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The impact of weight-bearing jump exercises on developing explosive leg strength and the accuracy of the blocking skill in volleyball

تأثير تمرينات القفز باستخدام الأوزان على تطوير قوة الساق الانفجارية ودقة مهارة الصد في الكرة الطائرة

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Abstract:

The study aimed to design weight-bearing jump exercises for the sample group to develop explosive leg strength and to examine the effect of these exercises on the precision of the volleyball blocking technique. Two groups, one experimental and one control, were used by the researcher to implement the experimental procedure. to align with the nature and objectives of the research. The study was conducted on a sample of sixteen players that are representative of the Al-Abbasiyah Youth Sports Forum. The program was implemented over 12 weeks. After the program's completion, data were collected and analyzed to obtain the results. The study determined that there is a favorable impact of using weight-bearing jump training on developing explosive leg strength. The researcher recommends the importance of using weight-bearing jump activities to increase the volleyball blocking skill's precision.

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Keywords: Weight-bearing jump instruction , Explosive strength , Blocking skill ,Volleyball**.**

ملخص:

هدفت الدراسة إلى تصميم تمرينات القفز بالأوزان لمجموعة العينة لتطوير قوة الساق الانفجارية ودراسة تأثير هذه التمرينات على دقة تقنية الصد بالكرة الطائرة. وقد استخدم الباحث مجموعتين إحداهما تجريبية والأخرى ضابطة لتطبيق الإجراء التجريبي وذلك لمواءمته مع طبيعة وأهداف البحث. وقد أجريت الدراسة على عينة مكونة من ستة عشر لاعباً يمثلون نادي شباب العباسية الرياضي. وتم تنفيذ البرنامج على مدى 12 أسبوعاً. وبعد انتهاء البرنامج تم جمع البيانات وتحليلها للحصول على النتائج. وقد توصلت الدراسة إلى وجود تأثير إيجابي لاستخدام تمرينات القفز بالأوزان على تطوير قوة الساق الانفجارية. ويوصي الباحث بأهمية استخدام أنشطة القفز بالأوزان لزيادة دقة مهارة الصد بالكرة الطائرة.

كلمات مفتاحية: القفز بحمل الوزن، القوة الانفجارية، مهارة الصد، الكرة الطائرة.

1. INTRODUCTION

Weight-bearing jump training is an effective form of exercise targeting the enhancement of muscle strength, endurance, and jumping ability. These exercises are widely used in various sports to improve physical performance and reduce the risk of injuries. Weight-bearing jump training combines jumping with weight lifting to increase muscle strength and improve athletic performance. This type of training is popular among athletes and those aiming to improve their overall physical fitness. The exercises focus on increasing muscle strength, particularly in the legs and hips, thereby enhancing athletic performance. They also increase jumping ability and speed, which is beneficial in sports that rely on jumping, such as basketball and volleyball. Additionally, these exercises improve physical endurance, enabling the body to sustain intense exercises for longer periods, and enhance balance and coordination by strengthening muscle balance and improving coordination among different muscle groups. Moreover, weight-bearing jump training is an energy-intensive exercise that burns a significant amount of calories, aiding in weight loss and improving overall fitness.Weight-

bearing jump training is an effective way to enhance muscle strength and general physical fitness. By adhering to proper techniques and starting with an appropriate weight, significant benefits can be achieved through these exercises. However, it is always recommended to consult a professional trainer to ensure the exercises are performed correctly and safely Mohammed Saad (2005) believes that achieving high levels of Accuracy and performance in sports are multifaceted scientific processes that are influenced by different training and educational initiatives. Facts and knowledge from science help to regulate the amount of physical, skill, and tactical training required to get ready. a well-rounded athlete capable of facing sports competitions.

Importance of the Research :

This study's significance stems from providing coaches and professionals in the realm of athletic training, namely in volleyball, with new exercises using weights, rubber bands, and other resistance tools to improve the players' strength, speed, and movement during offense and defense. These exercises aim to enable players to move with quick step frequency, defend effectively, prevent the opponent from scoring, and convert defense into counterattacks to score points

1-2. Research Problem:

Volleyball is a sport that requires a combination of physical and motor attributes across all skills, whether offensive or defensive. Learning and developing these skills necessitate various qualities such as strength, speed, endurance, flexibility, and agility. These attributes must be integrated to enhance the players' overall skill performance. For a player to improve their defensive skill performance, specialized exercises are needed that mimic the nature of the game and engage the entire body, with a

particular focus on the leg muscles and improving the performance of the active muscles. Through a review of numerous studies and previous scientific sources, it was observed that there is a noticeable weakness in the leg movements of players. Therefore, the researcher decided to address this issue by developing exercises that involve weights, resistance tools, and rubber bands specifically for the legs. The goal is to enhance and improve leg muscle strength, particularly explosive leg strength, as well as movement speed and agility to support defensive play. This approach aims to resolve the evident weakness in the leg-jumping power and improve the defensive performance of the players.

