DIFFERENCES IN SITUATIONAL PARAMETERS DURING SMALL-SIDED GAMES IN FOOTBALL

Dario Bašić[1], Marino Bašić[1], Damir Crnjac[2], Josip Tomaško[3] and Valentin Barišić[1]

[1] Faculty of Kinesiology, University of Zagreb, Croatia
[2] Faculty of Sciences, University of Mostar, Bosnia & Herzegovina
[3] Croatian Football Federation

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Abstract
The aim of this investigation was to determine whether there is a statistically significant difference during small-sided games with different field size and demands of the game. Ten soccer players (17.8 ± 0.6 years) voluntarily participated in this study. Players completed four different conditioned small-sided 5 vs. 5 games: 28x28m free play (28FP), 28x28m 2 ball touches (28T2), 39x39m free play (39FP) and 39x39m 2 ball touches (39T2). Each small-sided game lasted for 5 minutes, with a 10-min passive rest period between them. Total number of passes (TNP), number of correct passes (NCP), number of incorrect passes (NIP), ball possession (BP), average number of ball touches (ANT), lost balls (LB), number of duels (ND), rating of perceived exertion (RPE) and total distance covered (TDC) were analyzed. The ANOVA analysis and Bonferroni post hoc test were used to determine whether there is a statistically significant difference between small-sided games. Level of statistical significance was set at $p < 0.05$. Significantly greater values were in the game 28T2 in variables TNP, NCP and BD, then in the 38FP. For variable ANT there were significantly lower values in games 28T2 and 39T2, compared with 28FP and 39FP. For variable ND there was significantly higher value in 28FP, compared with game 39T2, while the variable RPE resulted in statistically significantly higher value in game 39T2. The TDC variable obtained significantly higher values in the small-sided games with larger size and demand of 2 ball touches. The results of the present study indicated that there are significant differences between small-sided games with different field size and demands in some situational parameters in football.

Key words: *football, small-sided games, situational parameters, HIIT*

Introduction

During the soccer game, players perform a great number of activities and movements with and without the ball (Marković & Bradić, 2008). Due to physical demands of the game, the player's capabilities must be constantly developed in order to perform high-intensity activities during the game. Recently, coaches use more and more small-sided games in order to simulate the demands of high-intensity interval training (HIIT) and simultaneously influence the development of football acitivities (Hoff et al., 2002). Small-sided games can be defined as modified games taking place on a smaller field, with modified rules and less players than in an official football game (Hill-Haas et al., 2011). Conucting a high intensity training through small-sided games has been fairly well researched and many studies conducted that field size, technical-tactical, or conditional demands, can have an influence on enlarging or reducing the small-sided game intensity (Hoff et al., 2002; Rampinini et al., 2007; Hill-Haas et al., 2008; Iaia et al., 2009; Hill-Haas et al., 2011; Krustrup et al., 2010;). Some of small-sided game advantages are that they mimic demands of movement, physiological intensity, and technical demands of a real football game, as well as making decisions under pressure and fatigue (Owen, 2003). Also, small-sided games are used to ease the development of technical skills and tactical consciousness inside of certain game context. Since they are sport-specific, they enlarge the player's motivation. They are also considered to be more time-efficient because at the same time they develop conditioning, technical, and tactical skills (Little, 2009). This work will research the influence of the field size and game demands on situational parametres during small-sided games in football.

Research methods

Subjects
The sample of this study represents players of junior age category of GNK Dinamo (U-19), in the first Croatian football league of season 2012-2013. The study included a total of 10 players (n = 10, 17.8 ± 0.6 yrs) divided into two groups (5:5).

Measuring methods
Every small-sided game (28x28m free play; 28x28m maximum of two touches; 39x39m free play; 39x39m maximum of two touches) game lasted 5 minutes with 10 minute rest in-between and was recorder with the camera and using notational analysis.

Players were provided with GPS heart rate monitors (Garmin Forerunner 110). Right after each game, players informed us on their subjective estimation of work load using Borg CR10 scale (Borg, 1998)

Methods of data processing
For data processing we used Statistica ver. 9.0 for Windows. Arithmetical middle (AS) and standard deviation (SD) was calculated.

Statistical significance of differences in each variable was determined through univariant analysis of variant (ANOVA) with Bonferroni post hoc test. The level of statistical significance is set on $p < 0.05$.

