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## Differential effectiveness of resistance theraband training on throwing accuracy among basketball players

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### Abstract

The study is to determine the effectiveness of different resistance theraband training on throwing accuracy among collegiate basketball players.

**Introduction:** Resistance Training is a type of exercise which utilizes a tool, an equipment or one's own weight to apply an external force to the body that stretches a segment of the body. The goal is to stimulate reactive improvements in support, stability, strength, symmetrical balance and muscle mass in order to improve muscle endurance. Theraband was consumed millions across the globe and is recommended by the American Heart Association Sports medicine, professionals, the gym, fitness and for rehabilitation purpose.

**Methodology:** It is an experimental study with 30 subject performed resistance theraband training. The study was conducted for 6 weeks. The outcome measure was seated Medicine Ball Put Test (SMBPT). Pre-test was measured before initiation of the first training session and Post test was performed at the end of last training session.

**Outcome measure:** Seated Medicine Ball Put Test.

**Results:** On comparing mean values of Seated Medicine Ball Put Test Score between Pre-test  $4.17 \pm .312$  and Post-test  $5.74 \pm .423$  within group (Resistance Theraband Training), it shows there is a highly significant difference between Pre-test and Post-test mean values at  $P \leq 0.001$ . Hence, the null hypothesis is rejected.

**Conclusion:** Resistance theraband training has shown greater improvement in terms of Seated Medicine Ball Put Test (SMBPT) test which improves throwing accuracy in collegiate basketball players.

**Keywords:** Resistance training, theraband training, upper body performance, throwing accuracy

### Introduction

Elastic bands, rubber bands and tubing are produced using by several manufacture under different product names, such as theraband, elastic resistance bands and tubing. Elastic resistance products, specifically designed for use during exercise. This band is classified into two broad categories: Elastic band and elastic tubing<sup>[1, 4]</sup> The most familiar of which is Thera band which are available in an assortment of grades or thickness. Colour coding denotes the thickness of the product and grades of resistance. Recognised as the original system of progressive resistance for over 25 years endorsed by American Physical Therapy Association (APTA), Thera band's elastic resistance has been proven to increase strength, mobility and function<sup>[2, 3]</sup> Elastic resistance equipment's such as bands and tubes are commonly used in sports and rehabilitation medicine for increasing muscular strength and endurance. One of the primary benefits of resistance band is that they help in increasing and improving natural movement pattern used in sporting activities, such as following through on golf swing, throwing accuracy, tossing football and raising something heavy (weight lifting) is one of the key advantages of resistance bands<sup>[3]</sup>. Resistance band relies on the tensile properties of latex or other elastic polymers such as form of resistance. Rate of elongation of the stretch of the material leads to variation in the resistance. The resistance property of resistance band is often compared to the dynamics of a spring, where the magnitude of resistance and the amount of potential energy stored dictates the type of material (modulus of elasticity), the change in length (applied force) the resistance is not constant, elastic exercise is not formally considered isotonic exercise<sup>[4, 5]</sup>. In addition, the rate of stretch may be non-uniform and this prohibits

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resistance band exercise from being categorized as a form of isotonic exercise. Despite the categorical dilemma, resistance band exercise is commonly used for the therapeutic exercise because of its low cost, simplicity, portability, versatility and non-reliance on gravity for resistance. The resistance offered by the theraband does not rely on the tensile property of latex or other elastic polymers as a form of resistance and therefore depends on the elastic resistance and range of strengthening. Resistance band exercise seems especially popular for shoulder rehabilitation [6, 7]. Specific protocols and methods have been described that exclusive use of theraband in strengthening the rotator cuff muscles. Few studies have reported that both male and female adults with and without musculoskeletal pain use elastic resistance band as a relevant tool for increasing muscular strength in young and elderly population. By the means of its ability to set force and resistance band and tube are preferred. To train one or more joints at the same time resistance theraband can be used [5, 7]. In recent years, the population of elastic resistance training appears to have grown, despite being used for decades in sports such as power lifting. Training with elastic bands is categorized into a training method known as variable resistance training. Elastic resistance training and chain resistance training [7, 9, 10]. When these tools are used as a resistive force, they increase the load being lifted in a linear force. However, their loading patterns are different. Elastic bands exhibit a curvilinear length-load relationship, whilst chairs display a much similar linear relationship. [9,10,11] Eccentric- Concentric Transition or Stretch Shortening Cycle (SSC) as elastic resistance increases muscle activity and rate of loading during the eccentric space, it is often believed that there will be an increased strong of elastic energy and thus improvement in the following concentric performance. In other words, the assistance of elastic bands during the descent is taught to load the eccentric-concentric SSC to a greater extent than free weights alone, and thus improve the following concentric portion of the lift. As a result, increase in concentric rate of force development Elastic resistance training to overcome the weakest part of the exercise, otherwise known as the “sticking point”. It is in the segment of any exercise that the joint levers are at their weakest position thus in turn, determines the maximal weight an athlete can lift. During this phase of an exercise, the elastic band are attempting to recoil, thus providing an assistive downward force. Which increase in muscle activity during the eccentric phase of different exercises when using elastic bands. The increase in muscle may increase the rate of loading during the eccentric-concentric SSC including the eccentric rate of force development and eccentric impulse by using elastic band during eccentric phase of an exercise Tension refers to the amount of force built up within a muscle. The total tension is a combination of passive (non-contractile) & active (contractile units) tension. Generally, a muscle is capable of being shortened to approximately 1/2 of its normal resting length & stretched about 2 times its normal resting length. The distance between maximum elongations to maximum shortening is referred to as excursion, and usually a muscle has sufficient excursion to allow the joint to move through the joint's entire range: A common issue when selecting and using elastic bands is the uncertainty in how much additional load the bands provide during an exercise otherwise known as the length-tension relationship. This relationship purely describes how much tension (i.e., load) is provided when the band is stretched to a particular length. A clear representation of the amount of weight added when the

