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The Effect of TRX Suspension Resistance Exercises on Certain Physical Variables and the Accuracy of Performing the Offensive Block Skill in Volleyball

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Abstract

The study aimed to develop resistance suspension (TRX) exercises to improve certain physical variables and the accuracy of performing the offensive block skill in volleyball. The experimental method was employed on a sample of 20 players from Al-Hussein Sports Club for Volleyball, who were intentionally selected. The sample's mean height was 171.25 cm with a standard deviation of 5.5 cm, the mean weight was 61.23 kg with a standard deviation of 4.656 kg, and the mean age was 16.88 years with a standard deviation of 0.52 years. Pre-tests were conducted on the sample before implementing the training program, which lasted for eight weeks at a frequency of three training sessions per week. After the program, post-tests were conducted, and data from physical and skill performance tests were collected and analyzed using the SPSS statistical program. The results showed statistically significant differences in all studied variables (arm strength endurance, leg strength endurance, physical-skill performance endurance, and blocking accuracy), with (Sig) values of (0.000, 0.005, 0.000, and 0.000) respectively. The researchers concluded that TRX suspension resistance exercises had a positive impact on the development of physical variables for volleyball players. These exercises also improved the accuracy of performing the offensive block skill, which was attributed to the physical development of the sample, leading to improved performance and better match outcomes. The researchers recommended conducting similar studies on other samples and incorporating TRX exercises in training units due to their effectiveness in developing physical qualities and enhancing the accuracy of the offensive block skill.

Keywords: TRX suspension resistance exercises, physical variables, offensive block skill accuracy.

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Introduction

Countries around the world are striving for a scientific revolution through research and studies in various fields, including sports training science, which is considered a balanced process based on solid scientific foundations. It is built upon experience and scientific knowledge aimed at preparing athletes to achieve the highest possible level of performance in their respective sports disciplines. In recent years, numerous training methods have emerged that enhance and develop physical traits and abilities through the use of unconventional training tools, such as the TRX suspension system. This tool is considered one of the most effective in enabling the body to move in different angles and directions while applying full resistance to muscle groups through various exercises such as squats, push-ups, and planks. These suspension exercises significantly impact the athletes' physical and motor abilities (Kadhim, 2024). Physical fitness, represented by the athletes' physical variables, is one of the essential aspects that a coach must understand accurately through regular tests and measurements, as it is a critical factor in winning matches. Physical variables are closely related to sports activities, although the degree of necessity varies depending on the requirements of each sport, event, and skill. Volleyball is a high-intensity sport that has specific physical demands. It requires speed, surprise attacks, coordination, and muscular strength and power in both the upper and lower body. Therefore, when designing training programs for volleyball players, the relationship between physical and skill-related variables should not be overlooked, as physical readiness forms the foundation for executing technical skills. This is particularly true for the offensive blocking skill, which is one of the most important technical skills. It is performed by front-row players near the net to intercept the opponent's ball and convert the situation into a scoring opportunity. (Kadhim, 2023) Thus, it is crucial that physical and skill training be integrated, as physical conditioning is one of the pillars of training and plays a vital role in players' development. Athletes with high physical capabilities are more likely to perform skills correctly and efficiently. Accordingly, the importance of this research lies in designing training exercises using full-body TRX suspension resistance. This is a form of suspension training that utilizes gravity and body weight to develop physical and skill-related variables. These exercises open up broad possibilities for coaches and professionals in volleyball training to use them to elevate the level of the game. The problem of the study stems from the researchers' experience in the sports field, a review of several scientific studies conducted by the researchers, and interviews with coaches and observation of their training practices. (Moayd et al., 2019) It was noticed that TRX suspension resistance exercises were not used in their training programs. Instead, traditional methods based on repetitions with appropriate rest intervals were used. Therefore, the researchers came up with the idea to explore this topic and propose TRX exercises that could develop physical variables and positively influence volleyball skill performance.

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Research Objective:

To design TRX suspension resistance exercises that target specific physical variables and the accuracy of performing the offensive block skill in volleyball.

