

THE EFFECT OF MAXIMUM SOFTBALL THROWING TRAINING ON ARM POWER U17 VOLLEYBALL ATHLETES

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Abstract

This study aims to evaluate the effectiveness of maximal softball throwing training in increasing the arm power of volleyball athletes under the age of 17 years (U17). The method used was a literature study, in which analyses were conducted on various scientific sources, including journal articles, sports training books, and other related publications, to collect data on the effectiveness of ball-throwing exercises in U17 volleyball. The study results showed that maximal softball throwing drills have significant potential to improve the arm power of these athletes. The exercise involves explosive and repetitive movements of the arm and shoulder, which can develop flexibility, strength, and speed - essential for executing powerful serves and effective smashes in volleyball. From the findings of this study, maximal softball throwing drills are an effective complementary method to traditional U17 volleyball training programmes. Implementing this drill has the potential to positively impact the physical development and performance improvement of young volleyball athletes, particularly in increasing power for attacking through serves. It smashes critical elements that determine success in volleyball. Therefore, coaches and sports educators are invited to consider integrating this exercise into the training regimen of U17 volleyball athletes.

Keywords: Softball Throwing Exercise, Arm Power, U17 Volleyball Athletes, Volleyball Training, Volleyball Attack, Serve, Smash.

INTRODUCTION

In volleyball, arm power plays a vital role in determining an athlete's effectiveness and success on the field. Arm power is not just about the power to hit the ball hard but also relates to speed, accuracy, and consistency in every serve, smash, or defence [1]. For U17 athletes who are still in the physical and technical development stage, increasing arm power can be one of the keys to optimising their performance and preparing them for competition at a higher level.

One of the essential aspects of volleyball is the serve and smash. Both techniques rely heavily on the athlete's arm strength [2]. A strong and precise serve can be a great start in any exchange of balls, putting pressure on the opponent from the start. Meanwhile, a powerful smash is often decisive in scoring points. Optimal arm strength allows athletes to produce complex and challenging shots for the opponent to predict and receive. From a defensive point of view, athletes with good arm power also have an advantage in blocking and digging (saving low balls).

The development of arm power in U17 athletes not only improves the technical aspects of the game but also provides confidence. Correctly understanding and applying strength training helps them develop better control of the ball, increases their resistance to injury, and ultimately contributes to overall improved performance [3]. This is important because, at this age, athletes are at a critical phase in physical and psychological development; improvements in any aspect of the game can significantly affect their motivation and aspirations in the sport.

The implementation of training programmes designed to improve arm power should be tailored to the specific needs of these U17 athletes, given that they are still in the growth phase. Exercise delivery should consider this factor to avoid injury and ensure that strength development goes hand in hand with average growth. Exercises can include variations from light weights with high reps to heavy weights with lower reps, depending on the athlete's condition [4]. In addition, training should also be integrated with the development of volleyball technical and tactical skills, ensuring that the increase in strength directly impacts the athlete's performance in the game.

Various training methods can increase arm power, including softball throwing training [5]. Softball throwing as a training method to increase arm strength departs from the understanding that volleyball athletes need a comprehensive series of exercises focusing on volleyball-specific skills and physical development, particularly strength and explosive power. The softball throwing exercise is a relatively new and innovative method in training athletes to develop significant arm power.

This exercise involves dynamic and explosive movements where the athlete throws the softball as hard as possible. This increases the strength of the arm muscles and the shoulders, chest, and core of the body that work simultaneously when making the throw. The critical element of this exercise is throwing with maximum intensity to trigger rapid muscle contraction, which is necessary to produce power or explosive power [6]. Thus, this exercise is very relevant to the movements performed in volleyball, such as smashing and serving, which require the same explosive power.

Softball throwing drills also help quickly improve neuromuscular coordination and the ability to generate force [7]. This is an essential factor in volleyball, where reaction time and the ability to deliver explosive power quickly can determine the success or failure of an attack or defence in a match.

