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# The effect of special exercises on developing agility and spiking skill in volleyball for players

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**Abstract**
The importance of these abilities and working on developing them lies in ensuring that we reach the optimal and best level of performance for this skill, because it is the player's transition In addition to having a lot of fundamental technical skills the deliberate and varied movements that the player must execute in the quickest amount of time and with the least amount of effort and being the solid foundation upon which the game is based, it also allows the player to switch between offensive and defensive tasks and vice versa. or team's achievement of success and excellence depends on mastering his performance. The research's objective is to create workouts that will agility and skill performance for junior volleyball players, and to understand how exercises contribute to the development of agility and skill performance for junior volleyball players. By creating equivalent groups that were appropriate for the problem's nature, the researcher employed the experimental approach. The juniors from Babylon Sports Club who were competing in the Iraqi Junior Volleyball League Championship during the 2024-2025 season were the researcher's sample. They were split into two groups: the control group, which used the approach, and the experimental group, which used workouts to improve agility and skillful performance for spiking volleyball, numbers six junior volleyball players followed by the team coach, numbering (6) junior volleyball players. The researcher concluded that the proposed exercises have an effect in developing the spiking skill in the agility variable and the spiking skill in volleyball.

**Keywords:** Agility, skill performance, volleyball, spiking, junior players, training exercises

## Introduction
Volleyball is a sport with distinct characteristics that distinguish it from other sports, because it provides a multitude of physical, energetic, psychological, and social advantages to its players. Therefore, this sport has made tangible strides in recent years in world and Olympic tournaments. This is due to several variables and aspects that advanced countries have recognized and studied in this sport. Achieving a high level in volleyball requires focusing on specific physical abilities, particularly at specific stages of training, because these abilities play a fundamental role in scoring points and winning matches. These abilities are known as special physical abilities.

Agility is an important requirement for all sports, as the ability to quickly change direction is often the difference between success and failure. Almost all sports involve full-body movements, requiring players to accelerate, decelerate, or quickly change guidance in reaction to game circumstances. Running straight ahead is not as vital in most sports as being able to change direction rapidly. As a result, a lot of coaches and players are looking for efficient methods to increase speed and agility. The spiking is considered one of the most prominent offensive skills due to its importance in enabling competing teams to outperform each other. It is also considered the most powerful means used in direct attacks. A team whose players are proficient in performing the spiking is able to win the match, because a successful spiking earns the team a direct point. (Radhi, & Obaid, 2020) [9]. It is also the most important offensive element due to its physical and kinetic qualities and abilities, as it has a positive impact on scoring points. It also works to confuse the opposing team's players due to the suddenness of the event, which leads to the loss of sufficient time to defend the spiking ball. It is an offensive method directed at overcoming the opposing team's defenses with great force compared to various other offensive methods or skills. Using the aforementioned to illustrate the significance of the spiking, the researcher points to the necessity of developing the physical

capabilities specific to this skill, including agility, due to its significant role in developing the level of performance of this skill, especially among young players. (Saleem Radhy, *et al.* 2025) [12]. This skill begins to emerge with the onset of specific physical abilities, as these abilities affect the level of spiking performance, along with other factors related to the technical and tactical aspects, so that we can By standing on the importance of these abilities and working on developing them in a way that guarantees us reaching the optimal and best level of performance for this skill, because it is the player's transition containing numerous fundamental technical skills, such as the deliberate and varied movements that the player must execute in the quickest amount of time and with the least amount of effort, as well as being the solid foundation upon which the game is built, from offensive to defensive responsibilities and vice versa or team's achievement of success and excellence depends on the mastery of his performance.

**Research problem**

By following the field researcher for the ball a plane and watching the matches in general, he noticed a decrease in the level of the skill of overwhelming the beating skill, which may be due to the weakness of the team players in moving from jump to changing the direction during the overwhelming beating, and this prompted the researcher to use fitness training in volleyball to solve this problem and train players and upgrade their physical and skill in the skill of overwhelming beating.

**Research objective**

- Establishing exercises to develop fitness and skill performance for emerging players in volleyball.
- Knowing the impact of exercises on young players' skill performance and agility development in volleyball.

