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The Effect of Resistance Band Training on Underhand Passing Skills in Boys' Volleyball Games Aged 16-18 Years at the Bahurekso Kendal Club

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ABSTRACT

This study investigates the impact of resistance band training on underhand passing skills in 16- 18-year-old male volleyball players at the Bahurekso Kendal Club. Initial observations indicated inadequate underhand passing skills among athletes. A one-group pretest-posttest experimental design was employed, involving 14 male athletes. A pretest using the Brumbach Forearms Pass Wall Volley Test assessed their skills before a 6-week resistance band training program, conducted three times a week. Post-training, a significant improvement was observed, with a Paired Sample t-Test yielding a p-value of 0.000. The average pretest score rose from 28.79 to 49.36, marking a 71.4% improvement. The findings suggest that resistance band training effectively enhances arm muscle strength and body stability, essential for underhand passing. The study recommends integrating this training method into coaching programs and encourages further research on various training techniques for improving volleyball skills.

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A. Conception and design of the study;
B. Acquisition of data;
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INTRODUCTION

Sports are activities that are structured into physical actions which incorporate various elements of movement skills and involve playing with an object, organized systematically under certain rules, and carried out consciously and deliberately to achieve the goals of developing physical, mental, and social potential (Di & Kerdon, 2024). This statement explains that not all physical activities can be classified as sports unless they contain specific elements. These elements include movement skills, systematic and organized structure, conscious and planned execution, and the aim of maintaining, developing, and enhancing physical, mental, and social potential (Tapo & Bile, 2021).

According to Khourotul Aini (2020:18), as cited in Wahyu Cirana et al. (2021), sports are activities that serve as a medium to facilitate a person's need to exert energy**.** It can be concluded that sports are not merely ordinary physical activities, but also involve

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planning, skills, and structured objectives aimed at developing human potential in various aspects.

Volleyball is a sport filled with competition and excitement, which makes it a popular sport. The movements are fast, intense, and highly enjoyable (Fahmi Firdaus et al., 2021). According to Eri Adik Surliyanto (2018), volleyball is a type of sport that involves the use of a net. It is played by two opposing teams separated by a net, with each team consisting of six players. The game takes place on a rectangular court measuring 18 x 9 meters, marked with boundary lines that are 5 cm wide. A net is installed in the centre of the court, measuring 9 meters in width. The net height is 2.42 meters for men and 2.24 meters for women. Volleyball is played by hitting the ball over the net to land it in the opponent's court. The main objective is to make the ball touch the ground on the opponent's side in such a way that they are unable to return it, thereby earning points for the team.

Therefore, players must first master the basic techniques to improve their performance in the game. The lack of optimal results becomes a weakness, both during training and in actual matches. Based on the researcher's observations during matches, one noticeable weakness is the improper execution of underhand passing skills, particularly when receiving a smash or a powerful ball (Massa, 2019).

One of the basic techniques in volleyball is the underhand pass. When the underhand passing skill is mastered, it facilitates the setter in delivering accurate and optimal passes according to the agreed-upon signals between players. However, if this basic skill is not mastered, it will hinder the setter from providing good passes, which in turn prevents the hitter from performing optimally (Marzuki & Setyawan, 2023). Volleyball requires strength in the arm muscles, where the underhand pass is considered the most fundamental technique in the game (Herman, 2019).

Strength is the most important element that a person must possess because every daily activity or task requires muscle strength. Strength is one of the basic biomotor components needed in every sport. To achieve optimal performance, strength must be improved as a fundamental foundation for developing other biomotor components (Juntara, 2019).

The resistance band training method is a very effective form of exercise to increase arm muscle strength. This type of training provides additional resistance to help enhance arm muscle power, and the training intensity should be progressively increased over time (Setia, 2021). In the sport of volleyball, resistance band exercises are commonly used, especially to improve the power of smashes. However, the researcher intends to apply the same method with a different goal, namely to improve the underhand passing skills of volleyball athletes.

