

ISSN: 2392-5442 ESSN : 2602-540X		Sport system journal
V/12. N/01 Year/2025		International scientific journal published by: Ziane Achour –Djelfa- Algeria
P 06 - 24		Received: 2024-12-30 Accepted: 2025-02-01

Comparative Study of Speed Replicability (RSA) and Fatigue Index in Footballers by Positions of Play under Modern Tactical Orientation(Playing with a block)

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Abstract:

The aim of this study is to compare the repeatability of speeds and the fatigue index among football players according to their positions, in order to identify any statistically significant differences among them based on the requirements of modern football under the contemporary tactical approach (playing as a block). The authors of this study adopted a comparative descriptive methodology. The sample of the study consisted of U-21 players from the Union of Biskra team, which competes in the first national division, comprising 18 players, with 6 players representing each position (defense, midfield, attack). Data were collected through the Bangsbo test, and after the statistical processing of the study variables, the result showed no statistically significant differences in the repeatability of speeds and the fatigue index among football players according to their playing positions. In light of this, the researchers conducted a physical-tactical comparison based on the team's playing style (playing with a medium block) and built on the speed of transition for all players simultaneously. The authors concluded that there is a need to reconsider the physical indicators related to playing positions according to the tactical requirements and current updates in this field for proper planning of the training process.

Keywords: repeatability of speeds, fatigue index, football, playing positions, playing as a block

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Introduction and problem of the study:

The development of the technology used in the field of sports, whether related to training or sports competitions in general. In particular, football has enabled us at present to see clearly and comprehensively the content of performance during competitions by providing quantitative data and how it helps to evaluate and evaluate players functionally within a team, whether collectively or individually through collective performance or according to playing positions.

The task of the physical preparation of the footballer is basically to upgrade his basic physical and functional capabilities associated with this type of activity according to the contents and nature of the competition, and according to the size and nature of the movements during the different match times which translate into roles played by the players inside the stadium which are divided into two main roles. (Defensive activation attack where (dellal and al 2020,p3) is translated through a study conducted at the high level, which demonstrates the agreement of high-level coaches in our current time on the need to know the content of the motor performance of footballers in a functionally commensurate with their roles during play. This is different from their playing positions in order to properly plan the building of the training process and according to the correct methodology.

By addressing this topic and from the theoretical background of the present study that the repeatability of speeds (RSA) and the fatigue index, which are associated with each other as physical properties that affect each other, and which are an integral part of the physical evaluation of players' performance during games, play a vital role in improving their performance over the course of their respective crises. The implementation of defensive and offensive duties of footballers through speeds implemented over short distances is considered in the context of (possession or loss of the ball) is essential and must be taken into account to ensure effective performance during all match times for the team's players as a whole.

The replicability of speeds (RSA) and the fatigue index are an integral part of the physical assessment of players' performance during games, and they play a vital

role in improving their performance throughout the match. Short-haul staging in the context of possession of the ball or elimination of the opposition, or even in quickly returning to defence after the loss of the ball, is essential. It also contributes to the development of the team's physical performance and enhances the ability to carry out rapid and harmonious attacks at various match times.

From the foregoing and in the light of the updates in football, especially with regard to the tactical aspect And with the emergence of new philosophies that mimic the ideas and methods of coaches and place the tasks of players' roles individually and collectively through the content of these methods and by informing the scholars of the field reality from the analysis of the data of the new updates and through the reports of the technical committees of the local, continental and international football federations, there is a new trend towards the performance group, which in turn imposes the collective movement and sharing of roles among the players, which is the new term for the "Playing a block", where some roles related to positions of play are fused into common collective roles within a conceptual framework known as "Decentralization in the position of play", through which statistical data converge due to the idea of these methods and due to the duties assigned to players under collective movement (playing with mass) horizontally and vertically on the field.

He explains (**M.M: Jasim Saad Jasim 2014**) that all the distances or repetitions of football players traveling for fast running during official competitions will contribute to the determination of modern physical requirements in football for players, each according to his playing position such as (Strength, Speed, Endurance), it is felt that it is necessary to analyze the physical performance of players during competition in order to obtain quantitative data, especially in relation to the number of repeats of fast runs and the total distances travelled for each position during competitions, in order to reduce the burden on coaches and shorten the effort and time when building the training process.

