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The effects on soccer passing skills when warming up with two different sized soccer balls

Keskin Burcak

Department of Physical Education and Sport Teaching, Faculty of Sport Sciences, Istanbul University, Turkey.

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The purpose of the present research is studying the effects of warm-up with two different sizes of balls on passing skills. Loughborough Soccer Passing Test (LSPT) was conducted on 28 non-elite football players, who participated in the present research for 10 training days. LSPT is a passing skill protocol established on completing 16 passes successfully in the shortest period of time possible (Ali et al., 2007). After 5 days implementation of LSPT, the participants were divided into 2 equal groups of 14, as experiment and control groups. During the second 5-day test period, control group participants warmed up with ball number 5, than took LSPT with the same ball. On the other hand, experiment group warmed up with ball number 4, and took LSPT with ball number 5. Obtained data were analysed with independent samples t-test, and accordingly experiment group was more successful than control group in LSPT (p< .01). Consequently, passing skills of football players who warmed up with ball number 4 were affected positively. The present research, which aimed at increasing match performance, predicted that passing skills were affected positively during the match among football players who warmed up with smaller size balls before the match.

Key words: Soccer, passing, warm up, ball, LSPT.

INTRODUCTION

Passing in soccer, basically involves giving the ball to a teammate (Bate, 1996). In other words, passing is to throw the ball from one of the players to their teammate (FACR, 1997). Passing is the most important skills in soccer, and the soccer players must be acquired consciously and individually (Hargreaves, 1990). Before throwing a good pass, there is a need to be known where and why the ball is thrown (Hughes and Franks, 2005; Ali and Williams, 2009).

In the game of soccer, teams manipulate space and time in order to score and prevent goals. Understanding how these two concepts govern play is essential to a proper understanding of the game (LA84 foundation, 2007). Realization of defensive and offensive strategies is demanding excellent physical fitness and technique like passing skill (Russell and Kingsley, 2011). Without strong technical skills, your soccer players cannot score goals or defend effectively (LA84 foundation, 2007). Fundamental techniques like passing, dribbling, heading, shooting and collecting are very important for all players, and they must develop and continually refine. The soccer players who want to be best, always must have the

E-mail: burcakka@hotmail.com.

strongest technique (Huijeng et al., 2010).

One of the main skills in soccer is passing the ball correctly. When the player has the chance of passing, the other players must have position where the best place is to take pass (Coerver and Galustian, 1995). It is what keeps the game pace going and without it; you are not likely to win your team a goal (LA84 foundation, 2007). For taking the good pass, soccer players must have the best position in the soccer field (Howe and Waiters, 1993; Katis and Kellis, 2009).

Basic to playing good soccer is absolutely good passing. Roughly 80% of the game involves the giving and receiving of passes (LA84 foundation, 2007). The pass must be realized at the right time by the player to teammate (LaPrath, 2009). No matter how talented the dribbler, it is nearly impossible to penetrate an offense without good passing (LA84 Foundation, 2007). Bad passing destroys a team, but good passing builds team confidence and momentum. Largely a matter of teamwork is good passing. Good communication between teammates and mobility of players help purify passing (Russell et al., 2010). The passing is an art and largely the art of doing simple things quickly and well (Ali and Williams, 2009; Impellizzeri et al., 2008).

The most frequently used technique in passing skill is the technique of “inside of foot” and it has most hit rate (Schreiner, 2010; LA84 Foundation, 2007). A matter of good judgment is mostly good passing. Although a player cannot be a good passer without good technique, technique is useless unless the player sees the field of play and makes the correct choice of pass (LA84 foundation, 2007). If players dribble with their heads down, they will fail to see openings (Levanon and Dapena, 1998). Besides when the players receive a ball, if the players are not relaxed and prepared, they will tend to lose valuable passing space. Trainers must teach to see the field of play to players (Thomas et al., 2009). Players must always lift their heads and observe the play around them. Being able to see the field of play allows players to act confidently and not make risky passes (LA84 foundation, 2007; Stone and Oliver, 2009).

