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Effects of Small-Sided Games versus Traditional Endurance Training on Aerobic Capacity and Match Performance in Soccer Players

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ABSTRACT

Background: The required fitness in soccer, is that of repeated high intensity efforts with good aerobic endurance and fitness for the game in the specific situation. Recently, Small sided games (SSGs) are gaining popularity due to the combination of physical conditioning and technical and tactical performance. Little evidence, however, exists to show their effectiveness versus traditional endurance training for players at the university level in soccer.

Methodology: The subjects were 30 male players at the University soccer team between the ages of 18 and 25 years who participated in a randomized controlled trial. The participants were randomly assigned to either a Small-Sided Games (SSG) group (n=15) or a Traditional Endurance Training (TE) group (n=15). The three groups received three training sessions per week for eight weeks. Aerobic capacity was measured by the Yo-Yo Intermittent Recovery Test Level 1 (Yo-Yo IR1) and match performance was determined using total distance run and fitness scores. Data processing was done by SPSS 26 by performing paired and independent sample t-test.

Results: The intervention showed to lead to significant improvements in aerobic capacity

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and match performance. Yo-Yo IR1 scores improved significantly from 14.94±0.80 to 17.15±0.86 ($p<0.001$). Total distance covered increased from 2.99±0.39 km to 4.43±0.57 km ($p<0.001$), while fitness scores improved from 57.97±4.82 to 76.13±5.63 ($p<0.001$). But there was no significant difference between SSG group and TE group after the intervention ($p>0.05$).

Conclusion: Small sided games together with traditional endurance training, resulted in a significant increase of aerobic capacity and match performance in soccer players of the university level. Additional sport-specific benefits can be gained through the use of sport-specific, technical and tactical training alongside physiological conditioning by SSGs.

Keywords: Small-Sided Games, Traditional Training, Soccer, Aerobic Capacity, Endurance Training, Yo-Yo IR1, Match Performance.

Introduction

The soccer game consists of 90 minutes of intermittent, high intensity running with repeated accelerations, decelerations, sprinting, jumping, and changing directions. During matches, elite soccer players run a distance of 9–12 km, of which a large percentage is spent on high-intensity running activities[1]. One of the most important physiological factors in soccer is aerobic fitness, which enables the players to make repeated demands on their body during a game. Players with higher aerobic fitness will recover more rapidly between sprinting actions, maintain speed and intensity of movement and be able to execute technical skills in a fatigued state. Previous studies have shown that increased aerobic fitness is associated with increased total distance covered, increased sprint frequency and a later onset of fatigue throughout matches, and improved match performance in soccer athletes[2]. In addition, there is a close correlation between the ability to delay fatigue in the final part of competition and levels of aerobic conditioning, suggesting that development of endurance is a fundamental part of current soccer training programmes[3].

The traditional approach of endurance training such as continuous running or high-intensity interval training (HIIT) has been employed for a long time to enhance the aerobic fitness of soccer players. While each of these methods is effective in terms of their physiological impact, they rarely involve the technical and tactical aspects of soccer performance. Small sided games (SSGs) are becoming increasingly popular in recent years as they can simultaneously develop physical conditioning, technical skills and tactical awareness. SSGs are soccer games with a reduced number of players and field size, which require more of the players and increase their involvement in the game. The heart rate responses that can be obtained from SSGs have been shown in previous studies to be greater than 90% of the maximum HR, which is thought to be adequate for producing aerobic adaptation. [7]

Furthermore, SSGs enhance decision-making skills, passing accuracy and tactical performance[8]. Although the number of studies on SSGs has been increasing, few studies have investigated effectiveness of SSGs with university level soccer players, especially in developing countries. So, the intent of this study was to compare the effects of SGs to traditional endurance training on match performance and aerobic capacity of university soccer players.

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Methodology

Study Design

A randomized controlled trial (RCT) with pre and post-test design was used to evaluate the impact of small-sided games versus endurance training on aerobic capacity and match performance.

Ethics

This study was ethically cleared by the Institutional Review Board (IRB) of Department of Emerging Allied Health Technologies, Superior University, Lahore. Prior to participation, the participants were provided with information about the study objectives, procedures, benefits and risks. All participants were given written informed consent.

Setting

This study was carried out in the Superior University Lahore at a well-established sports training center at the Department of Sports Science and Physical Education, Lahore, Pakistan from 02-01-2026 to 04-03-2026.

Participants

The subjects of the study were 30 healthy male soccer players from the university who volunteered to participate in the study. Participants regularly participated in soccer training and were medically fit.

