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The effect of balance exercises on the principle of moments in specific motor abilities and volleyball spiking for youth

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Abstract

The research problem was the presence of weakness in accurately performing the skill of crushing straight and diagonal beating. The researcher will try to solve this problem by developing special exercises for balance during activities that take the form of skilful performance and the nature of muscular work, as well as the use of weighting for the limbs (arms, legs), which works on the principle Determination, because the movements of the human body are semi-circular, and that these exercises combine the development of skilful, muscular and motor performance at the same time, like the actual positions of playing according to the required mechanical paths, Research aims: Preparing equilibrium exercises according to the principle of determination to influence some motor abilities in crushing volleyball for young people, To identify the effect of balancing exercises according to the principle of determination on some motor abilities in crushing volleyball for youth, Conclusions: The development of the two groups in all motor abilities and the preference of the experimental group in the post-tests, There was no difference between the two groups in the variable of kinetic flexibility because balance exercises according to the principle of moments were not based on this ability.

Keywords: *balance exercises, specific motor, volleyball spiking*

Introduction

The importance of the research lies in knowing the impact of the exercises that have been prepared on achieving ideality in performance by exploiting the principles and laws of biomechanics, saving effort and achieving balance for the player to reach the highest height to hit the ball from the highest point when performing the crushing hit, and trying to find logical solutions to the problems of wrong performance resulting from lack of Balance to improve the technical implementation of the athlete and bring him to the highest level during the performance of the crushing hitting skill [1][2].

Research problem:

The research problem was the presence of weakness in accurately performing the skill of crushing straight and diagonal beating. The researcher will try to solve this problem by developing special exercises for balance during activities that take the form of skilful performance and the nature of muscular work, as well as the use of weighting for the limbs (arms, legs), which works on the principle Determination, because the movements of the human body are semi-circular, and that these exercises combine the development of skilful, muscular and motor performance at the same time, like the actual positions of playing according to the required mechanical paths [3][4][5].

Research aims:

1- Preparing equilibrium exercises according to the principle of determination to influence some motor abilities in crushing volleyball for young people.

2- To identify the effect of balancing exercises according to the principle of determination on some motor abilities in crushing volleyball for youth.

Practical part:

The researcher used the experimental method in the style of the two equal groups (experimental and control) with two pre and post-tests because it fits with the nature of the research problem on the young players of the clubs of the Middle Euphrates governorates in volleyball for the sports season (2022_2023), whose number is (80) players representing (6) clubs, and the researcher excluded the player Free (libero) [6][7].

- **Field research procedures:**
- **Define search parameters:**
- **First: the crushing skill (diagonal - straight)**
- **Second: Mobility Abilities**:

1- The explosive power of the arms
2- The explosive power of the two men
3- The movement speed of the two legs
4- Agility

Exploratory experience: -

The exploratory experiment was conducted on Monday, corresponding to (12/12/2022) in the (closed hall of Al-Qasim Sports Club) in the province of Babylon in the (closed hall of the Al-Qasim Sports Club). The purpose was to identify the validity of the tests in terms of difficulty and the ability of the players to Perform them and take the appropriate distance for the cameras from the performance point of the volleyball players for the skill (crushing hit) and the length of the cameras from the net and determining the appropriate height for the focus of the video camera lens from the ground. High clarity so that we can then perform the analysis accurately, and the performance was conducted by three players representing Al-Qasim Sports Club in volleyball [8][9].

The researcher reached several points through the two exploratory experiments, which are:

1- Knowing the difficulties and problems that the researcher faces during work.
2- Knowing the actual time for each exercise
3- Knowing the suitability of the test for the research sample.
4- Knowing the time taken to conduct and implement the test.
5- Testing the validity of the used tools and devices
6- Ensure the efficiency of the auxiliary work team

Main search procedures

Pre-tests for the research sample

The researcher conducted pre-tests on the members of the research sample in its two groups (control and experimental) with the help of the assistant work team on (Friday) at (1:00 pm) on (12/19/2022), and the tests were conducted according to the following sequence [10][11].

