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The Effect of Resistance Band Training On The Leg Speed of Badminton Athletes of PB. New Executive

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ABSTRACT

This study aims to determine the Effect of Resistance Band Training on the Foot Speed of Badminton Athletes PB. New Executive. This study refers to a quantitative research approach with an experimental research type using a one-group Pretest-Postest Design research design with a shuttle run test instrument. The population in this study were badminton athletes PB. New Executive, while the sample in this study used total sampling, namely 10 people. The test results showed that there was an effect of training using Resistance Bands on the foot speed of badminton athletes. The hypothesis test showed a value (t count 7.2189> t table 1.833), so that it showed that Ho was rejected and Ha was accepted, which means that there was a significant effect on the foot speed of athletes after being treated with the training method using Resistance Bands

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INTRODUCTION

Badminton is one of the fastest racket sports in the world, requiring players to possess a unique combination of agility, speed, power, coordination, and endurance (Phomsoupha & Laffaye, 2015). Among the key physical attributes essential to elite badminton performance, leg speed is critically important. Fast footwork enables players to swiftly move to the shuttlecock, change direction explosively, and recover their position within a fraction of a second (Cabello-Manrique & González-Badillo, 2003). These actions must be executed repeatedly throughout a match, often at high intensity and under psychological pressure.

Leg speed is closely linked with an athlete's ability to perform effective footwork patterns, which directly influence offensive and defensive capabilities during rallies (Chen & Wang, 2018). In competitive badminton, especially in singles, rapid court

coverage often determines who dominates the rally. Therefore, any improvement in leg speed can contribute significantly to overall match performance.

To enhance leg speed, strength and conditioning practices are increasingly integrated into badminton training programs. Traditional methods, including plyometrics, ladder drills, and sprint intervals, have long been used. However, resistance band training has gained popularity due to its portability, affordability, and adaptability to sport-specific movements (Colado & Triplett, 2008).

Resistance bands provide variable resistance across the range of motion, allowing for a more functional and controlled strengthening of muscles used in badminton-specific movements such as lunges, shuffles, split steps, and rapid directional changes (Andersen et al., 2014). Training with resistance bands targets both concentric and eccentric muscle actions, improving the reactivity and elasticity of muscles, especially in the lower limbs.

From a biomechanical perspective, rapid badminton footwork involves strong activation of the quadriceps, hamstrings, glutes, calves, and hip flexors, with stabilization from the core. Resistance band exercises such as resisted lateral shuffles, banded lunges, monster walks, and standing hip extensions activate these key muscle groups under tension, promoting neuromuscular adaptations (Kobayashi et al., 2016). The increased proprioception and muscle coordination developed through resistance band use can enhance acceleration, deceleration, and multidirectional speed (Behm et al., 2015).

Furthermore, resistance bands allow for movement-specific training in multiple planes of motion, mimicking the multi-directional demands of badminton footwork. This makes resistance band training more functional and transferable than isolated machine-based resistance exercises, particularly for developing leg speed (Souza et al., 2017).

Despite its recognized potential, resistance band training is still underutilized in many amateur and semi-professional badminton clubs. At PB New Executive, a local training centre for aspiring badminton athletes, the lack of structured strength and conditioning programs often results in a performance gap, especially in attributes like speed and explosive power.

Most training sessions in such environments remain technique-oriented, with insufficient emphasis on physical conditioning. This often limits the athletes' ability to sustain high-intensity rallies and respond effectively to rapid directional changes. Moreover, leg fatigue and slower recovery during matches can lead to positioning errors, increased unforced errors, and ultimately, performance decline (Ghosh, 2008).

There is also a prevalent misconception that resistance training, including bands, might reduce flexibility or be too intense for young athletes. However, contemporary sports science supports the safe and effective application of resistance band exercises across all age groups when properly programmed (Zemková & Hamar, 2014). Given these issues, there is a need to explore and validate the use of resistance band interventions in localized training settings, particularly in developing athlete populations.

While previous studies have explored strength training interventions for badminton performance, most focus on elite or adult populations, with limited emphasis on leg speed as an isolated variable. Studies often address broad performance indicators such

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as endurance, reaction time, or agility but do not specifically evaluate the impact of resistance band training on lower limb velocity during badminton-specific movements (Andersen et al., 2014; Prasertsri et al., 2020).

