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The Effect of Special Weight Exercises Using Auditory Apparatus According to Kinematic Indicators For Developing Auditory Response and Accuracy of Spiking in Volleyball

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Abstract

The research aimed at designing weight exercises using auditory apparatus according to kinematic indicators for developing auditory response and the accuracy of spiking in volleyball as well as to identify the effect of these exercises on the developing auditory response and the accuracy of spiking in volleyball players. The subjects of the research were (12) volleyball players from the national center for gifted in volleyball/ Ministry of Youth and Sports in Baghdad. Two setters as well as the libero were excluded making total of (9) players as research subjects. The researchers used special weight exercises using auditory apparatus according to some kinematic indicators for developing auditory response and spiking accuracy in volleyball players. Kinovea was used for motor analyses to conclude the kinematical variables of spiking in volleyball. Spiking accuracy test was conducted on volleyball players using auditory apparatus. The results showed a great development in auditory response and spiking accuracy in the subjects understudy as well as there was an improvement in some kinematical variables due to these exercises using the auditory apparatus according to kinematical variables.

Keywords: *auditory apparatus, kinematical indicators, spiking accuracy, volleyball.*

I. Introduction:

Spiking is considered one of the most important skills in volleyball for both players and spectators as well as being the hardest of skills regarding to performance that requires coordination between neuro – muscular systems. In addition to that, spiking is the skill with which a team ends its three touches allowed by the rules

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of the game leaving its effects of strength, speed and accuracy on the opposing team scoring points. The accuracy of perfroming spiking in volleyball requires many varaibles including audiotry and biomechanical variables as well as training exercises that suits the requirement of this skill. Training has many benefits; it recruits the most possible number of muscles, improves old skills and develops new skills till reaching a high level of coordination. There are many factors that affect training and they are:[1]

1. Guidelines related to the nature of the skill.

2. Model and display of skill movement exercises.

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4. Motivation and encouragement before exercises.

5. Providing knowledge of mechanical principles related to performance.

6. Observing cases of fatigue during exercises.

7. Identifying psychological and social conditions.

Using training aids and apparatuses during training have a great effect in developing the players' level of performance for they improve skill level through developing muscular strength, speed development and other physical traits.

The importance of the exercises lies in developing the players' auditory or visual response speed specially the offense to increase his speed in executing spiking according to variables for escaping the block of the opposing team and performing the skill with strength, speed and accuracy away from the opposing team's defense. This can be achieved through repeating exercises that stimulate certain response to speed decision making process decreasing reaction time.[2] Increasing the number of repetitions and attempts will decrease reaction time.[3]

II. Method:

The subjects were (12) players from the national center of gifted in volleyball/ ministry of youth and sport in Baghdad. two setters and the libero were excluded making a total of (9) players aged (16 – 18) years old. Table (1) shows the subject's homogeneity (age – height – weight – training age)

Table (1)

No	Variables	Mean	Std.Deviation	Mode	Skewness
1	Age (year)	**17.3333**	**.70711**	**17.00**	**-.606**
2	Height (cm)	**183.8889**	**1.90029**	**183.00**	**-.922**
3	Weight (kg)	**75.1111**	**2.93447**	**71.00**	**.242**

4	training age (year)	**5.3333**	**.70711**	**5.00**	**-.606**

Table (1) shows skewness of the subjects between (±3) in (age – height – weight – training age) that proves the homogeneity of the subjects.

Material Used:

1. Random shot (1)

2. Electronic stopwatch type (SEWAN)
(2)

3. Official volleyball balls type
MIKASA (30)

4. Colored tape (5)

5. Measuring tape (1)

6. Video camera type (SONY) (1)

7. Cones 1m height (4)

8. Numbered positions (1,2,3,4) (4)

9. Different weighted weights.

Random Shot: -

The random shot is a teaching - training apparatus use for improving the speed and accuracy of motor response in many sports and activities including volleyball. In addition to making training fun, it can be used for many levels. The shot provides random set of numbers through a motor sensor and has robotic speaker that calls out the numbers (1,2,3,4) randomly. On the floor there are numbered positions for places where the ball should fall. When a player passes this apparatus it calls out one of these numbers and the player should hit the ball towards the position with the same number on the floor.

