

Neuromuscular Coordination and Its Relationship with the Skills of Setting and Spiking among Football Tennis Players

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Abstract: *The aim of the current research was to examine the correlation between neuromuscular coordination and setting and spiking skills of football tennis players. The researcher used the descriptive approach in investigating the relationship between neuromuscular coordination and setting and spiking skills. The sample of the research was selective and composed of 45 youth players of the Specialized Football Tennis School in Baghdad Province with age of 16 years and above. The research sample was subjected to the relevant tests and the results obtained analyzed statistically to establish whether there is a relationship between neuromuscular coordination and setting skill on the one hand and neuromuscular coordination and spiking skill on the other. The primary finding of the study showed a positive correlation between neuromuscular coordination and setting as well as spiking skills among the football tennis players. Upon such findings, the researcher suggests that additional researches be carried out to investigate the effects of neuromuscular coordination on other skills in football tennis.*

Keywords: *Neuromuscular Coordination, Football Tennis, Setting Skill, Spiking Skill.*

Introduction

The involving neuromuscular coordination is important in performance of precise and fast movements in sporting activities especially those that require high accuracy and speed. It is regarded as a core factor in the development of physical skills because it leads to the optimization of the contact between muscles and the nervous system, which leads to the enhancement of motor and skill performance. This enhancement enhances the performance level of different physical exercises. As (Schmidt, 2019) explains, neuromuscular coordination can be defined as the skill of accurately coordinating and controlling muscular movements by interaction of the nervous system and the muscles. As it was specifically pointed out by (Wright, 2020), neuromuscular coordination is the capacity of the nervous system to exercise the utmost control and arrangement of the muscle movements in a harmonious and coordinated way and, therefore, enable efficient and accurate motor performance. In the same way, (Hassanein, 2015) indicated that the neuromuscular coordination improves the performance of fine and complicated motor skills, the capacity to carry out movements with a high rate and precision, and is crucial in

enhancing athletic performance in sports that involve precision in motor coordination, including football, basketball, tennis, and fencing.

Football tennis is a fun and difficult sport played between two competing teams of one, two or three players each on a court divided by a 110 cm high net. The objective of the game is to strike the ball over the net into the opponent's area using any part of the body except the hands, which requires motor skills and precise team coordination. According to (Stehlik, 2005), "Football tennis, like other sports, has its own specific skills and rules, with the skills divided into offensive and defensive categories, including the skills of setting and spiking." (Al-Humaid, 2015) described the setting skill as "the foundation of successful spiking in football tennis and one of the most frequently used skills in the game. A team's offensive performance largely depends on this skill, as successful spiking requires accurate ball preparation with varying distances and heights relative to the net ." Another essential skill is spiking, which (Abdullah, 2020) described as "one of the most effective offensive techniques in the game, characterized by its power and precision and serving as a primary method for scoring points. The success of this technique depends on two main factors: the power of the strike and the accuracy of its direction. In doubles and triples, the player delivers a powerful strike near the net after receiving the ball from the setter, while in singles play, the player prepares the ball for themselves and then executes the spike."

The significance of this research is to elucidate the connection between neuromuscular coordination and the skills of setting and spiking in football tennis players. Despite the acknowledged importance of neuromuscular coordination in performing intricate motor skills like setting and spiking, limited research exists on this correlation in football tennis players. Hence, this study aims to investigate: What are the current levels of neuromuscular coordination, setting skill, and spiking skill among football tennis players? Furthermore, is there a statistically significant correlation between neuromuscular coordination and these essential skills?

To fulfill this objective, the study will explore the association between neuromuscular coordination and the skills of setting and spiking in football tennis players. The proposed hypothesis asserts that there exists a statistically significant relationship between neuromuscular coordination and the skills of setting and spiking in football tennis players.

The research was performed on youth participants from the Specialized Football Tennis School in Baghdad, aged 16 and older, from April 1, 2025, to June 1, 2025, at the Al-Shaab International Stadium.

Methodology

The researcher employed the descriptive correlational method to investigate the relationship between neuromuscular coordination and the skills of setting and spiking.

Research Sample

The sample of the research was selected intentionally and included players of the Specialized Football Tennis School in Baghdad Province, namely, in the youth category, 16 years old and more. There were a total of 45 players. Therefore, 40 players were used as the

research sample and 5 players belonging to the same research community were used as exploratory sample.

