

# The effect of auxiliary exercises to develop the speed of the kinematic response of volleyball players from a seated position

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## **Abstract**

The first chapter included the introduction to the research and its importance, and the researchers dealt with the advantages of the game of volleyball from the sitting position, which has specific features that distinguish it from other group games. As for the research problem, it crystallized in the team players' lack of modern sports equipment, so the researchers decided to prepare exercises using optical devices and rubber ropes to develop the speed of movement response and help players to perform their technical skills with the utmost speed and accuracy.

As for the objectives of the research, they were:

1. Preparing exercises with assistive means to develop the speed of movement response for volleyball players - sitting.
2. Identify the effect of exercises with assistive means to develop the speed of the kinematic response of volleyball players - Seating.

As for the hypotheses for research, they were:

- 1- There are statistically significant differences between the results of the pre and post tests for the experimental group and in favor of the post test.
- 2- Exercise has an effect on developing the response speed of volleyball players from the sitting position.

The second chapter included a detail in the research methodology and field procedures, as the researchers used the experimental method in the style of one experimental group with two pre and post tests, and the research sample was chosen by the deliberate method, and they are the players of the national volleyball team from the sitting position of (14) players.

As for the third chapter, the statistical results extracted were presented in graphical tables with the analysis and discussion of those results in accordance with the theoretical knowledge foundations assigned by the scientific references.

In light of the experiment carried out by the researchers and the results achieved through tests and statistical means, they reached conclusions, which are:

1. The different and varied motor response speed exercises using auxiliary tools helped to develop the motor response speed of volleyball players from the sitting position.
2. The use of auxiliary tools in the exercises increased the players' experience in reducing the response time and thus the speed of decision-making. All this improved the level of performance of the players.
3. The use of multiple stimuli in one exercise exposes the player's movement programs to difficult requirements (which are somewhat similar to the playing conditions) and with regular repetitions, which adjusts the player to those stimuli and increases experience, and then reduces the time of the movement's response to him.

As for the recommendations, they were:

1. The use of modern devices and tools in training for volleyball players from a sitting position because of their importance in developing the speed of the motor response.
2. Relying on advanced and modern equipment when building tests because they reflect the true level of individuals, far from bias.
3. Paying attention to exercises to develop the speed of the kinetic response using multiple and various stimuli and resistances, provided that the performance is from movement (ie, linking more than one movement in a single exercise).
4. Giving the player complex or multiple stimuli to make the exercises similar to the real playing conditions, especially in games that require speed and accuracy at the same time.

## **Definition of research:**

### **1.1 Research introduction and its importance:**

The game of volleyball - sitting is one of the games that depend on following careful scientific planning in order to improve the level and capabilities of its players, as the game of volleyball requires from a sitting position speed in performance, in addition to that it needs accuracy during the implementation, so volleyball entered the sporting forums in a serious way, as it has become one of the games that take a large place in the Olympics and sports competitions, as the volleyball game from a sitting position is one of the sensitive and important games because it is concerned with an important segment of society, namely the

handicapped, as this disability does not constitute an obstacle for them in their lives as it became for them. Recognized clubs and federations, and they became involved in various sports Olympiad. Their disability was no longer a problem, because society's view had changed for them because they were not discouraged by disability, rather on the contrary. The speed of the motor response of the volleyball players from the sitting position because of its importance in the performance of the technical skills of the game.

### **1.2 Research Problem:**

Through the researchers following up on special volleyball training from a sitting position, he noticed that there is a lack of use of modern devices and tools, as well as that the speed of the movement response is one of the important characteristics that players must possess due to the difficulty of moving for a disabled player. Also, he noted the lack of modern sports equipment for the national team and the federation players Therefore, the researchers decided to prepare exercises with assistive means to develop the speed of movement response and help players to perform their technical skills with the utmost speed and accuracy.

### **1.3 Research Objectives:**

1. Preparing exercises with assistive means to develop the speed of the motor response of volleyball players - sitting.
2. Identify the effect of exercises with auxiliary means to develop the speed of the kinematic response of volleyball players - Sit.

