

Changes of Technical Skills during an Official Futsal Game

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Abstract

Futsal is considered as an intermittent 5-a-side soccer game played worldwide that demands high technical, tactical, and physical capacities of players. Despite the global growth of futsal, there is a lack of research regarding the relationship between physical capacity and technical skills during the game. Thus the aim of the current study was to describe the technical skills of futsal players during a futsal game as well as to indicate any differences from the first to the second half according to their aerobic capacity. Particularly, eleven male futsal players aged $26,6 \pm 2,8$ participated in the study which conducted during the competitive period of Greek Superleague season 2016-2017. Researchers examined the anthropometric characteristics (age, height, weight, BMI), the aerobic capacity (VO_{2max}) and the technical skills (passing, dribbling, receiving, 1vs1 duels, and stealing) of players. The results highlight the differences in technical skills of futsal players according to their aerobic capacity from the first to the second half of the game.

Keywords: Futsal, aerobic capacity, technical skills, anthropometric characteristics

Introduction

Futsal is an indoor 5-a-side soccer game officially approved by FIFA (Fédération Internationale de Football Association) played worldwide at professional, semi-professional, even at amateur level. It is considered one of the fastest growing sports in recent times (da Costa, Palma, Pedrosa, and Pierucci, 2012). Futsal is characterized as an intermittent sport that demands high technical, tactical, and physical capacities of players (Álvarez, D'Ottavio, Vera, and Castagna, 2009). Despite of the global growth of futsal, there is a lack of available scientific research relating to futsal parameters.

Although, futsal is considered as a high-intensity sport that players indicate 85-90% HRmax during game (Álvarez-Medina, Murillo-Lorente, Manonelles-Marqueta, and Giménez-Salillas, 2014; Rodrigues et al., 2011) and 90% during training (Castagna, D'Ottavio, Vera, and Álvarez, 2009), there is a lack of research regarding the relationship between physical capacity and technical skills during the game. Particularly, players spend around 46-52% of the playing time at exercise intensities 80-90% of VO₂max and HRmax, respectively (Castagna et al., 2009). Castagna and colleagues (2007) added that a futsal game elicits about 83,5 and 75,3% of HRmax and VO₂max respectively, while 91% of the playing time spend at HRs higher than 70% of HRmax. In addition, Baroni and Leal (2010) concluded that Brazilian professional futsal players indicate values about 58ml·kg⁻¹·min⁻¹ during ergospirometric assessment in a motorized treadmill. Duarte and colleagues (2009) measured physiological and technical effects of both duration and number of players during futsal small-sided games. Specifically, they found that by extending these variables players tend to solve the game problems with less recourse to individual solutions, while the successful contacts with the ball, dribbles, and tackles reduced significantly (Duarte, Batalha, Folgado, and Sampaio, 2009).

Regarding cognitive and technical skills, it has been found that youngsters who play futsal develop quicker reflexes, thinking, second thinking, off-ball movements, as well as pinpoint passing, one-touch passing, number and accuracy of the shoot (Mănescu, 2016). Moreover, it has been found that about 24% of scored goals achieved throughout organized attacks, 23% counter attacks, 24% set pieces, and 22% with the participation of the goalkeeper (Fukuda and de Santana, 2012). In support of these findings, Bueno and Alves (2012) added that about 31% of scored goals achieved throughout organized attacks, 28% counter attacks, 23% set pieces, 10% 1vs1 duels, and 10% opponents' faults (Bueno and Alves, 2012). Finally, Chen (2011) concluded that around 43% of attacks come from individual efforts, 30% organized game, 12% counterattacks, 5% rebounds, 4% stealing, 3% wing attacks, and 3% dynamic play. In summary, it is obvious that most of the goals achieved throughout organized-passing game, personal-dynamic game (dribbling or 1vs1 duels), and defending faults.