1- Testing the accuracy of the crushing and shooting skill
2- Medicine ball throwing test (2 kg) (the explosive ability of the arms)
3- Vertical jump test (Sargent) (explosive power of the two men)
4- Testing the speed of the two legs' movements (kinetic speed)
5- Slalom running test by Barrow method (agility)
6- Numbered circles test (eye-to-leg compatibility)
7- Throwing and receiving a tennis ball (eyes and arms coordination)

The tests lasted for four consecutive hours, and there were rest periods between them for the laboratory to achieve its best. The researcher worked on writing down and fixing the conditions related to all the tests in terms of time, place, tools, devices, and the method of executing the trials to try to create the same or similar conditions when conducting the post-tests, as well as The researcher took the physical measurements of all the players, their mass and their training ages [12][13].

Video filming to test the accuracy of the overwhelming hitting skill:

The researcher filmed the performance of the sample for crushing and hitting the volleyball, as he used two cameras to perform the skill. Fixed supports, and both cameras cover the target movement field, for the purpose of identifying the kinematic variables of the skill, and in order to obtain a scientific formula for studying these variables, as the researcher used video imaging as one of the means of analysis, so the researcher relied on the video imaging process as it is the appropriate method in which he envisages The required accuracy in determining the sports movements that take place at a high speed so that they cannot be known through observation, as large numbers of pictures can be photographed in small units of time, and the cameras are operated by giving a signal to the imaging team to use them before starting the performance, and the first camera was placed on a tripod With a height of (1.65 m) from the focus of the lens to the ground, and a distance of (30 cm) from the net, while the second camera was (1.25 m) high from the focus of the lens to the ground, and at a distance of (3.35 m) from the net, where the distance of the two cameras from the track of the player's performance is (3.60). m) to show the full performance of the crushing skill of the volleyball players, where the speed of the camera dedicated to the performance was (60 p / s), and the scale used to know the dimensions through the scale depicted in the film by defining two points on both ends of the scale, which was used to measure (1m), and with this simple step, the program can determine any other distance such as the player's height, or specify a specific distance or a certain height by placing two points on both ends of the thing to be measured. Then the program will compare the required distance with the drawing scale and show the result directly in available units of measurement (meter and its parts) without the need for any other operations as happens in the previous method [14][15].

Homogeneity and equivalence of the two research groups:

Sample homogeneity: To control the variables that affect the accuracy of the research results, the researcher resorted to verify the uniformity of the research sample that relates to morphological measurements, namely (height, body mass, chronological age, and training age), as the researcher used the torsion coefficient before applying the main experiment to The two research groups (control and experimental) as shown in Table (1) [16][17].

Table (1)

It shows the homogeneity of the research sample in the variables of height, mass, chronological age, and training age.

Variables	Units of measure	mean	Standard deviation	Median	**skewness**

The length	cm	181.58	9.31	179	0,83
the weight	kg	63.67	6.64	65	0,61
age	years	16.67	2.3	16	0.87
The training age	month	15.5	7.13	16.5	0.42

Table (1) shows that the torsion coefficient values are less than (1 ±), indicating the homogeneity of the research community in all variables [18][19].

Sample Equivalence:

For the researcher to be able to attribute the differences in the results of the posttests of the variables under study to the effect of the experimental factor of balance exercises according to the principle of moments, the researcher resorted to verifying the equivalence of the two groups by using the (t) test for independent samples [20][21].

Table (2) shows the equivalence of the two research groups in the mental alertness scale and the motor abilities tests.

