

THE EFFECT OF A PROPOSED TRAINING PROGRAM USING INTERMITTENT TRAINING TO DEVELOP SOME PHYSICAL AND BIO- KINEMATIC VARIABLES AND ACCURACY OF THE JUMP SPIKE SERVE SKILL IN VOLLEYBALL

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Abstract

The purpose of this paper is to identifying the values of some physical and Bio- Kinematic variables during the performance of the jump spike serve skill, and identifying the effect of the proposed training program using intermittent training to develop some physical and Bio- Kinematic variables and accuracy of the jump spike serve skill among the research sample. The experimental method was used and the research was conducted on a deliberately chosen sample of the players of the Army Club, who were primarily advanced in volleyball, and the number of the sample was (10) players. The conclusions were reached that the proposed training program using intermittent training has a positive effect on some of the physical and Bio- Kinematic variables of the advanced volleyball players and that this program has made an improvement in accuracy of the skill, Therefore, some recommendations were given, including the use of the intermittent training program to develop some physical and Bio- Kinematic variables because of its positive impact on volleyball players, and the use of intermittent training activities mainly in the special preparation period and the transitional period because of its importance in improving the physical and skill condition of volleyball players Providing sports equipment and tools used in intermittent training in sports clubs to serve the training process for volleyball players.

Keywords: Intermittent training. The skill of the jump spike serve. Bio- Kinematic. Physical. Volleyball

Introduction

Sports achievements constitute the bulk of the coaches and specialists in the sports field, and volleyball is one of the games that are directly affected by the physical and skill aspect, which Necessarily has to do with the application of the various conditions associated with performance, whether these conditions are technical or mechanical, the analysis and reliance on mechanical laws In training and its practical applications, it will lead to improving technique and accuracy of performance. Sports training for any skill performance is not a random process, but a planned process that depends on scientific rules, The training methods aim to raise the efficiency and capabilities of the players, physical, skill, tactical and psychological, to be able to make the required effort in an economic way to reach a better level (Al-Hawi. 2002).In order to find training treatments for volleyball

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practitioners, it has become possible to use intermittent training for different activities and games in order to give many diversities to reduce the risk of injuries, and it also means the difference in practicing different sports and other activities that improve performance in specialized sports, and finding appropriate training solutions to improve and raise its level of during the focus within the training units to develop some of the physical and Bio- Kinematic variables and accuracy of the jump spike serve skill.

Research Problem

Improving the level of skill performance of volleyball players plays an important role in competitions, so it has become necessary for the coach to have facts and information related to the characteristics of kinetic performance from the Bio- Kinematic aspects, which are difficult to obtain except by following the player's movement during his performance of the skill and analyzing it.

Therefore, this research came to contribute to the development of some scientific solutions based on mechanical laws, and the application of codified scientific training using intermittent training to develop some physical and Bio- Kinematic variables through the preparation of a proposed training program to develop some physical and Bio- Kinematic variables and accuracy of the jump spike serve skill for volleyball players and to bring the player to the best level of athletic performance.

Research Objective

- Identify the values of some physical and Bio- Kinematic variables during the performance of accuracy of the jump spike serve skill in the research sample.
- Identify the proposed training program using the intermittent training of the research sample.
- Identify the effect of the proposed training program using intermittent training to develop some physical and Bio- Kinematic variables and accuracy of the jump spike serve skill of the research sample.

Research Hypotheses

- There are statistically significant differences between the pre tests and post- tests for the values of some physical and Bio- Kinematic variables related to the performance of the jump spike serve skill for volleyball players.
- There are statistically significant differences between the pre and post-tests in accuracy of the jump spike serve skill for volleyball players.

Research Fields

- Human field: Advanced players of the Army Sports Club in volleyball
- Time field: (2/5/2021) to (8/7/2021)
- Spatial field: The Armenian Sports Club Hall, Al-Shaab International Stadium, volleyball sports hall and the swimming pool of the College of Physical Education - University of Baghdad.

Research Methodology and Field Procedures

Research methodology

Using the experimental method by designing one group to suit the nature of the research problem.

Community and sample research

The research sample was chosen by the intentional method of volleyball players from the Army Club for applicants, as the research community numbered (12) players, and (10) players were selected as a basic sample (one group), in addition to selecting (2) players from the same research community and outside the basic sample as a Exploratory sample, the research sample constituted (83%) of the research community.

Means, Tools and Devices Used in the Research

Means of collecting information

- Arab and foreign references, personal interviews, tests and

measurements.