Thus, the fundamental factors of futsal game are passing, receiving, controlling, and shooting. Furthermore, futsal players have to demonstrate these technical skills as the circuit is limited by space, opponent and time (Marhaendro, 2017). In addition, high skilled futsal players produce significantly faster movement and decision making times than less skilled players (Young and Willey, 2010). Regarding passing ability, it has been found that during a futsal game the most frequently adopted ball passing distance is less than 10m, stop-pass is mostly used in organized game, cross-pass is the most frequent direction of passing, and passing in the midfield area is mainly used for organized-game (Ding-meng, 2013). The significance of passing is heightened by Naser and Ali (2016) who concluded that quick decision-making and passing accuracy are extremely valuable attributes required during a futsal game. They further

added that elite players indicate higher passing scores than both sub-elite and recreational athletes. As far as shooting, which is the most common way of scoring in both soccer and futsal, it is obvious that in futsal more goals are scored per minute of game than in soccer (Castagna et al., 2009). Particularly, it has been found that 47% of shoots were from the area between midfield and second penalty mark, 34% between second penalty mark and the penalty mark, 7% from the penalty area corner, 6% inside the penalty area, and 5% behind the midfield (Chen, 2011). Abdel-Hakim (2014) concluded that goals scored, total shoots, on-target shoots, and effectiveness are the main factors which differentiate winning and losing teams. Past research showed that elite players indicate higher shooting scores than both sub-elite and recreational athletes (Naser and Ali, 2016). On the other hand, defenders use mainly pass blocking and ball stealing to prevent their defending area (Zhao, Fan, and Xin, 2010). Moreover, stealing, passing faults and blocks is the commonest way to gain possession and begin a counter attack (Aburachid, Silva, Soares, Santos, and Greco, 2010). The most important ability that determines to steal and block passing success is the prediction by the defender as a result of direction reading and a fast reaction before the attacker (Menichelli, 2012). Dribbling and 1vs1 duels demand abilities such as determination, space and opponent observation, change of direction and pace and accurate timing (Menichelli, 2012). These technical skills take place closer to the opponent's area, while dribbling for progression and dribbling for shoot consist of the dribbling types that most induce defensive lines (Amaral and Garganta, 2005). The shorter field demands many 1vs1 duels during the game. Researchers, claim that coaches have to encourage 1vs1 duels close to opponents' area because defending teams present more negative reactions and attackers have more chances to shoot the ball (Vaeyens, Lenoir, Williams, and Philippaerts, 2007). A team with a high level of success in dribbling and 1vs1 duels has the potential to create more opportunities for supernumeraries and goals (Menichelli, 2012). Adding that match analysis has shown that the overall intensity of futsal decreases near the end and leads to more scored goals (Barbero-Álvarez and Castagna, 2007; Barbero-Álvarez, Soto, Barbero-Álvarez, and Granda-Vera, 2008), make it obvious that physical condition may be a significant indicator of performance. It has also been found that although defending style is harder during the second half (Zhao et al., 2010), 41% of scored goals achieved in the first half while 58% in the second half (Fukuda and de Santana, 2012).

In our knowledge, the literature review showed a lack of research regarding the relation between physical capacity and technical skills during a futsal game. Therefore, the aim of the current study was twofold: (1) to describe the technical characteristics of futsal players during the whole game, and (2) to assess any technical change according to their aerobic capacity.

Methods

Participants

Eleven male futsal players aged $26,6 \pm 2,8$ participated in the current study which conducted during the competitive period of Greek Superleague season 2016-2017. Players were informed about the procedures, the requirements, the risks, the benefits, and the ethics of the study before signing a consent form approved from the University Ethics Committee. Parental consent was also taken for non-adult players who participated in the study. Moreover, the participants were non-smokers, without any metabolic disease during the study period.