Results

Table 1 shows basic descriptive parametres, mean (AS) and deviation (SD), for each variable. Table 2 shows results of univariant analysis of variant (ANOVA) for each variable between all small-sided games. Tables 3, 4, 5, 6, 7, 8, 9, 10 and 11 show results of Bonferroni post hoc test for each variable.

Table 1. Descriptive parametres of observed variables for every small-sided game

	28x28 SI		28x28 M2D		39x39 SI		39x39 M2D	
	AS	SD	AS	SD	AS	SD	AS	SD
UBD	10.90	2.846	14.20	3.360	9.30	2.751	10.90	2.132
BTD	9.80	3.155	12.30	3.713	8.00	2.944	9.00	2.055
BND	1.10	0.994	1.90	1.287	1.30	1.160	1.90	0.568
PL	12.70	3.234	15.00	3.742	10.10	3.071	11.90	2.514
PBDL	2.16	0.337	1.68	0.170	2.34	0.669	1.63	0.159
BIL	2.60	1.506	2.70	1.703	1.90	1.197	2.60	1.075
BD	4.00	1.563	2.40	1.075	3.20	1.476	1.80	1.687
SPO	7.40	0.843	8.10	0.568	8.30	1.059	8.80	0.919
UPU	650.50	49.880	682.50	51.468	720.80	61.478	758.50	58.650

SI – free play; M2D – maximum 2 touches; UBD – total number of passes; BTD – no.of precise passes; BND – no.of imprecise passes; PL – ball possession; PBDL – average no.of ball touches; BIL – no.of balls lost; BD – no.of duels; SPO – subjective estimation of workload; UPU – total distance.

Table 2. Univariant analysis of variant (ANOVA)

	p
UBD	0.004
BTD	0.021
BND	0.212
PL	0.013
PBDL	0.000
BIL	0.555
BD	0.011
SPO	0.009
UPU	0.001

UBD – total number of passes; BTD – no.of precise pass; BND – no.of imprecise passes; PL – ball possession; PBDL – average no.of ball touches; BIL – no.of balls lost; BD – no.of duels; SPO – subjective estimation of the workload; UPU – total distance.

Table 3. Bonferroni test – total number of passes

TOTAL NUMBER OF PASSES (UBD)				
	28x28 SI	28x28 M2D	39x39 SI	39x39 M2D
28x28 SI	-	0.075	1.000	1.000
28x28 M2D	0.075	-	0.002	0.075
39x39 SI	1.000	0.002	-	1.000
39x39 M2D	1.000	0.075	1.000	-

SI – free play; M2D – maximum two touches.

Table 4. Bonferroni test – number of correct passes

NUMBER OF CORRECT PASSES (BTD)				
	28x28 SI	28x28 M2D	39x39 SI	39x39 M2D
28x28 SI	-	0.438	1.000	1.000
28x28 M2D	0.438	-	0.018	0.119
39x39 SI	1.000	0.018	-	1.000
39x39 M2D	1.000	0.119	1.000	-

SI – free play; M2D – maximum two touches.

Table 5. Bonferroni post hoc test – number of imprecise passes

NUMBER OF IMPRECISE PASSES (BND)				
	28x28 SI	28x28 M2D	39x39 SI	39x39 M2D
28x28 SI	-	0.561	1.000	0.561
28x28 M2D	0.561	-	1.000	1.000
39x39 SI	1.000	1.000	-	1.000
39x39 M2D	0.561	1.000	1.000	-

SI – free play; M2D – maximum two touches.

Table 6. Bonferroni post hoc test – ball possession

BALL POSSESSION (PL)				
	28x28 SI	28x28 M2D	39x39 SI	39x39 M2D
28x28 SI	-	0.681	0.450	1.000
28x28 M2D	0.681	-	0.009	0.212
39x39 SI	0.450	0.009	-	1.000
39x39 M2D	1.000	0.212	1.000	-

SI – free play; M2D – maximum two touches.

Table 7. Bonferroni post hoc test – average number of ball touches

AVERAGE NUMBER OF BALL TOUCHES (PBDL)				
	28x28 SI	28x28 M2D	39x39 SI	39x39 M2D
28x28 SI	-	0.053	1.000	0.026
28x28 M2D	0.053	-	0.003	1.000
39x39 SI	1.000	0.003	-	0.002
39x39 M2D	0.026	1.000	0.002	-

SI – free play; M2D – maximum two touches.