Through the above came the problem of our study which started from the idea that each position has a particular play (Defense, center, attack) Specific physical requirements, while with the emergence of modern tactics such as playing with the block of our study which is based on overlapping roles and the collective movement of footballers in different positions of play as part of shifts from



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defense to attack and vice versa (TRANSITION ATT-DEF/DEF-ATT) This makes it imperative for everyone to start at different speeds and distances during the entire match times depending on the state of play and the accompanying effects on functional devices translated by the fatigue index through which players' physical condition can be measured in different positions of play The problem with the replicability of speeds and the fatigue index by positions of play came in this modern direction, which represents the **study's questions:**

- There are statistically significant differences in the repeatability of speeds (RSA) among footballers according to their positions of play (defence, centre, attack) under the modern tactical orientation of playing with a block?
- Are there statistically significant differences in footballers' fatigue index by positions of play (defence, centre, attack) under the modern tactical orientation of playing blocks. ?

Study hypotheses:

- There are no statistically significant differences in the frequency of speeds (RSA) in footballers according to their playing positions (defense, center, attack) under the modern tactical orientation of playing with a block.
- There are no statistically significant differences in footballers' fatigue index by positions of play (defence, centre, attack) under the modern tactical orientation of playing with a block.

Objectives of the study:

- Reveal the importance of repeatability of speeds and fatigue index for footballers.
- - Determine the relationship between repeatability of speeds and fatigue indicator for footballers according to their playing positions.



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- Reveal the relationship between repeatability of speeds and fatigue indicator of modern tactical orientation playing with mass.
- Contribute to the selection of tests that will contribute to the assessment of footballers' physical condition.
- Contribute to proper planning of training process building by instructing trainers.
- Contribute to the correct and sound selection process.

Importance of the study:

In practice, the importance of our study is as follows:

- Indicate the importance of repeatability of speeds and fatigue indicator on the performance of footballers according to their playing positions.
- The study is important for the planners of loads and physical metals to take into account in preparing their training programmes as well as guiding them towards planning based on the style and contents of play.
- Knowledge addition so that the study is an important scientific study for the field of training.

Definition of study terms:

5-1 Speed replicability : Jafar Nawal and Salami Syed Ali 2021 are defined as $\times$ -speed force earner. The mechanical aspect of this is a mobilization of force in order to exert sufficient energy for repeated rapid performance with similar performance for as long as possible in the absence of fatigue

5-2 Fatigue Index: is a tool that enables us to know the rate at which an athlete's energy levels decline, as it indicates the level of athlete fatigue when running (sivanesan.2019.p19)

5-3 Football: Two teams compete with 11 players for each team. The winner is the team that scores the most goals in the opposition team's corridor after the end of



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the official or additional time or penalties.

5-4 playing with a block: "team block" is a tactical system that aims to coordinate movements in the offensive phase (attack block "wide, spread") and in the defensive phase (integrated defensive block) where players will take into account where the ball is located and the position of teammates and the same for the opponent on the field. Players will have to answer the question "What do we do as a team? and what should we do individually? " For mass retrieval and transformation operations: low mass - medium mass - high mass.

5-5 of playing positions: It can be defined as the position of the player through which it contributes to the integration of his team's construction through which a set of defensive and offensive roles are assigned to him in a sketch of all these roles (**Moufti Ibrahim Hammad, 2001, p. 235**)

6. Studies associated with research:

There are many previous studies that have already touched on the subject of our study or parts of it, including:

6-1 study (ALTAVILLA. G 2017) entitled "The physical effort required of professional footballers in various playing positions" The aim was to analyze the physical performance content required of high-level footballers, given the different playing positions. The researcher relied on the analytical descriptive curriculum in his study, and selected a sample of players from the Italian Championship who were tracked through the preparatory friendly interviews over a year by GPS and were divided into groups according to the different play centers. and the study concluded that there were statistically significant differences between the results obtained before and after the end of the sports season for all the indicators examined (Total

travelled distances - average fast travelled distances and accelerations over speed zones) The results after statistical processing showed that the biggest distances traveled were in favor of the side's players and midfielders, while the side's players and midfielders achieved a preference in accelerations and the number of repeats, and for the central attackers and defenders, they traveled the distances more aggressively.

6-2 Ibrahim can study. 2018 .With the title "Comparison of repeated rapid enemy capability of amateur footballers according to age and playing attitudes" Which aimed to compare the repeatability of speeds in footballers is amateur considering the ages and the playing position. The student used the frequent sprint test in which the running distance is estimated at 34.2m taking into account the intersection period between repeat and late lasting for 25 seconds. During this study, the players were divided into 6 positions. (goalkeepers 16 players), (pivotal defenders 30 players), (two backs 34 players), (pivotal quarterbacks 36 players), (quarterbacks on both sides 30 players), (attackers 28 players).

