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The effect of jumping exercises to develop the strength moments of some leg muscles and the accuracy of the skill of crushing beating

Muna Taha Idris
/ University of Technology / Department of Student Activities
Muna.t.idrees@uotechnology.edu.iq

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ABSTRACT

The progress in the sports level came as a result of the progress of the training process and upgrading the level of methods and devices and the preparation of coaches technically and practically, and keep pace with different situations, and one of the important training methods is to pay attention to the exercises for biomechanical variables, and the goal of the research is to identify the values of the strength moments of some of the working muscles of the two legs, and to identify the impact of jumping exercises for the two legs to develop the strength moments of some of the muscles of the legs and the accuracy of the skill of overwhelming beating young people and the researcher used the experimental approach to design the group One with a pre- and post-test and applied the experiment to the experimental group, which consisted of (10) players of young players from the Specialized School of Sports Talent, and conducted pre-tests, and post, and the researcher reached the need to build and prepare training programs to reach the required level of performance through the development of strength moments for some muscles of the legs Because of its positive role in developing muscle strength, and the accuracy of the skill of overwhelming beating

1- Definition of research:

1.1 Introduction and importance of research :

There is no doubt that we live in a developed world through the application of several sciences, foremost of which is the science of training and biomechanics in order to develop sports performance, and that scientific progress produces new directions of vision and future insight, which reflects on various areas of life, including the sports aspect, by linking various sciences to benefit from them, which will produce us modern trends of training methods, sports equipment and various training methods.

The skill of overwhelming beating is one of the important skills that need continuous training and a special technique for the players who practice it, as these exercises must be according to the technical performance of the movements related to the skill, and the importance of jumping exercises lies in increasing the speed and strength of jumping with the legs, which is especially useful for players as it will improve jumping or will increase the ability to rise vertically during the performance of the skill, and will work to strengthen the muscles of the lower part of the main body such as the quadriceps and posterior bilateral thigh And twins of the leg and hamstrings, through the foregoing, the researcher developed special exercises to develop the moments of strength for some of the muscles of the legs and the accuracy and accuracy of the skill of beating overwhelming .

1-2 Research problem:

The discovery of modern exercises is one of the important factors helping to achieve progress in the training process, and the events that require payment and flight are difficult and complex events, so you need scientific and codified training in order to develop the technical performance of the athlete, so the researcher's interest was in the use of jumping exercises for the two legs through the use of various exercises to develop the strength moments of some of the muscles of the legs andthe accuracy of the skill of overwhelming hitting.

1 - 3 Research objectives: -

Identify the values of the moments of force for some of the working muscles of the two legs in the research sample.

- Identify the jumping exercises of the research sample.

- Identify the effect of jumping exercises to develop the strength moments of some of the muscles of the legs and the accuracy of the skill of overwhelming beating

1-4 Research hypotheses :

- There is a positive effect when using jumping exercises in the strength moments of some of the muscles of the legs and the accuracy of the skill of overwhelming hitting.

1-5 Research Areas :

1-5-1Human field: a group of players of the Specialized School of Sports Talent, numbering (10) players.

1.5.2 Time Domain: 27/9/2024 to 29/11/2024

1.5.3 Spatial area: People's Stadium.

2- Research Methodology and Field Procedures :

2-1 Research methodology: The researcher used the experimental method for its suitability to the nature of the research problem.

2-2 Research sample: The sample of the basics on which the research depends and the number of the research community (14) players and the research sample was selected in a deliberate way, and their number reached (10) players and (4) players were excluded to conduct the exploratory experiment and they represent a percentage (71.4) % of the original research community.

2.3 Means of collecting information, tools and devices: 2.3.1 Means of collecting information

- Arab and foreign sources.

- World Wide Web (Internet). -Testing and measurement. - Data registration and unloading forms.

2.3.2 Tools and devices used in research:

- Sony video camera (Sony) Carl zeiss Varho – Tessar optical with a frequency of (25) images / s (1), and a tripod for the camera number (1).
- Video cassette tape (8 ml) number (3) and laser discs number (3).

