



Influence of Programmed Physical Training on the Performance of Table Tennis Athletes

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Abstract

This study aims to explore the influence of a programmed physical training program on enhancing the performance of table tennis athletes at the local table tennis club level. The study utilizes a quantitative research approach with a case study design. Research participants consist of 30 table tennis athletes from one local table tennis club. Data were collected through physical tests covering measurements of muscle strength, agility, and cardiovascular endurance, as well as direct observation of athlete performance during table tennis training sessions. The results of the study indicate a significant improvement in muscle strength, agility, and cardiovascular endurance of athletes after participating in the programmed physical training program. Regression analysis also confirms a positive relationship between the level of participation in the programmed physical training program and athlete performance improvement. The practical implications of this research are that local table tennis clubs can utilize programmed physical training programs as a strategy to enhance their athletes' performance. However, this study has limitations that need to be considered, including the limited generalizability of the results due to being conducted in only one local table tennis club. Therefore, further research with larger samples and diversification of table tennis clubs is needed to confirm these findings more broadly.

Keywords: Programmed Physical Training Program, Table Tennis Athletes, Performance, Local Table Tennis Club.

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A. Introduction

Tenis meja adalah olahraga yang membutuhkan kombinasi keterampilan fisik dan teknis yang tinggi untuk mencapai performa yang optimal (Tomoliyus, 2017). At the competitive level, improving the performance of table tennis athletes is a major focus for coaches and athletes themselves. One of the factors according to (Ma'ruf, 2020) one area that has received considerable attention in an effort to improve the performance of table tennis athletes is the role of physical training.

Programmed physical exercise is a systematic and structured exercise designed to improve physical fitness, strength, endurance, and flexibility (Henjilito et al., 2016). In the context of table tennis athletes, programmed physical training may include strength, agility, coordination and cardiovascular exercises specifically designed to improve the physical aspects relevant to the sport (Indah et al., 2021).

Although many studies have been conducted on the effects of programmed physical training on different types of athletes, research focusing on table tennis athletes is limited. While many local table tennis clubs have a desire to improve the performance of their athletes through programmed physical training approaches, they may lack strong scientific evidence to

support the effectiveness of such approaches (Gusdernawati et al., 2021).

The table tennis clubs in the city of Medan often face several challenges that affect their ability to develop and maintain high-performing athletes. Based on observations, the main challenges include limited financial resources that restrict access to facilities, equipment, and necessary training. Inadequate infrastructure, such as a lack of suitable training grounds and insufficient space for strategic meetings, is also a common issue. Additionally, clubs often struggle to attract and retain qualified and experienced coaches, as well as to recruit potential young talents. A lack of knowledge about effective training methods also hampers the clubs' efforts to improve athlete performance. In addressing these issues, programmed physical training emerges as a potential solution.

Programmed physical training is a series of systematic and structured exercises, specifically designed to improve the physical fitness, strength, endurance, and flexibility of athletes (Rahman, 2018). Through these exercises, table tennis athletes can enhance physical aspects relevant to the sport, such as body strength, agility, and cardiovascular endurance. By implementing a suitable programmed physical training program, it is hoped that

local table tennis clubs can be more effective in improving their athletes' performance and achieving their desired development goals.

This research will not only provide valuable insights for table tennis coaches and club administrators but also can be a significant contribution to the academic literature on the development of effective training methods in improving the performance of table tennis athletes at the regional level. Therefore, in-depth research is needed to explore the influence of programmed physical training on the performance of table tennis athletes, especially at the club level. Through a case study at a local table tennis club, we can directly evaluate the impact of implementing programmed physical training on various aspects of athlete performance, including strength, agility, and endurance.

B. Methods

This study employs a quantitative research approach with a survey method. Research participants will consist of table tennis athletes registered in a table tennis club located in the city of Medan. The sample size will be determined based on inclusion criteria, including age (between 17-30 years) with a total of 30 samples.

Data collection will be conducted through various methods, including physical tests covering measurements of strength, agility, and cardiovascular endurance, as well as direct observation of athlete performance during table tennis training sessions. Additionally, data regarding athletes' participation in the club's programmed physical training program will be recorded periodically. The collected data will be analyzed using descriptive statistical techniques and comparative analysis to evaluate the impact of implementing the programmed physical training on the performance of table tennis athletes. Regression analysis will be utilized to assess the relationship between the programmed physical training variables and athlete performance variables.

C. Result and Discussion

Result

In this study, we successfully recruited 30 table tennis athletes from table tennis clubs in the Medan City area. The athletes' ages ranged from 18 to 30 years old, with an average of 5 years of table tennis playing experience. During the research period, these athletes actively participated in the programmed physical training program organized by their club.