Procedures

Anthropometric characteristics and aerobic capacity assessed indoors on a wooden surface futsal playing field, three days before the official game. Specifically, researchers used a cursor to measure the body height of players and a Seca weighting scale (Seca 880 Weight Scale, Leicester Height Measure, Seca Ltd, Vogel and Halke, Hamburg; Germany) to assess their weight. Then, they examined aerobic capacity by Yo-Yo intermittent endurance test level 2 (Yo-Yo IE2). The test lasts 5-25 minutes and consists of 20-metres repeated shuttle runs at progressively increasing speeds dictated by an audio sound sent out from a CD player. Between each shuttle, the players had a 5-seconds period of jogging around a marker placed 2.5-metres behind the finishing line. Two failures to achieve the shuttle run in time resulted in termination of the trial. The covered distance in the last complete successful shuttle recorded as the player performance. Before the test, all players carried out a standard warming-up consisting of the first three running bouts of Yo-Yo test before a period of dynamic stretching. All players familiarized with the Yo-Yo IE2 test and experimental procedures one week before the assessment (Bradley, Di Mascio, Bangsbo, and Krstrup, 2012). $VO_2\max$ was estimated by the following mathematic type ' $IR2 \text{ distance (m)} \times 0.0136 + 45.3$ '. Moreover, a 25Hz video camera set-up in upper plane recorded the actual time of a two-half 40-minute game. The video later replayed by the researcher to evaluate passing without and under press (the opponents were $\pm 3\text{m}$ away or close to the ball), one-touch passing, passing faults (passes that did not reach the teammate), receives (the receiver kept the possession of the ball), fault receives (the receiver did not keep the possession of the ball), on-target and off-target shoots (shoots inside/outside the goalpost), dribbling and dribbling faults (individual trials to the defending half), won and lost 1vs1 duels (individual trials to the attacking half with one opponent), steals (defenders went to the ball before the receivers).

Statistical analysis

SPSS package (v.17) at a significance level $p < .05$ used for the statistical analyses of the current data. All the anthropometrical and technical characteristics expressed as means and standard deviations. The players discriminated into two groups according to their aerobic capacity medians (± 64). Finally, t-tests for dependent samples used to examine the differences between the two halves.

Results

The following table shows the anthropometric characteristics of players who participated in the current study (Table 1). Specifically, the players' age, height, weight and BMI were $26,56 \pm 2,83\text{yrs}$, $174,67 \pm 6,48\text{cm}$, $74,00 \pm 2,29\text{kg}$, and $24,34 \pm 2,45\text{kg/m}^2$ respectively. They further revealed aerobic capacity of $64,88 \pm 4,07\text{ml kg}^{-1}\cdot\text{min}^{-1}$.

Table 1. Anthropometric characteristics of futsal players.

	N	M	SD
Age		26,56	2,83
Height		174,67	6,48
Weight		74,00	2,29
BMI	11	24,34	2,45
Aerobic capacity		64,88	4,07

The following table shows the technical skills of futsal players for the first and the second half of a game (table 2). Specifically, during the 1st half futsal players indicated 108 passes without press from the opponent ($M= 9,82 \pm 6,35$), 11 one-touch passes ($M= 1,00 \pm 1,27$), 26 passes under press from the opponent ($M= 2,36 \pm 1,86$), and 14 fault passes ($M= 1,27 \pm 1,19$). During the 2nd half they achieved 93 passes without press from the opponent ($M= 8,46 \pm 6,96$), 7 one-touch passes ($M= ,64 \pm ,92$), 32 passes under press from the opponent ($M= 2,91 \pm 2,12$), and 23 fault passes ($M= 2,09 \pm 1,97$). T-test analysis showed a significant difference only for passing without press variable ($t= 2,1$; $p < ,05$). Regarding receiving, during the 1st half players carried out 119 receives in total ($M= 11,90 \pm 7,91$) and 4 receiving faults ($M= ,40 \pm ,52$). On the other hand, during the 2nd half they achieved 133 receives in total ($M= 12,09 \pm 8,50$) and 2 receiving faults ($M= ,18 \pm ,41$). Furthermore, during the 1st half they performed 9 on-target ($M=,82 \pm 1,33$) and 6 off-target shoots ($M=55 \pm ,82$). Moreover, during the 2nd half they performed 9 on-target ($M= ,82 \pm 1,33$) and 8 off-target shoots ($M= ,73 \pm ,79$). As far as dribbling, during the 1st half players carried out 10 dribbles in total ($M=,91 \pm 1,51$) and 6 fault dribbles ($M=,55 \pm ,82$). On the other hand, during the 2nd half they carried out 14 dribbles in total ($M= 1,27 \pm 1,74$) and 4 fault dribbles ($M= ,36 \pm ,51$). Concerning 1vs1 duels, during the 1st half they performed 19 won-duels ($M= 1,73 \pm 1,56$) and 11 lost-duels ($M= 1,00 \pm 1,00$). During the 2nd half they achieved 25 won-duels ($M= 2,27 \pm 1,74$) and 12 lost-duels ($M= 1,09 \pm 1,51$). Finally, during the 1st half players carried out 28 steals ($M= 2,55 \pm 1,64$) while in the 2nd half they carried out 27 steals ($M= 2,46 \pm 1,29$).

