloadis affected from the changes in the rules of the game (Dellal, Hill-Haas, Lago-Penas & Chamhari 2011a; Owen, Twist, & Ford 2004). Study shows that the dimensions of players and playing fields change both technical load and physiological reactions in the small sided games. However, Rostgaard et al (2008) stated that a physical activity affected technical performance in football.

The findings of the study were considered to be similar to other researches when examining goal kick, pass number, positive pass, negative pass, dribbling, ball win and playing time with a ball in the 20 x 34 m and 30 x 40 m small sided games.
It was given that the technical actions in the 1st sets of the small sided games applied for the research was not affected from the field sizes. Also, the goal kick number in the small sided game in the 26 x 34 m playing field was found to be more than the goal kick in the 30 x 40 m small sided game. The numbers of the other technical actions in the second sets were similar in both playing fields. In the third sets the negative pass number was more in the 26 x 34 m playing field. The numbers of the other technical actions in the third set was similar.

Testistore et al. (2006), Kelly and Drust (2009), Fanchini et al.(2011), Jonest and Drust (2007), and Owen et al. (2004), studied the football players' technical actions in the small sided games.Testistore et al. (2006), reported that the numbers of the technical actions were not different in the small sided games in the 30 x 40 m and 40 x 50 m playing fields.

Kelly and Drust (2009), also studied the technical actions in thesmall sided games in the playing fieldwith the dimensions 20 x 30 m, 30 x 40 m and 40 x 50 m. They explained that the numbers of technical actions such as pass number, interception, and headingwere not different in the 3 different small side games (Kelly & Drust 2009).They emphasized that the ball win number in the 20 x 30 m small sided game was higher than the30 x 40 m playing field, but that it was not different in the 20 x 30 m and 40 x 50 m playing fields. The shooting number in the small sided games was more in the 20 x 30 m playing field than the other playing fields.
Kelly and Drust (2009), reported that the numbers of technical actions in the playing field were not the basic determinants since the technical actions were mostly similar to each other in the small sided gameswith the dimensions of playing fields. But this situation was considered not to be valid for all technical actions.

In a study by Fanchini et al. (2011) ,the 3 versus 3 small sided games were performed in the 31 x 37 m playing field with the different playing time. The playing time of the small sided games was 3 x 2 min, 3 x 4 min and 3 x 6 min. The authors determined that there was no difference in the different playing time in the technical actions of the small sided games and suggested in their studies focused on the trainers' technical development that they would use the set time from 2 min to 6 min in the small sided games.

The fundamental finding of the study did not have any effects on the numbers of technical actions in accordance with the playing field dimensions in the 4 versus 4 small sided games. This situation was valid for both total time and each set in the small sided games. In the 3rd set of the small sided game in the 30 x 40 m playing field, it was concluded that there were decreases in the inaccurate pass numbers and dribbling numbers.

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