For a good play, passing skills are vital. The range of play is limited if a player is not able to hit a teammate in open space, bend a ball around opponents, or chip a ball over a wall of defenders (LA84 foundation, 2007). It is extremely difficult without good passing skills, moving the ball through the middle third of the field (Coerver and Galustian, 1995). Your team should spend much time developing passing technique (Katis and Kellis, 2009; Rampinini et al., 2008). Fédération Internationale de Football Association (FIFA) goes to great lengths to ensure that the soccer balls meet rigid standards for competition. FIFA stated, “the size of a football (soccer ball) must meet defined standards. This is crucial for players to make accurate passes and go on thrilling dribbles. Could you imagine everyone playing with different sized footballs” (FIFA, 2011).

Literature review on the subject matter shows that the relationship between pre-match warm up exercise and match performance in football has been studied frequently (Mohr et al., 2004; Little and Williams, 2006; Smith, 1994; Needham et al., 2009; Gelen, 2010; Grandstrand, 2006; Church et al., 2001; Soligard et al., 2008; Zakas et al., 2006; Fletcher and Monte-Colombo, 2010).

Mohr et al. (2004), examined the relationship between quadriceps muscle temperature, and sprint performance was evaluated during soccer matches in 25 competitive players. This study demonstrates that in soccer, the decline in muscle temperature and core temperature during half-time is associated with a lowered sprint capacity at the onset of the second half, whereas sprint performance is maintained when low-intensity activities preserve muscle temperature. Little and Williams (2006), aimed to examine the effects of different modes of stretching within a pre-exercise warm-up on high-speed motor capacities important to soccer performance. Dynamic stretching during the warm-up was most effective as preparation for subsequent high-speed performance.

Smith (1994), aimed to review the literature regarding stretching, with the aim of defining its role during the warm-up. A proposed model stretching regime was presented based on the literature reviewed. Needham et al., (2009), aimed to investigate the acute effect of different warm-up protocols on anaerobic performance in elite youth soccer players. The results of the study showed that a dynamic warm-up with the inclusion of resistance enhances jumping ability more than dynamic exercise alone. In addition, a dynamic warm-up produced a superior sprint and jump performance compared to a warm-up consisting of static stretching.

Gelen (2010), aimed to compare the acute effects of different warm-up methods on soccer performance. The results of this study suggested that it may be desirable for soccer players to perform dynamic exercises before the performance of activities that require a high power output. Grandstrand et al. (2010), aimed to examine lower extremity kinematics following implementation of the Sportsmetrics Warm-Up for Injury Prevention and Performance (WIPP) training program. The results indicated that 8 weeks of WIPP training did not significantly alter landing strategies. Church et al. (2001) aimed to determine to what degree different warm-up routines affect performance in the vertical jump test. Based on the results of this study, performing Proprioceptive Neuromuscular Facilitation (PNF) before a vertical jump test would be detrimental to performance.

Soligard et al. (2008) aimed to examine the effect of a comprehensive warm-up programme designed to reduce the risk of injuries in female youth football. Results indicated that a structured warm-up programme can prevent injuries in young female football players. Zakas et

Table 1. The ball sizes, ball weights, and ball dimensions for each age group.

Age	Size	Circumference (inches)	Weight (g)
13 and upper	5	27-28	400-450
10-12	4	25-26	310-370
6 -9	3	23-24	310-340

Table 2. Measurements of the participants.

