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EFFECTS OF LOWER BODY PLYOMETRICS TRAINING ON DIGGING SKILL OF FEMALE UNIVERSITY VOLLYBALL PLAYERS

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Keywords: *Plyometric, digging skill, volleyball, squats,*

Abstract: *This study examined the effects of lower body plyometrics training on digging skill of female university volleyball players. The study adopted the true-experimental research design. Out of twenty-two registered female volleyball players who voluntarily participated in the study, fourteen female students were purposefully chosen from the university female volleyball team with body mass indices (BMI) between underweight and normal weight (≤14.5±18.9) (height, x=1.50±1.17cm; body weight, x=50.31±70.15kg). Only the volunteered final year female volleyball athletes were used for the study. No sample was used because the population is small. Data collected was analyzed using mean scores, standard deviation and t-test inferential statistics. The study revealed that lower body plyometrics training had an effect on the digging skill of female volleyball players. The study concluded that the digging skill of female university volleyball players will be greatly improved with the consistent use of plyometric training and recommended that coaches include lower body plyometrics training in the training sessions and competitions for optimal performance.*

Introduction

Volleyball is a game played by two teams, of six players on a side, in which the players use their hands to bat a ball back and forth over a high net, trying to make the ball touch the court within the opponents' playing area before it can be returned. To prevent this, a player on the opposing team bats the ball up and toward a teammate before it touches the court surface; that teammate may then volley it back across the net or bat it to a third teammate who volleys it across the net. A team is allowed only three touches of the ball before it must be returned over the net. Volleyball is a unique an exciting game that requires solid teamwork and constant individual implementation. The sport of volleyball is nice-looking to all types of players, from competitive to leisure, young and old, male and female. To play volleyball, players need to obtain a few basic skills, learn a few rules, need very little equipment, and can play the game almost every place; from the beach to the gym (Joel, 2018)

Digging is a fundamental skill in volleyball and it is a common form of defense that can set up a lot of the offense. When the attacker hits or spikes the ball over, diggers have to prevent the ball from landing on the floor. Diggers must be able to anticipate the spike or attack and prepare to quickly move or dive in any

direction. They should have strong footwork for the individual to move laterally, forward and backward at a variety of movements. Players must be ready to move fast from their base to dig the ball. When practicing to dig the ball, there is a full range of motion players can apply to control the ball, like moving or sliding laterally, forward, and backward. As such, the digger's base posture helps players to build physical and mental alertness in the play.

Plyometrics, also known as jump training or plyos, are exercises in which muscles exert maximum force in short intervals of time, with the goal of increasing power and speed. The two main categories of plyometrics are lower and upper body plyometric training (Uzor & Ujuagu, 2020). Lower body plyometric training includes: Power skipping, alternate leg bounding, Box jumps, Vertical depth jump; while the upper body plyometric training requires the use of a medicine ball throws and plyometric push-ups (Walker, 2014,). Studies have shown that plyometric training greatly improved measures of muscular strength, power, speed, vertical jump, leg strength, agility and running economy after the training Kons, Orssatto, Ache-Dias, De Pauw, Meeusen, Trajano, & Detanico, 2023, Uzor & Emeahara, 2019). This training focuses on learning to move from a muscle extension to a contraction in a rapid or "explosive" manner, such as in specialized repeated jumping Plyometrics are primarily used by athletes, especially martial artists, sprinters and high jumpers, to improve performance, and are used in the fitness field to a much lesser degree ((Mohamed & Chachou, 2022; Michael, 2009). The study is conducted to examine the effects of lower body plyometrics on the performance of female volleyball players.

It has been observed that the female volleyball players are not as fast and agile as their male counterparts therefore the researcher wants to know if these plyometric training could in any way improve their performance at the end of the research. Although studies were carried out on the effect of plyometric training on the physical fitness of male athletes, however these studies were generalized to all types of plyometric training, lacked specificity of sport as well as limitation to male athletes only. Maamer, Karim; Fabricio (2016). Based on that, this research intends to find out whether two lower body plyometric training could enhance the female volleyball players digging skill in the game of volleyball.

Purpose of the Study

The purpose of this study is to determine the effect of two lower body plyometric training on digging skill of female university volleyball players.

Hypothesis

This hypothesis guided this study

There is no significant difference in the digging skill of female university volleyball players using lower body plyometric training and those in the control group.

