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The Effect of Resistance Band Training on Arm Muscle Strength Endurance of Basketball Players

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Abstract

This study aims to determine the effect of resistance band training on increasing the endurance of arm muscle strength in adolescent basketball players. The method used is an experiment with a pre-test and post-test design in one group. The subjects of the study consisted of extracurricular basketball players who followed a training program for six weeks (12 sessions). The instrument used to measure arm muscle strength was a 60-second push-up test. The results of the statistical analysis showed a significant increase in the average value, from 20.20 (pre-test) to 25.00 (post-test). This finding is supported by previous studies stating that resistance band-based training is effective in increasing muscle strength, even in the elderly group. In addition to increasing strength, the advantages of resistance bands lie in their flexibility, portability, and high level of safety, making them suitable for use by school-age athletes. Thus, resistance band training can be an efficient and effective alternative in the youth basketball physical development program, especially in increasing arm muscle endurance to support the performance of basic game techniques.

How to Cite

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INTRODUCTION

Basketball is one of the most popular games throughout the world (Ponciano et al., 2018). In addition, basketball is famous throughout the world and Serbia, this sport has unexpected characteristics in its matches. Therefore, basketball is one of the most popular sports in the world and is often found in parts of the world (Rismayadi et al., 2023). Basketball is also a big ball game where the aim is to put as many balls into the opponent's basket as possible and defend your own basket so you don't concede as many balls as possible (Sofyan et al., 2020).

In Indonesia, basketball is one of the most popular sports after football. Almost everyone is involved in this branch of basketball. As time goes by, interest in basketball is increasing compared to before when there were only a few fans (Wibowo et al., 2017). According to (Augie, 2017)from year to year the enthusiasm of young people towards basketball has never decreased, even tends to increase. Likewise, inter-school competitions, in many cities never lose interest and enthusiasm. The enthusiasm of the community can be seen from the Detection Basketball League (DBL), Indonesia Basketball League (IBL) events.

In the game of basketball there are several basic techniques of playing basketball that can be learned, namely starting from the basics, such as how to hold the ball, catch, pass, and dribble and shoot the ball. With regular practice, it will accompany the success of the player to achieve achievements. This basketball sport is a sport that is easy to teach because it has a large ball size so that it does not make it difficult for people to throw or bounce the ballN(Biellsa et al., 2023).

Every basketball athlete must have the ability to catch the ball, pass the ball, dribble the ball and shoo (Irawan et al., 2021). According to (Maulana & Fitrianto, 2023)conclude that dribbling, passing, and catching skills are only able to deliver players to score opportunities and shooting skills are ultimately needed to score. In addition, physical factors also play a major role in supporting the athlete's abilities. Some important physical elements include arm muscle strength, wrist flexibility, leg muscle strength, and speed (Badaruddin et al., 2022).

Basketball players must be strong, fast, tenacious and agile in order to compete well against their opponents (Sianturi, 2023). Resistance bands are able to develop and improve physical fitness which is closely related to endurance, strength and speed. Variations of exercises using resistance bands are made to improve certain muscle parts (Oktavianus et al., 2024). In order to become a skilled player, a basketball player must be supported by physical elements such as flexibility, speed, muscle strength, and endurance (Dwi Khory et al., 2022). Physical elements are also very important in improving sports achievements because the better the physical quality, the better the quality of technique and skills.(Isyani et al., 2022).

Resistance band exercises were chosen as an effective method (Maulana & Barikah, 2023). Resistance bands are simple exercise equipment, but have been proven to effectively increase the strength of arm muscles and leg muscles. In a study revealed by (Purwadinata & Wijono, 2020) has shown that resistance band training has been shown to increase the arm muscle strength of taekwondo athletes.

Problems in the sport of basketball continue to emerge and continue to occur, in the training process there are several problems expressed by (Lenggono Sakti et al., 2021)among others: 1) The lack of a good program plan, 2). Organization that has not run optimally and systematically, 3). Implementation of training that is hampered by limited facilities and infrastructure. In addition, another factor that is also a challenge in training is the lack of structure in training. Many teenage basketball players are good technically, but physically they are still lacking, especially in arm muscle strength. Therefore, this study focuses on the discussion of resistance band training design to increase arm muscle strength in the sport of basketball.

