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Correlation between types of strength and blocking volleyball skills in young volleyball players

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ABSTRACT

This study aimed to identify the correlation between types of strength and blocking volleyball skills in young volleyball players. The researcher employed a descriptive approach to address the research problem. The research sample was randomly selected and included 8 players from the youth category in volleyball. The instruments used in this study included personal interviews, tests and measurements, volleyballs, a timing device, a tape measure, adhesive tape, and a medical weighing scale. Additionally, the following tests were conducted: vertical and horizontal jump explosive force tests using the (time it) device, and jumping tests. The researcher performed statistical analyses using IBM SPSS Statistics (version 23). A statistically significant correlation was found between vertical explosive force and blocking skills ($p<0.05$). Additionally, a statistically significant correlation exists between horizontal explosive force and blocking skills ($p<0.05$). Furthermore, the strength characteristic of speed is also significantly correlated with blocking skills ($p<0.05$). There is a need for trainers to focus on the development of different types of strength, select players with muscle strength, disseminate results to trainers, and study other physical abilities and their connection to other skills.

KEYWORDS

Strength; Blocking Volleyball Skills; Young Volleyball Players

1. INTRODUCTION

The use of muscular strength development programs has a significant impact on the muscular system, the skeletal system, and the nervous system of athletes. In the case of volleyball players, a positive effect can be achieved through strength training in varying proportions. These programs aim to develop physical abilities or detect physiological changes occurring in the muscles. They also help

identify factors that optimize muscular and physiological adaptation, leading to improved performance on the field. Volleyball is an example of a sport in which training plays a crucial role. The block is one of the multiple offensive and defensive skills and requires high physical strength and skills, which can be enhanced through proper training (Hussein & Azim, 2017; Hussanein, 1982).

Muscular strength has a significant impact on the performance of basic volleyball skills, especially blocking skills, where players should be trained using detailed planning to save effort and time and achieve the best results. However, the distribution of strength training in volleyball players is often not done correctly. The available information about the forms of strength and their relationship to blocking skills is rather scarce, and these forms have not been thoroughly studied (Awad, 2004).

The researcher recognizes the importance of studying them as a premise for developing the necessary blocking skills to counter strong and fast balls from the opposing team. Therefore, this study aims to identify the correlation between types of strength and blocking volleyball skills in young volleyball players. It is hypothesized that there will be a correlation between certain forms of strength and blocking skills in young volleyball players.

2. METHODS

2.1. Study Design and Participants

The researcher employed a descriptive approach to address the research problem. The study population consisted of youth volleyball players from clubs participating in the 2020 league. A random sample of eight players from the youth category in volleyball was selected for the study.

Table 1 presents the statistical analyses of the measurements and primary data, assessing the homogeneity of the sample in terms of age, height, and weight. It is evident that the values of the torsion coefficient for weight, age, and height measurements were appropriate, indicating the sample's homogeneity and its accurate representation of the research population (Table 1).

Table 1. Body measurement homogeneity

Variable	Mean	Median	SD	Skewness
Weight	72,33	73	3,185	0,226
Height	188	187	3	0,156
Age	18,08	18	0,717	0,125

2.2. Instruments and procedures

The instruments utilized in this study included personal interviews, tests and measurements, volleyballs, a timing device, a tape measure, adhesive tape, and a medical weighing scale. Additionally, the following tests were conducted:

Vertical and horizontal jump explosive force test using (time it) device

It is a system designed to help coaches or athletes measure explosive power, speed-related strength, and endurance in an easy and practical way. The system includes a main unit and several (4) sensors. On the jumping board, the system can record test results for up to 100 players, arranged from 55 to 99, and the results can be printed with their names using an Excel sheet.

How the system works: First, the battery is inserted into both the main unit and the sensors, which are then connected to electrical power and must be charged for 8 hours. When conducting tests that use sensors, such as for speed and endurance, it is essential to ensure the sensors are aligned vertically. Any misalignment in the perpendicularity of a sensor will result in incorrect measurements. If the sensors are not properly positioned, a sound (whistle) will alert the person conducting the test of the misalignment. The sensors operate using wireless technology.

The jumping board, however, is connected to the main unit via its dedicated cable. If the jumping board is not in use, it is recommended to disconnect it.

Jumping Tests

A. Static jump (measurement of explosive power):

The static jump test measures not only the height of the jump and the horizontal distance, but also the time during which the athlete remains in contact with the jumping board. This will make it possible to calculate the force generated during the jump.

Testing the force characteristic of speed (rebound jump (6 seconds) using the (time it) device

Bouncing jump: Measures the achievement of the number of jumps completed during time. The athlete stands on the board and begins to jump, and the result will indicate whether the player was in contact with the board or was in the air, as well as the number of jumps completed for a period of 6 seconds.