- Medical scale to measure mass in kilograms type (Ketecto).
- Volleyball court, 10 legal volleyballs, whistle and 2 stopwatches.
- Metal measuring tapes (2) with a scale of 1 m and 25 m and adhesive tape to identify targets with a width of 5 cm.
- Multigm device, genometer, and iron dumbbells of different weights and types.
- Tape measure for measuring lengths and tape measure metric.
- Lenovo calculator .
- Kinetic analysis program (Kinovea).
- Jumping boxes of different heights 30 - 40 - 50 centimeters.
- Horse jumping gymnastics (moving height).

2-4 Biomechanical variables:

2-4 Field Research Procedures:

2.4.1 Determine the variables of the research: determine the moments of forces for some of the working muscles of the legs, and determine the test andaccuracy of the skill of beating overwhelming by the researcher, and was informed and take the opinion of experts and the Medical Committee [0,*]

2.4.2 Measurements and tests used in research:

3.4.2.1 Measurements used in research:

3.4.2.1.1 Body mass measurement: Body mass was measured by a medical scale to the nearest kg.

3.4.2.1.2 Measurement of leg heights:

A metal tape was used to measure leg length anatomically, i.e. the distance from the protrusion of the acromial bone of the knee joint to the place of gravity

* Consultant Doctor Majed Ahmed Al-Abd, Surgeon specializing in bones, joints, vertebrae, birth defects, and fractures -retirement.
Dr. Saad Hussein Abbas – Orthopedics and Traumatology.

a.Dr. Lama Samir - Training - Airplane - University of Baghdad / College of Physical Education and Sports Sciences for Girls .

carried in the leg to be used in the application of the law of force moment of the muscles (quadriceps, twins leg, and plantar muscle).

3.4.2.1.3 Measurement of the force arm (after the mdagam) of some muscles working on the hip and knee joint:

The point of connection of the muscle tendon to the bone (madagam) and its distance from the joint (axis of muscle rotation), i.e. measuring the distance between the muscle and the knee joint, was accurately diagnosed and determined based on medical sources, and with the help of a specialist in anatomy, orthopedics, and joints [*].

3.4.2.2 Tests used in research:

3.4.2.2.1 Tests of force moment variables for some muscles working on the shoulder joint and striking arm [*]:

3.4.2.2.1.1 Test the force moment of quadriceps**:**

Sit on the molting, where the back of the thighs is completely adjacent to the seat,

Place the feet under the weighted pillow withstability on the lower part of the shins of the legs above the ankles, holding the sides of the seat to prevent the hips from ri sing during the exercise, then

Stretch the legs completely with the thighs in full contact with the seat for two seco nds and then go back

Slowly to the starting position.

The moment of force of the quadriceps muscle was calculated by measuring the distance between the

[*] The distance of the joint was determined by the two doctors listed below:
- Consultant Dr. Majed Ahmed Al-Abed, a surgeon specializing in orthopedics, joints, vertebrae, birth defects, and fractures -retirement.

[*] These proposed tests are designed by the researcher and take the opinion of biomechanical experts:
Prof. Dr. Sareeh Abdul Karim - Biomechanics - Square and Square - University of Baghdad / College of Physical Education

Assoc. Prof. Najah Salman - Biomechanical / Hand - University of Technology - Director of Student Activities Department.

The tendon of the muscle, the rotation joint (knee) representing the (arm of strengt h) as well as calculating the dimension from

The knee joint up to the added weight as it represents this dimension (resistance a rm). The value of the maximum forces was calculated throug h the following law:

Strength × after the mudgham = resistance × after it [1].

The force is extracted by determining the resistance, and the resistance arm to extract the resistance moment that corresponds to the force moment, and the value of the real forces that affect the rotation of the organ around the joint can be found by the law:

The resistance × after it

Force = unit of N

After the mudgham

The maximum value of the quadriceps muscle was calculated by the following law:

Torque = the maximum force previously calculated × after the madgham [2].

