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Development of SMR Training Model in Forehand Tennis Groundstroke Technique Aged 14-16 Years

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Abstract

Background - The quality of forehand groundstroke training is a crucial aspect in improving the performance of junior tennis athletes. However, structured and tailored training models that address the specific needs of athletes aged 14–16 are still limited, especially in training centers such as SRTC Jakarta.
Purpose - This study aims to develop an innovative and applicable forehand groundstroke training model to assist coaches and athletes in enhancing training effectiveness and playing performance.
Method/approach - The research employed a Research and Development (R&D) approach based on the ten-step Borg & Gall model, including information gathering, planning, initial product development, preliminary field testing, product revision, main field testing, operational revision, operational field testing, final product revision, and dissemination. The developed model consists of 25 forehand groundstroke training variations, including Shadow, Multiball, and Rally exercises, which were validated by experts. The study was conducted at SRTC, Jakarta, from October to December 2023, using a pretest-posttest control group design. Data were analyzed using descriptive statistics, t-tests, and the N-Gain Score to measure the model's effectiveness.
The results indicate that the developed training model is valid in content, effective in improving forehand groundstroke skills, and applicable in the context of junior athlete training.
The study concludes that the developed model significantly enhances the quality of training and technical performance of forehand groundstrokes in junior tennis athletes aged 14–16.
The novelty of this research lies in the development of a varied and empirically tested forehand groundstroke training model tailored to the specific needs of junior athletes, offering a systematic and targeted training guide for early-stage athlete development.

Keywords: Training Model, Forehand Groundstroke, Tennis, Junior Athletes.

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INTRODUCTION

The tennis tournament at the 2023 Cambodia SEA Games, which will be held at the Morodok Tecno National Stadium, Phnom Penh, from May 6 to 14, 2023, is one of the largest sports events in the Southeast Asian region. Athletes from all countries in Southeast Asia participate in this tournament to compete for seven gold medals (Chen, et al., 2023). Indonesia stood out with extraordinary achievements, winning four gold, two silver, and three bronze medals, exceeding the initial target of only setting three gold medals. This victory puts Indonesia in the leading position, beating Thailand, which was previously the overall champion of the 2021 SEA Games and now has to settle for the runner-up position.

The winners from Indonesia include big names such as Muhammad Rifqi Fitriadi who won gold in the men's singles, Priska Nugroho who won in the women's singles, and the women's team team who managed to secure a gold medal (Pluim, 2023). The duo of Christopher Rungkat and Aldila Sutjiadi also made a significant contribution by winning gold in the mixed doubles category. This achievement shows that Indonesia has depth and strength in various categories of tennis.

Indonesia's success in this tournament is inseparable from the contribution of senior athletes such as Christopher (33), Aldila (28), Beatrice (32), and Jessy (33) who have been actively participating in international tournaments since 2015. Their extensive experience in the international arena makes a great contribution to the Indonesian national team. Christopher Rungkat, who has participated in seven editions of the SEA Games and won a total of six golds, five silvers, and three bronzes, showed how important experience is in supporting the team's achievements (Thompson, 2023).

The high achievements achieved by Indonesian athletes are the result of planned preparation from an early age. The athlete coaching process not only focuses on physical improvement, but also includes technical, tactical, and mental aspects. These aspects are crucial to ensure that athletes have the comprehensive ability to compete at the highest level. Basic tennis stroke techniques, such as groundstroke, volley, and service, are the main focus in daily practice, as mastering these techniques can increase the chances of winning a match (Koopmann et al., 2023).

Hitting the ball correctly is a fundamental principle in tennis that cannot be ignored. Excellent physical condition is also very important to support athletes' performance on the field. Research, groundstroke, volley, smash, and serve are the main components in tennis that require good physical condition (Nugroho et al., 2022; Agustiyanta et al., 2022). In particular, the forehand groundstroke technique is considered one of the most important strokes in tennis, requiring systematic and programmed practice and development to achieve perfection.