Method and Materials

Research Design

This study employed a true- experimental approach as its research strategy. The study uses a 2 x 2 factorial design with two subject

groups: the experimental group and the control group. Since it is a true experimental research design, it is suitable for this investigation because the subjects were equal at baseline. The goal of the study is to determine effect of plyometric training on the digging skill of female university volleyball players

Participants

The target population of this study consisted of all the female volleyball players from Nnamdi Azikiwe University, Awka main campus. The participants were those who have participated in one or two local and school team competitions from the university school team. All players have been practicing on a regular basis for at least 3 years (three days per week). Only the volunteered final year female volleyball athletes were used for the study. Fourteen university female athletes aged 18 to24years constituted the population of the study. No sample was used because the population is small. The subjects were selected purposively. They were assigned into two groups namely Group A (7) 5meter plyometric training (squats & lunges) (PT), and Group C (7) Control. Athletes were verbally told of the study's guidelines at the outset, and their written agreement was sought before they could take part in it.

Descriptive statistical parameters, arithmetic mean, and standard deviation values, were calculated for all variables while t-test inferential statistics was used for testing hypothesis. Statistical significance was accepted at $P < 0.05$.

Instrumentation

Anthropometric Data

The athlete's body heights were measured with a scale having a sensitivity of 0.01 m (m), and their body weights (VA) were measured with electronic scales (SECA, Germany) with a sensitivity level of 0.1 kilograms (kg). The BMI was calculated as a ratio of the BW (kg) and squared BH (m).

Description of Instrument for Data Collection

Agility T-Test: The agility test was used to examine the participant's ability to move forward, backward and side to side. For this test, the participants are asked to run from the start point 50metres forward to point one, side step to point two before side stepping to point three, side stepping back to point one and then running back to the finish. The process is then repeated, side stepping in the other direction first. Each attempt is timed from start to finish and compared to establish norms. Three trials were given to the subject and out of these three, the best time was recorded

Purpose: To determine the agility level of an athlete.

The athlete will complete the test twice turning to the left first and twice turning to the right first. The athlete may have 2 minutes rest in between each test. The best time of the two trials in each direction should be recorded to the nearest 0.01 second.

Excellent	Good	Average	Poor
<10.50	10.51 – 11.50	11.51 – 12.50	>12.51

Facilities and Equipment: A stopwatch, a measuring tape, a recording sheet and cones.

Procedure: The athlete completes a warm-up that prepares them for the test about to be undertaken. The athlete starts the test at cone "A". The test administrator will stand in line with cone A and will count "Three, Two, One, Go!!" On "Go" the athlete accelerates forward ten yards to cone "B" and touches the cone with her right hand. Once the participant reaches cone B, the participant will then shuffle left 5 yards to cone C and touch it with their left hand, and then shuffle 10 yards to the right to cone D and touch it with their right hand, then they will shuffle to the left back to cone B and touch it with their left hand and then run backwards past cone A.

Description of Treatment Test

1. **Lunges-** can refer to any position of the body where one leg is positioned forward with knee bent and foot flat on the ground, while the other leg is positioned behind it. Lunges are used by athlete as a training exercise for building muscles.

Procedure for lunges

Start in a standing position with your feet hip-width apart. Step forward longer than a walking stride so one leg is ahead of your torso and the other is behind. Your foot should land flat and remain flat while it's on the ground. Your rear heel will rise off of the ground. Bend your knees to approximately 90 degrees as you lower yourself. Remember to keep your trunk upright and core engaged. Then, forcefully push off from your front leg to return to the starting position.

Squats- are strength exercises in which the trainee lowers their hip from a standing position and then stands back up. Squats are considered a vital exercise for increasing the strength and size of lower body muscles.

Procedure for Squats

Stand with feet a little wider than hip width, toes facing front. Drive your hips back-bending at the knees and ankles and pressing your knees slightly open as you sit into a squat position while still keeping your heels and toes on the ground, chest up and shoulders back. Strive to eventually reach parallel; meaning knees are bent to a 90-degree angle. Press into your heels and straighten legs to return to a standing upright position.

Assigning the Subjects to Groups:

Fourteen (14) athletes who have participated in one or two volleyball competitions volunteered to participate for this study. The athletes are divided into two (2) groups of seven (7) persons each (n=7), one group for lower body plyometric training (lunges and squats) and the other for control group. This training practice will run for six weeks (6) after which a post test will be conducted. The control groups are not part of the training session for the validity of the study.

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Training of Subjects:

The training session lasted for six (6) weeks; three times per week. The days used for training session in a week were Mondays, Wednesdays and Saturdays. The table below best explains the training program used for the study;

Schedule for the 6 weeks of lower body plyometric training (lunges and squats)
Results

3 days per week	Week 1	Week2	Week 3	Week 4	Week 5	Week 6
Monday / Wednesday /Saturday	5-10min Warmup exercises 15 Squats 15 Lunges 5-10min Cooling down exercises	5 - 10min Warmup exercises 15 Squats 15 Lunges 5-10min Cooling down exercises	5-10min Warmup exercises 30 Squats 30 Lunges 5-10min Cooling down exercises	5-10min Warmup exercises 30 Squats 30 Lunges 5-10min Cooling down exercises	5-10min Warmup exercises 30 Squats 30 Lunges 5-10min Cooling down exercises	5-10min Warmup exercises 30 Squats 30 Lunges 5-10min Cooling down exercises

Research Question: How does lower body plyometric training (Squat and Lunges) affect female students' performance of digging skill in the game of volleyball?