3.4.2.2.1.2 Test of the force moment of the stem twinide muscle:

Lying on the abdomen on the device of the legs of the legs and placing the heels under the pillow of the weights and the knees at the end of the seat directly and the thighs are contiguous, holding the hand handles as a kind of support, then bending the knees and holding on this position (2) s, then extending the legs slowly and the force moment of the twin muscle was calculated by measuring the distance between the muscle tendon medjam, and the rotation joint (knee) which represents (force arm), and calculating the distance between the added weight, and the knee joint that represents (resistance arm), and then calculate the value of the maximum forces and muscle moment through the aforementioned law.

3.4.2.2.1.3 Test of the variable of the moment of force of the plantar muscle (Soleus):

[1] **Applications of Biomechanics in Sports Training and Motor Performance**, 1st Edition, Part 2: (Amman, Dar Dijla, 2010), p. 308.

[2] Ahmed Fouad El-Shazly: **Mathematical Encyclopedia in Biomechanics of Equilibrium**: (Alexandria, Knowledge Foundation, 2009), p. 217 .

From a standing position, put the right metatarsal on the edge of a wooden board or standing so that the heel under it is empty with weights placed in the feet, holding the hands with something to find appropriate support to maintain balance, lifting the body up as much as possible based on the metatarsal, holding on this position (2) s so that the muscles are tight and then slowly lowering the heel down as much as possible, and the leg must be straight during movement, then stretch the leg muscle completely in the part Low movement and the heel is at a low level from the toes and the muscle torque was calculated by the aforementioned law.

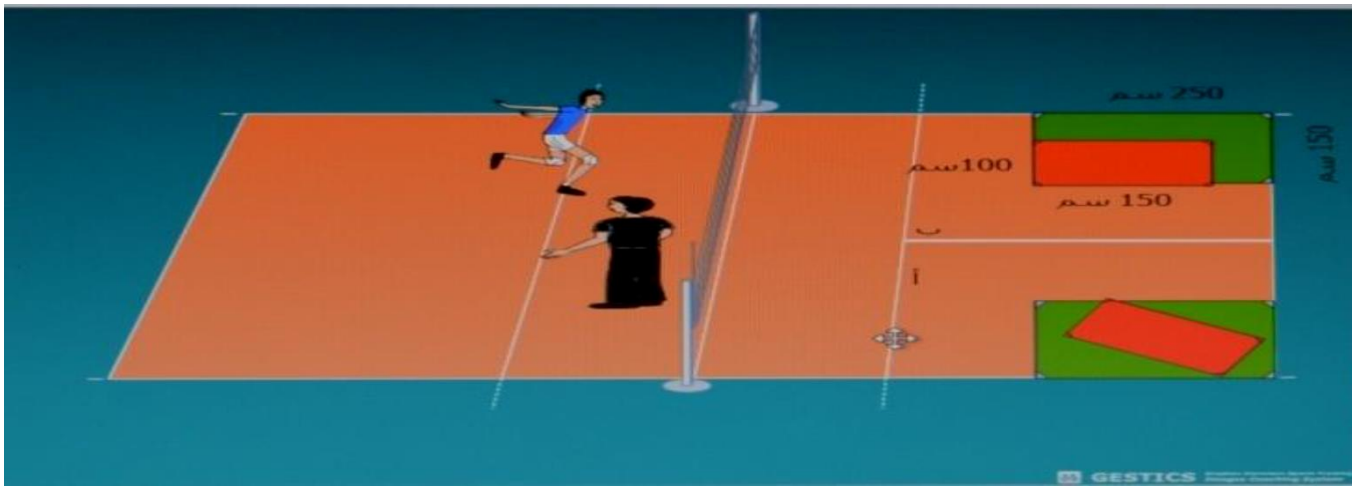
3.4.2.2.2 Overwhelming Beating Skill Accuracy Test ([3])