Table 8. Bonferroni post hoc test – number of balls lost

NUMBER OF BALLS LOST (BIL)				
	28x28 SI	28x28 M2D	39x39 SI	39x39 M2D
28x28 SI	-	1.000	1.000	1.000
28x28 M2D	1.000	-	1.000	1.000
39x39 SI	1.000	1.000	-	1.000
39x39 M2D	1.000	1.000	1.000	-

SI – free play; M2D – maximum two touches.

Table 9. Bonferroni post hoc test – duels number

NUMBER OF DUELS (BD)				
	28x28 SI	28x28 M2D	39x39 SI	39x39 M2D
28x28 SI	-	0.119	1.000	0.011
28x28 M2D	0.119	-	1.000	1.000
39x39 SI	1.000	1.000	-	0.239
39x39 M2D	0.011	1.000	0.239	-

SI – free play; M2D – maximum two touches.

Table 10. Bonferroni post hoc test – subjective estimation of workload

SUBJECTIVE ESTIMATION OF WORKLOAD (SPO)				
	28x28 SI	28x28 M2D	39x39 SI	39x39 M2D
28x28 SI	-	0.474	0.155	0.005
28x28 M2D	0.474	-	1.000	0.474
39x39 SI	0.155	1.000	-	1.000
39x39 M2D	0.005	0.474	1.000	-

SI – free play; M2D – maximum two touches.

Table 11. Bonferroni post hoc test – total distance

TOTAL DISTANCE (UPU)				
	28x28 SI	28x28 M2D	39x39 SI	39x39 M2D
28x28 SI	-	1.000	0.046	0.001
28x28 M2D	1.000	-	0.793	0.025
39x39 SI	0.046	0.793	-	0.828
39x39 M2D	0.001	0.025	0.828	-

SI – free play; M2D – maximum two touches.

Discussion and conclusion

Univariant analysis of variant showed that in 7 variables there is a statistically significant difference between the small-sided game, while for the two variables no significant differences were found. The variable of total number of passes we obtained a statistically significant difference ($p = 0.002$) between the small-sided game in a field of 28x28m with a maximum of two touches (AS = 14:20) and free games on 39x39m (A = 9.30) with a larger number added in the small-sided game with a maximum of two touches on the size of the field of 28x28m.

The difference can be explained by the fact that the respondents in the small-sided game on 28x28m with a maximum of two touches have half the surface on which they can move and keep the ball and thus they had to have a larger number of ball passes to avoid losing possession of the ball. With the number of correct passes, as well as the total number of possessions, it is statistically significant ($p = 0.018$) that there is greater number of precise passes in the small-sided game on 28x28m with a maximum of two touches (A = 30.12) when compared to requirements of free games on 39x39m (AS = 8:00). This can be explained by the fact that the total number of passes is significantly larger, and consequently, so is the number of correct passes. Also, this can be explained by the fact that the games with demands requested less time to think, so the simplest solution was sought and pursued. The difference was obtained also because of the two sizes of the field, passes in a smaller space were shorter and more passes were made Difference ($p = 0.009$) was also gained between small-sided game on 28x28m with maximum two touches (AS=15.00) and free play on 39x39m (AS=10.10) in the variable ball possession (number of times the player was in possession of the ball), with higher values in small-sided game with demands, on a smaller field.

The difference can be explained by saying that the subjects on s smaller field with maximum two touches had to get rid of the ball after first or second touch, so passes had to be shorter and faster, while with small-sided games on 39x39m with free number of touches players had more timr for ball manipulation and were longer in possession. In the variable average number of ball touches there were differences between groups. Statistically significant differences are simply explained by reduced contact „freedom" for subjects in small-sided games with demands. In duel number significant ($p = 0.011$) was a greater number of duels in small-sided game on 28x28m with free play demand (AS=4.00) compared to small-sided game on 39x39m with two touch demand (AS=1.80). Mentioned difference is explained through the fact that smaller surface more often leads to duels. Also, since in two touch demand number of contact is limited, unlike free play where players are longer in possession of the ball and use a possibility of greater number of contacts, enabling the opponents' team to make contact and enter the duel. Subjective estimation of work load gives statistically significant differences ($p = 0.005$) between small-sided game on 28x28m with free play demand (AS=7.40) and small sided game on 39x39m with maximum two touches (AS=8.80), with higher score in small-sided game on bigger field with demands. The result can be explained with the fact that on bigger surface the possibility of movement is greater and players can cover a greater surface. Also, it can be explained that players need to think faster and find faster solutions according to limited number of contacts. In total distance covered, as in average number of touches, there were more significant differences between groups with higher results in small-sided games on a bigger field and with demands of maximum two touches. Significant difference ($p = 0.001$) exists between small-sided game on 28x28m with demands of free play (AS=650.50) and small-sided games on 39x39m with maximum two touches (AS=758.50). There was a statistically significant difference ($p = 0.046$) between small-sided game with demands of free play in 28x28m (AS=650.50) and 39x39m (AS=720.80).