Table 1: Homogeneity of the Sample in Age, Height, Weight, and Training Age

Variables	Mean (\bar{X})	Standard Deviation (\pm)	Coefficient of Variation (%)
Age (years)	17.56	0.77	4.43
Height (cm)	169.33	4.13	2.44
Weight (kg)	69.77	4.03	5.77
Training Age (months)	30.8	16.05	52.1

Tools and Equipment Used

Sources and References Utilized in the Research:

- a. Arabic and foreign books and references
- b. International information networks (Internet)
- c. Data recording forms
- d. Devices and Equipment Used in the Research:
- e. Acer Core i5 laptop (personal)
- f. Football tennis court (10 units)
- g. Measuring tape, calibrated (1 unit)
- h. Digital stopwatch (1 unit)
- i. Colored adhesive tape
- j. Handheld scientific calculator

Tests Used in the Research

First: Neuromuscular Coordination Test — Numbered Circles Test (Al-Mandalawi, 1990)

Purpose of the Test:

To measure coordination between the legs and eyes.

Required Equipment:

- Stopwatch
- Eight circles drawn on the ground, each with a diameter of 60 cm, numbered from (1) to (8)

Test Specifications:

The participant begins at circle (1). Upon the initiation signal, they sequentially jump with both feet to circle (2), then to circle (3), and proceed in order until reaching circle. **Scoring:**

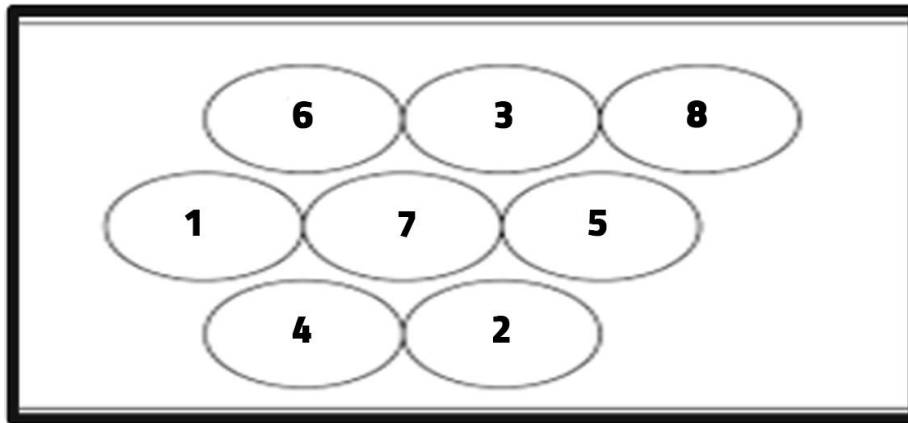


Figure 1. Illustrates the Numbered Circles Test for Neuromuscular Coordination

Second: Mays Test for Spiking Skill in Football Tennis (Salman, 2019)

Purpose of the Test:

The time taken by the participant to move through all eight circles is recorded using the stopwatch.

Figure 1. Illustrates the Numbered Circles Test for Neuromuscular Coordination

Second: Mays Test for Spiking Skill in Football Tennis (Salman, 2019)

Purpose of the Test:

To measure spiking accuracy.

Equipment Used:

Standard football tennis court, measuring tape, colored adhesive tape (5 cm wide), rope (5 mm thick, 9 meters long), one whistle, five official football tennis balls.

Test Description:

- a. The designated testing zone is located on the opponent's half of the court and segmented into seven distinct scoring areas. A rope is stretched one meter above the net, held in place by two poles mounted on top of the net posts and aligned parallel to the net. Furthermore, a circular zone with a diameter of one meter is marked on the court, positioned 2.5 meters from the net.
- b. The participant stands inside the circular area, positioned 2.5 meters away from the net.
- c. The player performs the spiking skill with five attempts, aiming to pass the ball through the space between the rope and the net.
- d. The participant remains inside the designated spiking area (1-meter diameter) as the coach throws the ball toward the participant. After the ball bounces off the ground, the player performs the spiking skill toward the opponent's area, attempting to land the ball in the highest-scoring zone according to the diagram.

Test Instructions:

- The ball must pass between the net and the rope positioned above it.
- The participant must not step outside the designated spiking area while performing the skill.
- Each participant is allowed five attempts.

Scoring Method:

The scores from the five attempts are summed. Each attempt is scored based on where the ball lands, with the maximum possible total score being 25 points.