**Research hypotheses**

Exercises have a moral impact on the development of agility and the skill performance of the overwhelming hitting of volleyball.

**Research fields**

- **Human field:** The players of the Babylon Sports Club teams-the junior category for the sports season (2024-2025).
- **Time field:** (15/1/2025) to (16/4/2025)
- **Spatial field:** Babylon Indoor Sports Hall in Babylon Governorate.

**Methods of research and fieldwork**

**Methods of Research**

Research Methodology: To address the nature of the issue, the researcher employed an equivalent group design in conjunction with the experimental approach.

**Research on communities and samples**

The Babylon Sports Club junior players competing in the Iraqi Junior Volleyball League Championship for the 2024-2025 season made up the researcher's research sample. They were split up like this:

1. The experimental team, which performed exercises to develop agility and skill performance in volleyball spikinges, consisted of (6) junior volleyball players.
2. The control group, which employed the team coach's methodology, consisted of (6) junior volleyball players.

**Equivalence and Homogeneity of the Two Research Groups' Samples**

**Consistency of the Study Sample**

The researcher performed a sample homogeneity process for skewness coefficient for the sample members' results, as indicated in Table (1), by computing the variables (age, height, weight, and technical performance of the skill).

**Table 1:** The homogeneity of the sample individuals in terms of age, length, and weight is displayed in

| No. | Factors | Measuring unit | Insensitive | Typical deviation | Skewness |
|---|---|---|---|---|---|
| 1 | Length | cm | 176.82 | 4.75 | 2.68 |
| 2 | Mass | kilogram | 72.64 | 3.40 | 4.68 |
| 3 | Chronological Age | year/month | 17.91 | 0.89 | 4.97 |
| 4 | Training Age | year | 5.54 | 0.92 | 16.61 |

It is evident from Table (1) that there were no variations in the body measurement variables among the research sample members. This indicates the research sample's homogeneity, as indicated by the coefficient of variation value was between (2.68-16.61). These values are less than 30%. Whenever the value of the coefficient of variation is less than (30%), this indicates homogeneity among the research sample members. Therefore, the sample is considered normally distributed.

**Sample Equivalence**

To establish equivalence between the two research groups in some biomechanical variables, the pretest of the research sample was conducted. The table below shows some statistical parameters specific to the research sample for the experimental and control groups.

**Table 2:** Shows equivalence in some biomechanical variables between the experimental and control study groups in the pretest.

| No. | Factors | Group under experimentation | | group under control | | T value calculated | Type Sig |
|---|---|---|---|---|---|---|---|
| | | Arithmetic mean | Typical deviation | Arithmetic mean | Typical deviation | | |
| 1 | T-teas | 9.72 | 0.28 | 10.12 | 0.98 | 0.96 | non sig |
| 2 | Diagonal Spiking | 13.67 | 2.27 | 15.56 | 2.14 | 1.48 | |

It is evident from Table (2) that the experimental and control groups' biomechanical variable values for the Qatari spiking skill did not differ significantly. The computed t-value fell below the tabular value of 0.05, falling between 0.32 and 0.47. This shows that the two research groups were equivalent in the pretest.

**Methods of Collecting Information and Data**

- Arabic, foreign, and internet sources.
- Personal interviews.

- Observation and kinetic analysis.
- Statistical processing.
- Tests and measurements.
- Previous studies.
- Supporting staff.

**Equipment and Tools Used**

- Several tools.
- Training tools with all their components.
- One (1) digital watch.
- One (1) CASIO Exilim video camera, manufactured in Japan, capable of recording at 300 frames per second.
- One HP laptop.
- Software and applications used on the computer:
- Motion analysis program (kinovea).
- Metal measuring tape.
- Height and weight measuring device.
- (10) balls.
- A legal volleyball court.

**Identifying Tests**

To ensure accuracy and objectivity in the results of the tests used, the researcher reviewed available sources to select the best tests for the trait to be measured.

Tests are essential in any scientific research, as testing is an important means of evaluation in all areas of life, especially in volleyball, given the progress it has made in this field in recent years. It should be noted that all results obtained for the sample members were under conditions appropriate for performance.