### **1.4 Research hypotheses:**

1. There are statistically significant differences between the results of the pre and post tests for the experimental group and in favor of the post test.
2. Exercise has an effect on developing the response speed of volleyball players - sitting

### **1.5 fields of research:**

**1.5.1** Human field: National team volleyball players from a seated position for the sports season 2019-2020.

**1.5.2** Spatial field: the closed hall of the Specialized Volleyball School.

**1.5.3** Time domain: the period from 2/1/2020 to 28/6/2020.

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researchers used the experimental method in the method of one experimental group and with the pre and post tests to achieve the objectives of the research and its hypotheses and its suitability with the nature of the problem to be studied.

## **2.2 Research Sample:**

The researchers deliberately selected the sample. They are the players of the Iraqi national team in volleyball from the sitting position, which number (14) players. The percentage of the research sample is 100%.

## **2.3 tools, devices and aids:**

### **2.3.1 tools and devices used in the research:**

- Volleyball court - sitting (legal).
- (2) SEWAN electronic stopwatch.
- A tape measure (FITT) count (1), category (20 meters).
- (SONY) video camera (1).
- 4 rubber ropes, 2 meters long.
- Laces (belts) used for the waist

**Figure 1: Rubber bands used in exercises**



**Figure (2): Waist belt for attaching elastic ropes**

❖ The visual system:

The optical device is a training educational device designed to measure and develop the speed of the motor response with visual stimuli and in many games and events, including volleyball from the sitting position as well as the pleasure of training and can be used by all levels of sports, and the device gives a bundle of colors randomly through the control panel The device consists of several parts linked together, and these parts are:

- 1- Control Panel: which contains multiple buttons, namely:
  - ON-OFF-OFF button.
  - The switch button to the optical system.
  - A button to start each player's eight attempts.
  - One-person switching operating system button.
  - Eight new attempts restart button.
  - Screen displaying the number of attempts and the time of each attempt for each player



Figure (3) shows the parent device

- 2- The signal triggering device for the two optical stimuli (ON-OFF), which is placed inside the signal and is connected with the parent device in a wireless manner.



Figure (4) shows the trigger device for the optical stimuli

- 3- The sensory device through which the time is stopped when the player touches it upon reaching an end point, and its place is at the top of the person.



Figure (5) shows the sensitive device

- 4- The person who contains inside the operating device and the sensor device, while the external shape of it contains light of one of the four colors.



Figure (6) shows the figure for the optical device

#### **2-4 Tests used in the research:**

After reviewing the scientific sources and previous studies to determine tests that are compatible with the nature of the subject of the study, the researchers did not find what is appropriate due to the specificity of these tests in measuring the speed of the motor response

to the visual stimulus and by using an accurate measuring device, so the researchers decided to modify these tests in order to obtain accurate results that reflect the level of individuals. The research sample is accurate without any bias, noting that the opinions of experts in the field of tests, measurement and volleyball ( ) were taken into consideration, as well as the scientific conditions for the test (validity, reliability, objectivity) were made.

Selective kinematic response velocity test for visual stimulus:

**The purpose of the test:**

Measurement of the ability to rapid and accurate motor response according to the choice of the stimulus.

**Tools:**

Legal Sitting Volleyball Court, Four Colors Launcher, Measuring Tape, Masking Tape.

**Measures:**

The test area is planned with four points, each point representing one of the four colors, the distance from the side between one point and another 1.5 m and the distance between the starting point and the four points 3.20 m and the starting point in the middle of the finish line of the volleyball court is determined so that the four points are in the shape of a crescent in order to ensure The distances are equal for all points with respect to the starting point, and the color launch device is placed on the starting point as shown in Figure (2).

**Test description:**

The tester stands at the starting point.

- The laboratory takes a standby position so that the starting point is under the seat and bends its body forward slightly and looks towards the four colors.
- The laboratory responds to one of the four colors that the device shoots and tries to run as fast as possible in the specified direction to reach the specified point that is 3,20 m away from the starting point.
- When the laboratory reaches the required person, it touches the sensor at the top of the person to stop the attempt time.
- And if the laboratory starts running in the wrong direction, time continues in the device until the laboratory changes its direction, reaches the correct direction and touches the sensor.



The laboratory is given (8) consecutive attempts between each attempt and the other (10) seconds, with two attempts in each of the four colors.

Attempts are determined in each of the four colors in a random, successive manner.

the conditions:

- Each laboratory is given a number of attempts outside the test itself, the basic conditions, in order to familiarize with the test procedures.
- The laboratory should not know that it is required to perform eight attempts divided into two attempts for each color, and this procedure is also important to reduce the laboratory's expectation.