1.3 Research Objectives:

1-To develop exercises with varying resistance levels using weights attached to the legs to improve explosive leg strength.

2-To utilize weight-bearing jump training and blocking exercises to enhance The precision of the blocking technique in volleyball.

3-To examine the impact of weight-bearing jump training on improving and developing the variables under study.

1.4 Research Hypotheses:

1- The experimental group's findings from the pre-test and post-test differ statistically significantly in developing explosive leg strength.

2- There are statistically significant variations between the experimental group's pre-test and post-test outcomes in improving the accuracy of the blocking skill in volleyball.

1.5 Research Fields:

1.5.1 Human Field: Players from the Al-Abbasiyah Youth Sports Forum.

1.5.2 Temporal Field: From February 1, 2023, to May 10, 2023.

1.5.3 Spatial Field: The forum's sports field.

Chapter Two

2. Research Methodology and Field Procedures:

2.1 Research Methodology:

Because it fits with the goals and nature of the study, the researcher used the experimental approach with an experimental group and a control group. "Experimentation is the deliberate and controlled alteration of specific conditions of an event, observing the resulting changes in the event itself, and interpreting the causes that influenced it" (Dhafir Hashim Al-Kadhimi, 2012).

2.2 Research Sample:

Players made up the research sample. from the Al-Abbasiyah Youth Sports Forum in Najaf Al-Ashraf Governorate, who were selected intentionally. The sample included 16 players, who were split up into a control group and an experimental group.

2.3 Data Collection Tools, Instruments, and Equipment Used in the Research:

2.3.1 Data Collection Methods:

- Arabic and foreign scientific sources, observation, experimentation, testing, and measurement.

2.3.2 Tools and Equipment Used:

- 5 volleyball.
- Wooden boxes of varying heights.

- Barriers of different heights.
- Medical scale for weight measurement.
- Measuring tape for height measurement.
- Stopwatch.
- Markers and cones.
- Jump ropes.
- Various iron weights.
- 6 medicine balls weighing 5 kilograms each.

2-4. Test Selection:

First: The Vertical Jump Test (Sargent Jump Test) (Stephen M-2010, p.45)

•Test Objective: Determine the leg muscles' explosive power.

•Tools: A smooth wall with a scale marked from 151 to 400 cm, white cement powder, and a cloth for wiping marks.

•Performance Specifications: The subject dips the fingers of their dominant hand into the white cement powder, then stands with the extended arm fully raised against the wall. The subject then makes a mark on the wall with their fingers while ensuring that the heels remain on the ground. The initial mark is recorded. From a standing position, The individual swings their arms in front of them. and upward, then backward, bending the knees halfway. After that, the person swings their arms in front of them. and upward again, using the knees to propel themselves into a vertical jump, making a second mark with their fully extended hand at the highest point reached.

•Instructions: When making the first mark, the subject must not lift their heels off the ground, and the dominant arm's shoulder

should not rise above the level of the other shoulder. The shoulders must remain aligned. The subject should perform two swings while preparing to jump.

•Conditions: Each subject is allowed three attempts. The scores from all three attempts are averaged to obtain the final score.

•Scoring: The distance between the first and second marks represents the subject's explosive leg strength, measured in centimeters.

Second: Accuracy of Volleyball Blocking Skill Test (Nahida Abdul Zaid, 2014, p.110)

•Test Name: Blocking Skill Accuracy Test.

•Test Objective: Calculate the volleyball blocking skill's accuracy.

•Equipment The opposing court was divided using colored sticky tape, five legal volleyballs, and a regular volleyball court.

•Performance Requirements: The participant positions themselves 50 cm in front of the net in position 3. in a blocking-ready stance. The instructor performs a spike from the opposing court, and the subject attempts to block according to the pre-agreed technique.