Variables	Unit of measurement	Control group		Experimental group		t value	Sig.	Significant type
		mean	standard deviation	mean	standard deviation			
The accuracy of the crushing skill	degree	17.22	3.25	23	3.58	0.68	0.910	Not significant
The explosive capacity of the arms	meter	5.98	0.59	6.25	0.77	0.66	0.171	Not significant
The explosive capacity of the legs	cm	54	2.96	55.61	3.86	0.58	0.220	Not significant
Motor speed	seconds	9.16	0.47	9.27	0.53	0.37	0.587	Not significant
Agility	seconds	25.13	1.28	24.91	0.7	0.34	0.73	Not significant

Executing balance exercises according to the principle of determination:

The researcher prepared and organised equilibrium exercises according to the principle of determination, based on the personal experience of the supervisor in the field of training and biomechanics, as well as benefiting from the opinions of some specialists that he obtained through personal interviews in the field of sports training, biomechanics and volleyball, referred to above, and began applying the exercises to the group. Experimental on 12/23/2022 until 2/13/2023, taking into account (intensity, repetitions, and appropriate rest periods). The researcher codified his training curriculum exercises according to the principle of determination, as well as the motor and skill ability of the research community, the tools used, and the method of training to be able to develop Kinetic capabilities and bio-mechanical variables in volleyball to achieve the purposes and objectives of the training process [22][23].

Details of balance exercises according to the principle of determination in the training curriculum are as follows:

1. The total number of training units for balance exercises according to the principle of intention (16) units.
2. The number of weekly training units that included balance exercises according to the principle of determination (2 units) for a period of (8) weeks.
3. Training days during the week are (Friday, Monday).
4. The time for the exercises prepared in the training unit is (40-55) minutes from (the main section only).
5. The researcher adopted the interval training method (high intensity) and the training process (repetitive) in all training units.
6. The exercises used within the training program fall within the special preparation stage
7. Balance exercises aim, according to the principle of determination, to develop motor capabilities, which are (explosive ability of the arms and legs, movement speed of the legs, flexibility, agility, coordination between the eyes and components, and coordination between the eyes and the legs).
8. The exercise codes were determined according to the physical and motor characteristics
9. The researcher used wave (1:2) between weeks and (1:1) between training units and exercises when applying balance exercises according to the principle of moments.
10. The intensity was determined by time and weight for all exercises.
11. The principle of torque was applied to all training units by placing heavy weights placed at the end of the forearm and lower leg of the players at a rate of (0.1% to 0.5%) of the player's body mass, according to the equation and the table of relative groups mentioned earlier to determine the added weight of the body parts These percentages were distributed over the weeks as follows (the first week and the second week 0.5%, the third week 0.4%, the fourth week and the fifth week 0.3%, the sixth week and the seventh week 0.2%, the eighth week 0.1%)
12. Each player's maximum intensity (100%) time was extracted to draw the curriculum and training units.
13. Details of the exercises related to equilibrium according to the principle of moments, which shows the symbol of the movement, the method of performing each exercise, how to calculate the intensity, and the number of units during which the activity is repeated.
14. All training units were applied to the experimental research, which included all the details of each training unit [24][25].

Post-test:

The post-tests for motor abilities were conducted on (Friday) at (1:00 pm) corresponding to 17/2/2023, after the period of applying the exercises, and the researcher tried to provide the conditions and controls followed in the pre-tests themselves in terms of place, time, tools, method of implementation and the work team The assistant who conducted the pre-tests [26][27].

Statistical means:

The appropriate statistical methods were used for his research and tests through the statistical (SPSS).

Results:

Presenting the results of the pre and post-tests of the control group for motor abilities

table (3)

It shows the arithmetic means, standard deviations, the value of (T) calculated for correlated samples, the level of test significance, and the importance of the difference for the pre and post-tests of the control group for motor abilities.