The results of the study showed that there were statistically significant differences in the frequency of speeds by position and by age, while the study concluded that the fatigue index showed statistically significant differences by position, but that there were no statistically significant differences by age.

6-3 Khouildi Al-Hawari study 2018 entitled "Comparing the anaerobic and anaerobic capabilities of footballers according to different lines of play" The study aimed to compare the aerobic and anaerobic capabilities of footballers according to the playing positions of the U19 category of the Second Amateur Division of Algeria. The researcher drew on the descriptive curriculum using the comparison. The sample research included 21 players divided by different playing positions (7



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defenders, 7 quarterbacks, 7 in attack). 3 physical tests (test sergeant) vertical jump test have been approved

- Step-in-minute test of acidic anaerobic capacity (step test)
- Navate test (t. navette) to measure aerobic capacity. After the statistical study, the study concluded that there were no statistically significant differences in the results of aerobic and anaerobic capabilities among the players according to the three positions and this was due to the collective training of the players (quantum-qualitative) by the coach.

6-4 **Baumdien kada** study 2018 leaders entitled "Comparative study of some physiological abilities by lines of play (Defense, central attack) during the competition stage of football where the aim of this study was to look for the difference between the physiological indicators of footballers by their playing positions, The study was made up of 15 players from the JS team and was deliberately selected. The researchers relied on a range of field physical tests:

- Prixi test to measure maximum oxygen consumption
- Vertical jump test (SARGENT) to measure explosive force of lower limbs and 30m transition speed test.

After statistical processing, the researchers concluded that there were statistically significant differences in some of the physiological abilities of football subjects depending on their playing positions (aerobic capability-retrieval-pulse after effort).

6-5 **Jouber Khaled and others** 2020 entitled "Comparative Study in Some Physical Characteristics of Footballers by Their Playing Positions" The researchers selected a sample of 30 players who were divided into three groups by positions. The researchers selected a set of tests:

- Test bend the stem forward of stand

- 50m enemy test

-The running test is 1500m

-The winding running test and the broad jump test of stability.

The researchers concluded a set of findings, the most important of which was that the results of the study showed that the assessment of the physical characteristics of the players fell under the heading "average estimate", nor were there statistically significant differences in the following physical indicators (Endurance-Speed-Flexibility-Agility) At the same time statistical processing showed statistically significant differences in strength depending on their positions of play and for the benefit of the defending players.

6-6 Study **Jose Luis Arjol and al** 2021 "The impact of the formation of play on physical requirements and tactical and technical procedures according to the playing positions in elite football teams" The study aims to test differences in the physical requirements and the content of the tactical and technical performance of footballers from different gameplay methods (4-2-3-1) and (4-4-2) for each gameplay position, in which the study holders relied on the descriptive curriculum and the research sample was the 23 of a professional player who played 31 an official interview classified according to their gameplay positions. (Centre-Back-Show-Defensive Quarterbacks-Offensive Quarterbacks-Attackers) The indicators of the study on field examination were: -The traveled distances-distances covered by different speed thresholds-the number of accelerations and the number of slowdowns in addition to the inclusion of some technical and tactical indicators and after statistical processing the results showed that the formation of (4-2-3-1) demanded a slowdown compared to the formation (4-4-2) of all players, while forwards and quarterbacks scored higher physical requirements in (4-2-3-1) Compared to the formation of (4-4-2), as for technical and tactical tests, there were statistically significant differences between the players' positions in both ways and the study holders concluded that the quality of training programmes should be taken into account in accordance with the predominant gameplay of the team based on their effects on the position of play from all aspects of performance (Physical-technical-tactical) which is the mainstay of the footballer in official competitions.



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6-7 **cetin and al 2022** study entitled "Repeated ability to sprint young footballers in the same category according to playing positions"

This study aimed to test the frequency of speeds (RSA) in young footballers of the same dental category according to the level of competition and depending on the playing positions (U16) assembled from 4 different clubs competing in two different levels.

The players conducted the Bangsbo sprint test, which Wragg adapted ($34.2 * 7$) with breaks between repeat and late estimated at 25 THS. This is in order to reveal the nature of running at repeated speeds through indications prepared before the test included:

(Best Time for Running - Average Speed Time - Fatigue Index) Researchers have concluded: The best running time and average speed time varied according to the level of competition through the statistically significant differences in the index of fatigue by competition. The study also concluded that the players in the highest competition had the highest frequency of speeds compared to the other.