The player performs the skill of beating the Qatari crush from the center (4) by preparing by the coach from the center (3) and the player performs (6) attempts in the Qatari direction with the rank in the position (5), and grants (4) degrees for each correct crushing blow in which the ball falls on the rank painted in red, and grants (3) degrees For each correct crushing blow in which the ball falls in the area drawn in green, and (two degrees) are awarded for each correct crushing blow in which the ball falls in the two areas (a), and one point for each crushing blow in which the ball falls in the area (b), and (zero) when the ball falls outside these areas, and when the ball falls on a common line between the two areas, the degree of the highest area is calculated and the attempt is canceled in the event that the player commits a legal error as in picture (1).

Accuracy is calculated by calculating scores, and calculating the time from the moment the ball leaves the player's hand to the moment it falls to the ground through the use of the program (KinoveaThe following law has been applied:(2011 الفضلي، مظاهر التعلم الحركي للقوانين الميكانيكية)

Accuracy = degree / time is a unit of degree / s .

[3] Ali Salman Abdul Tarfi, Scientific Research Methodology, 2nd Edition: (Amman, Dar Al-Yazuri Scientific Publishing, 2015), p. 383 .



Picture (1) shows the planned stadium to perform the skill of the overwhelming beating

3-4-3 Exploratory experiments:

3.4.3.1 The first exploratory experiment for thetests :

The researcher conducted this exploratory experiment on Monday, 30-9-2024 at four o'clock in the afternoon at the People's Stadium on a group of (4) players from outside the research sample from the gifted school to find out the suitability of thetests for the level of playersEnsure the validity of the tools, the adequacy of the assistant team, its understanding of the test, the time required to carry out the tests, and overcome the errors that may occur when performing the tests.

3.4.3.2 The second exploratory experiment on the vocabulary of the exercises used:

The researcher conducted the exploratory experiment on (5) players from the same research sample, and at exactly four o'clock in the afternoon on Wednesday 2- 10 - 2024 and carried out the experiment in the People's Stadium and the Weight Hall, to try exercises on the players to know, find the maximum value, and know the percentage of the intensity of the exercises for weights.

2.5 Main experiment procedures

2.5.1 Pre-tests :

The researcher conducted the tribal tests on the players of the research sample, where the aforementioned measurements were made on Friday 4-10-2024 at four o'clock in the afternoon at the People's Stadium to perform the test of the

accuracy of the overwhelming beating skill, and then conduct the tests of moments for the muscles in the internal hall of weights with the installation of all conditions in terms of space, time and equipment when conducting post-tests
.

3.5.2 Special exercises used in the research :

The researcher developed the exercises, as well as the opinions of experts* and specialists

The main experiment started on Monday (7-10-2024) until Friday 29-11-2024

- The use of the method of interval training high intensity (90-100%) in training, as the method of training weights was used with intensity ranging from (80-90%) of the maximum intensity of the player's level to strengthen the muscles [(4),] while the intensity used in the exercises of adding weights to the legs during the performance of the skill of crushing beating ranges between (7-10) % of the mass of the leg for each playerSome of the physical exercises used were similar to the natural form of the same event .

- The time of exercises in one training unit ranges (40-45) minutes from the time of the main part.

- Use three boxes of different heights (30-40-50) cm.

- The application of the exercises took a period of eight weeks, and at a rate of (3) training units per week on (Monday, Wednesday, Friday), i.e. a total of (24) training units during (12) weeks .

- The training unit included separate and continuous momentary strength exercises, each according to its repetitions to suit the research sample, taking into account the ratio of work to rest between repetitions (1: 2), and according to the type of exercise, and its size, and the rest between one group and another (2 d) as shown in the supplement to the training units [(*).]

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Prof. Dr. Alaa Mohsen - Biomechanics / Volleyball - University of Baghdad - College of Physical Education and Sports Sciences.

a.Dr. Naima Zidan Khalaf - Tests and measurement / - Volleyball - University of Baghdad / College of Physical Education and Sports Sciences for girls.