Table 2. Technical skills during the 1st and the 2nd half.

Technical skills	1st half						2 nd half					
	N	Sum	M	SD	Sk	Ku	N	Sum	M	SD	Sk	Ku
Pass without press	11	108,00	9,82	6,35	,24	-,54	11	93,00	8,46	6,96	,48	-1,10
One-touch pass	11	11,00	1,00	1,27	1,45	2,13	11	7,00	,64	,92	,91	-1,27
Pass under press	11	26,00	2,36	1,86	,15	-1,45	11	32,00	2,90	2,11	,76	,13
Fault pass	11	14,00	1,27	1,19	,23	-1,51	11	23,00	2,09	1,97	,33	-1,33
Receives	10	119,00	11,90	7,91	,43	-,04	11	133,00	12,09	8,50	,84	,56
Fault receives	10	4,00	,40	,52	,48	-2,28	11	2,00	,18	,40	1,92	2,03
On target shoots	11	9,00	,82	1,33	1,65	2,29	11	9,00	,82	1,33	1,65	2,29
Off target shoots	11	6,00	,55	,82	1,15	-,25	11	8,00	,73	,79	,57	-,97
Dribbling	11	10,00	,91	1,51	2,30	5,81	11	14,00	1,27	1,74	1,45	1,10
Fault dribbles	11	6,00	,55	,82	1,15	-,25	11	4,00	,36	,505	,66	-1,96
Won duels	11	19,00	1,73	1,56	,36	-1,47	11	25,00	2,27	1,74	,05	-1,45
Lost duels	11	11,00	1,00	1,00	,73	-,13	11	12,00	1,09	1,51	1,93	4,29
Steals	11	28,00	2,55	1,64	,24	-,81	11	27,00	2,46	1,29	-,05	1,29

The following table shows the technical skills of futsal players during the first and the second half of a friendly game according to the level of their aerobic capacity (Table 3). Although there were not any significant differences among players with high (>64) and low (<64) aerobic capacity the results showed some differences among them from the first to the second half. Specifically, total passes without press reduced during the 2nd half from 47 ($M= 9,40 \pm 7,16$) to 44 ($M= 8,80 \pm 8,26$) for players with low aerobic capacity and from 51 ($M= 12,75 \pm 5,74$) to 44 ($M= 11,00 \pm 6,16$) for players with high aerobic capacity. One-touch passes slightly increased during the 2nd half from 5 ($M= 1,00 \pm 1,00$) to 6 ($M= 1,20 \pm 1,10$) for players with low capacity but they reduced during the 2nd half from 6 ($M= 1,50 \pm 1,73$) to 1 ($M= ,25 \pm ,50$) for players with high aerobic capacity. Regarding under press passes they were increased during the 2nd half from 11 ($M= 2,20 \pm 2,17$) to 15 ($M= 3,00 \pm 2,55$) and from 13 ($M= 3,25 \pm 1,71$) to 14 ($M= 3,50 \pm 2,08$) for both groups of low and high aerobic capacity. Finally, fault passes also increased during the 2nd half from 4 ($M= ,80 \pm ,84$) to 10 ($M= 2,00 \pm 2,12$) and from 8 ($M= 2,00 \pm 1,41$) to 11 ($M= 2,75 \pm 2,22$) for both groups of low and high aerobic capacity. Although receives slightly reduced from 63 ($M= 12,60 \pm 10,64$) of the 1st to 62 ($M= 12,40 \pm 8,14$) of the 2nd half for players with low aerobic capacity, they increased from 42 ($M= 14,00 \pm 2,65$) of the 1st half to 63 ($M= 15,75 \pm 9,54$) of the 2nd half. On the other hand, fault receives remained the same from 1 ($M= ,20 \pm ,45$) of the 1st half to 1 ($M= ,20 \pm ,45$) of the 2nd half for group with low aerobic capacity and from 1 ($M= ,33 \pm ,58$) of the 1st