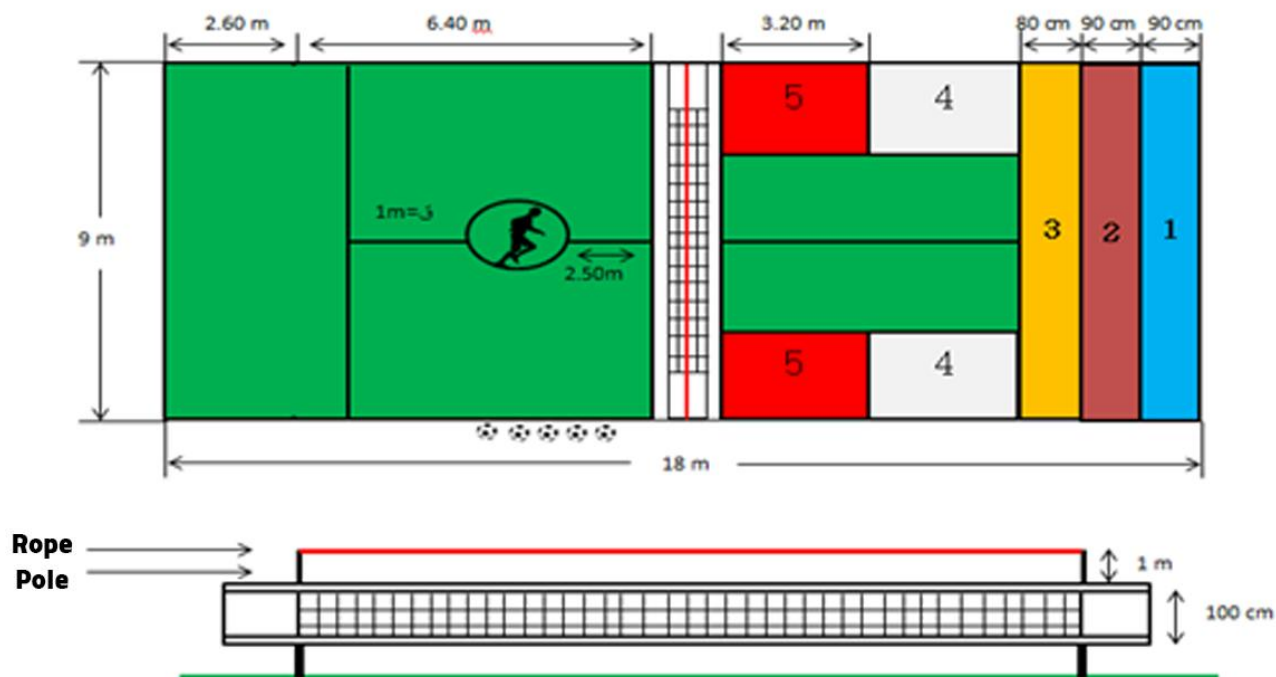


Figure 2. Illustrates the Spiking Skill Test. **Third: Mays Test for Setting Skill in Football Tennis (Salman, 2019)**

Purpose of the Test: To measure setting accuracy.

Equipment

Standard football tennis court, two poles (2 meters in height), measuring tape, rope (5 mm thick, 9 meters long), colored adhesive tape (5 cm wide), five official football tennis balls.

Used:

Test Overview:

1. The player stands within a specified setting zone, positioned between a rope elevated 2 meters above the floor and set 2 meters from the net, and the service boundary line. The instructor is stationed around the midpoint of the service line.
2. The instructor gently tosses the ball in the direction of the player. After the ball makes contact with the ground, the player uses the setting technique to direct the ball over the rope located close to the net, aiming for it to land inside one of the pre-defined scoring sections.

Test Guidelines:

- Each player is allowed five tries.
- Before being set, the ball must first make contact with the ground.
- The ball must travel over the rope positioned near the net and land within one of the marked scoring zones.

Scoring System:

- The final score is calculated by adding the results from all five attempts, based on where the ball lands.
- A ball landing in zone (3) awards three points, in zone (2) gives two points, and so on.
- The highest possible score that can be achieved in the test is 15 points.