**Test 1: Agility T-test (Reiman, M. and Manske, Robert, 2009) [8]**

- The test's objective is to evaluate the participants' speed and agility of movement of athletes, including sprinting in forward, sideways, and backward directions.
- Tools: timer, marking cones, tape measure, and timing gates (optional).
- Performance Specifications: Place four cones, with cone A 10 yards from cone B, and cone B 5 yards from cones C and D. The tester starts at cone A with the timer beeping, sprinting forward to touch cone B's top with the right hand, then take sidesteps to the left to touch cone C, then take sidesteps to the right to touch cone D, then turn left to touch cone B with the left hand, and finally run back to cone A, where the stopwatch stops and the test ends.
- Scoring: The test will not be scored if the tester crosses their steps with one foot in front of the other during a transition, such as when they don't face forward or don't contact the tops of the cones with their hand. Choose the optimal timing for three successful tries.

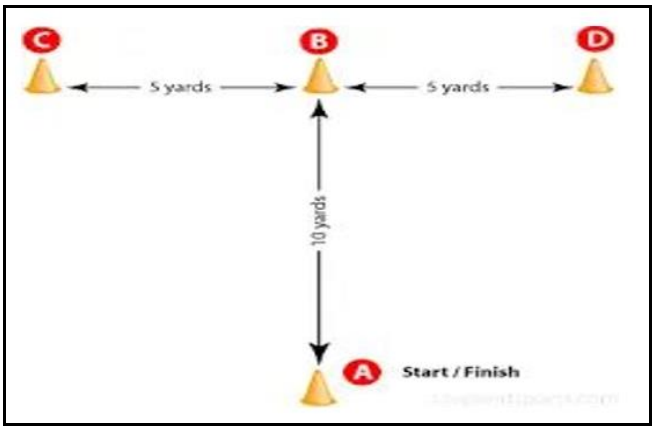


**Fig 1:** Show T-test for agility

**Second Test: Diagonal Spiking Accuracy Test (Muhammad Subhi Hassanein; Hamdi Abdel Moneim. 1999) [8]**

- Purpose of the Test: To measure the accuracy of the diagonal spiking skill in the diagonal direction.
- Ten volleyballs, a volleyball court, and two practice boxes are the necessary equipment. One practice box is positioned in a court corner, with its inner corners 5 cm from the side and end lines, while the other is positioned as illustrated in Figure (3).
- Performance requirements: The coach passes to the examinee from position 3 with a long diagonal pass after he spikes from position 2. Five spiking attempts on the back rank (A) and five more on the front rank (B) are required of the examinee. According to the scoring guidelines, the examinee receives credit for the ten correct attempts that were made.
- Recording
  - Every time the ball lands on the rank after a proper spike, four points are awarded.
  - Each accurate spike that results in the ball landing in the allotted area earns three points.
  - Each successful spike that results in the ball landing in zone (A) or (B) earns two points.
  - Each successful spike that results in the ball landing in zone (C) earns one point.

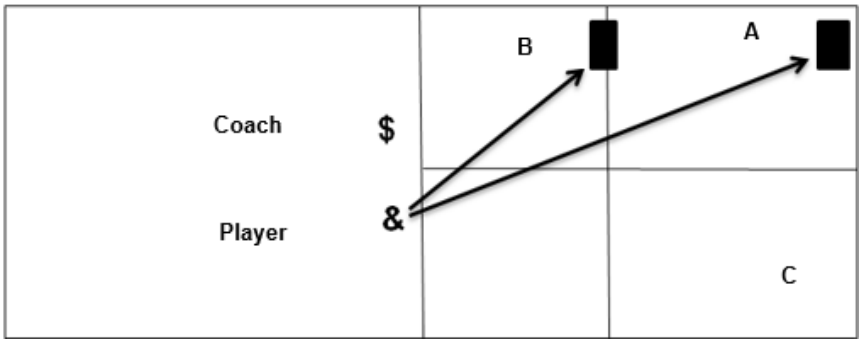


**Fig 2:** Show Diagonal Spiking Accuracy Test

**Exploratory Studies**

**1. Exploratory Study**

The researcher examined a sample of 12 volleyball players who were not part of the main research sample in an exploratory study, representing the club's under-19 team, during the period from January 5, 2025 to January 14, 2025. The study aimed to:

- Calculate scientific coefficients (validity and reliability) for each of the tests under study.
- Identify the difficulties that may arise in implementing the proposed tests used in the research procedures, as well as identify the most appropriate order for these tests.