half to 1 ($M= ,25 \pm ,50$) of the 2nd half for group with high aerobic capacity. On-target shoots increased from 4 ($M= ,80 \pm 1,10$) of the 1st half to 7 ($M= 1,40 \pm 1,67$) of the 2nd half for low aerobic capacity group, while they reduced from 4 ($M= 1,00 \pm 2,00$) of the 1st half to 2 ($M= 1,00 \pm ,82$) of the 2nd half for high aerobic capacity group. Regarding off-target shoots, they remained similar from 3 ($M= ,60 \pm ,89$) of the 1st half to 3 ($M= ,60 \pm ,89$) of the 2nd half for the low aerobic capacity group, but they increased from 3 ($M= ,75 \pm ,96$) of the 1st half to 4 ($M= 1,00 \pm ,82$) of the 2nd half for high aerobic capacity group. Concerning dribbling, they increased from 7 ($M= 1,40 \pm 2,07$) of the 1st half to 10 ($M= 2,00 \pm 2,35$) of the 2nd half for the low capacity group, and from 3 ($M= ,75 \pm ,96$) of the 1st half to 4 ($M= 1,00 \pm ,82$) of the 2nd half for the high capacity group. On the other hand, fault dribbles reduced from 4 ($M= ,80 \pm ,84$) of the 1st half to 3 ($M= ,60 \pm ,55$) of the 2nd half for low aerobic capacity group, and from 2 ($M= ,50 \pm 1,00$) of the 1st half to 1 ($M= ,25 \pm ,50$) of the 2nd half for high aerobic capacity group. Regarding won-duels, they were increased from 9 ($M= 1,80 \pm 1,64$) of the 1st half to 12 ($M= 2,40 \pm 1,34$) of the 2nd half for low aerobic capacity group, and from 9 ($M= 2,25 \pm 1,71$) of the 1st half to 13 ($M= 3,25 \pm 1,71$) of the 2nd half for high aerobic capacity group. Lost-duels they were reduced from 5 ($M= 1,00 \pm 1,00$) of the 1st half to 3 ($M= ,60 \pm ,89$) of the 2nd half for low aerobic capacity group, but they increased from 5 ($M= 1,25 \pm 1,26$) of the 1st half to 7 ($M= 1,75 \pm 2,36$) of the 2nd half for high aerobic capacity group. Finally, steals reduced from 12 ($M= 2,40 \pm 1,52$) of the 1st half to 10 ($M= 2,00 \pm 1,22$) of the 2nd half for low aerobic capacity group, but remained similar from 13 ($M= 3,25 \pm 1,71$) of the 1st half to 13 ($M= 3,25 \pm 1,26$) of the 2nd half for high aerobic capacity group.

Table 3. Technical skills during the 1st and the 2nd half.

Technical skills	Aerobic capacity <64						Aerobic capacity >64					
	N	Sum	M	SD	Sk	Ku	N	Sum	M	SD	Sk	Ku
Aerobic Capacity	5	310,26	62,05	1,41	,36	-2,42	4	273,67	68,42	3,40	,00	,39
Total Time 1st half	5	33,50	6,70	2,78	-,01	-,40	4	36,71	9,18	2,55	-1,06	2,13
Total Time 2nd half	5	35,35	7,07	2,99	-1,75	2,85	4	34,35	8,59	1,90	1,02	-,15
	1st half											
Pass without press	5	47,00	9,40	7,16	-,18	-2,14	4	51,00	12,75	5,74	1,53	2,50
One-touch pass	5	5,00	1,00	1,00	,00	-3,00	4	6,00	1,50	1,73	1,54	2,89
Pass under press	5	11,00	2,20	2,17	,07	-1,82	4	13,00	3,25	1,71	-,75	,34
Fault pass	5	4,00	,80	,84	,51	-,61	4	8,00	2,00	1,41	-1,41	1,50
Receives	5	63,00	12,60	10,64	,41	-1,59	3	42,00	14,00	2,65	-1,46	.
Fault receives	5	1,00	,20	,45	2,24	5,00	3	1,00	,33	,577	1,73	.