Means of participants	n	Age (years)	Height (cm)	Weight (kg)	Yo-Yo / IR1 (m)
	28	20.82±1.41	178.36±3.83	73.96±6.3	1663.57±183.72

al. (2006) aimed to examine in field conditions the acute effects of passive stretching after a general warming-up bout as well as the effects of passive stretching alone. Results showed that improvements in flexibility are observed after passive muscle elongation, irrespective of warming-up. Fletcher and Monte-Colombo (2010) aimed to investigate the effect of different warm-up stretch modalities on specific high-speed motor capabilities important to soccer performance. They recommended for optimal performance, specific dynamic stretches be employed as part of a warm-up, rather than the traditional static stretches.

In an experimental research conducted with different sizes of ball, Miller (2012) studied the dribbling skills among young football players. Miller found that children could dribble in a more balanced way with smaller balls. In the light of this information, the purpose of the present research is studying the effects of warm-up with two different sizes of balls on passing skills. The hypothesis of the research is that, Loughborough Soccer Passing Test (LSPT) scores after passing exercise with ball number 4 are lower than the scores after passing exercise with ball number 5.

MATERIALS AND METHODS

Balls

The soccer ball used in professional leagues and in the FIFA World Cup is called “size 5”. However, the size 5 soccer ball is not used at all times. The soccer ball sizes for official match use vary according to the type of soccer being played or the age group of players. The soccer ball circumference for different age groups and game variations are shown (Miller, 2012). The ball sizes, ball weights, and ball dimensions for each age group are presented in Table 1.

Participants

Twenty-eight male non-elite soccer players participated in the study. All football players have been voluntarily participated in the research and after completion of a screening questionnaire, written informed consent was obtained from all participants. Besides, all procedures had the prior approval of Ethical Advisory Committee. Before LSPT, fitness level (Yo-Yo / IR1) of participants were measured to help dividing into two physiologically equal groups. Measurements of the participants are shown in Table 2.

Loughborough soccer passing test (LSPT)

Loughborough soccer passing test (LSPT) was conducted on 28 non-elite football players, who participated in the present research for 10 training days. LSPT is a passing skill protocol established on completing 16 passes successfully in the shortest period of time possible (Ali et al., 2007) (Figure 1). Ali et al. (2007) ,developed this test designed to create a valid and reliable test protocol by analysing data obtained from 48 football players in Loughborough University in 2007. According to this protocol, the football players should complete the test in the shortest time period possible to get higher scores from the test, and make the least mistakes and earn the most awards. In LSPT protocol, three different times are calculated; the time the test is completed; penalty time from the mistakes made, and awards earned, and the performance time obtained with the addition of these two times.

5/2 passing game

This passing game is a kind of soccer game aims to develop passing and tackling skills of soccer players. In the game, there are 5 passing players and 2 tackling players. While 5 players try to pass between each other, other 2 players tackle them and try to win the ball. By rules of this game, the player, who wins the ball, replaces the player who loses the ball. Besides hard tackling leads to injury, is forbidden. During this game, the players pass and tackle many times so that the players develop their passing and tackling skills.

Application of research

The present research was conducted on synthetic football pitch in two steps with the participation of 28 soccer players for 10 days. The first step was pre-test step, which took 5 days. In this step, all of 28 participants played passing game (5/2) with ball number five in four groups for 15 min, than they were selected one by one randomly. Randomly selection applied according to volunteering. After each selected footballer was given one trial chance with ball number 5, they were given the LSPT. Each participant completed test as they were recorded with 2 video cameras, and had one score for that day (Figure 2).

