The impact of mini-match training to develop the aerobic and anaerobic ability and the level of skill performance of futsal youth in Iraq

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Introduction

Sports training is a cornerstone of the athletic preparation process. It utilizes systematic exercises to develop physical fitness, physiological functions, mental abilities, and skill performance, aiming to achieve the highest levels of sports proficiency. In recent years, specialized training methods have emerged to enhance performance across various sports disciplines.

Futsal, a modern and popular game among all age groups, is characterized by its excitement, fast pace, and adaptability. Milanovic (2011) emphasizes that futsal is a dynamic, high-intensity sport that demands exceptional physical, technical, mental, and psychological capabilities. The small playing area, reduced number of players, and specific rules necessitate continuous movement and impose significant physical and mental challenges. (Milanovic, 2011, p. 59)

Mohammed Kishk and Amrallah Al-Basati (2000) noted that mini-pitch training is highly effective in motivating players, increasing engagement, and enhancing performance. It replicates real-game dynamics, thereby improving skill proficiency and stability under match conditions. (Mohammed Kishk & Amrallah Al-Basati, 2000, p. 184)

Ali Muhammad Jalal (2000) highlighted that structured training programs positively affect the cardiovascular, respiratory, and nervous systems. They improve both aerobic and anaerobic capacities and enhance muscular efficiency by optimizing oxygen delivery during exertion. In contrast, random and unstructured training can lead to fatigue and reduced performance. (Ali Muhammad Jalal, 2000, p. 146)

Jalal al-Din (2003) underscored the importance of anaerobic capacity for producing energy during high-intensity activities lasting between 30 seconds and 3 minutes without relying on oxygen, requiring efficient muscular tolerance to lactic acid buildup. (Jalal al-Din, 2003, p. 147)

Abu Al-Ela Abdel Fattah (2003) emphasized that aerobic and anaerobic exercises are essential elements in physical fitness programs, improving cardiovascular and respiratory efficiency while aiding in weight management through appropriately dosed training loads. (Abu Al-Ela Abdel Fattah, 2003, p. 284)

Haroun Keshk (2004) stated that soccer training demands specific physical preparation to enhance functional, technical, and physical attributes. Compared to soccer, futsal requires a higher level of technical skill and imposes unique demands related to game speed, performance techniques, and rule application. (Haroun Keshk, 2004, p. 21)

Research Problem

Optimal futsal performance depends on the integration of physical, psychological, mental, and physiological capacities. Training these elements is vital for improving skill accuracy and achieving success.

Through an analysis of matches from the 2021 Arab Futsal Cup (semi-finals and final) and the 2021 FIFA Futsal World Cup (final), significant differences in skill execution, speed, and decision-making between Arab and international teams were observed. Key skills identified included ball control in tight spaces, dribbling under pressure, and shooting accuracy.

Interviews with futsal coaches revealed a general lack of understanding regarding aerobic and anaerobic training methods. Based on these findings, the researcher proposed designing mini-games that simulate match conditions to enhance the players' performance under continuous pressure.

Research Significance

- Enhance players' performance and decision-making speed.
- Highlight the value of mini-games in developing physical, technical, and psychological capabilities.
- Provide standardized training programs for under-17 futsal players.
- Align training content with futsal-specific performance requirements.

Research Objectives

- Design mini-match drills for under-17 futsal players.
- Evaluate the impact of mini-games on aerobic and anaerobic capacities.
- Assess the influence of mini-games on basic skill performance in futsal.

Research Findings

- Significant improvement in aerobic and anaerobic capacities and basic skill performance in the control group between pre- and post-tests.
- Greater improvements observed in the experimental group compared to the control group.
- Development of aerobic and anaerobic capacities was directly linked to enhanced skill performance.

Research Methodology

The study adopted an experimental design using two groups (experimental and control) with pre- and post-testing to effectively address the research questions.

Research Fields

- **Timeframe**: April 9, 2022 – July 25, 2022 (2021/2022 sports season)
- **Location**: Hashemite Club, Babylon Governorate, Iraq
- **Participants**: Under-17 futsal players registered with the Iraqi Central Football Association.

Research Sample

The study included 32 players, divided equally into experimental and control groups. An additional 10 players participated in a pilot study to validate tests and training protocols.

Data Collection Methods

- **Review of Previous Studies:** Identified relevant skill tests based on works by Saddam Ahmed (2013), Mohammed Kishk & Amrallah Al-Basati (2000), and Mufti Ibrahim Hammad (2001).
- **Skill Identification:** Key futsal skills for the under-17 age group were selected based on literature reviews.
- **Skill Tests:** Tests from Amrallah Al-Basati and Muhammad Kishk (2007), Rashid Dawood Hamad (2009), and Teh Nia Hassan Hussein (2015) were adapted for this study.

Training Program Parameters

- **Duration**: 8 weeks
- **Age Group**: Under-17
- **Location**: Martyr Hamza Nouri Hall
- **Sessions per Week**: 4 sessions
- **Total Training Units**: 32
- **Training Loads**: Maximum, high, and medium
- **Training Unit Structure**: Warm-up, main part, conclusion
- **Mini-Games Implementation**: Started in the third week and continued through the tenth week to regulate training loads.

Aerobic and Anaerobic Ability Tests

- **Anaerobic**: 30-Second Step Test
- **Aerobic**: Harvard Step Test

Exploratory Study

Conducted from April 9 to 11, 2022, to:

- Validate tests and measurement tools.
- Identify possible challenges during implementation.
- Determine time requirements for test application.

Mini-Games Design

Focused on:

- Tailoring to players' physiological responses.
- Developing skill performance alongside aerobic and anaerobic capacities.

Program Objective

To develop aerobic and anaerobic capacities and improve basic skill performance among under-17 futsal players in Iraq.

Implementation Steps

- **Pre-tests**: Conducted on May 20–21, 2022.
- **Program Application**: Conducted over 8 weeks, 4 sessions per week.
- **Post-tests**: Conducted on August 23–24, 2022.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics 25 through:

Table (1)

Mean, Standard Deviation, and Calculated t-value between the pre- and post-test measurements for the experimental and control groups in aerobic and anaerobic capacity for futsal youth (N = 32)

No.	Variables	Experimental Group	Control Group	Difference between Means	Calculated t-value
		Mean (±SD)	Mean (±SD)	Mean (±SD)	
1	Step Test for (30) seconds	42.58 (±2.84)	40.23 (±2.67)	2.35 (±0.17)	3.36*
2	Harvard Step Test	88.46 (±8.23)	73.60 (±3.59)	14.86 (±4.64)	9.21*

*Significant t-value at the 0.05 level = 2.04

It is evident from Table (١) that there are statistically significant differences in the calculated t-values between the pre- and post-test measurements for the experimental and control groups in both aerobic and anaerobic capacity, favoring the experimental group in the post-test for futsal youth.

Conclusions

- Mini-games significantly improved aerobic and anaerobic capacities and basic futsal skills.
- Effect sizes for skill performance:
    - Wall passing: 2.24
    - Ball control: 1.88
    - Contact kick accuracy: 1.49
- Effect sizes for physical capacities:
    - 30-Second Step Test: 1.66
    - Harvard Step Test: 1.53

Recommendations

- Integrate mini-games into training programs for futsal players under 17.
- Use mini-games to develop physical, skill, and physiological attributes.
- Conduct further research on the psychological and social impacts of mini-games.

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