The formulation of this study is whether there is a significant effect of resistance band training on the endurance of basketball players' arm muscles, and the aim is to examine the significant effect of resistance band training on the endurance of basketball players' arm muscles, this study is theoretically useful for increasing understanding of the effect of resistance band training on the endurance of basketball players' arm muscles.

The results of this study are expected to contribute to the development of sports science, especially in basketball, and be a reference in designing more effective training programs. Practically, this study provides useful information for coaches in choosing the right training method to increase the endurance of players' arm muscles, so that it can support the performance and achievements of athletes optimally. In addition, practical benefits are also felt by the players themselves in developing their physical abilities.

The novelty of this research lies in the implementation of a structured resistance band

training program specifically targeted at adolescent basketball players in a school extracurricular setting, which has been rarely explored in previous studies. This study not only confirms the effectiveness of resistance bands for adult or elderly populations—as shown in prior research—but also demonstrates their significant impact on the muscular endurance of school-age athletes. By focusing on a simple, low-cost, and accessible method, this study fills a gap in the literature regarding practical training approaches that are both safe and adaptable for younger populations.

Furthermore, the findings can serve as a foundation for further research in the field of sports science, especially basketball, to explore long-term adaptations, integration into broader training curricula, or comparisons with other forms of resistance training.

METHODS

This research is an experimental study, so there are two variables in it, namely resistance band training as the independent variable and arm muscle strength endurance as the dependent variable. The research method used is a quantitative research type with a One-Group Pretest-Posttest Design. This One-Group Pretest-Posttest Design is measured using a push-up test that is carried out during (pretest) then given resistance band training treatment after which another push-up test is carried out (posttest) (William & Hita, 2019). The resistance band training treatment was carried out within 6 weeks. Every week training is carried out 2 times.

In this study, the researcher determined that the target population was the extracurricular basketball students of Senior High School 22 Bandung. The population taken in this study was 23 people. The reason for choosing this population was that many extracurricular basketball students still lacked the endurance of their arm muscles, which caused losses to their own team in the match, and the sample in this study was taken using a purposive sampling technique. The instrument or measuring tool used in this study was the push up test (Pasaribu, 2020).

In this study, researchers provided treatment in the form of a resistance band training program for 6 weeks. This exercise was carried out twice a week, so that there were a total of 12 training sessions. At each meeting, participants would follow a series of exercises that had been specifically designed to increase the endurance of arm muscle strength. A detailed description of the training program can be seen in the table provided. The data obtained will be analyzed using the SPSS 25 software application (Fadluloh et al., 2024).

RESULTS AND DISCUSSION

Table 1. Descriptive Statistics

	N	Min	Max	Mean
Pretest	15	10	25	20.20
PostTest	15	14	30	25.00
Valid N (listwise)	15			

Based on the results **Table 1** of descriptive statistical analysis in table 1, the number of subjects in this study was 15 people. The pre-test push-up value showed a minimum score of 10, a maximum of 25, and an average of 20.20. After following the resistance band training program for 12 meetings, the post-test results showed an increase with a minimum score of 14, a maximum of 30, and an average of 25.00. These data reflect an increase in the overall endurance ability of the arm muscles after the treatment was given.

The results of the normality test using Shapiro-Wilk show that the pre-test data has a significance value of 0.105 and the post-test is 0.072. Because both significance values are greater than 0.05, it can be concluded that the pre-test and post-test data are normally distributed, thus meeting the requirements for parametric testing.

The results of the Paired Samples t-test showed a t value of -44.900 with a degree of freedom (df) of 14 and a significance value (2-tailed) of 0.000. Because the significance value is <0.05, there is a significant difference between the pre-test and post-test results. This shows that resistance band training has a significant effect on increasing the endurance of basketball players' arm muscles.