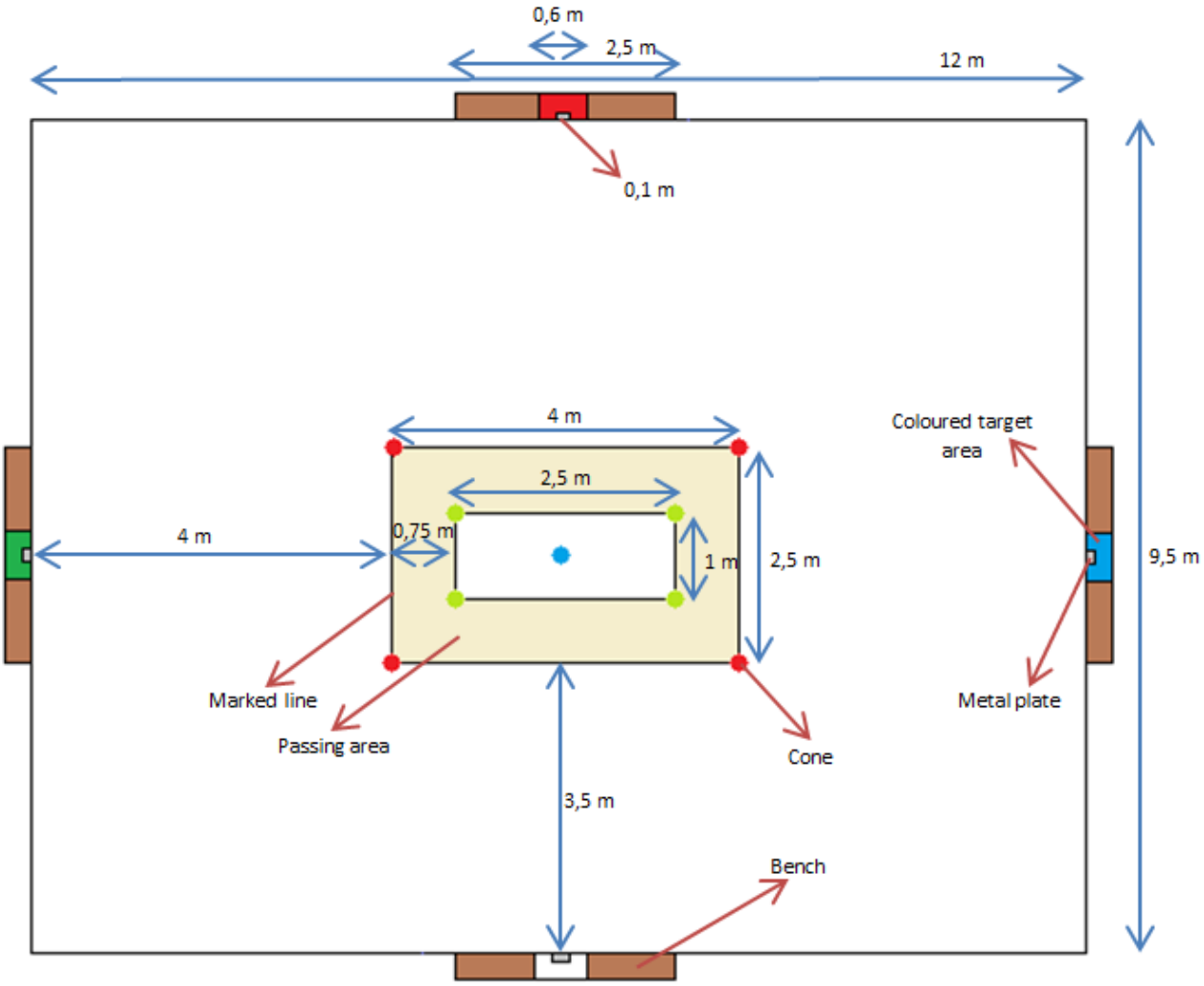

Figure 1. Schematic representation of the Loughborough Soccer Passing Test

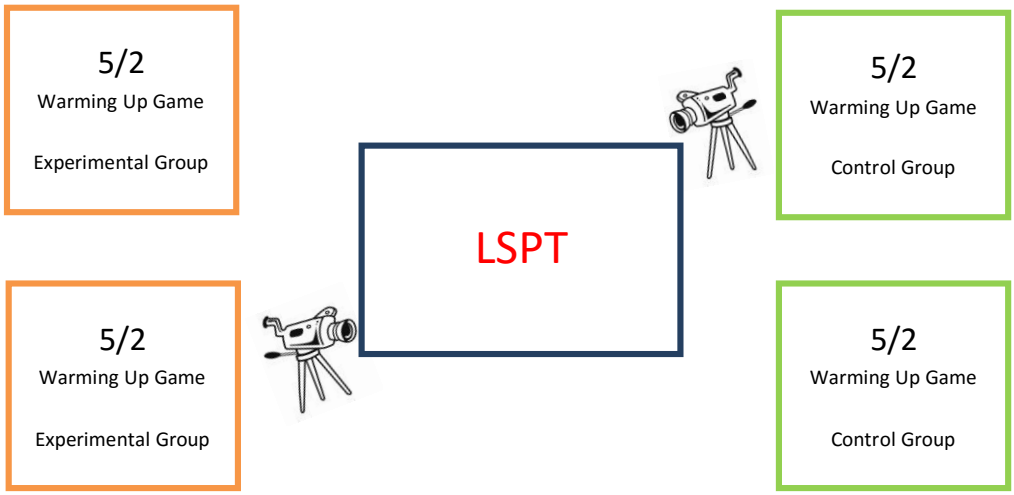

Figure 2. Application area of warming up game (5/2) and LSPT

Table 3. Definitions and scores of participants.

No.	Participants	Age (y)	Height (cm)	Weight (kg)	Yo-Yo IR1 (m)	LSPT pre-test
1	Experiment 1	23	178	81	1860	43.8
2	Control 1	24	176	76	1900	44.1
3	Control 2	21	173	69	1980	44.3
4	Experiment 2	26	189	81	1740	44.7
5	Experiment 3	22	175	72	1820	45.2
6	Control 3	21	169	65	1840	46.1
7	Control 4	21	178	83	1740	46.2
8	Experiment 4	23	181	75	1640	46.5
9	Experiment 5	20	182	77	1480	46.8
10	Control 5	19	184	80	1840	47
11	Control 6	18	167	69	1740	47.5
12	Experiment 6	22	169	65	1680	47.9
13	Experiment 7	21	179	80	1660	48.2
14	Control 7	21	178	81	1680	48.5
15	Control 8	20	181	79	1600	48.6
16	Experiment 8	19	180	72	1740	49.1
17	Experiment 9	20	192	83	1680	49.8
18	Control 9	21	178	69	1540	50.6
19	Control 10	20	177	72	1480	50.6
20	Experiment 10	18	175	68	1620	50.9
21	Experiment 11	19	172	70	1540	51.7
22	Control 11	19	189	81	1640	51.8
23	Control 12	22	182	72	1440	52
24	Experiment 12	22	176	69	1600	52.3
25	Experiment 13	20	179	68	1560	52.4
26	Control 13	20	181	73	1520	53.2
27	Control 14	21	176	68	1460	53.5
28	Experiment 14	20	178	73	1560	53.8

Table 4. Pre-test means of the groups.

Groups	N	Age (y)	Height (cm)	Weight (kg)	Yo-Yo IR1 (m)	LSPT pre-te. (s)
Experiment	14	21.07	178.93	73.86	1655.71	48.79
Control	14	20.57	177.79	74.07	1671.43	48.86
All	28	20.82	178.36	73.96	1663.57	48.83

Football players went back to passing game after completing the test. After each test day, video recordings were analysed by the researchers according to LSPT protocol, and the scores were recorded in statistical package for social sciences (SPSS). Pre-test scores averages for 5 days for each player were listed so that the participants were divided into two equal groups according to passing skill. Each football player was given a code so that they could be defined (Table 3). After LSPT, the participants were divided in two equal groups of 14 as experiment and control groups (Table 4). In the pre-test step, in the first week of implementation, all participants (n=28) played 5/2 passing games which increasing basic passing skills with ball number 5 for warming up before the routine training. During the passing game, each player (one by one and in regular turn according to groups) took LSPT without cooling down.

