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The Impact of Transition Training on Developing Collective Tactical Synchronization Among Under-21 Football Players

أثر تدريبات التحول في تنمية التزامن الخططي الجماعي لدى لاعبي كرة القدم تحت 21 سنة

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Abstract:

This study aimed to investigate the effect of transition training on the development of collective tactical synchronization among Under-21 football players. The researcher adopted an experimental approach due to its suitability for the nature of the study. A training program based on offensive and defensive transition drills was implemented. The study sample consisted of Under-21 football players, and specific tests and indicators were used to assess the level of collective tactical synchronization before and after the implementation of the training program. The results revealed statistically significant differences between the pre- and post-tests in favor of the post-test, indicating the effectiveness of transition training in enhancing tactical coordination and cooperation among players during various match situations. The study concluded that transition training is an effective training method for developing collective tactical synchronization and improving team performance among young football players.

Keywords: Transition Training ; Collective Tactical Synchronization; Football; Tactical Performance; Under-21 Players.

1-Introduction and Importance of the Research

To elevate the level of the game, it is necessary to comprehensively prepare players at a high level across all physical, skill, psychological, and tactical aspects. This is particularly true for the physical aspect, which represents a fundamental cornerstone for developing various endurance components and raising player standards to meet the demands of modern football. Football is a competitive team sport where all aspects must be trained to achieve a performance level similar to actual match conditions in terms of speed and accuracy, in the presence of an opponent and a ball, whether the performance is individual or collective. This provides the element of specificity, along with excitement, suspense, and enjoyment during training.

There are many methods that have proven effective in achieving the required goals, although over time and with the advancement of science, knowledge, and training philosophy, they have become traditional methods. Nonetheless, they achieved acceptable development in reaching the goals for which they were originally designed. In this context, it is imperative to implement diverse, multi-faceted, and standardized training built on scientific foundations that align with modern gameplay concepts. These concepts are characterized by diversity in covering the multiple dimensions of football principles. Research must be put into practice to determine its effectiveness and discover new approaches that serve the physical and skill components of the training process.

Training science and its tactical components are deeply intertwined ; no type of training can be presented unless it is linked to the tactical side of the player and the specificity of the game. Specific training reveals the importance of advancing the player's tactical level. Furthermore, sports training leads to various physiological changes across body systems. As performance advances, these positive changes enable the body to handle and endure physical loads efficiently.

Collective tactical synchronization is one of the most critical factors determining the success of football teams, especially for youth categories in their tactical development phase. Transition Training is a method that focuses on improving the transition from defense to attack and vice versa with speed and accuracy, thereby enhancing coordination among players and improving the team's response to different match situations. Recent studies show that transition training improves not only individual performance but also enhances collective tactical synchronization and quick decision-making during matches.

Here lies the importance of the research: to elevate under-21 football players by utilizing proper tactical exercises that develop the body in a way suited to the specificity of football, offering a competitive, exciting, and enthusiastic training environment.

1-1- Research Problem

Despite the growing recognition of transitional phases in football performance analysis, there remains a significant gap in empirical sports science research examining the effectiveness of structured transition training programs in enhancing collective tactical synchronization among under-21 football players. Observations of youth league competitions in the Holy Karbala Governorate revealed recurring deficiencies in spatiotemporal synchronization during transition phases. Teams frequently exhibited tactical disorganization following ball possession changes, resulting in the loss of defensive compactness and missed opportunities to execute effective counterattacks. These shortcomings appear to stem largely from the continued reliance on conventional training methods that emphasize isolated technical skill development while neglecting the dynamic tactical demands of match situations. Consequently, the present study addresses the following research question: To what extent do structured transition training programs and their specialized training drills contribute to improving offensive and defensive collective tactical synchronization among under-21 football players?

1-2- Research Objectives

- Developing transition drills to improve the tactical synchronization of under-21 football players.
- Identifying the impact of transition drills on developing the tactical synchronization of under-21 football players.

1-3- Research Hypotheses

- There is a statistically significant positive improvement between the pre- and post-tests in collective tactical synchronization (offensive and defensive) for the experimental group.
- There is a significant statistical difference between the experimental and control groups in the post-tests, favoring the experimental group.

1-4- Research Fields

1-4-1 Human Field: Under-21 football players from clubs in the Holy Karbala Governorate.