:Research Aim

To identify the effect of TRX suspension resistance exercises on certain physical variables .and the accuracy of the offensive block skill in volleyball

:Research Hypothesis

There are no statistically significant differences between the pre- and post-tests of the research sample in some physical variables and the accuracy of performing the offensive block skill in .volleyball

Time Frame

From January 3, 2025, to March 2, 2025

Location: Al-Hussein Sports Club Hall in Baghdad

Participants:

A sample of youth volleyball players under the age of 17 for the 2024–2025 season.

Materials and Methods

The researchers used the experimental method with a one-group pre-test/post-test design, which was suitable for the nature of the research problem. The experimental approach is considered the most reliable method for testing hypotheses about cause-effect relationships and is one of the most credible ways to solve scientific problems, contributing significantly to the advancement of scientific research (2:74). The research population included 130 volleyball players under the age of 17. The sample was intentionally selected from Al-Hussein Sports Club players for the 2024–2025 season. The total sample consisted of 16 players, with 4 players excluded for the pilot study, leaving 12 players as the final research sample. The researchers ensured homogeneity among participants in the variables likely to affect the research outcomes, such as height, age, and body mass, as shown in Table (1).

Table (1)

Variables	Unit of measurement	arithmetic mean	The mediator	standard deviation	Coefficient of skewness
height	poison	171.25	169.5	5.5	22.0
the weight	kg	23.61	61	4.656	65.0
the age	year	16.88	16.50	0.52	0.17

Shows homogeneity for research variables (length, Weight, age)

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It is noted from Table (1) that the values of the coefficient of skewness are confined. For (+-1) and it indicates homogeneity of the Sample, and it is within the normal distribution.

Purpose of the test: To measure the strength endurance of the arms.

Tools used: flat ground

Test description: The tester assumes a prone position on the floor with the body straight. The tester bends the arms to touch the floor with the chest and repeats.

Recording: Each flexion and extension of the arm is recorded as one repetition, and there must be no pause in the performance. The examinee is given one attempt.

Figure (1)

30-second forward lean test demonstrates

The second test: Vertical jump in place (30) seconds to measure the strength endurance of the legs (4:23)

Purpose of the test: To measure the strength endurance of the legs.

Tools A: Whistle, Stopwatch

Test Description: The test subject stands inside a drawn circle and starts jumping continuously without stopping until the test time is up.

Recording: The number of jumps is calculated during the time and each tester has one attempt.

Figure (2)

Vertical jump 30 seconds

Third: Test Physical performance endurance in volleyball (9: 80)

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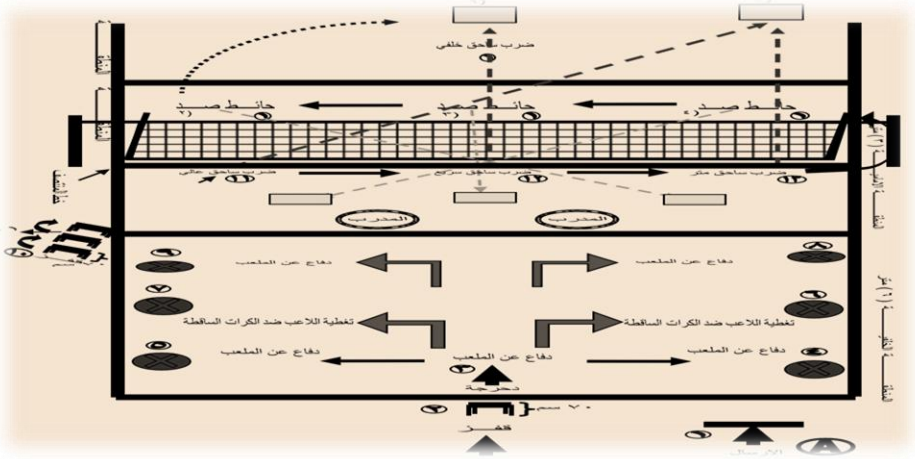
Purpose of the test Performance tolerance measurement

Tools Volleyball court, volleyballs, timer, hurdles (3) with a height of (5 cm, hurdle (1) with a height of (70) cm

Test description: This test contains (17) stations.