Training with resistance bands is a very effective method to improve the endurance of the targeted muscles. Several examples of muscle endurance exercises using resistance bands are commonly applied in the sport of volleyball (Hasnawati, 2021). Resistance bands can be used to aid the strengthening of human muscles, enhance joint stability, reinforce ligaments, and stabilize muscle groups. According to Mario et al. (2017:152), resistance band training is a form of endurance exercise that essentially increases the muscle's energy potential, resulting in an overall improvement in muscle strength quality.

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Observations at Bahurekso Kendal Club indicate that athletes have not yet mastered the underhand passing skill well, especially when receiving powerful balls. Although other skills such as smashing and serving are already good, underhand passing remains a weakness. Therefore, an effective training method, such as resistance band exercises, is needed to improve arm muscle strength and underhand passing skills. This study aims to evaluate the effect of resistance band training on underhand passing skills to help athletes achieve better performance in volleyball.

METHODS

This research uses an experimental approach with a one-group pretest-posttest design. The study aims to measure the effect of resistance band training on underhand passing skills in male athletes aged 16-18 at Bahurekso Kendal Club. A pretest was conducted to assess the participants' initial abilities using the Brumbach Forearms Pass Wall Volley Test, followed by a 6-week resistance band training program with a frequency of three sessions per week. After the training period, a posttest was administered to evaluate the improvement in underhand passing skills.

The training procedure consists of several exercises, namely Stead Bicep Curls, Delt Front Raise, and Squat with Straight Arm Rises, performed alternately by 14 athletes divided into three groups. Each exercise is carried out in three sets of eight repetitions, with a focus on proper repetition and recovery to achieve optimal results. Observation data from each training session is recorded for further analysis.

The population of this study consists of all male volleyball athletes aged 16-18 at the Bahurekso Kendal Club, totalling 14 athletes. The sampling technique used is total sampling, where all members of the population are included as samples. The independent variable in this study is resistance band training, while the dependent variable is underhand passing skill. The operational definitions of the variables are provided to avoid misunderstandings, with a focus on the skills and training performed.

Data collection was conducted through a pretest and a posttest to measure underhand passing skills. Data analysis involved normality testing and hypothesis testing using a paired sample t-test with SPSS Statistics 23. The normality test was performed to ensure the data were normally distributed, while the t-test was used to compare the mean scores of the pretest and posttest to determine whether there was a significant improvement after the intervention.

RESULTS AND DISCUSSION

Result

This study was conducted to determine the effect of resistance band training on underhand passing skills in male volleyball players aged 16–18 at Bahurekso Kendal Club. The subjects consisted of 14 athletes, with pretest measurements taken before the

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training and posttest measurements after several weeks of resistance band training. Below is a summary of the pretest and posttest data results.

Table 1.

Normality Test of Pre-test and Post-test Volleyball Scores

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Kelas	Statistic	df	Sig.	Statistic	df	Sig.
Hasil	Pre	.202	14	.127	.928	14	.286
	Post	.203	13	.148	.957	13	.700

a. Lilliefors Significance Correction

The results of the normality test can be compared with the decision criterion, which states that if the test value is greater than 0.05, the data can be assumed to be normally distributed. The normality test result for the pretest scores in the control group was 0.127 > 0.05 (meeting the normality requirement), while for the experimental group, the value was 0.148 > 0.05 (also meeting the normality requirement).

Table 2.

Normality Test Results of Pretest and Posttest Scores for Volleyball Out

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Kelas	Statistic	df	Sig.	Statistic	df	Sig.
Hasil	Pre	.214	14	.081	.938	14	.395
	Post	.185	14	.200*	.912	14	.166

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The normality test results can be interpreted based on the decision criterion that if the test value is greater than 0.05, the data can be assumed to be normally distributed. The normality test result for the pretest scores in the control group was 0.081 > 0.05 (meeting the normality requirement), while for the experimental group, the value was 0.200 > 0.05 (also meeting the normality requirement).

Table 3.