According to Staff et al., (2020), about 35-45% of all strokes in tennis matches are groundstrokes, showing how crucial this technique is in the game. Therefore, a varied training model is necessary to keep athletes motivated and ensure they continue to improve. Monotonous training can reduce athletes' enthusiasm, so innovation in training methods is essential to achieve optimal results. To support effective tennis coaching, adequate financial support and facilities are needed (Saleh et al., 2024). Without strong financial support and infrastructure, it is difficult for athletes to achieve the expected achievements. In Indonesia, the PP PELTI organization provides training facilities and develops programs that support the development of athletes from an early age to the professional level.

Research and innovation in the development of training models are very important to overcome various challenges in tennis coaching in Indonesia (Dewanti et al., 2020). Effective training methods, such as the Shadow, Multiball, and Rally training models, are expected to help athletes better master forehand groundstroke techniques. The focus of this research on the age group of 14-16 years aims to improve the technical ability of athletes during their important developmental period, so as to create a generation of superior athletes in the future.

Based on interviews with coaches at SRTC (Southeast Regional Training Center), it was revealed that many athletes face difficulties in mastering forehand groundstroke techniques. The problems faced include difficulties in basic techniques, instability in accuracy and speed of punches, and lack of control and consistency when doing Rally (Fauzan et al., 2024; Diler et al.,

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2024). Although athletes have great potential, they still need more intensive and targeted guidance and training to hone their skills.

To overcome this problem, researchers and coaches plan to test several training methods that are considered effective, namely the Shadow, Multiball, and Rally training methods. The Shadow method involves practicing without a ball to improve hitting technique, while Multiball involves using multiple balls to improve the speed and accuracy of the shot. Rally practice, on the other hand, focuses on improving consistency and control in real-world game situations. With this combination of methods, it is hoped that athletes can overcome their existing shortcomings and improve their overall abilities (Jansen et al., 2021).

The ideal age to learn forehand groundstroke techniques is between 14-16 years old, where motor skills and technique adaptation are developing rapidly. Therefore, the focus of the research is on the development of SMR (Shadow, Multiball, Rally) training models specifically designed for this age group. This research aims to produce a training model that is not only effective in improving technical ability but can also be easily applied by coaches at various levels of tennis clubs. The formulation of the problem in this study includes two main questions: How to develop an SMR training model on the forehand groundstroke technique for athletes aged 14-16 years? Is the training model effective in improving the athletes' abilities? The answers to these questions are expected to provide practical solutions that can be applied in daily training programs at tennis clubs throughout Indonesia.

The usefulness of this research is very broad and significant. First, the results of the study can be a guideline in developing a more effective training program for athletes and coaches. Second, this research can help improve the quality of tennis clubs by providing proven effective and structured training methods. Third, the results of this study can be a reference for future research that focuses on the development of other technical training models or in different age groups. Previous research has been a strong basis for innovation in the development of this forehand groundstroke training model. Previous studies have identified several effective techniques and methods, but more comprehensive research is still needed. By combining the results of previous research and testing new methods in different contexts, it is hoped that a more effective training model can be found that suits the needs of young athletes in Indonesia. The success of this research will not only make a significant contribution to tennis coaching in Indonesia but can also have a positive impact on the development of tennis at the regional and international levels.

METHODS

This study adopted a Research and Development (R&D) approach using the model developed by Borg and Gall, which is widely recognized in educational and training research for systematically creating and validating new products or models. The Borg and Gall model consists of ten developmental steps: (1) research and information collecting, (2) planning, (3) developing the preliminary form of the product, (4) preliminary field testing, (5) revising the product, (6) main field testing, (7) revising the operational product, (8) operational field testing, (9) final product revision, and (10) dissemination and implementation. These steps were carefully followed to ensure that the training model produced was not only theoretically grounded but also empirically tested and practically applicable in real training contexts.