The overall result of the study was that the three indicators studied differ in terms of the level of competition, while the fatigue index does not vary according to the level of competition.

6-8 Study **Ryland Morgans.Rocco Di Michelle 2024** "Physical Performance of Elite Football Matches for the English League Division I Championship (ECL) and the English Premier League (EPL) "This study was aimed at testing physical performance during competitions and the impact of the level of competitors and playing positions where the scholars used a five-year longitudinal study involving 54 professional football players (from 2018 to the end of the 2023 season) through which data was obtained through trackers (GPS) of 213 official interviews, the results of the study have shown that:

- For the level of competitors in total distance it is high intensity in favour of (EPL) compared to (ECL)



- The study holders found that the level of competition affected the frequency of speeds and acceleration where (Epl) is greater than (Ecl)
- For players' positions, there were statistically significant differences in distances and frequency of speeds for both levels.

Based on this, the researchers concluded that the coaches and physical lecturers should be taken into account during their supervision of the training process to physical indicators that are appropriate to the tactical curriculum pursued based on the play positions according to certain requirements imposed by the analysis processes and the level of competitions.

7. Method and tools:

7-1Curriculum: We relied on the comparative descriptive approach (comparative descriptive) as appropriate to the nature of the topic in order to look for differences in the replicability of speeds and the fatigue index of footballers by their playing positions (defensive-middle-attack)

7-2 Study community: Our study community included the Biskra Federation Club Team (RDF for less than 21 years) for football and activist of the first national division of the sports season 2023/2024

7-3 Sample study: Our sample study included 18 players, who were deliberately selected from being the most involved in the competition and divided as playing positions into three groups (6 defenders, 6 midfielders, 6 forwards)

7-4 areas of study:

- Human field: The research sample consists of 18 players representing three different playing positions

-Spatial area: We conducted the physical test at the "Martyr Manani" stadium in downtown Biskara, which is the same field where the team plays

-Timeframe: the period during which the study was conducted and the tests were carried out from 07/01/2024 to 10/03/2024



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7-5 data collection tools:

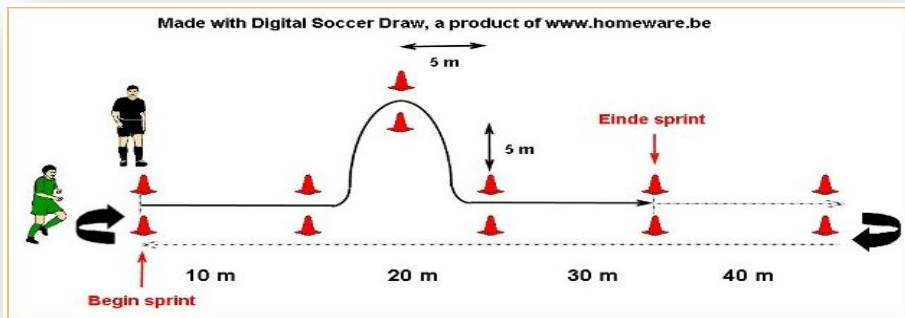
In our study, we relied on physical testing (T.Bangsbo) as well as research aids:

- Various references and previous studies.
- Task Force (Researchers - Team Trainers & Assistants)
- Data registration forms
- Cones + Livestock + Tape Measurement

Physical Test: Test (T.Bangsbo)

The objective of the test is: to measure the frequency of speeds

Figure 1: Chart showing T.Bangsbo test



Source (www.homeware.be/bangsbo.php)

Figure 2 shows field procedures for study testing



Source (Researchers)

8- Scientific bases of testing: Through a review of previous studies, researchers took an idea of the quality of the test used in the study and took an overview of the sample selected and of the type as the majority of previous studies went to, in order to ascertain the consistency and sincerity of the test used, the survey was conducted on 6 players from the research community where they were excluded from participating in the comparative study later. The first test was carried out by researchers on 09/01/2024 and the test was re-administered on Tuesday, 16/01/2024. Through this, we obtained the results of the examinations in respect of honesty and stability factors, as shown in the following table:

Table 1 represents the veracity and stability of the test

<i>Test</i>	<i>Sample Size</i>	<i>Indicative level</i>	<i>Constant Factor</i>	<i>Honesty coefficient</i>
<i>T.Bangsbo Test</i>	<i>6 players</i>	<i>0.05</i>	<i>0.89</i>	<i>0.94</i>

9- Statistical means:

9-1 Kolmogorov-Smirnov test:

In order to find statistically appropriate means to analyse the data of the study sample and to examine the validity of the hypotheses, we had initially to know the nature of the distribution of the study sample data. test, which is required in case of hypothesis testing, where there are teachers' and non-laboratory statistical tools And since the sample size in this study is less than 50 individuals, The Shapiro-Wilk test should have been used to determine how moderate the distribution of study variables (**Andrew Mayers 2013.P406**) was.