[4] Abdullah Hussein Al-Lami, **Scientific Foundations of Sports Training**, 1st Edition: (Al-Qadisiyah, Library of the Faculty of Physical Education, 2004), p. 74.

* Notes Appendix (1)

- Separate and continuous instantaneous strength training was used with a device to kiel legs, as the maximum weight was determined, and the number of maximum repetitions of performance was determined according to a certain time, and the training intensity was extracted for it either at the expense of time or repetition.

3.5.2.1 Determine the training intensity of some of the exercises used:

The researcher used the law of resistance moment, as the increase in the resistance moment can be by increasing the weight required to overcome it, and thus the increase in intensity depends on the maximum limits of the resistance weight as long as the length of the leg is constant (resistance arm).

The reason for using the resistance moment to determine the required intensity is suitable for the exercises of the body parts attached to the axes[5].

To illustrate how to extract the intensity using the law of resistance moment, if the added mass of gravity of the man in the case of pulling or pushing (8 kg), and this weight is a distance (0.65 m) from the knee joint and represents this distance (resistance arm) To determine the maximum intensity of the resistance torque, we apply the following law:

Torque of resistance = mq× after

= 8 × 0.65 = 5.2 kg.m, which represents 100% intensity .

If we want to use the intensity (80%) of the maximum strength of the resistance torque.

∴ Required intensity = 5.2 × 0.80 = 4.16 kg. m.

As for determining the intensity depending on the mass of the man, it is possible that the increase in the mass of the man by adding the burdens of the man during the performance of the skill of beating the diagonal and straight overwhelming increase, for example, (5%) of the mass of the man, if the mass of the body, for

[5] **http** www.shoulder doc .co.uk /new /article .asp?artical =366& section =255 parsons et al. Orthop Res .2002.

example, (70) kg. It is calculated in kilograms according to the following equation (6):

The intensity of the exercise can be calculated as follows:

$$\text{Mass of man} = \frac{\text{K Body} \times 6.5}{100} = \frac{\mathbf{70} \times 6.5}{100} = 5.85 \text{ kg}$$

If we want to use the intensity (5%) of the man's mass

∴ Required intensity = 5.85 × 0.05 = 2.92 kg.

3.5.3 Post-tests:

The post-tests were conducted on the players of the research sample on Friday 27-11-2022 at four o'clock in the afternoon in the internal hall of the volleyball court, and the weight hall.

3.6 Statistical means:

The researcher adopted the statistical system (SPSS) and the following statistical laws (7).

4- Presentation, analysis and discussion of the results:

4-1 Presentation, analysis and discussion of the results of kinetic energy tests for the pre- and post-tests:

4-1 Presentation and analysis of the results of the moment tests for some working muscles of the leg for the pre- and post-tests, and discussed:

Table 1

The arithmetic mean, the standard deviation, the difference of the arithmetic means, the standard deviation of the differences, the calculated value of (T) and the level of significance for the research sample in the pre- and post-tests to test the moments of some working muscles

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6 Rolf Wirhed .; **Athletic Ability and the Anatomy of motion** : (Sweden, Harpoon publications . AB order, 1984) p.102.

7 Ahmed Odeh Youssef, Khalil Al-Khalili, Statistics for the Researcher in Education and Human Sciences: Amman, Dar Al-Fikr, 2000, p. 98.

Significance of differences	(v) Calculated	p f	SSF	Standard deviation	Arithmetic mean	Unit of measurement	Muscle moments	
Moral	5.02	80.18	179.69	129.23	723.56	N.m	southern	Quads
				267.01	903.25	N.m	Go away	
Moral	6.72	69.74	156.34	89.30	764.67	N.m	southern	Leg Twins muscle
				123.01	921.01	N.m	Go away	
Moral	7.44	80.81	200.32	38.87	189.12	N.m	southern	Plantar muscle
				78.48	389.44	N.m	Go away	
Note / Tabular value of t at degree of freedom (9) and probability of error (001) = 3.25								

Table (1) shows the appearance of the results function and in favor of thepost-test[8], and the researcher attributes this as a result of the use of discrete and continuous instantaneous force training that leads against gravity that acts as a resistance force.