Variables	Unit of measurement	Pre-test		Post-test		t value	Sig.	Significant type
		mean	standard deviation	mean	standard deviation			
The explosive capacity of the arms	meter	5.98	0.59	6.43	0.6	3.5	0.01	significant
The explosive capacity of the legs	cm	54	2.96	56.66	3.44	2.6	0.04	significant
Motor speed	seconds	9.16	0.47	8.43	0.32	3.38	0.01	significant
Agility	seconds	25.13	1.28	24.4	1.01	3.53	0.01	significant

Our observation of Table (3), which shows the arithmetic mean, standard deviation, and the value of (T) calculated for correlated samples, and the level of significance and significance of the differences for the control group members in the pre-and post-tests,

Discussing the results of the pre and post-tests for the control and experimental groups for motor abilities:[28][29][30].

Through the results presented in tables (3) and (4) related to tests of motor capabilities, the results of the tests (explosive power of the arms, explosive power of the legs, motor speed, agility) showed that there were significant differences between the pre and post-tests of the control and experimental groups in favour of the post-tests. The researcher said that the reasons for the moral differences of the control group members are due to the exercises that were applied with the methods and methods prepared by the trainer, as they caused the development of those capabilities, which are one of the essential pillars of the skill of crushing hitting, which enables the player to perform the skill well, which led to the presence of moral differences in favour of the tests Dimensional, as a result of the regularity and continuity of training and the use of various exercises such as jumping, iron, medicine balls, etc. in the training units and rationing the training load according to what is appropriate with the sample level. The researcher also attributes the effect to the various exercises after the researcher has seen the training units of the control sample. As it had a significant impact on the development of these capabilities, and thus the use of training tools and tools played an essential role in the training process by contributing to increasing motivation and improving the efficiency of motor capabilities that gain the player muscle strength, which in turn leads to reaching the optimal motor path in carrying out duties during performance as well as. [31][32][33].The researcher agrees with (Saad Mohsen Ismail) regarding the process of improvement for the control group, as he says, "No matter how different the curricula of their scientific and practical culture are, the training or educational program inevitably leads to the development of achievement or performance, if it is built on a scientific basis in organizing the education and training process, programming it, and using Appropriate and gradual intensity and observation of individual differences as well as the use of optimal repetitions and effective inter-rest periods and under the supervision of specialists under good educational and training conditions in terms of space, time and tools used. "The training that aims to

develop the physical characteristics affecting achievement mainly when it is similar to skilful performance is better [34][35].

The researcher also attributes to the increase in training loads in the curriculum followed by the coach in setting the strategy to increase the burdens to create necessary adaptations appropriate to the level, and this is confirmed by (Mohammed Hassan Allawi) "It is required to gradually increase the degree of load to raise the organs and systems of the body to achieve more requirements and thus the possibility of expanding The level of capabilities of the individual than it was before.

The researcher attributes the development of the explosive force variable of the muscles of the arms and legs to the balance exercises and the resistances used according to the principle of moments, which includes the use of weights by weighting and the diversity in using these resistances. Muscle, where gravity works against muscle contraction, and each type of this resistance prepares different challenges for the power and relates to the situation in which the opposition is directed to the top of the muscle contraction. At that time, the administration must overcome the inertia of the mass of weights, and this is consistent with what (Issam Abdel Khaleq) mentioned, which it The efficiency of the individual in overcoming different resistances in the shortest possible time and the exercises that use a considerable resistance are among the appropriate means to develop the components of explosive power.

Conclusions:

Based on the research results that were reached within the limits of the research sample, it was possible to get the following conclusions:

1. The development of the two groups in all motor abilities and the preference of the experimental group in the post-tests
2. There was no difference between the two groups in the variable of kinetic flexibility because balance exercises according to the principle of moments were not based on this ability.
3. The balance exercises, according to the principle of moments, had a significant effect on the motor capabilities (explosive ability of the arms and legs, the movement speed of the legs, and agility), which was reflected in turn on the biomechanical variables of the crushing skill, which led to a clear development in the accuracy of the straight and diagonal crushing.
4. The achieved speed significantly affects the player's vertical height by converting the speed from horizontal to vertical.
5. The better the height of the ball at the moment of hitting, resulting from the explosive ability of the two men, the improvement is reflected in the accuracy.

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