At station number 1, Player's nation (A) serves from the backcourt once the timing starts. Then, the player jumps over a barrier with a height of 70 cm placed near the back line in position number 6, which is considered station number 2. After that, the player performs a forward roll at station number 3. The trainer (2) will focus (3) on guiding the player in the center (6). Next, the player moves (A) to center (1), specified by number (4), to defend against a ball coming from the coach with a smash hit. Finally, they move to station number 5 with a quick side movement to defend the field against smashing balls from the second coach.

The player moves to station number (6) to cover the balls falling from the team. The counterpart or which bounces back Then he moves at maximum speed with a lateral movement to the other side of the field at station number (7), after which he moves to station number (8) to confront the skill of the crushing strike from the coach standing in the front area and delivering the ball to center (3) in the correct manner that enables the coach to prepare the balls for his team with the highest degree of accuracy. Player turned (A) To the other side of the field, arriving at station number (9) to defend the smashes, player (A) runs to station number (10) and the jump on three and barriers with a height of (50)It is station 11The distance between the barrier and (100) cm the performance Skill of smashing from the center (4)It is station 12And directing the ball in the center (5) the player changes the rhythm of the movement from offensive skills to defensive skills from the opposite side of the field It is station 13Where he performs the skill of blocking the wall in to focus(4)It is station 14After the trainer performs the crushing skill on him from position (4) and position (3). It is station 15Center (2)It is station 16, and after completing the blocking wall skill, the player moves to the back line from the backward position to perform the back smash skill. At station number 17, after the ball is prepared by the coach after completing the last station, the timer is stopped, and the player is recorded. Real time for Testing sickness



Appearance (3)

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Shows performance endurance testing stations

The fourth test: Knock and skill wall to repel the attack (5: 314)

The goal of the test: measurement of offensive blocking skill accuracy

The tools: game ball the airplane legal, your Flying bird (5) tape despair colored to divide the field.

Performance specifications: The player stands in position 2, ready to perform the blocking skill, while the coach climbs onto a table to perform the smash in normal position.

Conditions To perform: to all players (3) Attempts From each position 2-3-4It is counted Correct From it only offensive He is given a 15-second rest between attempts, and the maximum score for the test is 27. The player is given the score of the area in which the ball falls.

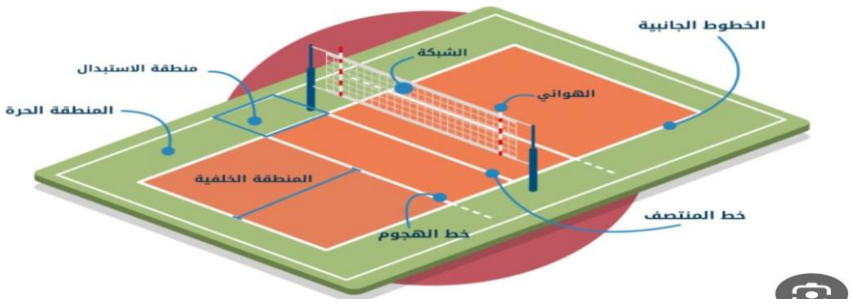

Figure (4)

The attacking block test from the 2-3-4 position is shown.

Exploratory experiment:- The researchers conducted a survey study to sample for urgent They are exploratory promise They are (4) players From the community of origin Monday 2/1/202510:00 AM at the club hall Hussein Athlete to ensure the validity of tools and equipment And its sufficiency And the time is set for conducting the tests and Reaching Difficulties Search that may occur during the main experiment How to overcome it And the suitability of the exercises prepared for the research sample as well Providing assistants with the necessary information, their tasks, and informing them of the study objectives.

Statistical Methods: To analyze the results, the researchers used the following statistical tools:

(mean, median, standard deviation, skewness coefficient, and paired t-test).

