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The Effect of Resistance Band Training on Topspin Power in Table Tennis

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Abstract
This study aimed to determine the effect of resistance band training on increasing top spin power in table tennis among PTM Mantang athletes in 2025. The research method used was a quasi-experimental design with a one-group pretest-posttest. Twenty athletes were sampled using a total sampling technique. The instrument used was a medicine ball throw test from a seated position, modified to resemble a top spin movement. Each athlete was given three attempts during the pretest and posttest, and the highest score was used in the analysis. Normality testing was performed using the Shapiro-Wilk test, and the results showed that the data were normally distributed. Therefore, analysis continued using a paired sample t-test. The test results showed a mean difference of -0.26000 with a t-value of -9.776 and a significance value of p=0.001 (p<0.005). This indicates a significant difference between the pretest and posttest. Thus, resistance band training has been shown to have a significant effect on increasing top spin power in PTM Mantang table tennis athletes.

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1. INTRODUCTION

Sport is a form of physical activity that plays an important role in improving physical fitness and overall health. In addition to shaping character traits such as discipline, sportsmanship, and positive behavior, sports participation also contributes to the enhancement of cognitive abilities and the achievement of optimal athletic performance. As stated by Akbar et al. (2023), physical activity can increase the production of endorphins, which helps reduce stress and improve mental well-being.

During participation in sports activities, individuals tend to develop an interest in specific types of sports, one of which is table tennis. In addition to being enjoyable, table tennis is widely favored among young people and serves not only as a recreational activity but also as a competitive sport aimed at achieving athletic excellence. In table tennis, several fundamental stroke techniques are required, including forehand, backhand, drive, push, chop, block, service, and spin (Hasan et al., 2012).

Physical components are among the most important factors influencing the performance of table tennis athletes. These components include power, endurance, flexibility, speed, and coordination, as highlighted by Larry Hodges (as cited in Liskustyawati, 2016). Among these components, power is considered one of the most critical characteristics for athletes engaged in competitive sports, including table tennis (Kraemer & Looney, 2012). Power refers to the ability to optimize muscular force and apply it at high speed (Kraemer & Beeler, 2018).

In table tennis, power plays a crucial role, particularly at higher levels of play, where athletes are able to utilize arm strength and wrist joint coordination through the entire body's kinetic chain to generate more effective top spin strokes (Wong, Lee, & Lam, 2020). Players with higher technical

proficiency demonstrate better movement coordination and controlled attacking strength, allowing them to produce adequate ball speed and spin within a limited time frame (Wong et al., 2020).

Resistance bands are effective training tools for enhancing muscle strength by providing external resistance during muscle contraction. Resistance band training has become increasingly popular in modern sports due to its ability to develop muscular strength without excessive joint stress, while also allowing for sport-specific movement patterns, including stroke motions in table tennis. Previous studies have indicated that resistance band exercises can improve explosive muscle strength through dynamic contractions with elastic resistance. However, many existing studies have primarily focused on general strength development rather than specifically addressing top spin power in table tennis. This gap highlights the limited number of studies that directly examine the effectiveness of resistance band training as a stimulus for enhancing top spin stroke power.

Based on this background, the present study aims to investigate the effect of resistance band training on the improvement of top spin power in table tennis athletes at PTM Mantang.

2. RESEARCH METHODS

This study employed a quasi-experimental research design, as the participants were not randomly assigned but were selected based on an existing group, namely athletes from PTM Mantang. The research utilized a one-group pretest–posttest design as proposed by Sugiyono (2019).

Table 1. Study design

Pretest	Treatment	Posttest
O_1	X	O_2
Power Top Spin	Resistance Band Exercises	Power Top Spin

The study population consisted of 20 active PTM Mantang athletes who regularly participated in training sessions. A total sampling technique was applied, considering that the population size was fewer than 100 participants, in accordance with Arikunto (2019).

The instrument used to measure top spin power was the Seated Medicine Ball Throw Test. In this test, athletes performed the assessment while seated with their backs firmly against a wall and were instructed to throw a medicine ball forward with maximum effort. Each athlete was given three attempts, and the highest score was recorded as the final measurement.

The resistance band training program was conducted three times per week over a six-week period. Training intensity and frequency were progressively adjusted based on each athlete's individual capacity. The exercise protocol emphasized shoulder rotation, elbow extension, and eccentric wrist contractions to simulate the biomechanical movements involved in the execution of a top spin stroke.

Data were analyzed using a paired sample t-test to determine the effect of resistance band training on the improvement of top spin power among the athletes

3. RESULTS AND DISCUSSION

3.1.Research Results

3.1.1. Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
average_Pre_Test	20	2.93	4.89	4.0900	.61267
average_Pos_Test	20	3.12	5.30	4.3500	.63908
Valid N (listwise)	20				

Based on the descriptive statistical analysis, the pre-test scores showed a mean value of 4.09, with a minimum score of 2.93 and a maximum score of 4.89. After the implementation of the resistance band training program, the post-test scores increased, yielding a mean value of 4.35, with a minimum score of 3.12 and a maximum score of 5.30. The increase in the mean score by 0.26 points indicates an improvement in top spin power performance among the athletes following the training intervention. Furthermore, the relatively small standard deviation values (approximately 0.61 for the pre-test and 0.63 for the post-test) suggest that the data were closely clustered around the mean, indicating low variability among participants.

3.1.2. Normality Test

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
average_Pre_Test	.174	20	.114	.905	20	.052
average_Pos_Test	.187	20	.064	.914	20	.076

a. Lilliefors Significance Correction

The normality of the data distribution was assessed using the Shapiro–Wilk test. The results revealed a p-value of 0.052 for the pre-test and 0.076 for the post-test. Since both p-values exceeded the significance level of 0.05, the data were considered to be normally distributed. Consequently, parametric statistical analysis using the Paired Sample t-Test was deemed appropriate.

3.1.3. Paired Sample t-Test

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	average_Pre_Test - average_Pos_Test	-.26000	.11894	.02660	-.31567	-.20433	-9.776	19	<,001

The hypothesis testing was conducted using a Paired Sample t-Test to compare two related sets of data derived from the same subjects, namely the mean pre-test scores (average_Pre_Test) and the mean post-test scores (average_Pos_Test). The results of the analysis indicated a mean difference of −0.26000 with a standard deviation of 0.11894. The calculated t-value was −9.776 with 19 degrees of freedom (df), resulting in a significance value (p) of less than 0.001. As the p-value was lower than the predetermined significance level of 0.05, it can be concluded that there was a statistically significant difference between the pre-test and post-test scores. Therefore, resistance band training had a significant effect on improving top spin power in table tennis athletes at PTM Mantang.

3.2.Discussion

The findings of this study reinforce the results reported by Hidayat R. (2017), who demonstrated that resistance band training is effective in enhancing arm muscle strength. Similarly, Damayanti (2022) reported that resistance band exercises contribute to improvements in arm power in badminton athletes. The application of resistance band training in the present study enabled athletes to execute power top spin strokes with greater speed and accuracy, a technical component that plays a crucial role in table tennis game strategies. The significant improvement in performance scores indicates that targeted training focusing on upper-body muscular capabilities effectively enhances the biomechanical functions involved in the execution of top spin movements in table tennis.

4. CONCLUSIONS

Resistance band training has a significant effect on enhancing top spin power in table tennis athletes at PTM Mantang.

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