The homogeneity test result for the pretest data

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Hasil	Based on Mean	.398	1	26	.533
	Based on Median	.515	1	26	.479
	Based on Median and with adjusted df	.515	1	23.762	.480
	Based on trimmed mean	.385	1	26	.540

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The next prerequisite test is the homogeneity test to determine whether the variation in the data is considered homogeneous or not. The homogeneity test result for the pretest data showed a value of 0.533 > 0.05, indicating that the pretest and posttest data are homogeneous.

Table 4.

The homogeneity test result for the posttest data

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Hasil	Based on Mean	2.372	1	26	.136
	Based on Median	2.354	1	26	.137
	Based on Median and with adjusted df	2.354	1	16.880	.143
	Based on trimmed mean	2.369	1	26	.136

The next prerequisite test is the homogeneity test to determine whether the variation in the data is considered homogeneous. The homogeneity test result for the pretest data showed a value of 0.136 > 0.05, indicating that the pretest and posttest data are homogeneous.

The hypothesis test was conducted using the Paired Sample t-Test because the research design is a one-group pretest-posttest.

Table 5.

Results of the Paired Sample Test for Volleyball In

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Hasil - Kelas	1.929	2.624	.496	.911	2.946	3.890	27	.001

The significance value (2-tailed) = 0.001 < 0.05; thus, it can be concluded that there is a significant difference between the pretest and posttest scores.

The mean difference between the two paired data sets is not zero, indicating a significant difference between them. This means that the treatment or a different condition has an effect.

Table 6.

Results of the Paired Sample Test for Volleyball In

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Posttest - Pretes	-20.571	5.626	1.504	-23.820	-17.323	-13.682	13	.000

The significance value (2-tailed) = 0.000 < 0.05, so it can be concluded that there is a significant difference between the pretest and posttest scores. The mean difference

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between the two paired data sets is not zero, indicating a significant difference between them. This means that the treatment or a different condition has an effect.

Discussion

Based on the statistical analysis using the Paired Sample t-Test, a significance value of 0.000 ($p < 0.05$) was obtained, indicating a significant difference between the pretest and posttest scores. Thus, resistance band training affects the underhand passing skills of male volleyball athletes aged 16–18 at Bahurekso Kendal Club. This improvement reflects the effectiveness of the resistance band as a training tool capable of stimulating arm muscle strength, which is a crucial component in performing underhand passes.

According to Setia (2021), resistance band training is highly beneficial in developing and enhancing muscle strength, especially in the arm and shoulder muscles, which are the primary supports in underhand passing techniques. In line with these findings, Dandi Gustyan (2022) concluded in his research that the development of a resistance band-based training model is feasible as a method for practising basic volleyball techniques, including underhand passing. Furthermore, Syahab et al. (2023) also demonstrated that the use of resistance bands increases muscle activation and significantly contributes to passing performance in technical sports such as futsal and volleyball.

This study proves that resistance band training significantly improves underhand passing skills in male volleyball athletes aged 16–18 at Bahurekso Kendal Club. The Paired Sample t-Test results showed a significance value of 0.000 (< 0.05), indicating a real difference between pretest and posttest. The average score increased from 28.79 to 49.36 (71.4%), confirming the effectiveness of this training. These findings align with Dandi Gustyan's (2022) research, which stated that resistance band training enhances arm muscle strength and coordination, two key factors in underhand passing.

The improvement in the underhand passing skills of volleyball athletes after undergoing resistance band training demonstrates that this method is effective in developing players' technical abilities. The study results showed a significant increase of 71.4% from pretest to posttest scores, proving that resistance band-based training can strengthen arm muscles and enhance ball control. This aligns with Setia's (2021) statement that training with elastic tools like resistance bands not only increases strength but also trains movement stability, allowing players to perform passing more consistently.

Thus, a structured training program using this equipment can be a solution to overcome weaknesses in basic volleyball techniques. Besides increasing muscle strength, resistance band training also helps improve coordination between the eyes, arms, and body during underhand passing. Movements such as Stead Bicep Curls, Squat with Arm Raises, and Delt Front Raise train players to regulate the force and direction of the ball's rebound more precisely. According to Syahab et al. (2023), this training enhances dynamic muscle performance, enabling players not only to be strong but also agile in adjusting their movements to incoming balls. This is crucial in fast-paced game situations demanding accuracy, such as when receiving a serve or a smash from the

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opponent. In other words, resistance band training focuses not only on strength but also on the technical and tactical aspects of the game.