Statistical analyses

Obtained data from the LSPT was statistically analysed. First of all, normality test was (Kolmogorov Smirnov) performed to obtained data. Normality tests (like Kolmogorov Smirnow, Shapiro Wilk-W) use to determine that obtained data shows normality or not (Lilliefors, 1967). To say that this data is normal, in the result of test,

Table 5. Independent samples t-test results of the pre-test means of the groups.

Variable	Groups	n	Mean	Standard deviation	t	p
Age (y)	Control	14	20.571	1.453	-.734	0.469
	Experiment	14	21.071	2.092		
Height (cm)	Control	14	177.79	5.727	-.514	0.612
	Experiment	14	178.93	6.044		
Weight (kg)	Control	14	74.07	5.850	0.098	0.923
	Experiment	14	73.86	5.736		
Yo-Yo IR1 (m)	Control	14	1671.43	174.306	0.287	.777
	Experiment	14	1655.71	107.897		
LSPT pre-test	Control	14	48.857	3.145	0.054	0.957
	Experiment	14	48.793	3.154		

significant level must be higher level than 0.05. If the data shows normality, researcher uses parametric tests to statistically analyse. In the result of Kolmogorov Smirnov test, obtained data showed normality (Z= .582, p= .887). Independent samples t-test is a kind of parametric tests, was used to analyse differences between two groups.

FINDINGS

The participants were divided in two equal groups as control (n=14) and experiment (n=14) groups according to their passing skill scores obtained from the test. There was no statistically significant difference between these two groups (p=0.957). This finding indicates that, these two groups were similar in terms of their passing skills (Table 5).

The second step was the experiment step. In this step, passing skills of the participants who were divided into two equal groups in the first step were lastly tested. As in the first step, passing skills of all participants were measured for 5 days. The difference in this step was that, experiment group football players played the passing game in warm-up with ball number 4. On the other hand, control group participants played passing game with ball number 5, as in pre-test step. It was assumed that, this training was similar to the warm-up exercises with ball conducted before football matches (Figure 3).

In the second week of the implementation, control group continued their applications for 5 days with standard ball number 5 as they did in the first week, and took LSPT with the same standard ball. On the other hand, experiment group did warm-up with ball number 4, but took LSPT with the same ball with control group, standard ball number 5, and the findings were recorded (Table 6).

LSPT score averages of the groups on the fifth and tenth day, and the average of the scores obtained during the week, are presented in Table 6 as test time, penalty time and performance time. Accordingly, there are no significant differences between experiment and control groups, in terms of their score averages for the first week, and the fifth day. This finding indicates that, control and experiment groups were similar in terms of passing skills.

In the second week of the implementation, experiment group followed a different training program, and as a result, even test times, which showed the time for completing test, were similar for both groups, other times were different from the first week. Experiment and control groups differed from each other statistically in terms of penalty and performance times (Figure 4).

There were no significant differences between control and experiment groups in terms of test times, when tenth day and second week averages were taken as different times (p=0.957). However, there were statistically significant differences between two groups, in terms of their penalty (p=0.004) and performance (p=0.000) times. The reason for this difference was that, experiment group obtained less penalty time than the control group (Table 7). According to groups' performance times, which were obtained from the addition of test and penalty times, experiment group had lower scores than the control group (Figure 5).

RESULTS AND DISCUSSION

Obtained data were analysed with independent samples t-test, and accordingly, experiment group was more successful than the control group in LSPT (p< .01). Consequently, warm-up exercise done with ball number 4 affected passing skills of football players positively.