Inclusion Criteria

Male university soccer players aged 18–25 years
Regularly participating in soccer training and matches
Physically healthy and medically fit athletes
Willing to participate voluntarily in the study

Exclusion Criteria

Any recent injury or musculoskeletal disorder
Presence of chronic medical illness
Participation in another training program during the study
Absence from training or testing sessions

Variables

The independent variable was the type of training intervention:
Small-Sided Games (SSGs)
Traditional Endurance Training (TE)
Dependent variables included:
Yo-Yo IR1 performance
Total distance covered
Fitness scores

Study Size

A total sample size of 30 participants was included using simple random sampling techniques. Participants were equally divided into two groups (n=15 each).

Bias

Random group allocation and standardized testing procedures were used to minimize selection and measurement bias. All testing sessions were conducted under similar environmental conditions.

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Intervention Protocol

Small-Sided Games Group

The SSG group performed modified soccer games involving smaller teams and reduced pitch dimensions for eight weeks, three sessions per week.

Traditional Endurance Group

The TE group completed continuous running and interval endurance drills for the same duration and frequency.

Outcome Measures

Aerobic Capacity

Aerobic capacity was measured using the Yo-Yo Intermittent Recovery Test Level 1 (Yo-Yo IR1).

Match Performance

Match performance was assessed using:
Total distance covered (km)
Fitness performance scores

Statistical Methods

Data analysis was conducted using SPSS version 26. Descriptive statistics were presented as mean ± standard deviation. Paired sample t-tests evaluated within-group changes, while independent sample t-tests compared post-intervention differences between groups. Statistical significance was accepted at $p<0.05$.

Results

Table 1: Pre- and Post-Intervention Comparison of Aerobic Capacity and Match Performance Variables (N=30)

Variables	Pre-Intervention Mean±SD	Post-Intervention Mean±SD	t-value	p-value
Yo-Yo IR1 Score	14.94±0.80	17.15±0.86	-124.57	0.001*
Total Distance Covered (km)	2.99±0.39	4.43±0.57	-42.22	0.001*
Fitness Score	57.97±4.82	76.13±5.63	-74.19	0.001*

$p<0.05$ considered statistically significant

The results showed statistically significant enhancement in aerobic capacity and match performance variables after 8 weeks of intervention. Yo-Yo IR1 scores, total distance covered and fitness performance scores all increased significantly. There were no significant differences between the SSG and TE groups' post-intervention outcomes, suggesting that both interventions were equally effective ($p>0.05$) using an independent sample t-test.

Discussion

The purpose of the present study was to compare the influence of small sided games to conventional endurance training on match performance and aerobic capacity in university level soccer players. Both interventions showed significant effect on aerobic endurance

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and performance related variables. The improvements in Yo-Yo IR1 scores are in line with other studies that found significant aerobic improvements after both SSG and interval training for endurance.[9] Soccer players who are more aerobically fit are able to play at a higher intensity for longer and recover more quickly between bouts of high intensity in the game.[10] These results were similar to those found in previous studies by Impellizzeri et al. (2006) and Dellal et al. (2012) who found comparable improvements in aerobic fitness between SSGs and traditional interval training[11],[12].

However, the SSGs can be used as an effective alternative conditioning strategy, and can also be used to improve technical and tactical skills. One of the key benefits of an SSG is the fact that they are sport specific. The SSGs are not like classical endurance running, because of the continuous decision making, ball involvement and tactical interaction. This type of training environment could help players become more motivated towards playing and training, and could help them enjoy both activities while keeping their physiological intensity high[13]. But SSGs do have drawbacks. Variability in sprint exposure and high speed running in SSG formats was reported in previous research [14].

Thus, coaches can vary SSGs with sprint specific conditioning to get the best overall development of the athlete. This study provides important information for university development of soccer training. Small sided games are often very practical and efficient for university athletes who have limited training time and resources.

Conclusion

In the end of this study, it is concluded that small sided games and endurance training to a certain extent have the same positive effect on the aerobic capacity and match performance in university level soccer players. There were no significant differences between interventions post-training. Small sided games are a great option to endurance training and can also benefit technical and tactical elements of soccer performance.

Recommendations

Based on the results of this study, the following recommendations are made:

Coaches should use small-sided games regularly during soccer training sessions.

Players should perform endurance training to improve overall fitness and stamina.

Future studies should include more participants for better results.

Similar research should also be conducted on female soccer players.

Training programs should continue for longer periods to observe greater improvements.

Conflicts of Interest

The authors declare no conflicts of interest.

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