The use of jumping exercises by bending the knees and taking the appropriate position for the knees, trunk and arms, then stretching quickly and strongly so that the jump is vertical to the highest possible and this depends on the use of exercises according to biomechanical variables, as the increase in the amount of muscle tension depends on increasing muscle strength and then increasing its torque, as the added weight (resistance) on the flexing muscles of any joint increases the strength and stability of the ligaments on that joint [(9)]Thus, the force exerted, and its arm is able to overcome the resistance moment using the least

-Peen, X., G. 1994: The effect of depth jump and weight training on vertical jump Research guarterly, sports medicine.p72 . [8]

Susan J,Hall; **Basic biomechanics**: (Copyringht C; printed in the USA, 1995) p.27. [9]

possible force, and as pointed out by (Sareeh Al-Fadhli) whenever the force moment is equal to the resistance moment, it means that there is a balance in these forces or if the force moment is greater than the resistance moment, it means economically in the work of the muscles [(10),] these physical exercises used are similar to skill performance using weights, as well as the use of skill exercises using weights in the man It led to the strengthening of working muscles.

4.1.2 Presentation, analysis and discussion of the results of the accuracy of the overwhelming multiplication skill of the pre- and post-tests:

Table 2

The arithmetic mean, the standard deviation, the difference of the arithmetic means, the standard deviation of the differences, the calculated value of (T) and the level of significance of the research sample in the pre- and post-tests for the accuracy test of the overwhelming multiplication skill :

Significance of differences	Value of t Calculated	p f	SSF	Standard deviation	Arithmetic mean	audition	Accuracy
Moral	6.84	3.47	7.46	3.04	10.96	southern	Overwhelming beating
				2.87	18.42	Go away	
Note / Tabular value of t at degree of freedom (9) and probability of error (0.01) = 3.25							

Table (2) shows the emergence of the results function and in favor of the post-test, and the researcher attributes this as a result of the special exercises according to the performance, which they practiced within the exercises prepared for them has been associated with mechanical exercises with physical, which in turn helped in improving and helping to maintain the highest possible efficiency to continue performance and development optimally and that the values of the rate of development indicate that and we can conclude from this result that the specificity of training had an active role in the development of mechanical manifestations The mobility of the players, which is an important principle of sports training from raising the physical and technical capabilities through special exercises

Sareeh 'Abd al-Karim al-Fadhli, **ibid**., p. 303. [10]

given according to the requirements of performance, which must be taken into account by athletics coaches in all types of training in order to raise the level of players. Having stated

(Ma Gardle) "that the specificity of training occurs special adaptations generated from the special effects of the training process "[(1).]

The addition of added weights is a burden in motor work, so the exercises were used correctly to achieve its purpose and to avoid injuries and errors, and that this development came because of the correct rationing of resistances according to scientific foundations, which affected and very effectively in increasing the amount of rapid strength as a result of muscle adaptation and development due to the added weights of the players when performing exercises that led to an increase in the ability of the nervous and muscular systems and this is consistent with (Sareeh Abdel Karim, 2003) "The muscle fibers have the ability to produce great strength By changing the type of resistance, the number of kinetic units operating will increase, and their ability to produce energy will increase accordingly."[11]

The researcher attributes the use of exercises by adding weights weighing (7-10) % of the weight of the man during the performance of the skill of beating the overwhelming, as the accuracy is linked to the rest of the variables mentioned above is the final outcome of all variables of the skill as "The achievement is the result of other variables whenever the kinetic path of the previous variables in the right direction be accuracy high ().[12]

The development of skill accuracy is caused by the emergence of significant results in the strength moments of some working muscles that indicate the development of strength for working muscle groups, so the strength of working muscles is the main factor in the success of performance .