The laboratory must be alerted that the number of attempts that it will perform is not evenly distributed among the four colors, but it is possible that the number of attempts of one color is more than the other, and that the order of the performance of the attempts is random and differs from one laboratory to another.

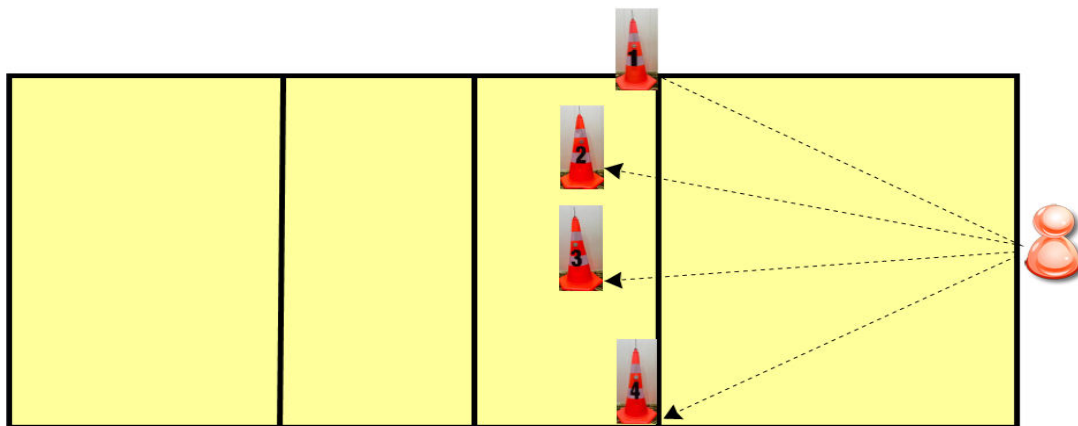
**The test should begin with the arbitrator giving the following signal:**

**Prepared and at all attempts.**

**Registration:**

Calculates the time for each attempt.

The laboratory score is: The average of the eight attempts.



**Figure (7):** (The test demonstrates the velocity of the kinematic response to the visual stimulus)

## 2.5 Exploratory Experience:

The researchers conducted an exploratory experiment for tests and exercises on Thursday 9/1/2020 AD in the hall of the Specialized Volleyball School in Baghdad on a sample of (4) players from the national team volleyball seated players and the purpose of the experiment was:

- 1- Knowing the difficulties that the researcher will face and working to avoid them.
- 2- Knowing the time it takes to take the tests.
- 3- Knowing the sample's ability to perform the selected tests and their suitability for them.
- 4- Knowing the ability of the assisting team to work on multiple means.
- 5- Ensuring the validity of the equipment and tools used in the research and the locations of their placement during the implementation of the tests.
- 6- How difficult and appropriate exercises prepared for players are.

## **2.6 Scientific foundations of the test:**

### **2.6.1 Test validation:**

In order to ensure the validity of the proposed device and the test, the researchers used the validity of the content or (the content), as the device and the test were clearly and detailed, and to ensure that the device and the test achieve the desired goal, as the test was presented to the specialists and experts (\*) and they agreed that this device and the test measures the characteristic Or the capacity you put it to measure.

### **2.6.2 Test Stability:**

Stability is one of the most important characteristics of a good test, and it is intended to give the same results if it is re-applied to the same sample on two different periods and in similar circumstances. Therefore, the stability coefficient was found by applying the tests to a sample of players, numbering (3), on 1/13/1. 2020 and the test was re-applied after seven days on 1/20/2020, and after taking the results, they were treated in a statistical way with the simple correlation law, Pearson found that the test has high stability and Table (1) shows the test's stability.

### **2.6.3 Objectivity:**

The objectivity of the measurement means ((Little or no difference in the method of evaluating the measurement for the testers, regardless of the arbitrators differing in it, and the less the difference between the arbitrators, this indicates that the measurements are objective)).

Since the tests used in this study are clear and not subject to interpretation, and far from self-evaluation, registration in them is done using units representing (seconds). Therefore, the tests used are considered to be of good objectivity and this was done by using two arbitrators (\*) and Table (1) shows that.