Ali et al. (2007), have showed the mean time taken,

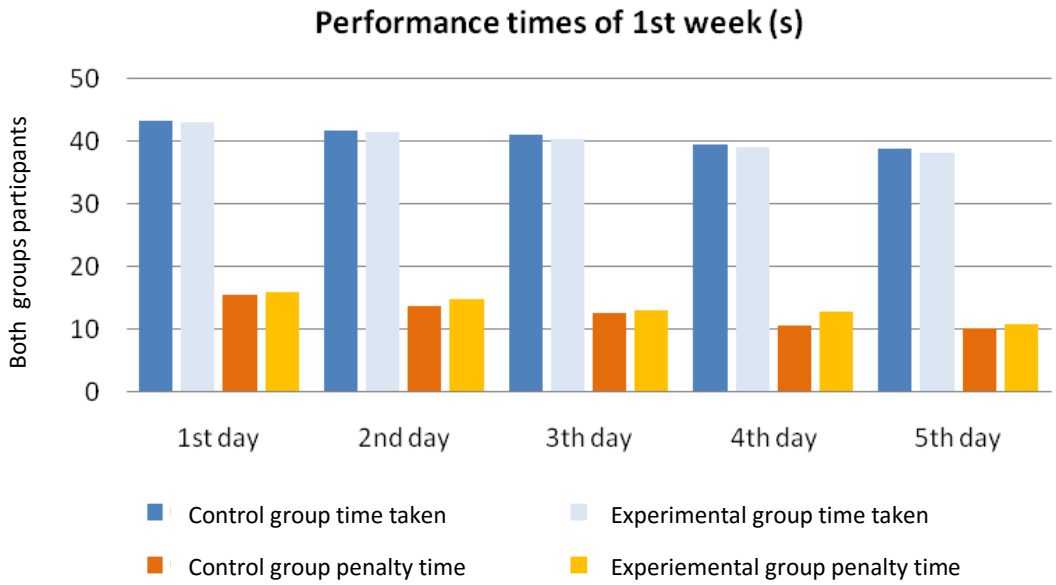

Figure 3. LSPT performance time (s) of 1st week (s).

Table 6. Scores and means of the groups.

Variable	Score of 5th day	Mean of 1st week	Score of 10th day	Mean of 2nd week
Control group (n=14)				
Time taken only (s)	38.670	40.727	38.027	38.065
Penalty time only (s)	10.187	12.524	9.216[a]	9.644[c]
Performance time (s)	48.857	53.251	47.243[b]	47.709[d]
Experimental group (n=14)				
Time taken only (s)	38.047	40.289	38.163	38.414
Penalty time only (s)	10.746	13.446	6.187[a]	7.586[c]
Performance time (s)	48.793	53.735	44.350[b]	46.002[d]

[a, b] Significantly lower than score of control group, $p<0.01$; [c, d] Significantly lower than mean of control group, $p<0.01$.

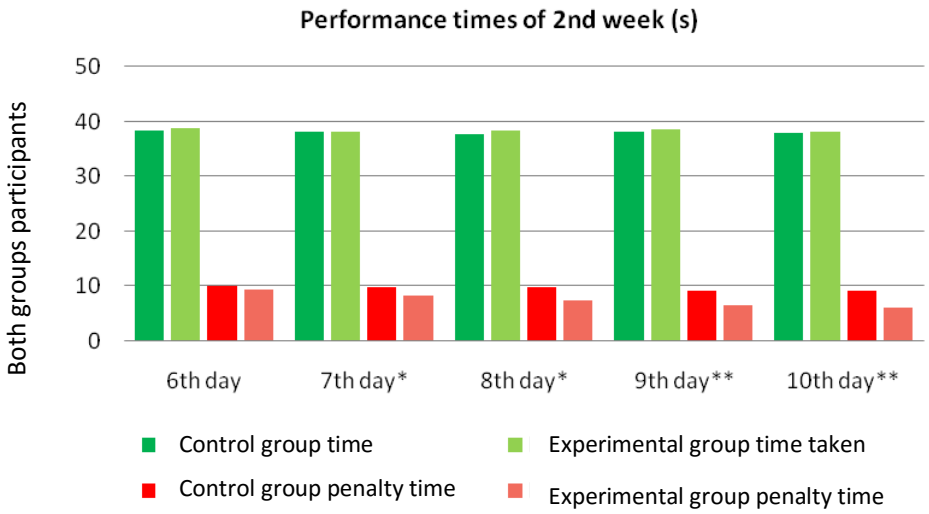

Figure 4. LSPT performance time (s) of 2nd week between groups (*$P<0.01$; **$P<0.001$).