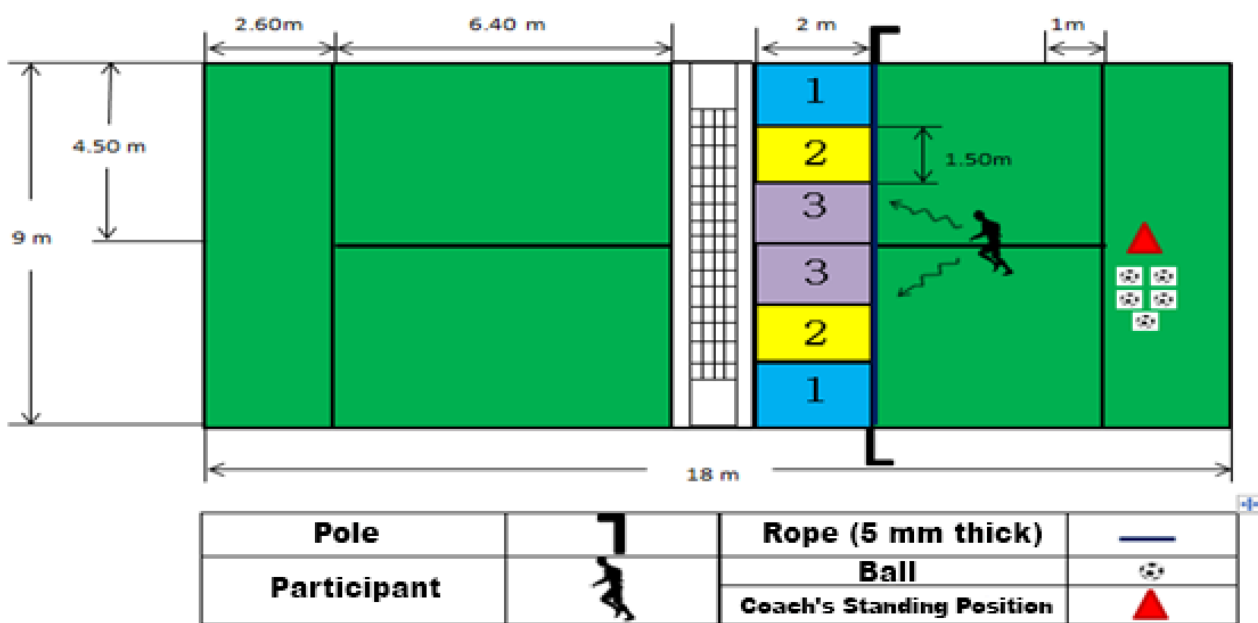


Figure 3. Illustrates the Setting Skill Test

Pilot Study

The researcher conducted a pilot study on Friday, April 4, 2025, involving five football tennis players from the total research population. The objectives of the pilot study were as follows:

- To verify the suitability of the tests used in the research.
- To ensure the reliability and functionality of the equipment used.
- To evaluate the capability and efficiency of the supporting research team.

This pilot study contributed to ensuring the overall quality of the research and the accuracy of the results.

Application of Research Tests

On Friday, April 11, 2025, the research tests were applied to the study sample. The specified tests designed to measure the variables related to the research topic were conducted, including:

- Neuromuscular coordination tests
- Tests for setting and spiking skills in football tennis

The tests were carried out according to standardized scientific procedures to ensure the accuracy and reliability of the results.

Statistical Tools

The researcher employed the Statistical Package for the Social Sciences (SPSS) for data analysis in the study.

Result and Discussion

Table 2: Arithmetic Means and Standard Deviations for Research Variables

Variables	Unit of Measurement	Mean	Standard Deviation
Neuromuscular Coordination	Seconds	7.29	0.98
Setting Skill	Degrees	11	1.53
Spiking Skill	Degrees	17.33	4.42

Table 3: Correlation Results Between Neuromuscular Coordination and Setting Skill in Football Tennis

Variables	Mean	Standard Deviation	Correlation Coefficient	Error Ratio	Significance
Neuromuscular Coordination	7.29	0.98			
Setting Skill	11	1.53	0.85	0.000	Significant

The neuromuscular coordination and setting skill had a significant relationship with asignificance level of (0.05).

Table 4: Correlation Results Between Neuromuscular Coordination and Spiking Skill in Football Tennis

Variables	Mean	Standard Deviation	Correlation Coefficient	Error Ratio	Significance
Neuromuscular Coordination	7.29	0.98			
Spiking Skill	17.33	4.42	0.81	0.001	Significant

A strong relationship was established between neuromuscular coordination and spiking skill at a significance level of (0.05).

Discussion

The results of the current study revealed the positive correlation between setting and spiking skills of football tennis players and neuromuscular coordination was very high. The findings are in line with the study by Schmidt and Lee (2011) who asserted that the neuromuscular coordination plays a critical role in fine motor performance. Similarly,

Magill (2011) indicated that neuromuscular coordination plays a vital role in development of performance of players, since it improves accuracy, speed and control of movements.

The current findings reiterate the need to establish neuromuscular coordination in the football tennis players in order to enhance their technical performance. This is in line with what Bompaa (2019) mentioned in his emphasis on integrated training to improve athletic performance. Hindawi (2015) also added that to increase accuracy, speed, and control over athletic movement, neuromuscular coordination training is applied. In addition, Al-Nimr (2012) asserts that through training of neuromuscular coordination, one can acquire control of movement and reduce the burden on joints and muscles therefore, reducing chances of injuries. It has also been noted by Hassanein (2011) that the neuromuscular coordination exercises enhance the ability of the athletes to acquire new motor skills.

Conclusion

The current research demonstrated a close positive relationship between neuromuscular coordination and the setting and spiking skills of football tennis players. These results show the significance of improving the neuromuscular coordination to increase the performance of the players in this sport.

The results of the present research will help to enhance the performance of football tennis players to achieve this goal, the effective training programs are elaborated which are aimed at enhancing the neuromuscular coordination. On this basis, the researcher proposes the following: The development of specialized training programs focused on improving neuromuscular coordination among football tennis players.

- a. The integration of neuromuscular coordination exercises within regular training programs for players.
- b. Conducting further research to examine the impact of neuromuscular coordination on player performance in other sports disciplines.

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