**Table No. (1):** It shows the coefficient of stability and objectivity

T	the exams	Stability coefficient	Factor of honesty
1	The speed of response to the visual stimulus	0.94	<b>0.97</b>

### **2.7 pre-tests:**

The pre-tests for the experimental group were conducted on Thursday 23/1/2020. The tests were conducted under the supervision of the researchers and with the help of the auxiliary team specialized in the game of volleyball from the sitting position.

### **2.8 Main Experience:**

The researchers prepared the exercises and their application was as follows. (12) educational units were implemented in which the exercises were applied using the visual device with rubber ropes in the main section of the training unit, as the duration of their application lasted (4) weeks and at three educational units per week (Thursday - Friday - Saturday) From Thursday 1/30/2020 until Saturday (2/29/2020), the number of educational units reached (12) educational units, and the total time for the total weekly educational units was (90) minutes, at (30) minutes from the main section in One educational unit.

### **2.9 Dimensional Tests:**

After the completion of the educational units, the post-tests of the experimental group were conducted on 3/2/2020, and the researchers, through their supervision of the research procedures and in cooperation with the assisting work team, were keen to implement the same procedures used in the pre-tests while creating appropriate conditions in terms of time, place and tools.

### 2.10 statistical methods:

The researchers used the Statistical Package (SPSS) for the following statistical laws:

- 1- The arithmetic mean.
- 2- Standard deviation.
- 3- Simple correlation coefficient (Pearson).
- 4- The t-test of cross-linked samples.
- 5- The percentage law.

### 3.1 Presentation, analysis and discussion of results:

The researchers presented and discussed their findings to identify the effect of exercise using auxiliary tools to develop the kinematic response velocity of volleyball players from a seated position.

#### 3.1.1 Presenting, analyzing and discussing the results of the pre and post tests.

##### 3.1.1.1 Presentation, analysis and discussion of the results of the pre and post tests of the experimental group.

**Table (2):**It shows the arithmetic mean, standard deviations, calculated (t) value, error rate and significance for the pre and post tests of the kinematic response velocity of volleyball players from the sitting position

Variables	The pretest		Post test		Calculated (t)	mistake percentage	indication
	s	P	s	P			
The speed of response to the visual	1.96	0.24	1.85	0.19	4.62	0.00	moral

<b>stimulus</b>							
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With a level of significance (0.05) and with a degree of freedom (n-1)

### **Analysis:**

Through the results presented in Table (2) for the experimental group, the arithmetic mean of the pre-test for the speed of the kinetic response to the visual stimulus was (1.96) with a standard deviation of (0.24). The arithmetic mean of the post test for the speed of the kinetic response to the visual stimulus was (1.85) with a deviation. Standard of (0,19)

The (T) values calculated are (4.62) for the visual stimulus at (11) degree of freedom and with a significance level (0.05), which indicates the presence of statistically significant significant differences in favor of the post-tests.

### **Discussing the results:**

It is evident from Table (2) that there are significant differences between the pre and post tests of the experimental group and in favor of the post-tests in order to achieve the hypothesis of the first research.

The researchers attribute this to the extent of the effectiveness of the exercises using auxiliary tools and the emphasis on the principle of repetition, as learning was done gradually from easy to difficult, and the extent of the effect of using the auxiliary tools for the purpose of developing the speed of the motor response through the performance and repetition of the exercises in a manner that amounts to being close to the playing conditions Taking into account the change in the exercise and its multiplicity as well, the player's impulse towards performance for modern and easy-to-use devices that were not previously used, such as the optical device and the rubber cords that are tied to the waist when performing exercises and that arouse the player's curiosity in trying what is new makes him any player to perform repetitions with confidence, desire and action For the better, therefore, this indicates that the direction of the cursor is towards the positive effect of exercises, and allowing the player to perform exercises at a slow speed during the first repetitions allows clear vision, which allows him to correct the paths and thus reduce the time of the movement response.

Exercise is the performance or completion of a specific work or duty repeatedly intended to bring the acquired skill to its full form, and among the basic principles of the exercise of the exercise, which he laid down ((singer1980) is the type of exercise and means the manner in which the exercise is performed and depends on motivation and repetition, avoiding errors and awareness of the conditions of the exercise environment. And his cases, as these concepts have goals, which are the obvious change in the form of movement performance to reach an advanced level in performance and control or control of performance (1).