bands are stretched to a particular length. The information is based on bands that are 100cm (1m) in length at rest (i.e., non-stretched), and their relative tensions for every 10cm of the stretch until they were deformed to 150% of their resting length (150 cm). Seated Medicine Ball Put Test: High reliability and valid tool that can be used by health professional to monitor deficits in upper body muscular power to improve training protocols.

### Methodology

The study design was experimental type with comparison of pre and post-test values. The study done at Chennai with 30 samples simple random sampling. The study duration was 6 weeks. The inclusion criteria consists of age group with 18-25 years male subjects and those who play basketball in college on off season. The players ignore if they train resistance training for past 6 months. The acute inflammation, recent fracture of the upper limb and musculoskeletal injuries were excluded. The outcome measures was measured by seated medicine ball put test. The materials consumed were measuring tape, medicine ball, marking chalk and theraband.

### Procedure

This study was reviewed and approved by the Institutional Review Board of the Faculty of Physiotherapy. All participants were informed about the benefits and effect of study, the consent was obtained before data collection of the study. Theraband Training Protocol: Exercises were selected based on the similarity of their movement patterns to those that constitute the game of basketball to train muscle group of players in the upper extremities. The training was followed for 6 weeks.

### Results

On comparing mean values of Seated Medicine Ball Put Test Score between Pre-test  $4.17 \pm .312$  and Post-test  $5.74 \pm .423$  within Group (Resistance Theraband Training), it shows there is a highly significant difference between Pre-test and Post-test mean values at  $P \leq 0.001$ . The Post test values have shown improvement when compared with the pre-test. Hence, the null hypothesis is rejected.

### Discussion

The intent of the study was to find the effectiveness of different resistance theraband training on throwing accuracy among collegiate basketball players. In this study, seated medicine ball put test were used as outcome tools. Upper body strength training program is considered to be one of the key components for technical skill mastery in throwing. The deltoid, triceps, biceps and rotator cuff muscles play an important role in throwing Raffle *et al.* 2010. There is lack of studies regarding the recent advancement in training for throwing accuracy in basketball players. So, this study aimed to find effectiveness of different theraband training in collegiate basketball players. Result of the study Yoon *et al.* (2017) shows that use of elastic band provides and significant increase in the level of cognitive function, physical function and muscle strength Research from Yasuda *et al.* (2014) shows that exercise using elastic band as increased muscle show that exercise using elastic bands has increased muscle activation and an effective method for building muscle hypertrophy in adults who have low activity. A meta- analysis conducted by Lopes *et al* (2019) shows that resistant training using elastic bands as an effect on increasing muscles strength similar to the conventional resistance training using weight

machines and dumbbells. Hen *et al.* (2018) stated that resistance training in an exercise performance that causes muscle to contract against external loads in the hope of increasing endurance, strength and muscle mass. In resistance band training, the athletes work to develop the eccentric phase of muscle contraction by loring weight and overcoming the weight using concentric contraction. The result show that 6 weeks of training different theraband significantly increase the upper extremity power of collegiate basketball players. AB Carter *et al* (2017) it showed that effects of high-volume resistance theraband training on throwing velocity and functional strength ratio of the shoulder rotators in Collegiate basketball players which conclude that theraband training demonstrated increase in throwing velocity as their where improved in eccentric external rotation strength of shoulder. In this study, on comparing mean values of Seated Medicine Ball Put Test Score between Pre-test  $4.17 \pm .312$  and Post-test  $5.74 \pm .423$  within Group (Resistance Theraband Training), it shows there is a highly significant difference between Pre-test and Post-test mean values at  $P \leq 0.001$ . The Post test values have shown improvement when compared with the pre-test. Hence, the null hypothesis is rejected. On comparing Pre-test and post-test within Group on Seated Medicine Ball Put Test score shows significant difference in the mean values at  $p < 0.05$

### Conclusion

This study concluded that the effectiveness of different resistance theraband training improves throwing accuracy among collegiate basketball players. Various resistance theraband training had greater efficacy in the shoulder complex musculatures which involved in the phases of throwing. This exercise protocol can be implemented in the various levels of training in basketball players in terms to improve throwing accuracy in the basketball sport.

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### Conflict of interest

Nil

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