The participants in this study were junior tennis athletes aged 14 to 16 years who were actively involved in the training program at the Satria Tennis Training Center (SRTC) in Jakarta. A purposive sampling technique was used to select participants who met the inclusion criteria, such as age, training experience, and regular participation in the SRTC program. In total, the study involved two groups: an experimental group that received the newly developed training model and a control group that continued with the conventional training routine. Both groups consisted of male and female athletes with relatively similar skill levels to ensure fairness and

balance in the assessment of the training outcomes.

Data collection techniques involved both qualitative and quantitative approaches to capture comprehensive insights. Qualitative data were gathered through structured interviews with expert coaches and direct observations during the training sessions. These data provided contextual understanding of the athletes' needs and feedback on the training model. Quantitative data were obtained through a series of skill tests focused on the execution and consistency of the forehand groundstroke, conducted in both pretest and post-test formats. Additionally, documentation of the training process and participant performance was maintained throughout the study to support triangulation and analysis.

Data validation techniques were applied to ensure the credibility and reliability of the findings. The initial draft of the training model was submitted to a panel of experts in tennis coaching and sports science for validation. They assessed the model in terms of content relevance, technical accuracy, and applicability to junior athlete development. Revisions were made based on their feedback. Triangulation was also conducted by cross-verifying data obtained from interviews, observations, test results, and documentation to strengthen the validity of the research findings.

Data analysis techniques employed both descriptive and inferential statistical methods. Descriptive statistics were used to summarize the data collected during each phase of model development, particularly in presenting the characteristics of participants and the progression of the training process. To evaluate the effectiveness of the newly developed training model, a pretest-posttest control group design was utilized. An independent samples t-test was conducted to compare the mean differences in forehand groundstroke performance between the experimental and control groups. Furthermore, the Normalized Gain (N-Gain) Score was calculated to measure the magnitude of improvement in the athletes' skills after the intervention. The combination of these methods enabled the researcher to assess both the statistical significance and the practical impact of the new model on athlete performance.

RESULTS AND DISCUSSION

Tennis is a sport that has been around for thousands of years, with the first records indicating that the game was played in Egyptian temples around 1500 BC (Kristina, 2024). The beginnings of modern tennis can be traced back to medieval football played by priests in monasteries (Marpaung, 2024). The game evolved from a simple activity to a more complex and organized form of sport. In Indonesia, tennis began to attract public attention in the 1920s. Its growing popularity prompted the establishment of the Indonesian Lawn Tennis Association (PELTI) in 1935, an organization that still plays an important role in the development of tennis in Indonesia. PELTI is responsible for organizing competitions and programs for young athletes, as well as playing a role in improving tennis standards in Indonesia. As time went by, tennis continued to grow and became one of the popular sports, both among professionals and amateurs.

Tennis is a sport played by one or two pairs of players, either in singles or doubles formats. In every match, speed, precision, stamina, and intelligence play an important role in determining the winner (Xiao et al., 2022). Modern tennis carries the motto "higher, faster, more complete, more accurate, and faster to change." It illustrates the demand to always innovate and improve overall capabilities. The game involves quick moves and alternating with maintaining balance. The speed of reaction and the ability to adjust the position of the body to respond to each opponent's punch is crucial. In addition to the physical aspect, intelligence in reading the game and predicting the opponent's movements is also the key to success in tennis. Therefore, players are required to have a good strategy and the ability to change the game plan quickly and precisely.

The game of tennis requires very strong physical condition. Aspects such as strength, speed, endurance, agility, flexibility, and coordination are indispensable to playing tennis well.

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The game is typically played on different types of courts, including grass, clay, or hard courts, each of which has its own characteristics and challenges. Grass courts, for example, offer fast surfaces and low bouncing balls, while clay courts tend to be slower and require different strategies. The size of the pitch and the height of the net have also been set in the official regulations, ensuring that all matches take place fairly (Dobos et al., 2021). Players must have good stamina to survive in matches that can last for hours and require high intensity from start to finish. Regular and directed physical exercise is very important to keep the body in top shape and ready to compete.