1-4-2 Temporal Field: From (1/2/2026) to (10/6/2026).

1-4-3 Spatial Field: Karbala Secondary International Stadium.

1-5- Definition of Terms

1-5-1 Transition Training: Training focused on the rapid shift from a defensive posture to an offensive posture upon winning the ball, as well as shifting

from an offensive posture to a defensive posture upon losing the ball and tracking back.

1-5-2 Collective Tactical Synchronization: The coordinated and simultaneous movement of team players to achieve a specific tactical goal, whether in attack or defense.

2-Research Methodology

The study adopted a pre-test–post-test experimental design with two equivalent parallel groups: an Experimental Group and a Control Group. This design is widely recognized as one of the most rigorous experimental approaches for minimizing threats to internal validity and establishing causal relationships by isolating the effects of the independent variable (Transition Training Program) on the dependent variables, namely offensive and defensive collective tactical synchronization.

Table1:The Research Design Adopted

Group	Test per	Experimental Variable	Test post
experimental	Tactical Synchronization	Transition Training	Tactical Synchronization
control		Training caoch	

2-1- Research Population and Sample

The research population was defined as under-21 football players from 12 clubs in the Holy Karbala Governorate, totaling 304 players. The clubs are: (Imam Al-Muttaqin, Al-Ghadiriya, Al-Hindiya, Al-Taf, Karbala, Shabab Al-Hussein, Al-Usra, Al-Husseiniya, Al-Hur, Al-Ibdaa, Ain Al-Tamr, and Al-Jamahir).

The main research sample was selected using simple random sampling (lottery) and comprised players from **Al-Jamahir Sports Club (26 players)**. The sample was randomly divided into two groups of 10 players each (10 for the control group and 10 for the experimental group). One player from each group was excluded due to injury and rehabilitation. Two goalkeepers were also excluded because their training differs fundamentally. Additionally, 6 players from Al-Usra Club were selected for the pilot study.

Scientific Justification for Sample Size:

A purposive sample of 20 players (10 per group) was selected to ensure methodological rigor and facilitate the accurate assessment of collective tactical synchronization. This outcome measure required intensive frame-by-frame videogrammetric analysis and precise spatial coordinate tracking using LongoMatch software. Increasing the sample size would have markedly increased the analytical workload, thereby reducing tracking precision and limiting the

researchers' ability to maintain strict experimental standardization and environmental control throughout the eight-week intervention. Consequently, the selected sample size represented an appropriate balance between analytical precision and experimental feasibility.

Table (2): Research Population and Samples Distribution

N	Chub	Nº	Exploratoy sample	Search sample
1	amamahmotken	27	-	
2	Algadrya	25	6players	From a chub algadrya
3	Alhandia	27	-	
4	Altaf	28	-	
5	Alhur	25	-	
6	Karbala	26	-	
7	Aljamahir	26	20	The main specimen
8	Alhusynia	22	-	
9	Alabdaa	25	-	
10	Ain altmr	21	-	
11	Ahabab alhussain	28	-	
12	Alusra	24	-	
13	Sum	304		

2-2- Data Collection Tools, Devices, and Equipment

- Observation.
- Scientific sources and references.
- Testing and measurement.
- Kinovea analysis software (2019 version).
- Lenovo Laptop.
- 4 Laser CDs.
- Sony video camera with accessories (Japanese made).
- 3 Manual stopwatches.
- 2 Camera tripods.
- 1 Electronic pocket calculator.
- Colored adhesive tapes.
- 2 Whistles.
- 15 Footballs.
- Legal football pitch.
- Hurdles of various heights.
- Plastic cones and markers of various sizes and heights.

- 4 Small goals.

2-3- Field Research Procedures

2-3-1- Identification of Collective Tactical Synchronization Tests

Based on reviewing scientific literature in football coaching, the synchronization test was identified as a tactical index (Gonçalves et al., 2018) to analyze collective performance.

2-3-2 Description of the Collective Tactical Synchronization Test (Gonçalves et al., 2018)

Definition: A tactical metric used to evaluate the harmony of players' movements and their synchronization during game scenarios and transitions. It measures temporal and spatial compatibility while moving together as a team.

Test Objective: To determine the coordination level of transitions from defense to attack and vice versa.

Test Tools: Small GPS tracking devices or Video recording, along with Longomatch tactical analysis software.