5- Conclusions and recommendations:

5-1 Conclusions:

(1) Macardle, and after the Arcade of Crime O, et al (1981) Natration and Human Performance . hea and Febiqer . p . 268 .

11 Sareeh Abdul Karim Al-Fadhli: The effect of variable resistance training in improving the shape and ability of the muscles of the legs, research published in the Journal of Physical Education, Baghdad, Journal (12) No. (1), 2003, p. 175.

12 Aria slingers . Joan Ackerman : Volley ball , U.S.A . 1986, p98.

1- The results showed that there are real effects of a tangible nature of special physical exercises and performance assistance in the development of strength moments for some muscles of the legs.

2- Jumping exercises have an effective impact on developing the accuracy of the skill of overwhelming beating young people

5.2 Recommendations:

1- The need to pay attention to special physical exercises and help according to performance because they contribute to achieving progress in mechanical variables to perform the skill correctly with attention to the accuracy of the skill.

2- The need to build and prepare training programs because they have achieved values that have risen to the required level in performance accuracy by raising biomechanical variables.

3- Attention to the development of other muscle strength moments because of their positive role in developing muscle strength, and improving the accuracy of skill performance.

Sources:

- ✓ Ahmed Odeh Youssef, Khalil Al-Khalili, Statistics for the Researcher in Education and Human Sciences: Amman, Dar Al-Fikr, 2000.
- ✓ Mathematical Encyclopedia in Biomechanics of Equilibrium: (Alexandria, Knowledge Foundation, 2009).
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- ✓ -Peen, X., G. 1994: The effect of depth jump and weight training on vertical jump Research guarterly, sports medicine .

Appendix No. (1)

Total Time	Mug times of comfort between repetitions	Exercise time mug	Comfort between groups	Totals	Comfort between iterations	Iteration	Exercise time	Intensity	Objective of the exercise	Exercise	t
630 sec 10.30 min	270 sec	120 sec	2 min	2	3:1	4	15s	95%	Developing the skill aspect, technique and accuracy .	Performing the skill of beating the Qatari crushing (10) times .	1
600 s 10 min	270 min	90 s	2 min	2	3:1	4	15 s	90%	Developing the skill aspect , accuracy and performance technique	Performing the accuracy of the skill of beating the straight crush with the addition of weights in the legs with a weight of (5) % of the weight of the man.	2
600 s 10 min	240 sec	120 sec	2 min	2	3:1	3	20 s	90%	Strengthening the muscles of the legs	From the position of standing behind the box at a height of (40) cm, and the distance between the feet shoulder-width, then jumping strongly and quickly with a squatting position with the hands	3

										extended back, then swinging the hands forward and strongly, and landing is in a squatting position at an angle of 90 degrees, then standing quietly anddescending 10 times within 20 seconds	
580 seconds 9.40 min	240 sec	100 s	2 min	2	3:1	5	10s	100 %	Strengthening the twins muscle	Lie on the abdomen on the molten device and place the heels under the cylindrical pillows and knees at the end of the seat directly, and the thighs adjacent to the seat, bend the knees and stability (2) seconds and then return to the starting position.	4
580 seconds 9.40 min	240 sec	100 s	2 min	2	3:1	5	10s	80%	Strengthening the twins muscle	Same as the previous exercise, put on a weight of 65% and perform (6) times within 10 s	
630 sec 10.30 min	270 sec	120 sec	2 min	2	3:1	4	15 s	90%	Strengthening the leg muscle of the twins.	From a standing position, the distance between the feet shoulder-width and put the iron bar with weights at the back of the shoulders, and put the metatarsal on the edge of the plank and the heels under them free, then raise the body and legs extended during movement and stand on the combs of the feet until the maximum possible level stability 2 s and	

										then lower the heels down slowly (5) times during (10) seconds.	
60.20 min										Total	