B. Leg strength endurance test (number of jumps in 60 seconds)

Measures the achievement of the number of jumps completed during time. The athlete stands on the board and begins to jump, and the result will indicate whether the player was in contact with the board or was in the air, as well as the number of jumps completed for a period of (60) seconds.

Accuracy assessment test for the skill of the block (Hammad, 2002)

- The objective of the test: To measure the accuracy of the skill of the block (offensive).
- Tools used: A legal volleyball court, (5) legal balls, and a colored tape measure to divide the field as shown in Figure (2) below:
- Performance Specifications: The tested player stands in position (2), ready to perform the blocking skill, while the coach ascends to a table to perform the smash hit in the normal position.
- Performance conditions: For each player (3) attempts from each position (2, 3, 4) the correct ones are counted, i.e. (offensive only), where the maximum score for the test is (27) degrees.
- Scoring: The player takes the score of the area where the ball falls.

2.3. Statistical analyses

The researcher performed statistical analyses using IBM SPSS Statistics version 23 and applied the following methods: mean, median, standard deviation, and Pearson's simple correlation test. A significance level of $p < 0.05$ was used.

3. RESULTS

This section presents the results obtained, along with the analysis and interpretation of the measures that most significantly influence players in performing the blocking skill, and reveals the relationships between these measures.

Table 2 shows that the vertical explosive force has a mean of 33.75 (SD=1.669), the horizontal explosive force has a mean of 2.111 (SD=2.642). Speed power, with a mean of 3.340 and an extremely low standard deviation of 0.02, and the block measurement, with a mean of 14.375 and a standard deviation of 1.187.

Table 2. Descriptive statistics results of the anthropometric measurements of the research sample

Body measurements	Units	Mean	Median	SD	Lowest value	Highest value
Vertical explosive force	Cm	33.75	34	1.669	36	31
Horizontal explosive force	Cm	2.111	2.105	2.642	208	216
Speed power	M & Cm	3.340	3.345	0.02	3.30	3.36
Block	Degree	14.375	14	1.187	13	16

From Table 3, it is clear that there are significant correlations between the forms of force and the block skill. The vertical explosive force shows a strong correlation with the block skill ($p = 0.001$). Similarly, the horizontal explosive force is significantly correlated with the block skill ($p = 0.003$). Finally, speed power also exhibits a significant correlation with the block skill ($p = 0.009$). All results indicate statistically significant relationships, with p-values below 0.05, confirming the importance of these forms of force in influencing block performance.

Table 3. Correlation between different forms of strength and blocking skills

Stage	Variables	Block	*p*
1	Vertical explosive force	0.919	0.001
2	Horizontal explosive force	0.893	0.003
3	Speed power	0.842	0.009

4. DISCUSSION

The results of our study showed that there is a significant correlation between vertical explosive force and the block skill ($p<0.05$). Additionally, a correlation exists between horizontal explosive force and the block skill ($p<0.05$). Furthermore, the strength characteristic of speed is also significantly correlated with the block skill ($p<0.05$).

Undoubtedly, the forms of force reflect a player's ability to jump high and elevate their center of gravity, while increased height allows the player to hit the ball at a higher point, which favors achieving the goal. This justifies the relationship between the forms of force and the skill of blocking. As is well known, blocking requires specific characteristics, such as the ability to jump vertically, the correct technique for positioning the hands when contacting the ball, and proper timing to meet the ball after it has been hit by the opponent. Players who possess strength and can jump high are more likely to excel in this skill because their ability to reach a higher level allows them to block and direct the ball

effectively (Northrib, 1990). Notably, this height gives the player the opportunity to direct the ball to specific points.

It is also important to note that increasing the height of the center of gravity extends the time the athlete remains in the air, and that "elevating the center of gravity and hitting the ball at its highest point helps direct the ball to the opponent's court and provides greater control over its direction." This skill requires special characteristics in a blocker, as it involves physical and kinetic qualities. Among the most important qualities are the explosive power of the leg muscles, response speed, muscular strength, movement and jumping speed, as well as skill mastery and concentration.

5. CONCLUSIONS

There is a correlation between vertical explosive force and the block skill variable. Similarly, there is a correlation between horizontal explosive force and the block skill variable, as well as between the strength characteristic of speed and the block skill. Based on the results of this research, the following recommendations are made: trainers should focus on developing various forms of strength; efforts should be made to select players with strong muscle power; the results should be shared with trainers; and further research should be conducted on other physical abilities and their connection to other skills.

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AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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