In its application, this exercise is quite simple and does not require complicated equipment. A softball and an adequate area to throw the ball are all needed, making this drill easy to integrate into a regular training programme. Coaches can focus on form, intensity and frequency of throws to suit each athlete's individual needs and physical condition. The workout can also be customised with fun and competitive activities, increasing the athlete's motivation throughout training.

It is important to remember that these drills must be performed correctly to avoid injury, especially in the shoulder, one of the most commonly injured areas in volleyball athletes. Therefore, adequate warm-up before throwing drills is highly recommended to reduce the risk of injury. Furthermore, this training programme should be combined with other exercises such as stretching, strengthening and endurance to provide a balanced and integrated physical training programme.

According to research, softball throwing drills effectively improve arm strength and overall power for volleyball athletes. With the correct approach and consistency in training, this exercise can give athletes a substantial advantage in their performance on the field, both in attack and defence skills. Therefore, the authors conducted a literature review study to examine the effectiveness of softball throwing drills in improving arm power for U17 volleyball athletes.

RESEARCH METHOD

The method used in this research is a literature study. As a first step, a systematic search was conducted for articles published between 2022 and 2024 using electronic databases, including PubMed, Scopus, Web of Science, and Google Scholar. The keywords to be used include "softball throwing training," "arm power improvement," "sports performance," "throwing exercise," and "strength training effectiveness."

After identifying articles, a screening process based on inclusion-exclusion criteria will be conducted to ensure that only relevant studies are reviewed. Inclusion criteria included publications that focused on softball throwing exercises and their effects on arm power, were written in English or Bahasa Indonesia and included human subjects. Exclusion criteria include articles without peer review, published before 2022, and those not focusing on arm power.

We will use the Miles and Huberman (2022) analysis model, which includes three activities: data reduction, data presentation, and conclusion drawing/verification. The data collected will be analysed to identify patterns, themes, and relationships using a qualitative approach. Matrices will be constructed to structure the data and facilitate the identification of emerging trends and concepts.

DISCUSSION

A. Understanding and Importance of Arms Power in Volleyball Athletes

Arm power plays an important role in supporting volleyball athletes' performance. According to [8], arm power can be interpreted as the ability to produce maximum speed in arm muscle contractions in a short time. This is not only related to muscle strength but also to the speed of movement, which simultaneously affects the amount and speed of strength that can be generated by the arm.

Arm strength in volleyball is crucial because almost all the basic techniques in this game involve using the arm. From the serve to the smash to the block, all require a combination of strength, speed, and accuracy [9]. Good arm power will increase the shot's effectiveness, the ball's speed when released, and the accuracy and hardness of the serve or smash.

For example, in serving, maximum arm power can produce a serve that is hard and difficult for the opponent to anticipate. This becomes especially important in competitive-level play, where a good serve can be key to winning a match. In smash, arm power allows the athlete to hit the ball at high speed, which makes it harder for the opponent to defend.

In addition, in blocking techniques, arm power allows athletes to reach out and direct the ball back into the opponent's area with enough force to make it difficult for the opponent [9]. The reaction speed supported by good arm power makes blocking more effective.

Improved arm power helps not only with techniques but also increases stamina and endurance during the game. Athletes with good arm power usually have better control over muscle fatigue, which allows them to play at the peak of their performance for longer.

Training to develop arm power will include various weights and plyometric exercises focusing on increasing strength and speed. These exercises should be designed to

optimise the synergy between the bicep, tricep and deltoid muscles and other supporting muscles around the arm and shoulder [10].

Given the importance of arm power in volleyball, coaches and athletes must be committed to developing this physical attribute. This includes providing sufficient time, resources, and attention in training sessions to ensure that arm power is developed effectively and efficiently, which will ultimately improve the athlete's overall performance.