Tools and devices used

- The scale of the drawing is length (1 m), and phosphorescent signs.
- Volleyball court, handball court, 20(legal volleyballs,)5(legal handballs,)2(stopwatches, and a whistle.
- Adhesive tape for identifying targets with a width of (5) cm, two metal measuring tapes with a scale (1 m, 25 m).
- Japanese-made medical scale (ketecto), and the Raster device for measuring length in centimeters.
- Tripod holder for the camera (2) and the number of the projector (1).
- A Japanese video camera of Sony origin, with a frequency of (25 r / s), number (1).
- Japanese-made Sony high-speed video camera with a frequency of (1200 r / s) (1), and the speed was set to 210 m / s.
- A laptop computer (Lenovo) with the use of Kinovea program to analyze movements.
- Weight training equipment
- Rubber ropes (10)
- amphitheater
- Iron bar.
- Swimming pool.
- Medical balls (20) of different weights.
- Hand dynamometer

Field Research Procedures

Physical abilities tests:

- First: muscular endurance test for the arms and shoulders area (Inclined prone with bending of the arms) (Jawad.2004).
- Second: grip strength test (Abdel-Jabbar and Ahmed. 1987).
- Third: oblique frontal support test, bending and extending the arms (push up) (Abdel-Jabbar and Ahmed. 1987).
- Fourth: speed Power Featured test For legs (vertical jump from stability))Man fredscholich,kreis. 1982.(

Accuracy test of the jump spike serve (Ibrahim. 2001)

The skill test was adopted by giving six attempts, and the laboratory performs the serve directing the ball towards areas (A, B, C, D) from a standing position and facing towards the arena, as shown in fig (1).

- 4 points for each attempt inside Area (A).
- 3 points for each attempt inside Area (B).
- Two points for each attempt inside Area (c).
- One point for each attempt in Area (D).
- Zero when the ball falls outside these areas.

- When the ball falls on a common line between two areas, the score of the higher area is calculated.
- The attempt is cancelled if the laboratory commits a legal error (Figure 1).

Exploratory Experiments

The exploratory experiment was conducted on Saturday, 2-5-2021, at exactly ten o'clock in the morning, on a group of (2) players from outside the research sample in the Armenian Sports Club hall, in order to install the camera and conduct the test for the skill of jump spike serve.

A high-speed video camera No.)1(was installed, and the camera was placed in a suitable place and the focus of the camera lens was perpendicular to the middle of the player's movement path when performing the skill, and the camera was (14.80 m) away from the middle of the players' performance area for serve, and the height of the lens was (2.10 m) from the ground level, and the scale of the drawing (1 m) was photographed as a reference for the measurement, and a video camera No. (2) was used to depict the accuracy of the jump spike serve skill. In addition, the second reconnaissance experiment was conducted on Sunday on 3-5-2021 on (10) players from the same research sample to try the exercises on the players.

Identification of Bio- Kinematic Variables

Imaging mechanism and extracting the values of Bio- Kinematic variables related to them: The Kinovea program was used to measure all indicators, as follows:

First: the angular velocity of the hip joint:

The angular displacement was measured after determining the lines that determine the angle of the hip, which is the line connecting from the knee joint to the hip joint and the connecting line from the hip joint to the shoulder joint. The angular velocity of the thigh joint using the following law:

Angular velocity = angular displacement /time (degrees/second)

Second: the angular velocity of the striking arm:

It is the amount of angular movement of the striking arm in the unit of time in a particular movement, and the angular velocity was measured by calculating the angular movement of the striking arm divided by the transition time, and its unit of measure (degrees / s), and it is measured through the following law (Khouribet and Shalash.2002) :

Angular velocity = angular transition of arms / time

The angular movement of the striking arm was measured from the moment of preparing to strike to the moment of performing the blow, and the player at the highest point of elevation after determining the lines that determine the movement of the arm between these two moments, i.e. the line connecting from the shoulder joint to the elbow joint in both moments, and measuring this angle between the two moments of preparation, And multiplication by using the program to measure angles, and calculate time.

Third: the angular velocity of the stem:

It is the amount of **angular transition** of the torso Completed in time a particular movement, and the angular velocity was measured by calculating the angular movement of the stem divided by the travel time, and its unit of measure (degree / s), and it is measured by the following law :

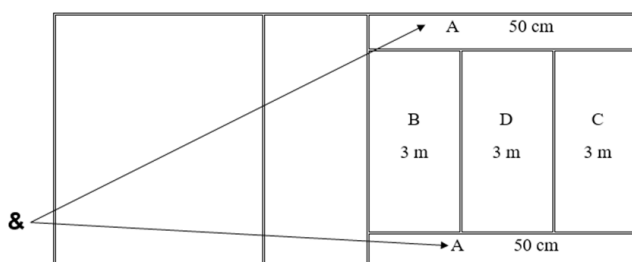


Figure 1: Shows the method of performing the serve skill accuracy measurement test.