Table 1: Summary of calculated arithmetic mean scores of Nnamdi Azikiwe University female volleyball players using lower body plyometric training (Squat and Lunges) on digging skill for both those exposed to training and those not exposed using agility T-test.

Groups	No	Pre-test Mean (x)	Post-test Mean (x)	Standard Deviation
Treatment group (Lunges & Squats)	7	10.99	10.47	0.52
Control Group	7	11.51	11.23	0.28

Measured Variables; Height (ft) & Weight (kg).

Table 1 Showed that the calculated arithmetic mean scores of female volleyball players on lower body plyometric training (lunges and squats) on digging skill using agility t-test for treatment group were 10.47 for post-test and

10.99 for pre-test respectively. The control group had 11.51 as their pre-test and 11.23 as post-test mean scores respectively. This significant margin in the mean difference between the training group and control group shows that the treatment has effect on performance of exposed groups than control group. This implies that lower body plyometric training (lunges and squats) has positive effect on digging skill of female university volleyball players when exposed to the Lunge exercises during training.

Test of Hypothesis

Hypothesis: Ho: There is no significant difference in the digging skill of female volleyball players using lower body plyometric training (lunges and squats) and those in the control group.

Table 2:

Group	Pre-test Mean	Post-test Mean	SD	T-value	P-value	5% (0.05)
Treatment group (Lunges & Squats)	10.99	10.47	1.91	24.26	2.179	(0.95)
Control Group	11.51	11.23	1.015			

Table 2 Showed that the calculated arithmetic mean scores of female volleyball players on lower body plyometric training (lunges and squats) on digging skill using agility t-test for treatment group were 10.47 for post-test and 10.99 for pre-test respectively. The control group had 11.51 as their pre-test and 11.23 as post-test mean scores respectively with a Standard Deviation (SD) of 1.91 for treatment group and 1.015 for control group. The calculated T-value of 24.26 at 0.05 level of significance against the P-value of 2.179 implies that there is significant difference in the digging skill of female university volleyball players using lower body plyometric training (lunges and squats) and those in the control group using. The findings revealed that the pre-test post-test scores of female volleyball players of the training and control group differ significantly using agility T-test

Conclusion: Reject Ho since the calculated value (T) is significantly greater than the table value (t), and accept Ha concluding that there is significant difference on the digging skill of female volleyball players using lower body plyometric training (lunges and squats) as reflected in the test of difference of post test scores.

Discussions

In the research question, the result of the study revealed that there is significant difference on the digging skill of female volleyball players

using lunges and squats. The analyzed data using the t-test inferential statistics showed that there is a significant difference in the post-test scores of the two modes of lower body plyometric training on digging skill of the female volleyball players. This is in line with (Mohamed & Chachou, 2022 , Daniel and Antonio 2021, Kons, Orssatto, Ache-Dias, De Pauw, Meeusen, Trajano, &Detanico, 2023, Uzor & Emeahara, 2019),) who examined the effects of plyometric training on the upper and lower body and physical readiness of female volleyball players and agreed that plyometric training significantly affected the skill performance of female volleyball players. The study however did not align with (Krzysztof and Andrzej, 2021) who examined the effect of four weeks plyometric application on the explosive power of athletes which revealed there were no significant changes in the DJ - 20/40/60 cm with vertical rebound which was as a result of lack of solid strength preparation before the plyometric training.

In testing of the hypothesis, there is no significant difference in the digging skill of female volleyball players using lower body plyometric training and those in the control group. This is in line with Uzor & Ujuagu (2020) that study the optimizing the university athletes cardiovascular health using lower and upper body plyometric training which the result shows that plyometric training has great effect on the athletes cardiovascular health.. The result revealed there is significant difference in the digging skill of female volleyball players using lower body plyometric training (lunges and squats) and those in the control group using agility T-test.

Conclusion

In conclusion, performing of lower body plyometric training on squats and Lunges had significant effect on the enhancement of digging skill. Lower body plyometric training also had significant role for the improvement of digging skill on female volleyball players by reducing the time to cover distance and speed of dive.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Coaches should be encouraged to use lower body plyometric training in their pre-season (preparation phase) training session for improving the player's physical fitness at a high level and producing physically fit competitor and professional volleyball players.
2. Volleyball players in clubs, national and state level coach instructors, universities and other responsible institutions and persons should train and encourage the coaches to include plyometric training techniques as a main training session.
3. Government should make efforts to organize seminar, workshops, and refresher courses to coaches, games-mistresses and game-masters from primary to higher institutions in collaborations with physical educators, lecturers from higher institution.

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