**The results of this study yielded the following**

**Scientific Conditions for Tests**

- **Validity Test:** The researcher used content validity to guarantee the tests' validity, relying primarily on the extent to which the test accurately and consistently represents the situations and aspects it measures to achieve the objective for which it was designed. Content validity consists of questionnaires distributed to experts in the field of volleyball testing. The tests with the highest agreement rate were selected.
- **Stability Test:** With three days separating the first and second applications, the researcher used the test-and-retest procedure to determine the stability coefficient of the research tests on the exploratory study sample. The reliability coefficient of the examined tests is displayed in Table 4.
- **Objectivity Tests:** One of the most important features of a standardized test is a high degree of objectivity. The objectivity of a test is due to the clarity of the instructions provided by the test administrator and the scoring. A test is characterized by high objectivity when it produces the same results, regardless of the differences in the examiners. (Dhoqan Obaidat *et al.* 1988) Objectivity is a shared understanding of the test term and the assessment. Cameras are used to photograph the precise areas specified by numbers, and the area number is recorded. This is undisputed, as is the use of skill analysis using precise and standardized programs.

**Table 2:** Shows the scientific conditions for tests

| No. | Tests | Unit of measurement | Stability | Objectivity |
|---|---|---|---|---|
| 1 | T-test | Degree | 0.95 | 0.93 |
| 2 | Diagonal Spiking | Degree | 0.94 | 0.91 |

**Main Experimental Procedures**

**Pre-Measurements**

The researcher conducted pre-measurements for the research variables, the agility test and the crushing strike, on the main research sample as a pre-measurement on January 15, 2025.

**Implementation of the Training Program**

The training program was implemented on the research sample at the Ghazl El Mahalla Club fields during the period from January 15, 2025 to April 15, 2025, for a period of (12) consecutive weeks, with three training units per week, and each training unit lasting 120 minutes.

**Post-Measurements**

After completing the training program implementation period, The post-measurements were carried out by the researcher in the same order as the pre-measurements on April 18, 2025.

**Methods of Statistics**

The following techniques were provided in the statistical software (SPSS) that the researcher used:

**Findings and conversation**

Presentation and analysis of the outcomes of the volleyball agility and spiking skill pre-and post-tests for the experimental and control groups, and their discussion

Presentation and analysis Considering the outcomes of the experimental group's agility and spiking skill pre-and post-tests in volleyball, and their discussion

**Table 5:** Shows the differences in some variables of agility and spiking skill in volleyball between the test before and after the experimental group.

| No. | Factors | Prior to the test | | After the test | | Calculating the mean of the difference | Differences' standard deviation | T value computed |
|---|---|---|---|---|---|---|---|---|
| | | Arithmetic mean | Typical deviation | Arithmetic mean | Typical deviation | | | |
| 1 | T-teas | 9.73 | 0.28 | 8.09 | 0.36 | 1.64 | 0.29 | 12.65 |
| 2 | Diagonal Spiking | 13.67 | 2.27 | 17.83 | 1.95 | 4.16 | 1.91 | 4.87 |

With a degree of freedom and a significance level of 0.05, the tabular t-value was 2.57of (5).

**Table (5) shows the following**

There are statistically significant differences between the averages of the pre-and post-tests for the experimental group in the agility and spiking skill variables, and in the direction of the post-test, as all calculated t-values were greater than the tabular t-value at a significance level of (0.05).

The researcher ascribes this to the agility training, which was distinguished by its comprehensiveness and diversity, and which integrated physical kinetic performance with skill and tactical performance. This contributed to the improvement in the experimental group's performance on the spiking skill performance tests, as seen by the different percentages of improvement between the pre-and post-tests. The improvement of the physical component will inevitably result in the improvement of tactical performance and skill during competitive volleyball matches.