Angular velocity = angular transition of torso / time.

The angular transition that the torso moves from the moment of preparing to strike to the moment of performing the blow was measured, and the player at the highest point of elevation after determining the lines that determine the movement of the torso between these two moments, which is the line connecting from the shoulder joint to the hip joint in both moments, and measuring this angle between two moments Prepare, and multiply through this program to measure angles, and calculate performance time.

Fourth: the circumferential velocity of the striking arm:

The following law measures it (Muslet.1999):

Circumferential velocity = angular velocity x arm length

The angular velocity calculated in the second paragraph above and the length of the arm of the player performing the smash serve are used.

Field Experiments

Pre-tests:

The pre-tests of the research sample were conducted on Saturday 9-5-2021 in the indoor hall of the volleyball court in the Armenian Sports Club.

Main experience:

The content of the proposed intermittent training program Appendix (1) was applied to the members of the basic research sample (one group) in the period from Sunday 10/5/2021 to Monday 6/7/2021 for a period of (8) Weeks by (4) training units per week.

Program foundations:

- Flexibility and elongation exercises at the beginning of the training unit.
- Paying attention to the element of suspense and diversification in sports activities and exercises.
- The training unit should be commensurate with the ability of the research sample members.
- Comprehensiveness and integration between the components of the proposed training program using intermittent training, with the aim of developing the mechanical and skill training status of the players.
- Using the method of low- and high-intensity interval training.
- Gradual and attention to training loads in proportion to the ability of the research sample, and to avoid overloading by paying attention to repetitions, groups and rest periods.
- The period of rest between one group and another ranges between (1 min - 2 min).
- Paying attention to the closing part by giving relaxation exercises to return to the normal state

Intermittent training activities for volleyball players:

The intermittent training activities for volleyball players were identified, in addition to the design of a questionnaire for experts' opinion to choose the appropriate activities, and it was presented to a number of experts specialized in sports training and volleyball, and in light of this, the following activities were identified:

- Weight training.

- Ballistic training.
- Water training.
- Handball.

Content of the training program:

Interest in integrating intermittent training activities in order to achieve the goal, where intermittent training activities (weight training, ballistic training and water training) were used, in addition to the Practicing handball and volleyball to achieve fun in training, and the content of the training program was divided into three main parts illustrated by Table 1:

Parts of The Daily Training Unit

Physical conditioning:

The duration of this part is (15) minutes, in order to prepare the circulatory and respiratory systems, with a focus on flexibility and stretching exercises.

Main part:

The time of the main part is (90) minutes. Implementation of intermittent training activities, which are explained in Appendix (1), and it includes a set of skill exercises to maintain the level of technical performance.

Conclusion:

The duration of this part is (5) minutes, and it includes relaxation and light stretching exercises.

-Post-tests:

The post-tests were conducted on Wednesday, 7-8-2021, taking into account that all the tests were under the same conditions in which the pre-tests were conducted, as much as possible and within the limits of the experiment.

Statistical methods: The search data was processed through the Statistical Package for the Social Sciences (SPSS).

Presentation, analysis and discussion of the results:

Presenting, analyzing and discussing the results of the physical variables of the pre and post-tests:

The results showed that there were significant differences in the physical variables, which indicates the endurance of the force of the muscles of the arms and the speed characteristic of the arms and legs. The reason for this development is likely to be the training program using intermittent training using physical and skill exercises appropriate to the sample's abilities, with repetitions, stress and appropriate volumes, gradation with training loads and the use of endurance exercises represented by weight training, ballistic and swimming And others, and this control from the physical side, as well as the skill exercises that depend on the continuity of performing the jump spike serve skill from different areas behind the serve line. On the highest sources of force production by prolonging the performance time, This is what he confirmed (William, 2001) that the athlete must develop muscular strength and the ability to endurance (the ability to exert force for a period of time) and this leads the athlete to reach high strength, that is, the endurance of force. The proposed program using intermittent training led to the development of physical variables through the use of weights, iron bars, medical ball throwing and the use rubber ropes that require grip strength and speed of movement to pull the rope with a certain resistance that directly contributed to increasing the grip strength of the players as well as the use of skill exercises with the ball with Developing movement speed, and the fist is one of the parts of the serve and improving the strength and accuracy of the jump spike serve skill,

Table 1: Shows the main parts of the proposed training program.