From this point of view, in order to know the nature of the distribution, we needed to develop two hypotheses, namely, that of nowhere and alternative hypothesis, since the nowhere's hypothesis is subject to testing, i.e. it may be incorrect, which requires the development of the alternative hypothesis:

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H0: Study variables track natural distribution.

H1: Study variables do not track normal distribution.

The following table shows the results of the normal distribution test of the study variables:

Table 2: Test (Shapiro-Wilk test) for natural distribution

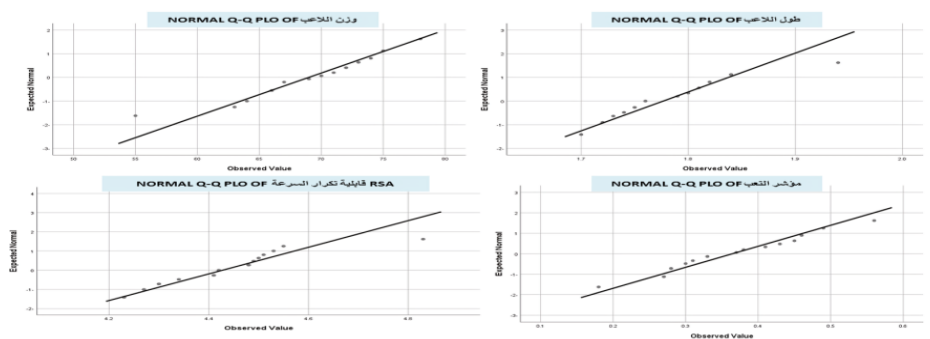
Measurement axes	Statistical Value	Indicative level
First axis: Player length	0.919	0.122
Second Axis: Player Weight	0.952	0.450
Axis III: Fatigue Indicator	0.970	0.801
Axis IV: Speed Replicability (RSA)	0.906	0.072
Axis V: Play Center	0.801	0.002

Source: Prepared by researchers (based on SPSS programme outputs)

From the table above, we note that the indicative level of the study axes is greater than the morale level ($\alpha \geq 0.05$), except for the fifth axis, and therefore we accept the zero hypothesis H0 which states: "Study variables follow natural distribution." From which we use the mono variation test. **ANOVA ONE WAY**

2. Detection of moderation:

Figure 3: Represents detection of moderation by Q-Q Plot



Source: Prepared by researchers based on SPSS outputs

From previous forms we note that most points are close to the line with little scattering which means that distribution is moderate

Table 3: Computational averages for repeatability of speeds and fatigue index by playing position

<i>Play Centers</i>	<i>Arithmetic Average RSA</i>	<i>Average computational fatigue index</i>
<i>Defenseemen</i>	4.38	0.38
<i>Quarterbacks</i>	4.48	0.35
<i>Attacking Players</i>	4.42	0.35

Source (Researchers)

- ANOVA oneway test:

Test hypotheses:

H0: There are no statistically significant differences for RSA replicability and fatigue index in footballers through play positions (in case of sig greater than 0.05).

H1: There are statistically significant differences for RSA replicability and fatigue index in footballers through play positions (in case of sig below 0.05).

Table 4: ANOVA oneway test

<i>Measurement axes</i>	<i>F value</i>	<i>Indicative level</i>
<i>First axis: Player length</i>	1.071	0.367
<i>Second Axis: Player Weight</i>	0.015	0.986
<i>Axis III: Fatigue Index</i>	0.181	0.836
<i>Fourth axis: RSA speed replicability</i>	0.614	0.554

Source: Prepared by researchers based on SPSS outputs

Through Table 3 and 4 we note first that there are slight differences in the arithmetic averages relative to the repeatability of speeds in favour of quarterbacks and significantly lower at the fatigue index as these arithmetic differences did not rise to the level of statistical indication, and the level of indication for the fatigue index of our current study of footballers by their playing positions (Defending - Central - Attack) came in at 0.836, which is greater than the indicative level ($0.05 \geq \alpha$), the same as for RSA, which came after statistical processing at 0.554 and is greater than the indicative level ($0.05 \geq \alpha$) In the test sample by playing position, we accept the zero hypothesis H0 which states: "There are no statistically significant discrepancies for the replicability of speed under the modern tactical orientation (playing with a block) as well as the second hypothesis that" there are no statistically significant differences in the fatigue



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index of footballers by playing positions under the modern tactical orientation (playing with a block) ".