- **Kinematical Variables :**

Kinovea for motor analyses program was used to find the variables of spiking performance speed.
The subjects were videotaped during pre and posttests using high frequency (140 pix/frame type Sony camera placed vertically on the right side of the player 8m from the floor and 55.1m height.

The following variables of spiking speed performance were concluded :

Angular Speed of Hitting Arm measured through the following formula : -

angular speed = angular arm transfer/ time

Perimeter Hitting Arm Speed measured through the following formula : -

Perimeter speed = angular speed × r / 57.32 min

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Ball Launch Speed measured through dividing the launch distance on launch -
time.

Auditory response and spiking accuracy test: -

Purpose : measuring the accuracy and auditory response speed of spiking from position (4)

Tools: official volleyball court, 243 cm high net, official balls, coach, two auditory device on a stand, electric extension as the figure below.

Performance: the tester should stand in position 4 ready to spike, the coach sets the ball at suitable height on the net, a steady block at positions (2-3). The moment the player starts to move to perform the spike, the auditory device is operated and the player should follow the directions of the device.

Conditions : the tester is given (10) random attempts; five diagonal spiking attempts and five straight spiking attempts. Unsuccessful attempts should be repeated with proper time between attempts.

Scoring : each players that spikes at the located position gets (4) points.

(3) points for the players who spikes and the balls falls in the back (A) diagonal -
and (B) straight.

(2) points for the players who spikes and the balls falls in the back (B) diagonal -
and (A) straight.

(1) point for spikes that falls in (C) -

(0) points for unsuccessful spikes. -

Total test scores is (40) points. -

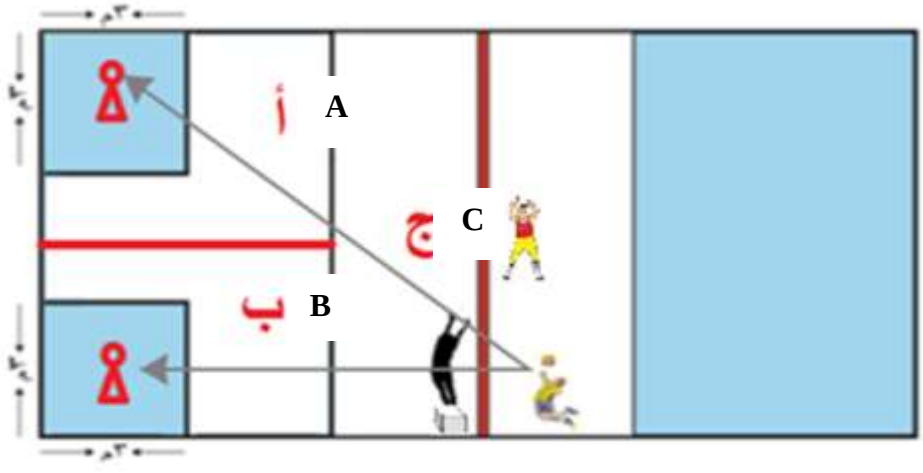

Figure (1)

auditory response and spiking accuracy test from position (4)

Main Experiment :

Pretests : -

Conducted at 4 o'clock evening on Sunday 1/12/2019

Special Exercises : -

Special exercises started on Monday 2/12/2019 and continued for (8) weeks with 24 training session with (3) sessions per week. The special exercises were applied during the main part of training according to kinematical indicators using weighted weights on hitting arm for developing auditory response and accuracy of performing spiking in volleyball.

Posttests : -

The posttests were conducted at 4 o'clock in the evening of Monday 27/2/2020.

Statistics :

The researchers used SPSS that includes the following; mean, median, standard deviation, t – tests and skewness.

III. Results : -

Table (2)

Means, standard deviation, t – tests and differences between pre and posttests in subject of the study in speed and accuracy of auditory response

Variables	Measuring unit	N	Pre- tests		Post- tests		t	df	Sig. (2-tailed)
			Mean	Std. Deviation	Mean	Std. Deviation			
Speed of Auditory response	s	9	1.9689	.02619	1.8567	.02345	40.400	8	0.000
Accuracy of Auditory response	deg	9	21.2222	1.30171	28.6667	2.39792	19.757	8	0.000

Table (3)

Means, standard deviation, t – tests and differences between pre and posttests in subject of the study in kinematical variables