-Performance Conditions: Every participant gets five tries in a row. Every time you try the spike, you have to do it correctly. Scoring is based on where the ball lands, as follows:

-In position 2: 2 points.

-In position 3: 3 points.

-In position 4: 2 points.

-Outside these areas: 0 points.

•Scoring: The subject's total score from The five attempts are noted. The test has a maximum potential score of 15 points. as

illustrated in Figure 1.

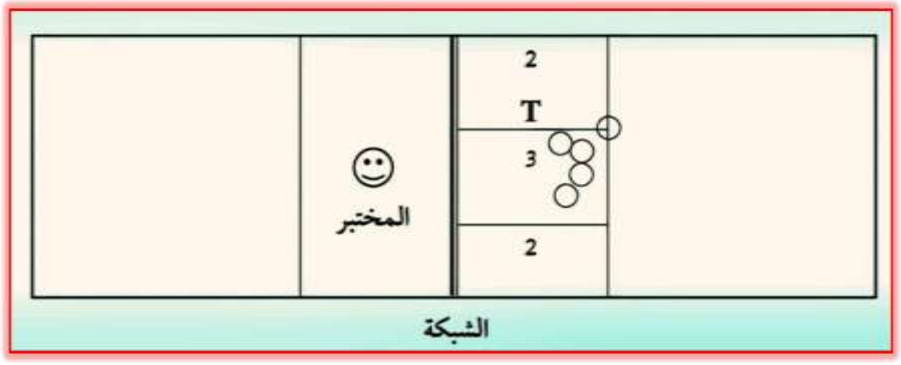

Figure (1) illustrates the accuracy test for the volleyball blocking skill.

2-5. Exploratory Experiment:

-According to Naheda Abd Zaid (2002), "it is a practical training to identify the negatives and positives encountered by the researcher during the test to avoid them in the future." As a result, on February 2, 2023, at Forum Stadium, an exploratory experiment was carried out on a sample of eight players who were chosen at random and were not part of the primary study sample. The goals were:

-To identify the obstacles faced by the researcher when applying the tests.

-To identify the difficulties faced by the researcher and find appropriate solutions.

-To assess the suitability of the tools, equipment, and tests employed, as well as to calculate how long the training program will take to execute.

2-6. Scientific Foundations of Tests:

2-6-1. According to Youssef Lazem Kamash (2003), test validity is defined as "the accuracy with which the test measures the purpose for which it was designed." to ensure that the candidate tests are legitimate.

2-6-2. According to Raheem Younis (2008), test reliability is "the test giving the same results if repeated on the same individuals under the same conditions." The researcher employed the test-retest approach to evaluate the tests' reliability. A sample of eight players who were not included in the experimental study sample were given the tests on March 2, 2023. Seven days later, the tests were given again since "the period between the two tests ranges from (1-7) days" (Ahmed Khater and Ali Fahmy, 1987).

2-7 Pre-tests:

The Earlier tests were conducted on 5/2/2023 on the study sample at the Al-Abbasiya Sports Forum at 3:00 PM. Tests for explosive leg strength and accuracy in blocking skills were conducted. All members of the research sample, totaling (16) players, attended. With the assistance of the support team, the examinations were completed by 5:00 PM.

2-8 Main Experiment:

The researcher implemented the training program from 6/2/2023 to 6/5/2023. The research sample underwent the training program designed by the researcher, which lasted (12) weeks with three training units per week. The researcher used weighted jumping exercises for the legs, incorporating special tools that allowed for

safe attachment without causing injury. Weights were attached using double-faced tape and varied from (1) kg to (3) kg per leg. Additionally, elastic bands were used with specially designed tools to ensure smooth attachment to the players' legs without hindering any movement, including jumping or lateral movement. The weights were progressively increased from the beginning to the end of the experiment. Training units were held on Thursdays, Fridays, and Saturdays, lasting (50-60) minutes each, using high-intensity repetitive training methods with scientifically regulated rest periods.

2-9 Post-tests:

After completing the training program, On July 5, 2023, post-tests were administered to the research sample. ensuring that the same time, location, and methods used in the pre-tests were provided, with the same support team.

2-10 Statistical Methods:

The SPSS statistical software was utilized by the researcher. software package for data processing.

Chapter Three

3. Presentation and Discussion of Results:

3-1. Presentation of Pre-test and Post-test Results for the Research Sample:

This section presents the mean scores, the experimental group's standard deviations and (T) values in the pre-test and post-test of the used tests.