Arm power is an important element in volleyball that can support various essential techniques. Improved arm power not only improves individual capacity but also increases the team's overall competitiveness. Therefore, structured coaching and training should be a priority in volleyball training.

B. Softball Sheet Method for Arm Power Improvement

One effort to increase arm power is the softball throwing training method. This training method is increasingly popular among volleyball athletes because it is considered adequate. It can simulate explosive movements similar to basic volleyball movements, such as serves and smashes while combining the principles of increasing strength and speed in one exercise [11].

1. Exercise Concept

Softball throwing drills are designed to optimise and strengthen the working ability of the muscles in the arms, shoulders, and core so that they can operate simultaneously and create a speed boost and power momentum. The softball, which has a proportional weight and dimensions, provides an ideal level of resistance, which helps increase muscle power while reducing the potential risk of injury due to using a heavier load than necessary.

2. Implementation Technique

To carry out the softball throwing training method can be done through several stages, according [12], namely:

a. Exercise Preparation Stages

This stage is carried out before starting the softball throwing training procedure. In this stage, training equipment such as softballs, gloves, open fields, or rooms with a safe distance to throw the ball must be prepared. In addition, athletes must warm up before the softball sheet training procedure.

Warming up is to avoid the risk of injury to athletes. Warming up can be done for approximately 10 minutes. Activities include stretching the arms, shoulders, and lower back, shoulder rotation, and light warm-ups such as jogging or jumping rope to increase blood flow to the muscles.

b. Stages of Exercise Procedure

In this softball throwing training method, athletes must do several activities, namely:

i. Perform Basic Throwing Technique Exercises

The basic throwing technique is a technique that prioritises movement and arm muscle strength.

In throwing softball balls, several technical aspects must be considered, namely:

- a) Standing Position: feet shoulder-width apart, knees slightly bent.
- b) Ball Grip: First, use both hands for better control, then switch to one hand when you feel comfortable.
- c) Swinging the Ball: When in a stable position, swing the ball backwards. Second, use the strength of the shoulders, arms, and body rotation to bring the ball forward. Thirdly, Release the ball when the arms are most extended forward.
- d) Follow-Through: Follow-through with the arms after the ball is released to ensure smooth movement and increased speed.

ii. Performing the Drill

At this stage of the drill, athletes perform several different throws, namely:

- a) Power Modulated Throws: Start with light throws, gradually increasing the intensity of the throw.
- b) Target Throws: Define the target of the throw and focus on hitting the target with precision.
- c) Distance Throws: Throw as far as possible, measuring the distance and trying to exceed the previous distance.

iii. Performing Practice Variations

Variations of throwing exercises that athletes must perform are:

- a) Throw with Various Angles: Practice throwing the ball with different angles to train flexibility and muscle adaptation.
- b) Relay Throws: Involve several athletes in one exercise to develop speed and accuracy in a team setting.

C. Cooling Stages

After performing a training procedure in the form of physical activity or exercise, it is mandatory to cool down because cooling is essential in helping the body recover mentally and physically. One of the significant benefits of cooling down is that it reduces delayed-onset muscle soreness, which a person may experience after exercise. The cool-down process may include gentle stretching and a phase of decreasing activity intensity aimed at bringing the heart rate back to a normal state. In addition, cooling down is also important to normalise blood pressure and body temperature after increases during exercise and prevent both physical and mental stress.

D. Factors Affecting Exercise Effectiveness

In volleyball, hand power is one of the essential competencies that athletes must have. This is not only based on proper technique but also hand power when throwing, which plays an essential role in determining the strength and accuracy of the throw [12]. The development of hand power can be optimised through practical training.

Here are some factors that affect the effectiveness of softball throwing training in developing hand power [13].

1. Warming-Up and Cooling-Down

Warming up or warming up before starting the exercise increases body temperature and muscle readiness to minimise the risk of injury. Cooling down after exercise aims to restore physical condition, reduce muscle tension, and prevent excessive muscle soreness. Both of these activities are essential in supporting the improvement of hand power.