Variables kinematic	Measuring unit	N	Pre- tests		Post- tests		t	df	Sig. (2-tailed)
			Mean	Std. Deviation	Mean	Std. Deviation			
Arm angular speed	Deg/s	9	575.6289	17.43051	777.4144	17.01426	277.934	8	0.000
Arm Perimeter Speed	m/s	9	6.5556	.04531	9.4989	.14469	86.378	8	0.000
Ball starting speed	m/s	9	15.4622	.07190	18.2911	.13033	140.740	8	0.000

IV. Discussion : -

Table (2) shows significant differences between pre and posttests of subjects understudy in speed and accuracy of auditory response. The researchers believe that these differences are due to the affectivity of auditory exercises stressing the principle of repetition as well as using auditory stimuli through auditory device as well as moving exercises from easy to hard. Training on spiking and auditory response speed concentrated at the beginning on accuracy using multiple exercises that increase concentration and reinforce motor programs, improve motor control and increase experience to develop the level of accuracy.

Liba[4] and Mohr[5] conformed that training for a specific amount of time lead to improvement in accuracy and experience improves as well.

Concerning time of slow exercises performance especially during the first repetitions of training, Zelaznik pointed that error reduction while increasing movement time is due to motor control that reduces error.[6]

Schmidt pointed that the aim of the main skill is accuracy the performance should be slow to reduce error.[7]

This has been noticed during the first days of exercises, the more the player had experience the better he was able to select the correct stimuli the suits performing spiking thus directing the ball towards the correct place. In addition to that, the players exposed to complex exercises using auditory device with varied exercises developed speed and accuracy of auditory response motor program for volleyball spiking by accurately evaluating the distance and angles of targeted positions. A matter that makes the players' motor outcomes suitable to their skill target they are practicing on as well as using devices, tools and apparatuses with complex exercises to develop artistic performance within a short period of time.

Variance in ball directions and positions is suitable for varied exercises during the development stage of skill performance due to their great effect on motor programs and laws that players' benefit from during matches.[8]

The researchers coordinated between speed and accuracy thus not using excessive speed that affect spiking accuracy with stressing performing the skill with low speed at the beginning of exercises to develop accuracy then gradually increasing speed to suit the development of accuracy. It is important to train players using this style to achieve the best levels of performance accuracy as well as using training aids that develop performance accuracy by using variable positions and performance methods controlling the difficulty of performing that is reflected in the speed and accuracy of performance.

Successful performance requires performing the skill with speed and accuracy and this cannot be done through performing the skill with excessive speed because it leads to increase in error and over concentration on accuracy leads to decrease in speed. Thus, for reducing error and achieving performance success the speed should specified.[9]

Reaction time can be developed in advance and elite players' through training and repetition of skill.[10]

Repetitive robotic practices for longer periods of time builds performance fluency (speed and accuracy) in motor skills to achieve fluency in executing complex and difficult skills in game – like situations leases to players' speed and accuracy skill development.[11]

Table (3) shows significant differences between pre and posttests in using complex exercises in angular and perimeter speed of arms and ball launch. The researchers believe that these differences are due to the effect of auditory complex exercises effect using weights that suits arms mass. That led to the development of arm muscular strength that is reflected in the speed development. The more the strength provided by body muscles the more angular speed of joint for "angular motion depends on a system of inner momentum resulting from muscle contraction that causes the rotation of limbs around their joints.[12]

In addition to that "sports that require speed as a main component it is better to train speed and strength in a game – like performance to increase body speed and performance.[13] Thus, the use of weights suitable for arm mass had a great effect on developing arm muscle speed and strength that led to an increase in angular and perimeter arm speed. Spiking speed and accuracy of performance in volleyball players cannot be developed by changing performance angles but through adding mass on working parts of the body to increase resistance that will lead to increase in momentum and developing muscle strength in return, according to working muscles and that all leads to developing contraction speed. [14] This means special strength of perfuming muscles will increase in speed in that part of the body that eventually increase the speed of ball launches that is considered the outcome of increase in arm angular and perimeter speed. In addition to that Susan Hall states that "skilled performances of high-velocity movements are characterized by precisely coordinated timing of body segment rotations.[15]

V. Conclusions:

The researchers concluded that there is a development in motor response for auditory stimuli as well as development in auditory response accuracy of spiking. In addition to that the results showed a development in angular speed variables and perimeter speed for hitting arms and ball launch speed in performing spiking in volleyball.

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