Table 7. T-test results of scores and means of the groups.

Variable	Groups	n	Mean	St.D.	t	*p*
Time taken only (s)	Control	14	38.065	4.571	0.054	0.957
	Experiment	14	38.414	4.318		
Penalty time only (s)	Control	14	9.644	2.176	3.168	0.004*
	Experiment	14	7.586	2.648		
Performance time (s)	Control	14	47.709	7.013	2.568	0.000*
	Experiment	14	46.002	6.386		

* $p<0.01$.

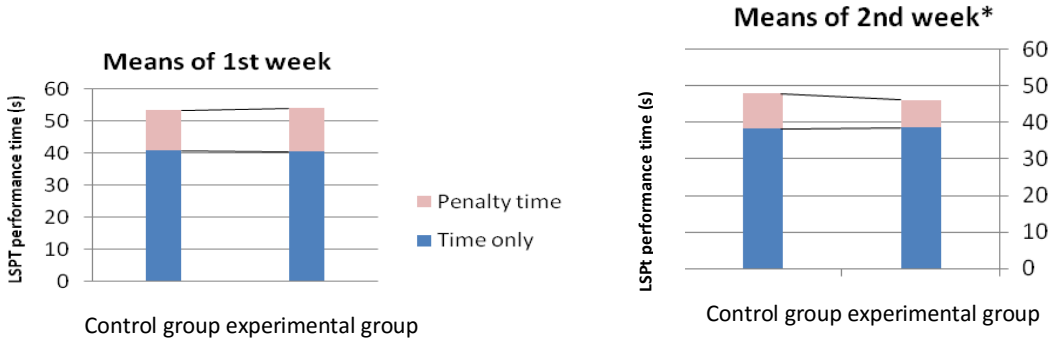

Figure 5. LSPT performance time (s) of weeks (* $p<0.01$).

added penalty time, and overall performance time were less in the elite players (elite: 43.6 s; non-elite: 52.5 s). In this study, non-elite football players were showed more effective performance (control: 47.2 s; experiment: 44.3 s). The reason of that was 10 days trainings affect its time positively. Ali et al. (2008), have aimed to validate the LSPT for use with female players. Nineteen Premier Division (elite) and 16 Reserve team players (non-elite) volunteered for this study. All trials were performed inside a sports hall, using an indoor soccer ball, and following a standardized 10-min warm-up. The mean time taken, added penalty time and overall performance time were lower for elite players.

Rampinini et al. (2008), have aimed to examine whether the fatigue accumulated during match play or determined by short bouts of high-intensity intermittent activities affect short-passing ability in junior soccer players. In result of test, a significant correlation was found between the YoYoIR scores and the decline in LSPT performance (accuracy, total time, total time with penalties) after high-intensity activities.

In an experimental research conducted with different sizes of ball, Miller (2012) studied the dribbling skills among young football players. Miller (2012) found that, children could dribble in a more balanced way with smaller balls.

Conclusion

The most important finding of the present research in that, passing games played with ball number 4 affected passing skills of football players positively. The reason for this finding was that, penalty times of the players, who warmed up with ball number 4, were shorter. Faulty ball controls, which result in longer penalty time, were observed less among experiment group. This difference showed that playing passing games with smaller size balls increased ball control. This increase is assumed to increase accurate passing during football matches. In this context, it is suggested that trainers make team players play passing games with ball number 4 before football matches.

Conflict of Interests

The author has not declared any conflict of interests.

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