2. Correct Basic Techniques

Understanding and applying the correct basic throwing technique determines the effectiveness of training. Incorrect techniques not only have the potential to cause injury but also hinder the development of hand power. Therefore, coaching basic techniques should be prioritised in every training session.

3. Nutrition Consumption

Nutrition plays an essential role in the recovery process and muscle mass building. Adequate protein consumption and proper carbohydrate intake before and after training help with muscle recovery and strength gains. Also, fulfil your hydration needs to support maximum physical performance.

4. Adequate Rest

Hand power development comes not only from intense training but also from adequate recovery. Adequate rest allows muscles to recover and grow. Lack of rest can result in decreased performance and increased risk of injury.

5. Structured Training Programme

Training programmes should be designed in such a way as to promote gradual improvement in hand power. Various exercises involving different types of movements and intensities can help achieve this goal. Using equipment such as resistance bands or small dumbbells in routine training is also beneficial in developing muscle strength.

6. Evaluation and Mental Training

Regular evaluation and mental training play a role in increasing motivation and focus during training. Understanding progress can increase the desire to continue training, while mental training, such as technique visualisation, can improve the consistency and quality of throwing technique execution.

E. Implications of the Findings for the Practice of Softball Throwing Training for U17 Volleyball Athletes.

The study of the effectiveness of softball throwing training in developing hand power provides insights that can be applied to the training of U17 volleyball athletes, especially in developing strong serving and smash skills. Here are some implications of these findings that can be integrated with U17 volleyball training programmes, among others:

1. Improved Warm-up and Cool-down

Like softball training, an effective warm-up before a volleyball training session and an adequate cool-down afterwards are essential to minimise the risk of injury. This also

supports improved athlete performance during training as prepared muscles and proper warm-up allow athletes to exert maximum power.

2. Technique and Coordination

The correct technique for serving and smashing is essential in volleyball. Softball throwing drills require harmony between hand, wrist, and shoulder movements and good coordination between the eyes and hands. These techniques can be applied to volleyball technique training to produce more robust and accurate attacks.

3. Focus on Strength and Physical Condition

Strength training, part of softball training, can be integrated into volleyball training programmes, particularly in developing hand, chest, and shoulder muscle strength. Exercises using resistance bands or lightweight training can strengthen these muscles, improving the quality of young athletes' serves and smashes.

4. Nutrition and Rest

The findings regarding the need for good nutrition and adequate rest for muscle recovery and growth are also applicable in volleyball. Coaches should develop nutrition plans that support athletes' physical growth and recovery and ensure that athletes get adequate rest for optimal recovery.

5. Periodic Evaluation and Motivation

Periodic evaluation of progress in volleyball training is essential to measure the effectiveness of the methods used and to motivate athletes. This includes checking the development of strength, technique, and tactics. Mental training and motivational methods such as those used in softball can be adopted to improve athlete focus and performance.

CONCLUSION

Softball throwing training positively influences the development of arm power as it involves intensifying the work of the same muscles used in volleyball, particularly during the serve and smash. The training focuses on improving arm speed, strength, and stability, critical to performing effective volleyball attacks.

Effective warm-up and cool-down training prepares and protects muscles for and from intense exercise while also improving flexibility and lowering the risk of injury. Correct technique training ensures that the strength developed through softball throwing drills is applied efficiently to improve the quality of the volleyball game.

Additional training aspects, such as adequate nutrition, sufficient rest, customised strength training, and support in building muscle mass and recovery, are essential for improving an athlete's arm power. Periodic evaluations and mental training provide feedback for training adjustments and additional motivation for athletes.

Based on the literature review, maximal softball throwing training can increase arm power in u17 volleyball athletes. It is an effective complement to traditional volleyball training programmes, positively impacting young volleyball athletes' physical development and performance in the attacking aspects, particularly regarding the power and effectiveness of serves and smashes.

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