Moreover, resistance band training remains under-researched in the context of localized sports development clubs such as PB New Executive. These grassroots-level environments are rarely included in formal academic inquiry, leaving coaches and athletes without evidence-based guidelines tailored to their needs.

To date, no published study has investigated the isolated effect of a structured resistance band program on the leg speed of amateur badminton athletes in Indonesia, despite the country's global prominence in the sport. Therefore, this research seeks to fill a critical gap in both regional literature and practical application.

This study offers several novel contributions to sports science and badminton coaching practice: (1) Contextual Innovation: The study is conducted in a community-based badminton club (PB New Executive), representing real-world conditions that differ from laboratory or elite-level training environments, (2) Targeted Focus: It isolates leg speed, a specific and critical performance variable, rather than general athletic ability or composite fitness scores, (3) Functional Training Methodology: By employing resistance bands, this research evaluates a low-cost, accessible training tool that has not been extensively studied for badminton leg speed development, and (4) Youth Development Implications: The study emphasizes the benefits of structured physical conditioning in youth athletes, potentially influencing training paradigms in clubs with limited resources.

Given the importance of leg speed in badminton and the need for effective, affordable training solutions, this study seeks to answer the following research question: "Does resistance band training improve leg speed among badminton athletes at PB New Executive?"

Through a quasi-experimental design involving pre- and post-tests of specific leg speed metrics, this study will assess the effectiveness of an 8-week resistance band training program. The intervention will consist of carefully selected exercises targeting the lower limbs, integrated into the regular training routine.

The expected outcome is a significant improvement in leg speed, measured through sprint drills, agility tests, and movement analysis during badminton-specific footwork patterns. These findings will not only support the efficacy of resistance band training but also provide actionable recommendations for coaches working in grassroots badminton development.

This research aims to bridge the gap between sports science theory and coaching practice, offering empirical evidence that empowers trainers to implement scientifically backed training methods in resource-constrained environments. It also advocates for the broader inclusion of strength and conditioning education in coach certification programs, particularly in developing regions.

Ultimately, this study aspires to enhance the athletic development and performance trajectory of aspiring badminton players by leveraging accessible, evidence-based training strategies.

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METHODS

The method used in this study is the experimental method. The purpose of the experimental method is to find the effect of independent variables (treatment) on dependent variables (results) under controlled conditions. The research design used in this study is a "One-Group Pretest-Posttest Design". The population in this study were 10 badminton athletes of PB. New Executive. Data collection techniques used were Observation, Test and Measurement and Library Techniques. Data were analyzed using Microsoft Excel. In this study, the data analysis used was the normality test analysis with the normality test method, homogeneity and hypothesis testing using the t-test.

RESULTS AND DISCUSSION

Result

The research data was tested for normality using the Shapiro-Wilk test, with the significance level used as the basis for rejecting or accepting the decision of whether or not a data distribution is normal is a = 0.05. Following the hypothesis stated above, the criteria used are to reject the null hypothesis; if the W-observation value is small from the W-table, it means that the population is not normally distributed. Conversely, the null hypothesis is accepted if W-observation is large from the W-table, which means that the population is normally distributed. The results of the normality test analysis of Foot Speed Training Using Resistance Bands at a significance level of 0.05 were obtained in the initial test, W-observation 0.916> W-table 0.842, then in the final test, W-observation 0.924> W-table 0.842 Thus it can be concluded that the data from the variables above are normally distributed.

Table 1.
Summary of Normality Test Analysis

No	Variable Data	N	Tes	$W_{observasi}$	W_{tabel}	Keterangan
1	Foot Speed	10	*Pre-test*	0.916	0.842	Normal
			Post-test	0.924	0.842	Normal

This study uses the homogeneity of variance test by testing the Pre-test and Post-test data. The Homogeneity Test aims to test whether the data obtained is homogeneous or not. The homogeneity of variance test with the F Test obtained F-count <from the F-table, thus both variances are homogeneous. Using degrees of freedom (n 1-1)(n 2-1) and a significance level of 0.05 in the F distribution table, with F-table is (5.117). Given that F-count (1.05214) <F-table (5.117), it can be concluded that the variance is Homogeneous.