Test Method: Recording the match or training using multi-angle cameras, utilizing player coordinates, and determining tactical states (offensive, defensive, rapid transition) on a prepared pitch.

Scoring: The researcher scores each tactical situation based on synchronization with the plan (1 or 0). A synchronized player receives a score of 1, and an unsynchronized player receives 0. Scores are given for individual player synchronization and the team as a whole across 10 collective tactical scenarios over actual playing time.

2-3-3 Pilot Study

The pilot study was conducted on Wednesday (1/4/2026) with 6 players to ensure the validity of the procedures, check equipment efficiency, familiarize the team with field steps, and identify any potential obstacles.

2-3-4 Pre-Test / Measurement

The pre-tests for collective tactical synchronization were carried out on Friday (3/4/2026) to record baseline scores before introducing the experimental program.

2-3-5 Main Experiment (The Training Program)

The researcher designed the transition drills and applied them to the experimental group. The program featured:

- Implementation during the specific preparation phase within the main part of the training session.
- Integration of physical fitness training with tactical drills in certain sessions.

- The program started on Sunday (5/4/2026) and lasted for 8 weeks.
- It included 3 sessions per week (Monday, Wednesday, Friday), totaling 24 training sessions.
- Training intensity ranged between 75% and 90%, utilizing high-intensity and moderate-intensity interval training methods.
- The program concluded on Friday (5/6/2026).

2-3-6 Post-Test / Measurement

On Monday (8/6/2026), post-tests were conducted under identical conditions to the pre-tests to measure development.

2-4 Statistical Methods

Statistical analysis was conducted using SPSS (v26.0). The following statistical tests were applied with the significance level set at $\alpha=0.05$:

- Descriptive statistics: Arithmetic Mean ($\bar{X}$) and Standard Deviation (SD).
- Inferential statistics: Paired-samples t-test for within-group pre/post comparisons , and Independent-samples t-test for between-group comparisons.

3- Presentation and Analysis of Pre- and Post-Tests

3-1- Results of the Control Group

The table below displays the statistical results for the control group in both offensive and defensive tactical synchronization.

Table (3): Significance of Differences Between Pre- and Post-Tests for the Control Group

Variables	Test	Mean	Stdv	Diffrence	Stdv.diff	T	Sig	Type of sig
Offenfive Tactical Synchronization	pre	5.2	0,788	-0.70	0,341	-2,040	0.055	NS
	post	5.9	0,737					
Defenfive Tactical Synchronization	pre	5.5	0,849	-0.80	0.343	-2,331	0.032	P-Value
	post	6,3	0,674					

Tabulated T-value at (0.05) significance level and (9) degrees of freedom.

Discussion:

Table (3) shows a significant improvement in defensive synchronization for the post-test. This is attributed to traditional training sessions that still provide essential physical, skill, and tactical developments. However, offensive tactical synchronization showed no significant development. The researcher attributes this to the coach's traditional training methods, which do not adapt well to modern fast gameplay and pressing tactics. (Walker, G., & Hawkins, R. (2021).

3-2- Results of the Experimental Group

The table below illustrates the pre- and post-test results for the experimental group.

Table (4): Significance of Differences Between Pre- and Post-Tests for the Experimental Group

Variables	Test	Mean	Stdv	Diffrence	Stdv.diff	T	Sig	Type of sig
Offenfive Tactical Synchronization	pre	5.5	0,268	0.309	-2,20	-7.11	0.000	P-value
	post	7.7	0.152					
Defenfive Tactical Synchronization	pre	5.5	0,268	-1,500	0.428	-3,50	0.003	P-value
	post	7	0,333					

Tabulated T-value at (0.05) significance level and (9) degrees of freedom.

Discussion:

Table (4) indicates highly significant developments in both offensive and defensive synchronization in favor of the post-test. This proves that the scientifically designed transition drills simulate modern match demands, which require fast passing, rapid shifting, and highly synchronized neuromuscular coordination.(Majid, Raysan Khraibet (1997).

3-3- Comparison Between Post-Tests of Both Groups

This section evaluates the differences between the experimental group and the control group in the post-tests.