Discussion of the results of the study with previous studies:

Our current study included two hypotheses stating that there were no moral differences in the frequency of speeds (RSA) and the fatigue index of footballers according to their playing positions under the modern tactical orientation (Playing with a block) This was achieved by the results of our statistical study so that there were no moral differences in the repeatability of speeds, which is the same for the fatigue index of the study sample by their positions of play, which also showed no moral differences, reflecting on the one hand the effect of the team's playing style on the results obtained through the collective movement of the team block and through the content of the fascist-based method in both position and gauge. (Repeatability of speeds and fatigue indicator) where it can be emphasized that increased repeatability of speeds is significantly influenced by the fatigue index, the lower the fatigue index the greater the repeatability of speeds RSA, and it should be noted that the calendar of results of the testPlayers can include it in an estimate "Hassan", the results of our study were generally consistent with the study of Khwilde Al-Hawari (2018), which found that there were no differences in anaerobic abilities between the three playing positions and this was due to the reason for the group training, as well as our study with the study of Joubr Khouiled (2020) which found no moral differences between the three playing positions and placed the results in the "average" rating and attributed this to the impact factor of competition, in addition, despite the conflicting results of our study and the studies of: (2021) Jose Luis Arjol and others and the Ryland Morgan Study (2024) and others have jointly with our study regarding the need to attach importance to the tactical aspect regarding the particular style and modes of play for the content of training programmes.

From the foregoing, the results of the sample examined showed that it was very close to the theoretical content that we addressed, which is in line with the physical and tactical requirements of modern football.

From the foregoing, the results of our current study can be explained by what we have obtained. In the light of the tactical and functional physical approach, they are based on:

- * Adequacy of the preparation period for players and coaching staff to make the results obtained acceptable regardless of the playing positions.

- * The predominant style of team performance, which depends on playing with medium mass and shifts during defensive and offensive activation, while giving sufficient freedom for players to move when shifting from defence to attack by

mode and by place of ball retrieval. All players in their positions are concerned with moving to the attacking role with compulsory quick return at the end of the attack to defend

* The time frame for conducting the study, which coincided with the end-of-the-go games where the players were in high form, which enabled us to obtain acceptable results through the test.

* A good assimilation by players of the tactical work content that the technical staff performs by performing individual and collective roles within the team's construction.

Conclusions:

Our study concluded that there are no statistically significant differences between players by their positions (defence, centre and attack) for both physical indicators of the subject matter of our study: The replicability of speeds and fatigue indicator in light of the modern tactical orientation of playing with a block and is consistent with the modern orientations of training through the integration of both physical and tactical performance aspects. Teams that approach the style of playing with a block depend on the balance of distribution of effort among their players in different positions of play, which will reduce the physical burdens of players on the one hand and ensures that high performance is maintained for as long as possible during the match phase in order to respond effectively to various critical situations and situations during matches. In addition, monitoring the fatigue index for players would contribute to giving them a collective signal as a block of both motion and comfort.

Through the foregoing, in view of the results obtained and in view of the study's objectives, the scholars propose the following:

Suggestions and recommendations:

In the light of the study's objectives and findings, the authors propose the following:

1 - We suggest that there be analytical studies using modern technological means in the physical and tactical fields. This is in order to understand the requirements of the modern footballer in the light of the emergence of new tactical ideas and philosophies that overcome the team's collective performance at the expense of individual performance to build a training perception that emulates these ideas and directions.

2- We recommend that trainers should investigate and know the level at which their teams are active through quantitative and qualitative data in order to plan proper training that keeps pace with the data obtained.

3 - We propose to integrate the physical and tactical aspects when building training programs in line with real playing situations in order to adapt to real competition conditions.



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4 - Conduct in-depth studies on the functional physical aspect of the tactical aspect.

5 - Comprehensive training of players in different positions of play for some of the basic physical qualities of footballers (strength-endurance-speed).

6 - We suggest that similar studies on the technical aspect include some soccer skills in the form of comparison between playing positions in a block by exchanging roles among players within this concept.

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