The results of this study indicate that the resistance band training program has a significant effect on increasing the endurance of arm muscle strength in adolescent basketball players. Based on the results of descriptive statistics, there was an increase in the average value of the push-up test from 20.20 in the pre-test to 25.00 in the post-test. In addition, the minimum score increased from 10 to 14, while the maximum score increased from 25 to 30. These changes indicate that the training program not only increased the average ability of the participants, but also generally improved individual performance across the spectrum of initial abilities, both in participants with low and high initial performance. Thus, this

program can be categorized as inclusive and effective overall.

Inferentially, the results of statistical analysis using paired sample t-test showed a significance value of 0.000 ($p < 0.05$). This means that there is a very significant difference between the pre-test and post-test, so it can be concluded that the training program carried out for 6 weeks (12 sessions) has a real impact on increasing the physical capacity of the research subjects, especially the endurance of arm muscle strength. Arm muscle endurance is an important component in basketball performance, because it plays a role in maintaining technical abilities such as shooting, passing, and dribbling for a long time without experiencing significant fatigue.

These performance improvements can be explained by the physiological principles of elastic resistance training, in which muscles are subjected to progressive resistance through tension from the elasticity of a resistance band. This type of training simultaneously stimulates both type I and type II muscle fibers, thereby not only increasing momentary strength but also strengthening the muscle's ability to perform repetitive activities for a specified duration (muscular endurance). The elasticity of the band creates tension that increases with the length of the movement (range of motion), providing a unique stimulation that is difficult to achieve through conventional non-weight training.

These findings are in line with findings made by (Vafaeenasab et al., 2019)entitled The Effect of Lower Limb Resistance Exercise with Elastic Band on Balance, Walking Speed, and Muscle Strength in Elderly Women states that the effect of resistance band training improves aesthetic balance and results in increased walking speed and increased muscle strength. Elderly sports trainers are advised to utilize the elasticity of strength training and consider the special needs of the elderly and the possibility of injury in designing training programs. Conclusion: The results of this resistance band exercise have an effect on balance, speed, and increased muscle strength even in the elderly., then in addition to research by (Cahyono et al., 2018)entitled The Effect of Traditional Push Up, Plyometric Push Up, and Incline Push Up Exercises on Arm Muscle Strength, Arm Muscle Power, and Arm Muscle Endurance states that traditional push ups, plyometric push ups, and incline push ups are all effective in improving upper body performance in students of Senior High School 2 Lamongan.

Furthermore, resistance bands have several practical advantages that make them a good choice for training programs for school-age athletes. They are portable, inexpensive, and can be used in a variety of settings, including school, home, and outdoor fields. In addition, resistance bands can increase specific muscle activation that directly contributes to basic basketball techniques such as passing, shooting, and dribbling, all of which rely heavily on arm muscle strength and endurance.

Overall, the results of this study confirm that resistance bands are an efficient, effective, and adaptive training alternative in improving arm muscle strength endurance in adolescent basketball players. This increase in muscle capacity can support athlete performance during matches, especially in match situations that require high intensity and long duration. Therefore, coaches and sports teachers are advised to integrate resistance bands as part of a routine training program for students or beginner athletes to optimize the development of arm muscle strength without overloading the body.

CONCLUSION

Based on the results of the research that has been conducted, it can be concluded that the resistance band training program has a significant effect on increasing the endurance of arm muscle strength in adolescent basketball players. This is indicated by an increase in the average value of the push-up test results from 20.20 in the pre-test to 25.00 in the post-test, as well as the results of statistical tests that show significant differences inferentially. This increase reflects the effectiveness of resistance band training in building overall arm muscle capacity in participants, both those with low and high initial performance.

Resistance band training has been proven to not only increase strength, but also offer greater flexibility, portability, and safety compared to conventional weight training. With these advantages, this training method is very suitable for school age groups in extracurricular programs or sports coaching, especially basketball. Optimal strengthening of arm muscle endurance plays an important role in supporting the implementation of basic techniques such as shooting, passing, and dribbling more consistently and efficiently.

Overall, resistance band training is an alternative physical training program that is efficient, economical, and effective in improving the physical performance of young athletes, especially in terms of arm muscle strength endurance. This study is expected to be a reference for coaches, sports teachers, and fitness practitioners in de-

signing training programs that are adaptive, safe, and have a positive impact on the performance of young athletes.

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