Table (5): Comparison of Post-Test Results Between Experimental and Control Groups

Variables	Unit	Group	Post-test		T	Sig	Type of Sig
			Mean	SD			
Offensive Tactical Synchronization	Score	experimental	7.7	0.152	-17,11	0,000	Significant
	Score	control	5.9	0.737			
Defensive Tactical Synchronization	Score	experimental	7	0.333	24.828	0.000	Significant
	Score	control	6.3	0.674			

Tabulated T-value at (0.05) significance level and (9) degrees of freedom.

Table (5) shows clear significant differences favoring the experimental group in both metrics. Transition training enhanced the quality of offensive and defensive shifts, altering player behavior during moments of losing or gaining possession. Repeated tactical transition training optimizes the central nervous system, creating accurate, rapid, and controlled tactical execution. (Ahmad, Bastawisi (1999).

Discussion

The findings of the present study revealed statistically significant differences between the pre-test and post-test measurements of the experimental group, in addition to its superiority over the control group in both offensive and defensive tactical synchronization. These results confirm the effectiveness of transition training in enhancing collective tactical performance among under-21 football players.

The researcher attributes these findings to the nature of the transition training program, which was specifically designed to simulate the actual demands of modern football. The training drills replicated competitive match situations that required rapid transitions between attacking and defensive phases while maintaining team organization and facilitating quick decision-making. According to van den Tillaar, training programs based on game-realistic situations effectively improve players' physical, technical, and tactical performance because they integrate physical, cognitive, and technical components within a single training context, thereby enhancing overall match performance.

Furthermore, the observed improvement can be explained by the progressive overload, systematic variation of training content, and repeated exposure to tactical game situations incorporated into the training program. These factors contributed to strengthening tactical understanding, improving coordination among players, and accelerating responses to constantly changing match situations. This interpretation is consistent with the principles proposed by Bompa and Buzzichelli (2019), who emphasized that contemporary training should closely replicate competitive demands by integrating physical, technical, and tactical elements into interconnected training sessions to maximize athletic adaptation.

The results can also be interpreted from the perspective of motor learning theory. Repeated practice of tactical situations under match-like conditions reinforces motor programs, enhances decision-making speed, and improves collective tactical execution. This interpretation is supported by Schmidt and Lee (2019), who argued that motor learning becomes more effective when practice occurs in environments that closely resemble actual performance conditions, thereby facilitating the transfer of learning to real competition.

The present findings are also consistent with studies published in the *Aures Journal of Sports Sciences*. Fadel et al. (2026) demonstrated that game-based training designed to replicate realistic match situations significantly improved the technical and tactical performance of young football players. Likewise, Hussein et

al. (2026) reported that improvements in biomechanical variables positively influenced movement quality and technical accuracy. Similarly, Naji (2026) concluded that scientifically designed training programs enhance physical and physiological efficiency, which is reflected in improved technical execution and tactical performance during competition.

The researcher believes that the superiority of the experimental group can be attributed to the dynamic nature of the transition training, which simultaneously developed rapid transitions between attack and defense, tactical awareness, communication, and cooperation among teammates. These components represent fundamental requirements of modern football. This interpretation agrees with the findings of Helsen and colleagues, who emphasized that successful collective performance depends primarily on synchronized movement, coordinated team actions, and shared decision-making rather than solely on individual technical ability.

Overall, the findings demonstrate that transition training represents an effective training approach for developing both offensive and defensive tactical synchronization among under-21 football players. The program significantly improved collective tactical performance, enhanced the efficiency of transitions between attacking and defensive phases, and strengthened tactical cohesion among teammates. Therefore, incorporating transition training systematically into football training programs is recommended, as it effectively prepares players to meet the tactical demands of modern football and contributes to achieving higher levels of competitive performance.

Overall, the findings confirm that transition training represents an effective methodological approach for developing collective tactical synchronization among under-21 football players. Incorporating transition-based exercises into regular football training programs can substantially improve offensive and defensive organization, facilitate faster tactical adaptation during match play, and ultimately contribute to higher levels of team performance.

4-Conclusions

− Transition training exercises built into the training units have a highly positive impact on under-21 football players.

− The prepared transition exercises effectively developed both offensive and defensive collective tactical synchronization within the experimental group.

5- Recommendations

− Incorporate transition drills into regular football training programs due to their direct positive effect on offensive and defensive tactical synchronization.

− Utilize transition training methods across other organized team sports that demand maximum training intensities.

− Apply and study the principles of transition training in other sports specializations.

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