And that the correct and continuous implementation of these exercises reduces response time, which adapts the player for this purpose and provide the opportunity to refine their talents.

Whenever there are many iterations in response to a specific stimulus, this will accelerate the decision-making and then shorten the reaction time and increase its speed (2).

The use of the optical device with rubber ropes also had a great effect by giving the player different stimuli, which helped the players in diverting attention between stimuli and repeating them through various exercises, as weighing the waist with rubber bands when training leads to an increase in the speed of movement performance, meaning that the strength gained from this The type of training leads to better movement activity by increasing the ability of the muscles to contract at a faster and more explosive rate.

When there is a variety of stimuli at different speeds, the athlete has decisions to determine the appropriate response to those stimuli by responding and refraining from each other, in other words, the distinction must be made quickly between the different stimuli, and when there are two or more stimuli, two or more must be employed. Responses are in quick succession and this is common in ball games (1).

#### **4- Conclusions and Recommendations:**

##### **4.1 Conclusions:**

In light of the experiment carried out by the researchers, they reached the following conclusions:

1. The different and varied motor response speed exercises using auxiliary tools helped to develop the motor response speed of volleyball players from the sitting position.

2. The use of auxiliary tools in the exercises increased the players' experience in reducing the response time and thus the speed of decision-making. All this improved the level of performance of the players.
3. The use of multiple stimuli in one exercise exposes the player's movement programs to difficult requirements (which are somewhat similar to the playing conditions) and with regular repetitions, which adjusts the player to those stimuli and increases experience, and then reduces the time of the movement's response to him.

#### **4.2 Recommendations:**

1. The use of modern devices and tools in training for volleyball players from a sitting position because of their importance in developing the speed of the motor response.
2. Relying on advanced and modern equipment when building tests because they reflect the true level of individuals, far from bias.
3. Paying attention to exercises to develop the speed of the kinetic response using multiple and various stimuli and resistances, provided that the performance is from movement (ie, linking more than one movement in a single exercise).
4. Giving the player complex or multiple stimuli to make the exercises similar to the real playing conditions, especially in games that require speed and accuracy at the same time.

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## **Appendices**

### **Accessory (1)**

Kinematic response speed exercises using the optical device and rubber bands

1. The exercise of lying flat on the stomach and looking at the light stimuli on the finish line of the volleyball court. Sitting with the signs in front of the player when one of the colors appears, starting at full speed towards the offensive line, where the four signs are placed on the offensive line.
2. The same previous exercise with the elastic bands attached to the waist.
3. The exercise of lying flat on the stomach and legs towards the light stimuli on the finish line of the volleyball court, the signs are sitting in front of the player, and upon hearing the instruction, it goes towards one of the colors towards the specified color.
4. The same previous exercise with the elastic bands attached to the waist.



5. The sitting exercise in the defense position and the signs are in the form of a square minus a rib, and the player is in the middle when launching one of the colors, the maximum speed will be launched towards the specified color.
6. The same previous exercise with the elastic bands attached to the waist.
7. Exercise lying on the back and legs towards the light stimuli on the finish line of the volleyball court. Sitting when one of the colors appears, start at full speed towards the offensive line, where the four signs are placed on the offensive line.
8. The same previous exercise with elastic bands attached to the waist.
9. The long sitting exercise with the player's back toward the stimuli, and upon hearing the instruction, he blows in the direction of one of the colors towards the specified color.
10. The same previous exercise, with the elastic ropes attached to the waist.

#### **Accessory (2) Experts and specialists**

<b>The scientific title</b>	<b>Name</b>	<b>Jurisdiction</b>	<b>Workplace</b>
<b>Associated professor</b>	<b>Alaa Mohsen Yasser</b>	<b>Biomechanics (volleyball)</b>	<b>College of Physical Education and Sports Sciences Baghdad University</b>
<b>Associated professor</b>	<b>Riad Mezher</b>	<b>Test and measurement (football)</b>	<b>College of Physical Education and Sports Sciences Mustansiriya University</b>
<b>Associated professor</b>	<b>Ammar Khalil Ibrahim</b>	<b>Motor learning (volleyball)</b>	<b>Ministry of Higher Education and Scientific Research / Supervision and Evaluation Agency</b>