Therefore, the researcher believes that the better a coach uses agility training, the greater the kinetic coordination, which contributes to the development of skill performance. This is because it increases the ability to control the body, especially foot movements, which helps the player maintain proper kinetic positions and thus achieve ideal kinetic performance.

The researcher attributes these results to the effective organization of the program employing agility training and the rationing of training loads using a scientific technique appropriate to the age and training level of the research sample. Additionally, he credits agility ladder training as a crucial element in the development of kinetic speed for the spiking skill.

Robert Lindsey adds that interactive agility training involves multiple muscle groups and achieves greater gains compared

to other training exercises. Due to the use of the arm and leg muscles, the advantage of using agility ladder training is greater accuracy when using tools such as hoops and floor ladders. Furthermore, The level is raised by the variation, change, and various formations used in kinetic speed training of various abilities, which has an impact on the development of skill level (Robert Lindsey, 2009) [8]

**Results of the agility variables and volleyball spiking skill pre-and post-tests for the control group are presented, analyzed, and discussed.**

**Table 6:** The agility characteristics and volleyball spiking ability differences between the pre-test and post-test for the control group are displayed.

| No. | Factors | Prior to the test | | After the test | | Calculating the mean of the difference | Differences' standard deviation | T value computed. |
|---|---|---|---|---|---|---|---|---|
| | | Arithmetic mean | Typical deviation | Arithmetic mean | Typical deviation | | | |
| 1 | T-teas | 10.12 | 0.98 | 12.89 | 0.86 | 2.77 | 0.95 | 7.14 |
| 2 | Diagonal Spiking | 15.56 | 2.14 | 16.77 | 1.92 | 1.21 | 0.85 | 3.49 |

The tabular t-value is (2.57) with a degree of freedom and a significance level of (0.05) of (5).

**Displaying, evaluating, and talking about the post-test findings for the agility variable and the spiking skill in volleyball for the control and experimental groups.**

**Table 7:** Shows the post-test differences for the agility variable and the spiking skill in volleyball for the control and experimental groups.

| No. | Variables | Post-test for the experimental group | | Post-test for the control group | | T value calculated |
|---|---|---|---|---|---|---|
| | | Arithmetic average | Typical deviation | arithmetic average | Typical deviation | |
| 1 | T-teas | 8.09 | 0.36 | 12.89 | 0.86 | 11.51 |
| 2 | Diagonal Spiking | 17.83 | 1.95 | 16.77 | 1.92 | 2.87 |

The tabular t-value was (2.23) at a significance level of (0.05) and a degree of freedom of (10).

The researcher attributes this to the specific physical and skill agility training, which had a favorable effect on the experimental group's performance on the spiking skill compared to the control group's post-measurements. This is because this type of training includes various exercises with The player must adjust their location, speed, and direction due to unpredictable and fluctuating reactions during movement. It also includes exercises that increase strength, speed, coordination, and agility, all of which contribute to developing the spiking skill performance of junior volleyball players.

According to the researcher, using agility training improves the level of kinetic response speed when performing the spiking skill.

This indicates the improvement in the examined physical skills as a result of agility training and its beneficial effects on physical capabilities. The researcher credits the research sample's improvement in physical capabilities to their ongoing use of the suggested training program, which was created with consideration for scientific standards to develop physical abilities.

Sports training works to achieve athletic form for players by following practical principles when implementing training programs to enhance their physical and skill levels. (Mufti Ibrahim Hammad. 2001) [6]

Agility training without interruption in performance achieves positive results because it results in the advancement and enhancement of physical abilities.

This indicates that the application of agility training has improved skill performance. This improvement is attributed by the researcher to in skill performance to the players' regular adherence to the training program, which is based on standardized scientific foundations. This results in physical improvement through the development of physical abilities specific to volleyball, which is reflected in the level of skill performance.