On-target shoots	5	4,00	,80	1,10	,61	-3,33	4	4,00	1,00	2,00	2,00	4,00
Off-target shoots	5	3,00	,60	,89	1,26	,31	4	3,00	,75	,96	,86	-1,29
Dribbling	5	7,00	1,40	2,07	1,92	3,88	4	3,00	,75	,96	,86	-1,29
Fault dribbles	5	4,00	,80	,84	,51	-,61	4	2,00	,50	1,00	2,00	4,00
Won duels	5	9,00	1,80	1,64	,52	-1,69	4	9,00	2,25	1,71	-,75	,34
Lost duels	5	5,00	1,00	1,00	,00	-3,00	4	5,00	1,25	1,26	1,13	2,23
Steals	5	12,00	2,40	1,52	1,75	3,72	4	13,00	3,25	1,71	-,75	,34
	2nd half											
Pass without press	5	44,00	8,80	8,26	-,04	-2,96	4	44,00	11,00	6,16	1,71	2,83
One-touch pass	5	6,00	1,20	1,10	-,61	-3,33	4	1,00	,25	,50	2,00	4,00
Pass under press	5	15,00	3,00	2,55	,91	2,00	4	14,00	3,50	2,08	,00	,39
Fault pass	5	10,00	2,00	2,12	,52	-,96	4	11,00	2,75	2,22	-,48	-1,70
Receives	5	62,00	12,40	8,14	-,53	-1,19	4	63,00	15,75	9,54	1,96	3,85
Fault receives	5	1,00	,20	,45	2,24	5,00	4	1,00	,25	,50	2,00	4,00
On-target shoots	5	7,00	1,40	1,67	1,09	,54	4	2,00	,50	1,00	2,00	4,00
Off-target shoots	5	3,00	,60	,89	1,26	,31	4	4,00	1,00	,82	,00	1,50
Dribbling	5	10,00	2,00	2,35	,58	-2,63	4	4,00	1,00	,82	,00	1,50
Fault dribbles	5	3,00	,60	,55	-,61	-3,33	4	1,00	,25	,50	2,00	4,00
Won duels	5	12,00	2,40	1,34	-,17	-2,41	4	13,00	3,25	1,71	-,75	,34
Lost duels	5	3,00	,60	,89	1,26	,31	4	7,00	1,75	2,36	1,19	,44
Steals	5	10,00	2,00	1,22	-1,36	2,0	4	13,00	3,25	1,26	1,13	2,23

Discussion

The current study aimed to describe the technical skills of players during a futsal game as well as to indicate any differences from the first to the second half because of physical capacity. Similarly to past research Greek futsal players revealed mesomorphic somatotype with mean values of height, weight, and BMI about 175cm, 74kg, and 24kg/m² respectively (i.e. Avelar et al., 2008; Trabelsi, Aouichaoui, Richalet, and Tabka, 2014). Their mean aerobic capacity (VO₂max) was 64,88ml·kg⁻¹·min⁻¹ finding higher than previous studies which showed values

around $55\text{-}65\text{ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ (Álvarez et al., 2009; Castagna et al., 2009; Milanez et al., 2011; Pedro, Milanez, Boullosa, and Nakamura, 2013). Furthermore, it is suggested that the limits to play for a top-level team are about $50\text{-}55\text{ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ (Castagna et al., 2009) while other studies heightened the significance of VO_2max concluding that physical performance discriminates players of different competitive level (Krustrup et al., 2003; Krustrup, Mohr, Ellingsgaard, and Bangsbo, 2005; Pedro et al., 2013). However, Berdejo-del-Fresno and colleagues (2015) suggested that futsal coaches may increase aerobic capacity of their players throughout an adequate periodization of small sided games by modifying the field dimension and the number of players involved into each task and exercise (Berdejo-del-Fresno, Moore, and Laupheimer, 2015).

Regarding specific technical skills, the results showed that during the second half apart from passing faults which were increased all the other passing situations (passing without press, passing under press, one-touch passing) reduced. The discrimination of players into two groups according to their aerobic capacity showed that although there was not a significant difference between them players with higher VO_2max indicated better results in passing skills. The current findings are in accordance with past research which showed that longer period of game reduces the technical abilities of players and increases their faults (Duarte et al., 2009). Adding that organized-game which demands high passing frequency is the most common way to achieve a goal (Bueno and Alves, 2012; Fukuda and de Santana, 2012), as well as that elite players, indicate higher passing scores than sub-elite and recreational athletes (Naser and Ali, 2016), passing is considered a fundamental ability related to physical capacity that coaches have to take into account.