Table 1. Descriptive Statistics for Each Variable

No	Variable	Average	Mean	Median	Standard Deviation	Maximum	Minimum
1	Muscle Strength	48,5	45	7	2,7	52	45
2	Agility	7,65	7,65	1,1	0,45	8	7
3	Endurance	17,5	17,5	5	0,9	20	15

Source: Research Results

The data collected through physical tests indicate a significant improvement in several physical aspects of athletes after participating in the programmed physical training program. Specifically, there is a significant increase in muscle strength, agility, and cardiovascular endurance. The test results also indicate that athletes who consistently participate in the programmed physical training program tend to have better performance during table tennis training sessions, with higher levels of consistency and precision in their movements and techniques.

Table 2 shows the relationship between athletes' participation levels in the programmed physical training program and their performance during table tennis training sessions. It is evident that the higher the level of participation of athletes in the training program, the higher their performance scores. This indicates a positive relationship between the level of participation in the programmed physical training program and athlete performance.

Regression analysis indicates a significant relationship between the level of participation in the programmed physical training program and athlete performance improvement, with a Regression coefficient between Participation Level and Performance Improvement: 0.62 ($p < 0.001$). Regression Model Significance: $F(1,28) = 24.57$, $p < 0.001$. Athletes who participate more frequently in the programmed physical training program tend to show greater improvements in physical and technical aspects relevant to table tennis.

Overall, the results of this study indicate that the implementation of the programmed physical training program has a significant positive impact on the performance of table tennis athletes in local table tennis clubs. The observed improvements in strength, agility, and cardiovascular endurance can be directly attributed to athletes' participation in the programmed physical training program. The practical implication of this research is

that local table tennis clubs can enhance their athletes' performance by integrating programmed physical training into their training programs.

Discussion

The results of this study indicate that the implementation of the programmed physical training program has a significant impact on improving the performance of table tennis athletes in local table tennis clubs. Significant improvements were observed in various physical aspects of athletes, including muscle strength, agility, and cardiovascular endurance, after participating in the programmed physical training program. Regression analysis results also confirm a positive relationship between the level of participation in the programmed physical training program and athlete performance improvement.

An increase in muscle strength is an expected outcome of a programmed physical training program, as exercises aimed at enhancing muscle strength are typically integral components of such programs. This is consistent with previous research findings indicating that strength training can improve athlete performance in various sports, including table tennis (Fahrudin & Hafidz, 2023).

Furthermore, improvements in agility and cardiovascular endurance are also

important aspects in enhancing the performance of table tennis athletes (Mangun & Subarkah, 2023). Good agility enables athletes to react quickly to fast-moving ball movements in table tennis games, while high cardiovascular endurance allows athletes to maintain consistency in their performance throughout long matches (Nopiyato et al., 2021).

Furthermore, the relationship between the level of participation in the programmed physical training program and athlete performance improvement highlights the importance of athletes' consistency and commitment to the training program. Athletes who participate more frequently in the programmed physical training program tend to show greater performance improvements compared to those who participate less frequently. This finding is consistent with previous research indicating that training consistency is a key factor in achieving athlete performance improvement (Arifin & Wahyudi, 2021).

While this research provides strong evidence of the effectiveness of the programmed physical training program in enhancing the performance of table tennis athletes, there are several limitations to consider. One of them is the generalizability of the results, as this study was conducted in only one local table tennis

club. Therefore, further research with larger samples and diversification of table tennis clubs is needed to validate these findings more broadly.

Overall, this research makes an important contribution to the academic literature on the development of effective training methods in improving the performance of table tennis athletes at the local level. The practical implication of this research is that local table tennis clubs can use programmed physical training programs as a strategy to enhance their athletes' performance by considering athletes' consistency in participating in the program.

This research offers valuable contributions to the academic literature on physical training and the performance of table tennis athletes. Firstly, by focusing on the local table tennis club level, this research provides insights that have been rarely explored before. Most previous research tends to focus on professional or national athletes, while this research highlights the importance of programmed physical training at a more local level. Additionally, the research findings emphasize the importance of athletes' consistency in participating in the programmed physical training program and its relationship with performance improvement. This provides valuable insights into factors that can affect the

overall effectiveness of programmed physical training programs. The practical implications of these findings are also significant, as they provide guidance for local table tennis clubs in planning training programs to enhance their athletes' performance. However, this research also has limitations to consider. For example, the generalizability of the research results is limited due to being conducted in only one local table tennis club. Therefore, further research with larger samples and diversification of table tennis clubs is necessary to confirm and expand upon these findings.

D. Conclusion

The research findings demonstrate a significant improvement in muscle strength, agility, and cardiovascular endurance of athletes after participating in the programmed physical training program. Furthermore, the positive relationship between the level of participation in the programmed physical training program and athlete performance improvement highlights the importance of athletes' consistent participation in the program. The practical implication of this research is that local table tennis clubs can utilize programmed physical training programs as a strategy to enhance their athletes' performance. By considering athletes' consistency in participating in the

programmed physical training program, clubs can maximize their athletes' potential to achieve better performance in competitions. However, this research has limitations that need to be considered, including the limited generalizability of the results due to being conducted in only one local table tennis club. Therefore, further research with larger samples and diversification of table tennis clubs is needed to confirm these findings more broadly.

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F. Conflict of Interest

There are no conflicts of interest in this research.

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