Parts	Number of units	Stage type	Main part time	Pregnancy intensity	Rest	Intermittent training activities used
General setting	8	Physical	65 min	Medium	fixed	Weight training - handball -volleyball
		Skills	25min			
Special setting	8	Physical	40min	above average	fixed	Weight training - swimming.pool - volleyball
		Skills	50min			
Perfection stage	16	Physical	25min	less than maximum	fixed	Ballistic training - swimming.- volleyball
		Skills	65min			

And they mentioned (Al-Fateh and Al-Sayed. 2002) The method of intermittent training aims to develop and improve speed and develop muscle strength as well as special endurance if the exercise is repeated for a sufficient period and it works to develop the attributes associated with basic skills. This requires the player to have speed, strength and accuracy that contribute to performing the skill correctly, as intermittent training is training in more than one sport at the same time, or training various physical fitness elements such as speed, endurance, strength and flexibility at one time, where the players train with a set of weight training, Ballistic, swimming, running and cycling to prepare for sports competitions (Jack Wilmore, et.,al. 2008) (Table 2).

Presentation and analysis of the results of the Bio- Kinematic variables of the pre and post-tests of the skill of jump spike serve, as well as their analysis and discussion:

The percentages of development indicated a good level of improvement in these variables for the members of the research sample, and the reason for this is due to the effectiveness of the proposed program using intermittent training, as this program contributed to the development of some Bio- Kinematic variables in the research sample, these variables are considered an important factor during the stage of the competition and obtaining High accuracy by performing the skill correctly according to the Bio- Kinematic variables and thus obtaining a direct point. The training program included a set of weight training for the legs, arms and torso, in addition to the practice of water training and handball sports as a stimulus factor. Weight training was carried out strongly appropriate to the research sample, and then the ballistic exercises were implemented The results showed positive in the angular velocity of the hip, torso, hitting arm and peripheral velocity of the striking arm as a result of using the proposed program using intermittent training, where intermittent training is the ability to accomplish movement actions in the least possible period of time, taking into account the external conditions, intermittent training works to increase the speed with less power consumption (Gould,PSWeiberg. 1997.) Intermittent training has a high degree of importance in improving the level of fitness components through intermittent training activities represented in swimming, cycling, walking in the water, as well as runway climbing and rowing. For skill performance, by developing coordination, balance, speed and accuracy(Eric Small& Linda Spear.2002) (Table 3).

Table 2: Shows the values of arithmetic means, standard deviations, and a difference of arithmetic means, standard deviations, calculated (t) value and level of significance of the research sample in the pre and post-tests of some physical variables.

Physical variables	Measuring unit	Tests	standard deviation	Mean	Difference of arithmetic means	Difference of standard deviation	T value	Type sig
Endurance force	Sec	Pre	24.00	0.54	5.87	2.57	7.24	Sig
		Post	29.87	0.17				
Grip strength	Min	Pre	34.74	10.03	7.24	3.26	7.02	Sig
		Post	41.98	12.90				
Power Featured speed for the arms	Repetition	Pre	10.01	1.38	0.95	0.47	6.33	Sig
		Post	10.96	1.69				
Power Featured speed for the legs	Meter	Pre	10.53	6.52	2.31	1.47	4.91	Sig
		Post	12.84	5.17				

Table 3: Shows the values of the arithmetic mean difference, standard deviations, the calculated (t) value, the level of significance and the rate of development of the research sample in the pre and post-tests of the skill of jump spike serve.

Bio-Kinematic variables of the skill of jump spike serve	Measuring unit	Difference of standard deviation	Difference of arithmetic means	T		Type sig	evolution rate
				Tabular	Calculation		
hip angular velocity	m/s	183.015	37.327	4.903	2.26	Sig	0.56%
torso angular velocity	m/s	0.735	0.241	3.049		Sig	0.35%
arm angular velocity	m/s	0.380	0.094	4.042		Sig	0.42%
Circumferential velocity of the striking arm	m/s	1.034	0.197	5.248		Sig	0.61%

Table 4: Shows the values of arithmetic means, standard deviations, a difference of arithmetic means, standard deviations, calculated (t) value and significance level for the research sample in the pre and post-tests to test the accuracy of the jump spike serve skill.