Indicates that improving and developing skill performance is linked to the development of physical abilities specific to specialized sports, allowing for the best and most accurate level of skill performance. (Mufti Ibrahim Hammad. 2001) [6]

Developing Agility: Efforts must be made to equip athletes with a large number of different kinetic skills, and to perform these acquired kinetic skills under multiple and varied conditions, which helps develop and enhance the athlete's agility.(Abdul Haq, Imad, and Abu Areeda, Fayez. 2004) [1]

Developing muscular strength is important for reaching the highest point for a spiking. Muscular strength in the legs increases the player's vertical jump height, enabling them to reach the highest point when hitting the ball and making it easier for the player to direct it. Muscular strength in the hitting arm is also important for hitting the ball with force and speed, making it difficult for the opponent to block it, thus effectively and positively ending the attack. (Zaki Muhammad Hassan. 2021) [5]

Agility is among the most crucial physical skills required by volleyball players, as it is an important and essential requirement for the game. (Muhammad Subhi Hassanein, Hamdi Abdel Moneim. 1997) [7] Developing agility also enables the player to perform the skill effectively, by reaching the ball in the shortest possible time and quickly meeting the ball at the correct time to hit it.

Agility enables the player to quickly move their body or limbs on the ground or in the air when hitting or blocking the ball. This is considered one of the most important abilities in volleyball, especially skills that require changing the body's direction or position in the air or on the ground.

The researcher attributes this to the agility program's focus on working muscle groups. This is in line with research findings conducted by (Vanwassenhove *et al.* 2010) [13], which indicated an increase in jumping distance among the research sample of athletes and an improvement in their agility level due to the training course.

Matthew Schirm points out that through agility ladder training, running, jumping, and hopscotching develop. Since the athlete requires motivation to alter and vary their performance, it is crucial to practice all of the aforementioned

skills. Every ability aids in strengthening a distinct kinetic unit, which is critical for the development of skills in sports skills. Dividing the work into sets and repetitions is also very important for developing the athlete's level to the highest possible level. (Matthew Schirm, 2017) [5].

According to the study, the suggested program, which utilizes agility training, includes exercises aimed at developing speed, which generates involuntary muscular contraction that increases the amount of kinetic units in the muscles controlling these joints by stimulating more sensory organs. The exercises also match the movements performed in competition. (Velmurugan and Palanisamy), who state that agility training increases the amount of active kinetic units by stimulating muscle spindles, which causes high tension in the released kinetic units, and by stimulating additional receptors, leading to increased force output, confirm this. (Velmurugan G. & Palanisamy A. (2012) [14]

The careful selection of the type of exercises allowed the striker to interact well with the training atmosphere, creating a spirit of seriousness and excitement without showing boredom or fatigue during performance. Furthermore, the number of repetitions performed during the exercises were all factors that helped develop agility. This is consistent with what was stated, "The coach should provide the largest possible number of repetitions when performing any exercise to develop the desired quality." (Matin Sulaiman Saleh. 2004) [4]

Regarding agility, the experimental group also demonstrated superiority over the control group. The researcher attributes this difference to the fact that the specific exercises are different and interconnected with each other through a series of coordinated movements when performing them. Furthermore, "adopting the principle of gradual progression from simple to complex when providing specific agility exercises helped develop this quality, as the more agile the player is, the more quickly he can improve." His level, provided that we do not forget the basic educational principle (gradual progression from simple to complex), as the player must analyze it into its simple components. (Issam Abdul Khaliq. 2005) [3]

## Conclusions and Recommendations

### Conclusions

- The suggested agility training program resulted in the creation of specific physical abilities, including muscular strength (speed and agility), among the research sample.
- The agility training component of the suggested training program improved the Qatari spiking skill's performance level among the research sample.
- There are percentages of improvement in physical abilities resulting from the use of agility training, including muscular strength of the legs from running to attacking, muscular strength of the striking arm, and agility.

### Recommendations and Suggestions

The researcher made a number of recommendations and suggestions, including:

- Implementing physical training that aligns with the physical requirements of the skill without pauses or time intervals.
- Emphasizing the use of agility training to develop the physical abilities of players.
- Using agility training to develop the spiking skill in volleyball.
- Conducting research in the field of volleyball using agility exercises for their effectiveness in improving and developing performance.
- Use the proposed program to prepare players at different age levels, while regulating the training loads to suit each age level and the time of implementation during the training season.

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