Table (1)

Test Name	Pre-Test (S)	Pre-Test (A)	Post-Test (S)	Post-Test (A)	Calculated t Value	Significance Level	Type of Significance
1. Standing Jump Test for Measuring Explosive Power of the Legs	**58.134**	**8.045**	**64.045**	**6.078**	**3.207**	**0.05**	**Significant**
2. Accuracy Test for Block Skill	**8.067**	**3.576**	**11.899**	**1.687**	**3.038**	**0.05**	**Significant**

3-2. This section shows the control group's mean scores, standard deviations, and (T) values for the tests' pre- and post-tests.

Test Description	Pre-Test Mean (S)	Pre-Test Std. Dev. (A)	Post-Test Mean (S)	Post-Test Std. Dev. (A)	Calculated t Value	Significance Level	Type of Significance
Jump Test from a Standstill to Measure Explosive Strength of the Legs	56.042	6.378	59.013	5.467	1.633	0.05	Not Significant
Accuracy Test of the Block Skill	7.887	2.045	9.675	3.523	2.060	0.05	Significant

3-3. Discussion:

There are disparities between the experimental and control groups in the pre-test and post-test comparisons, according to the researcher's findings from the tables. At the significance threshold of 0.05, the computed t-values were greater than the tabulated values, suggesting substantial differences in favor of the experimental group's post-test findings. that used weighted jumping exercises. This suggests that these exercises had a significant and favorable impact on the experimental group's improved variables. The researcher attributes this improvement in leg strength to the use of weight training, medicine balls, and elastic bands, which showed clear progress in these variables and had an advantageous effect on muscular growth groups in the lower limbs, achieving harmony in the performance pathways, especially for the legs.

The gradual increase in adding weights to the players' legs, while placing them in the correct parts and locations, greatly contributed to the development of muscle strength. Chad confirms that “the added weights on each leg, within the player's capabilities, will significantly strengthen the legs without fear of injury from leg movements” (Chad, 2005, p. 110). Mahjoub also states, “If you want to develop strength, use progressively increasing resistance training” (Mahjoub, 1997, p. 126). Additionally, the researcher credits the growth of muscular strength to the effectiveness of using weight on the legs, which increased the effect of gravity and the resistance of the lifting muscles, namely the thigh, calf, and ankle muscles. Ismail confirms that “training with weights targeted at a specific muscle group leads to its development” (Saad Mohsen, 1996, p. 99).

Volleyball, by its nature, relies on jumping high and bending the legs, and the addition of elastic bands enhances movement effectiveness. Elastic bands add resistance while accommodating the natural movement of the legs without hindering it, providing additional training benefits that become apparent after completing the program. This significantly contributed to movement development. Hassan and Labeeb affirm that "bending the knees and jumping with additional weight or variable resistance enhances the strength of the leg muscles" (Sulaiman and Awatef, 1997, p. 253).

Nimer and Neriman confirm that "resistance and weight training aimed at developing muscular strength improves skill performance through movements used in weight training, whether with machines, bars, or frames, which enhance the explosive strength of the limbs in movement patterns similar to technical performance" (Abdul Aziz and Neriman, 1996, p. 44).

Weighted jumping training contributes to enhancing speed-strength through specialized training methods, allowing players to develop strength and rapid contraction and relaxation of muscles during specific exercises (Jameel and Ahmad, 2011, p. 59). This aligns with Mansour Al-Anbaki and others, who note that "if weight training is used scientifically and systematically, it greatly contributes to the development of muscular strength" (Mansour and others, 1990, p. 51).

These results agree with what Prince (2011) indicated, that weighted jumping training acts as a bridge between muscular strength and power. Many studies have confirmed that a combination of weighted jumping training along with traditional strength training will significantly elevate power levels.

Chapter four

4. Conclusions and Recommendations:

4-1. Conclusions:

1.The use of weighted jumping training has a significant effect on developing explosive leg strength in the experimental research sample.

2.The use of weighted jumping training positively affects the development of blocking skill accuracy in volleyball.

4-2. Recommendations:

1. Implement the proposed training program using weighted jumping exercises, as it positively contributes to enhancing explosive leg strength and blocking skill accuracy in volleyball for the research sample.

2. Conduct similar studies on different age groups and varying training ages.

3. Diversify training methods and avoid relying solely on one training approach.

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