Table 2.
Summary of Homogeneity Test Analysis

Variable Data	*Varians*	N	F_{hitung}	F_{tabel}	Description
Pre-test	0.82076	10	1.05214	5.117	Homogeneous
Post-test	0.863551				

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Hypothesis testing was conducted to determine whether there was an effect of Resistance Band Training on the Foot Speed of Badminton Athletes Pb. New Executive. The statistical test used was the Average Difference Test (t-test) at a significance level of alpha = 0.05. The results of the Hypothesis testing analysis of Foot Speed training using the Resistance Band, which was calculated statistically according to the formula used (t-test), obtained tcount 7.2189> ttable 1.833, which means Ho is rejected and Ha is accepted. These results mean that there is an Effect of Resistance Band Training on the Foot Speed of Badminton Athletes Pb. New Executive.

Table 3.

Summary of Hypothesis Testing Analysis

Foot Speed	Average	SD	t_{hitung}	A	t_{tabel}	Description
Pre-test	15.406	0.90595806	7.2189	0.05	1.833	Significant
Post-test	13.672	0.92927451				

In the Post-test results of Resistance Band Exercise on the Foot Speed of Badminton Athletes, PB. The New Executive from the Pre-test and Post-test increased by 1,734 or 11.25%, namely from an average score of 15,406 in the Pre-test to 13,672 in the Post-test. Thus, Resistance Band Exercise is one of the effective exercises to increase foot speed in Badminton. Resistance bands can be used to help the process of strengthening human body muscles, strengthening joint stability, strengthening ligaments, and the stability of muscle groups, so that they affect endurance training and increase the potential for muscle energy which causes an increase in the overall quality of strength in the muscles (Hasnawati, 2021).

The results of this study are supported by the results of relevant research conducted by Windy Nelsya Camella, Windo Wiria Dinata, Septri, and Sonya Nelson 2023. The Effect of Resistance Band Exercise on the Speed of Tsuki Karate Athlete Inkai Lembah Gumant. The results showed that resistance band training affected the speed of INKAI Lembah Gumanti Tsuki Karate athletes. This is supported by substantial evidence, because the t-test was conducted using SPSS Output Analysis and obtained significant results. Since 0.000 is smaller than 0.05 and tcount is greater than ttable (14.933 is greater than 1.761) for n = 14, we conclude that tcount is more significant than ttable. Ho fails to meet the hypothesis rejection criteria and is rejected; Ha is successful. It can be said that the speed of the tsuki of the Gumanti Inkai Valley Karate Athletes has increased thanks to their resistance band training.

Discussion

The purpose of this study was to determine the effect of resistance band training on the leg speed of badminton athletes at PB New Executive. The results demonstrated a significant improvement in leg speed following a structured resistance band training program. This finding supports the growing body of evidence emphasizing the effectiveness of resistance-based interventions in improving movement efficiency, agility, and explosive power in sport-specific contexts, especially in sports such as badminton that require fast, multidirectional movement.

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Badminton players are required to move rapidly across the court with precision. Speed of movement, especially involving the lower limbs, is a key determinant of performance (Phomsoupha & Laffaye, 2015). The footwork patterns in badminton, lunges, shuffles, split steps, and explosive takeoffs, are all dependent on leg speed and neuromuscular coordination.

In this study, athletes who underwent resistance band training showed marked improvement in footwork-related speed drills. This improvement can be attributed to the way resistance bands stimulate functional strength development while simultaneously training stabilizer muscles that support agility and balance (Colado & Triplett, 2008). The variable resistance provided by bands forces muscles to engage through the full range of motion, thereby promoting enhanced muscular activation and dynamic control (Andersen et al., 2014).

The observed improvements in leg speed may also be explained by neuromuscular adaptations resulting from resistance band training. According to Souza et al. (2017), band training increases motor unit recruitment and enhances the rate of force development, both of which are essential for short bursts of speed in sports like badminton. These adaptations are particularly important for the quadriceps, hamstrings, gluteus maximus, and gastrocnemius muscles, which collectively generate and absorb force during rapid changes in direction (Kobayashi et al., 2016).