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Results:

After completing the tests, collecting the results, and processing the data statistically, the findings were organized into tables, as they serve as clarifying tools for the research.
Presentation and Analysis of Physical and Skill Abilities Results and Their Discussion:
Table (3)
It shows the arithmetic means, standard deviations, the difference between the arithmetic means and standard deviations, and the calculated and tabulated t-value for the research sample in the pre- and post-tests...

Variables	Pre-tests		Post-tests				The calculated	values	Significance
	S	A	S	A	SF	A F			
Strength bearing arms	18.00	3.48	21.00	7.41	3.00	4.0	6.07	0.000	moral
Bearing power for the legs	20.00	2.89	22.00	3.96	2.00	1.13	3.86	0.005	moral
Endurance of skillful physical performance	53.00	3.7	41.00	2.01	8,000	1.6	3.15	0.000	moral
firewall accuracy	12.31	2.49	18.87	2.60	7.56	3.57	7.38	0.000	moral

Significant below the significance level <_ (0.05) and degree of freedom (15)

Discussion:

From the results shown in Table (3), it is evident that the research sample achieved statistically significant improvement in the post-tests in the physical variables: arm strength endurance, leg strength endurance, and physical-skill performance endurance. The researchers attribute this to the use of TRX suspension resistance exercises and to the well-planned and structured training units that included diverse and varied exercises. These exercises contributed to developing the physical variables under investigation by recruiting and activating as many motor units as possible, thereby increasing the muscular force exerted during performance and overcoming resistance. This, in turn, enhanced muscle strength and endurance, enabling the body to resist fatigue and physical exertion for longer periods. The greater the muscle strength, the more delayed the onset of fatigue after intense physical activity. (Sikhe & Khalid, 2022)

Nasr Al-Din (2003) confirms that "organized training increases the ability of muscles to withstand the fatigue resulting from repeated high-force muscle contractions, which is referred to as endurance performance" (10:66.(Al-Saadi (2023) also notes that "resistance exercises using weights are among the effective methods for developing

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physical abilities" (2:71.(The results of the current study align with those of Mustafa (2015) and Abdel-Moati (2016), which indicated that the use of TRX exercises led to improved specific physical fitness components and muscular abilities of the arms and legs, as well as general physical abilities (8:71; 6:20.(Koprince (2009) stated that training with modern equipment and tools is fundamental in physical preparation and has become a necessary requirement across various individual and team sports due to its impact on developing physical capacities (13:10). Additionally, the findings are consistent with the studies of Sukhjivan (2015) and Farag (2016), which showed that full-body TRX resistance training improved fitness components such as strength, flexibility, power, balance, agility, and enhanced abdominal muscles, trunk and pelvic flexibility (12:18; 7:106.(In this regard, Angus Gaedtke et al. (2015) point out that TRX suspension training is a form of functional training that activates core muscles and improves power, flexibility, and balance (11:2.(The researchers believe that the use of the TRX training tool contributed significantly to the development of physical abilities, which was reflected in the skill performance efficiency of the sample. (Sabhan & Abd AL-Hussein, 2015) Observing Table (3), there are statistically significant differences between the pre- and post-tests in favor of the post-test regarding the accuracy of the offensive block skill. The researchers attribute this to the scientifically structured training doses based on TRX suspension exercises, which helped enhance the performance level of the offensive block skill among the players. This improvement was evident through stronger hand contact with the ball, improved jumping ability, proper targeting of the ball's landing zone on the opponent's court, and better timing in jumping and landing — all achieved with fewer errors due to improved performance endurance.Hussein (2011) emphasizes that "blocking plays a crucial role in disrupting the opponent and potentially scoring a point when executed correctly" (1:17).Thus, the researchers conclude that improvements in arm and leg strength endurance, as well as performance endurance among players, played a vital role in enabling them to sustain effort and perform efficiently throughout the match. This also reflected in their awareness of the force applied during blocking and their ability to judge distances and target ball placement accurately (Munaf et al., 2021) . The higher the muscular ability, the greater the improvement in performance accuracy.

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