Also, with demand of maximum two touches there was a statistically significant difference ($p = 0.025$) in small-sided game between 28x28m (AS=682.50) and 39x39m (AS=758.50). From said differences it is obvious that players on greater field sizes have a greater distance covered. Also, with demand of maximum two touches players must move around faster and cooperate with their coplayers in order to pass the ball as soon as possible, so there is a greater distance covered. In variables imprecise number of passes and number of balls lost there is no statistically significant differences between groups. The results show that if we want to affect the increase the total number of additions, the number of accurate passings, and the frequent state of the player in possession of the ball, it is necessary to reduce the size of the field and limit the number of contacts of the ball. If we want to reduce the average number of contacts per ball, players need to also reduce the size of the field since it may have an impact on the average number of touches of the ball. Research has shown that the number of duels over the auxiliary game may increase if you reduce the size of the field without the requirement to limit the number of contacts. Furthermore, the results of the research are clear on if we want to contribute to the increase in total distance traveled and the subjective assessment of the load, it is necessary to increase the size of the field and / or add the request to limit the number of contacts in the small-sided game.

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RAZLIKE U SITUACIJSKIM PARAMETRIMA TIJEKOM POMOĆNIH IGARA U NOGOMETU

Sažetak

Osnovni cilj ovoga istraživanja je bio utvrditi postoji li statistička značajnost razlika između pomoćnih igara različite veličine terena i zahtjeva u igri. U istraživanju je sudjelovalo 10 mladih nogometaša (17.8 ± 0.6 god.). Korištena je pomoćna igra sa omjerom igrača 5:5, dok su promjene bile u veličini i zahtjevu u igri: 28x28m slobodna igra (28SI); 28x28m sa zahtjevom maksimalno dva dodira (28M2); 39x39m slobodna igra (39SI); 39x39m sa zahtjevom maksimalno dva dodira (39M2). Svaka pomoćna igra trajala je 5 minuta, sa odmorom od 10 minuta između svake pomoćne igre. Promatrane varijable bile su: ukupni broj dodavanja (UBD), broj točnih dodavanja (BTD), broj netočnih dodavanja (BND), posjed lopte (PL), prosječan broj dodira lopte (PBDL), broj izgubljenih lopti (BIL), broj duela (BD), subjektivna procjena opterećenja (SPO) i ukupna prijeđena udaljenost (UPU). Statistička značajnost razlika između svih 4 pomoćnih igara za svaku varijablu utvrđena je univarijantnom analizom varijance (ANOVA). Bonferroni post hoc testom utvrđena je statistička značajnost između pojedinih pomoćnih igara za svaku varijablu. Razina statističke značajnosti postavljenja je na $p < 0.05$. Rezultati pokazuju kako je kod pomoćne igre 28M2 došlo do statistički značajno većih vrijednosti u varijablama UBD, BTD i PL, uspoređujući sa 39SI. Kod varijable PBDL dobiveni su statistički značajno niži rezultati u igrama 28M2 i 39 M2 u usporedbi sa 28SI i 39 SI. Kod varijable BD došlo je do značajno viših vrijednosti kod 28SI, u usporedbi sa 39M2, dok su kod varijable SPO rezultati bili statistički značajno viši u igri 39M2. U varijabli UPU dobiveni su viši rezultati u pomoćnim igrama sa zahtjevom i na većoj veličini terena. Rezultati pokazuju kako se pomoćne igre na različitim veličinama terena i sa različitim zahtjevima statistički značajno razlikuju u određenim situacijskim parametrima.

Ključne riječi: *nogomet, pomoćne igre, situacijski parametri, visoko-intenzivni trening*

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Correspondence to:
Dario Bašić
University of Zagreb
Faculty of Kinesiology
10000 Zagreb, Horvaćanski zavoj 15, Croatia
Phone: +381 (0)18 510 900
E-mail: dariobasic@yahoo.com