Moreover, resistance band exercises mimic real movement patterns found in sports more effectively than machine-based resistance training. For instance, lateral band walks and resisted lunges closely resemble badminton-specific footwork and enhance the player's ability to perform rapid movements while maintaining posture and court coverage efficiency (Behm et al., 2015).

The findings of this study align with previous research that highlights the benefits of resistance training in improving leg performance. Wong et al. (2012) reported that youth athletes who engaged in resistance training showed increased sprinting speed and agility compared to control groups. Similarly, Prasertsri et al. (2020) found that resistance band exercises improved lower limb power and agility in junior badminton players in Thailand.

While most studies have traditionally focused on plyometric or weighted resistance training, this study contributes new evidence supporting the use of elastic resistance as a viable, low-impact alternative. According to Zemková and Hamar (2014), resistance bands are effective in improving explosive performance without placing excessive stress on joints, making them especially suitable for youth and developing athletes.

One of the major implications of this study is its applicability to community and grassroots-level badminton training environments, such as PB New Executive. Resistance bands are inexpensive, portable, and easy to incorporate into regular training. These features make them ideal for clubs with limited access to gym facilities or advanced strength training equipment (Mulyana & Riyadi, 2021).

The study's findings support the integration of resistance band routines into basic physical conditioning programs at the club level. Coaches and trainers working with

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young or amateur athletes can implement these programs without the need for complex equipment or high-cost interventions, yet still gain measurable performance improvements.

Improved performance outcomes often have a positive effect on athletes' psychological motivation and confidence. As the athletes observed measurable improvements in their leg speed and court coverage, this likely contributed to enhanced self-efficacy and willingness to engage more intensely in training. Raab (2014) emphasizes the importance of linking motor performance improvements with athlete motivation, especially in developing populations.

The adaptability of resistance band exercises also provides opportunities for variety and engagement during training sessions, preventing monotony and overtraining. This aspect is critical in youth sports development, where enjoyment and sustained participation are essential.

While the findings are encouraging, this study has limitations. The sample was limited to one club, which may not represent broader populations of badminton players. Additionally, the intervention period was relatively short, and longer-term effects of resistance band training were not evaluated.

The study also focused solely on leg speed without assessing its impact on broader performance indicators, such as match play outcomes, endurance, or injury prevention. Future studies could incorporate motion analysis or match simulation data to evaluate the transferability of improved leg speed to actual competitive situations.

Future research should investigate the long-term effectiveness of resistance band training across different age groups and levels of performance. Comparative studies between resistance bands and other training modalities, such as plyometric training, free-weight exercises, and agility ladders, can offer more nuanced insights into optimal leg speed development.

Furthermore, integrating wearable technology or video tracking to analyze movement patterns could enhance the validity of leg speed assessments and offer deeper biomechanical insights (Paul et al., 2016). Studies might also explore combinations of resistance band training with coordination drills or cognitive-motor tasks to reflect the real-time demands of badminton play.

In conclusion, the findings of this study affirm that resistance band training is an effective method to enhance leg speed among amateur badminton athletes. The improvements are likely due to neuromuscular adaptations, improved proprioception, and enhanced movement efficiency facilitated by variable resistance exercises.

This study contributes to the expanding literature on low-cost, functional training interventions suitable for resource-limited environments. For coaches, integrating resistance bands into training regimens can significantly boost performance with minimal expense or equipment. For players, especially in community clubs, it opens up a pathway to achieve performance gains previously associated only with elite training environments.

CONCLUSION

Based on the data analysis and discussion that have been obtained, the following conclusions can be put forward: Resistance Band Training has an effect on the foot speed of badminton athletes PB. New Executive with the results: (tcount 7.2189> ttable 1.833), then Ho is rejected, Ha is accepted.

Based on the previous conclusions, the researcher can put forward several suggestions that can be used as input or consideration. It is recommended for athletes to apply Resistance band training to increase foot speed. It is hoped that further researchers will add samples with the specifications of beginner athletes. And it is hoped that coaches can apply training concepts that can improve the quality of good foot speed.

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