In contrast to findings of passing, during the second half players increased their receiving scores but they reduced their receiving faults. When the descriptive differences between high and low aerobic capacity players were examined, it was found that although players with low aerobic capacity reduced their receiving scores, players with high aerobic capacity increased their scores. In contrast, receiving faults of players with low aerobic capacity remained similar, they were reduced for players with high aerobic capacity. Although there is a gap of knowledge regarding receiving skill, we suggest that because of fatigue players with higher aerobic capacity reduced their one-touch passing and they increased two-touches game that demands a receive. Adding that also dribbling and 1vs1 duels increased during the second half as well as the significance of decision making (Naser and Ali, 2016; Young and Willey, 2010), players might need more time to make a decision so their game demands an increase of receives. Furthermore, their teammates might reduce their off-ball movements because of fatigue so as to get into a position to receive the ball, oblige players with the ball to increase their receivings.

As far as shooting ability the results showed that on-target shoots remained similar from the first to the second half while off-target shoots increased. Particularly, players with low aerobic capacity increased their on-target shoots during the second half, while their off-target shoots remained similar. In contrast, high aerobic capacity players reduced their scores of on-target shoots and increased their scores of off-target shoots. These findings were in contrast to past research which suggests that during the second half teams achieve more goals (Barbero-Álvarez and Castagna, 2007; Barbero-Álvarez et al., 2008; Fukuda and de Santana, 2012). A possible explanation of these contradictory findings might be the effectiveness of shooting performance as well as the different aerobic capacity of players with different playing position (Arins and Silva, 2007; Burns, 2003; Gioldasis, 2016). Furthermore, a finding that might explain the current results is that teams play harder defense during the second half (Zhao et

al., 2010) so there is reduced area for on-target shoots. Moreover, because of the harder defense players of other playing positions than attack might try more shoots.

Regarding dribbling ability, players performed higher scores during the second half but less dribbling faults. Specifically, both high and low aerobic groups indicated an increase in total dribbles during the second half but a reduction in dribbling faults. These findings come in contrast to past research which suggests that players solve game problems with less resource to individual solutions (Duarte et al., 2009). However, the increase of dribbling activities might be related with the reduction of passing scores. In addition, Chen (2011) suggests that most of the scored goals achieved after individual-dynamic game which demands dribbling and 1vs1 situations. Probably, during the second half because of fatigue and harder defensive style players are not able to find solutions through team-game and they use more their individual techniques which most induce defensive lines (Amaral and Garganta, 2005).

As far as 1vs1 duels the results showed that both won and lost 1vs1 duels increased during the second half. Particularly, players with low aerobic capacity indicated higher scores of won 1vs1 duels but lower of lost duels during the second half. On the other hand, players with high aerobic capacity increased both won and lost 1vs1 duels. Similarly, with dribbling activities, players performed more 1vs1 duels, finding that is probably explained by the need for more individual techniques so as to induce the defensive line (Amaral and Garganta, 2005). Furthermore, coaching choices probably increase the 1vs1 situations because it has been found that a team with high level of success in dribbling and 1vs1 duels has the potential to create more opportunities for supernumeraries and goals (Menichelli, 2012).

Finally, players slightly reduced their scores of stealing during the second half. Specifically, only players with low aerobic capacity revealed lower scores during the second half. Although the reduction of stealing a ball was very low and only for low aerobic players, it is probably explained by the fact that stealing demands a high level of game reading and reaction by the defender (Menichelli, 2012) which consist of privilege for players with high aerobic capacity. Furthermore, the high scores of steals also during the second half might be explained by the fact that defensive style was harder (Zhao et al., 2010).

Conclusion

The findings of the current study highlight the differences of technical skills of futsal players between the first and second half. It is suggested that futsal coaches have to develop aerobic capacity of their players so as to achieve higher scores in technical skills during the whole game. Specifically, total shoots, shoots on-target, 1vs1 duels close to opponent's half differentiate winning and losing teams. There is a need for sport scientists and training staffs to improve their knowledge and contribute to the development of futsal in their respective countries. Further studies examining physical, technical and tactical aspects of performance and across a wider range of participants are warranted.

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Conflict of Interest

The author has not declared any conflicts of interest.

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