Jump spike serve skill	Measuring unit	Tests	Arithmetic means	Standard deviations	Difference of arithmetic means	Difference of standard deviation	T	Type sig
Accuracy	Degree	Pre	16.25	2.54	5.62	1.76	9	Sig
		Post	21.87	1.88				

Presenting the results of accuracy of the jump spike serve skill for the pre and post-tests of the experimental group under research, analysis and discussion:

Table 4 shows the values of arithmetic means, standard deviations, a difference of arithmetic means, standard deviations, calculated (t) value and significance level for the research sample in the pre and post-tests to test the accuracy of the jump spike serve skill:

There were clear differences in the values of the arithmetic means, and this difference indicates that there is a development in the accuracy of the skill performance with the exploitation of the capabilities of strength and speed during implementation, He confirmed (Timothy, R.et al.2009) the concentration of force constitutes a profit in the speed of its contraction, and it is one of the distinguishing characteristics of skill performance. The reason for this development in the accuracy of the skill is the use of intermittent training where the exercises carried out are very similar to the movement performance, which is characterized by the speed of movement, change of direction and change in the nature of work according to multiple positions in short periods of time, and used exercises that were aimed at raising the level of Skill performance such as various exercises similar to the skill of according to Bio- Kinematic indicators and taking the form of exercises in their movement path, the form of skill performance, which helped in the succession of implementation repetitions of the skill of jump spike serve, They confirmed (Al-Ani, and Salih. 1999) emphasized that “accuracy is the performance of a movement that is useful in a place and time ” Specific with an economy of energy and effort (Table 4).

Conclusions and Recommendations

Conclusions:

1. The intermittent training program has a positive effect on some of the physical and Bio- Kinematic variables of the advanced volleyball players.
2. The proposed intermittent training program made an improvement in the accuracy of the jump spike serve skill.

Recommendations:

1. Using the intermittent training program to develop some physical and Bio- Kinematic variables because of its positive impact on volleyball players.
2. The importance of using the intermittent training program to work on resisting the muscular effort.
3. Using intermittent training activities mainly in the special preparation period and the transitional period because of their importance in improving the physical condition and skill of volleyball players.
4. Providing sports equipment and tools used in intermittent training in sports clubs to serve the training process for volleyball players.

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Appendix 1:

The content of the proposed training program using intermittent training

Part one - week one (pregnancy intensity 50%)

Unit parts	Time	The exercises used	load size		rest period(min)	Used equipment
			Repetition	Set		
Physical conditioning	15min	1- Flexibility and elongation exercises for the muscles of the body.				
Main part	65min	physical exercises: 1- (lying high - bending the arms - (holding the device lever, extending the arms forward) (25) kg	15	5	1	weight equipment
		2- (Squatting) extending the knees. (Legs pressure). (40) kg	15	5	1	
		3- Arms high - Holding the device shaft, pulling the bar down. (20) kg	15	5	1	
		4- (Sitting high - the device is on the metatarsal) Extending the knees. (Extending the legs) (25) kg	15	5	1	
		5- A volleyball match. (5) min	1	2	2	
	25min	1-Perform scoring skill from different areas.	15	4	1	Handball
	2- A training match for (10) minutes.	1	1	2		
Conclusion	5min	1- Light running with regulating breathing. 2- Relaxation exercises.				

Parttwo - The third and fourth weeks (pregnancy intensity 70%)

Unit parts	Time(min)	The exercises used	Load size		Rest period(min)	Used equipment
			Repetiti on	Set		
Physical conditioning	15	1- Flexibility and elongationexercises for the muscles of the body.				
Main part	40	1 - (Standing) a variety of running forward and backward on both sides, inside the water, at a medium speed, in the form of a square (5 m x 5 m).	4	3	1	Swimming pool
		2- (Standing open, holding middle friend) progress forward	4	3	1	
		3-(Standing) holding a handball and passing it between two friends from standing in the water	15	3	1	
		4- buoyancy swimming back for 10 meters and back swimming	4	3	1	
		5- From a standing position, put the end of the elastic rope under the right foot and hold the other end in the right hand, then pull the hand to the side of the body up to shoulder level, then extend the arm in front of the body, then to the side, then return to the starting position.	15	3	1	Rubber ropes
		6- (standing) hopscotch on the right and left foot for a distance of 5 meters alternately	15	3	1	Stands
	50	1- Perform the skill of the jump spike serve with pitch planning in order to perform the skill	20	3	1	Volleyball

		accurately in Zone B, C				
		2- The player's performance skill of the jumping spike serve from different areas and directing the ball to area A, D	20	3	1	
		3- Performing a skill of the jumping spike serve in areas A, B, C, and D in order to train to develop the skill's accuracy.	20	3	2	
Conclusion	5	Relaxation exercises in the water.				