Another factor supporting this improvement is the physical and psychological adaptation of athletes after undergoing regular training. Resistance band exercises add extra load that makes the muscles work harder, so when this load is removed during a match, passing movements feel lighter and more controlled. Additionally, according to Adha (2019), this training also builds players' confidence because they get accustomed to facing more demanding physical challenges during practice sessions. The combination of increased strength, coordination, and mental readiness makes athletes better prepared to handle pressure during matches, thereby improving their underhand passing performance.

Although the results show significant improvement, the effectiveness of resistance band training can be optimized further if supported by a longer and more varied training program. This study was conducted over six weeks, whereas Sukadiyanto (in Nulhakim, 2020) recommends a minimum duration of eight weeks to achieve maximal results. Moreover, combining resistance band training with other methods, such as situational drills or agility exercises, can provide a more holistic impact. Therefore, coaches and athletes should consider integrating this training into long-term programs to achieve more comprehensive skill development.

Resistance band training has a significant impact on the development of arm muscle strength, which plays a major role in improving the quality of underhand passing in volleyball. Resistance bands work by providing elastic resistance to muscle movements, causing muscles to work harder during both concentric and eccentric phases. Such training is effective in increasing muscle strength without the risk of serious injury, making it highly suitable for adolescent athletes. A study by Lopes et al. (2019) showed that band-based resistance training significantly improves the stability and activation of major muscles compared to conventional training.

Underhand passing in volleyball requires optimal arm muscle strength, a stable body position, and good coordination between the hands, eyes, and feet. Resistance band training contributes to improving all three aspects. Exercises such as front raises and bicep curls with resistance bands indirectly train muscle endurance and body posture while receiving the ball. This aligns with the findings of a study by Fathoni et al. (2022), which showed that resistance band training over six weeks showed a significant improvement in the performance of basic volleyball techniques, especially underhand passing.

In a physiological context, resistance band training stimulates both type I and type II muscle fibres, which are crucial for explosive activities and muscular endurance. Resistance bands also allow exercise variations that can be adjusted to the individual athlete's capacity, enabling coaches to design progressive training programs. According to Nascimento et al. (2021), neuromuscular adaptations from resistance band training are more effective in younger age groups because their muscles are still developing and highly responsive to light-load training.

From a biomechanical perspective, underhand passing also benefits from resistance band exercises that help stabilize the shoulder and upper arm muscles, which

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play a key role in accurately directing the ball to the tosser. Strengthening these muscles assists players in maintaining stable elbow and arm positions during ball contact. Research by Miyamoto et al. (2020) emphasizes the importance of shoulder and rotator cuff strength in maintaining efficient passing technique, and resistance bands have proven effective in training these muscle groups.

The effectiveness of resistance band training is also influenced by the consistency and intensity of the exercise. In this study, training was conducted in a programmed and structured manner, adhering to the principles of progressive overload. Based on observations and performance measurements before and after the intervention, it is evident that resistance band training significantly contributes to improving the underhand passing technique. This is further supported by Suharto & Widiyanto (2023), who reported that regular use of resistance bands enhances accuracy and reaction speed in young volleyball athletes.

Therefore, it can be concluded that resistance band training is an effective and efficient approach to improving underhand passing skills in volleyball, especially for athletes aged 16–18 years. This method not only increases muscle strength but also supports motor coordination and body stability, which are essential in volleyball performance.

CONCLUSION

Based on the results of statistical tests and descriptive analysis of the pretest and posttest data, resistance band training has been proven to have a significant effect on improving underhand passing skills in male volleyball athletes aged 16-18 at Bahurekso Kendal Club. Resistance band exercises are effective in enhancing arm muscle strength and body stability, which contribute to better, more controlled, and accurate passing techniques. Therefore, this training method can be considered an effective alternative for improving fundamental volleyball skills, especially underhand passing.

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