Basic techniques in tennis are very important to master in order to play well. This technique includes a ready position, various types of grips, and types of punches such as defensive punches, offensive punches, and kills. Groundstroke, especially forehead, is one of the most important strokes in modern tennis. Service techniques are also crucial because they are the beginning of every point and provide an opportunity for players to control the game from the start. Volleys, overhead smashes, and lobs are other punching techniques that players must also master. In addition, the game strongly emphasizes the importance of footwork, which is good and fast foot movement to ensure that players are always in the right position to make a shot. Players must have good balance and the ability to move quickly and efficiently. Consistent practice and an in-depth understanding of basic techniques will help players improve their performance and reduce the risk of injury.

Based on the characteristics of the age of 14-16 years, tennis requires specialization and well-planned stages of training. At this age, young athletes are expected to have started focusing on the sport they are engaged in and following a more specific training program. Factors that support performance such as timing, balance, and racquet control are very important and need to be trained intensively (Cao, 2023). Tennis training ideally begins at an early age with a focus on developing coordination, specialized skills, and preparation for competition. Coaches must also pay attention to the mental and emotional aspects of young players, helping them develop confidence and the ability to cope with the pressures of competition. Ultimately, the goal of this training is to prepare young athletes to achieve victory and reach the pinnacle of achievement in the future. A comprehensive training program, which includes technique, physical, and mental, will help young players develop their potential to the fullest.

The planning for the development of the forehand tennis groundstroke training model began with in-depth observation with the coach at SRTC South Jakarta (Kobayashi et al., 2023). This observation process is important to understand the specific needs of athletes as well as the conditions and dynamics that occur during training. During the observation, the coach monitors how the athlete performs the forehand groundstroke and notes the aspects that need to be improved, such as technique, speed, and accuracy. This data is then analyzed to design an effective and structured exercise model. The result of this process is 25 variations of training models specifically designed to improve athletes' understanding and ability to perform forehand groundstrokes with a variety of movements and positions on the court.

The main goal of this planning is to facilitate athletes to get used to the forehand groundstroke with the correct technique and various variations of movement. Each training model is designed to challenge athletes in a variety of situations in the field, so they can develop the skills necessary to deal with a variety of game conditions. This varied exercise also helps to keep athletes motivated and interested, as they not only practice one type of movement over and over again but get new challenges that can improve their overall abilities.

Variations in the training model include steps forward, backward, right, left, as well as training in the service line and base line areas. The use of this variation aims to teach athletes how to do forehand groundstrokes from various positions on the court. In addition, this training model also combines "Shadow" and "feeding" movements. Shadow movements allow athletes to focus on techniques without distracting the ball, while feeding exercises involve the delivery of the ball by a coach so that athletes can practice their responses and techniques realistically. The combination of these two methods is expected to improve the mastery of the technique and the accuracy of forehand groundstroke movements.

The training methods used in these models mostly utilize the "cone" as a position marker. The cone helps athletes understand and remember the right position on the court to perform a

forehand groundstroke (Lambrich et al., 2022). All training models emphasize timing and accuracy, which are key in improving forehand groundstroke performance. The coach provides clear and detailed instructions on how to use the cone and perform the correct movements, so that the athlete can internalize the techniques taught and apply them in the match situation.

The equipment used in this exercise includes tennis courts, rackets, balls, and cones. Each piece of equipment has an important role in supporting the effectiveness of the exercise. The tennis court provides a suitable area for movement and technique training. Rackets and balls are the main equipment in the game of tennis that is used to train the forehand groundstroke. The cone is used as a position marker to assist athletes in understanding and remembering important areas in the field. In addition, the coach also acts as a "feeder" who gives the ball to the athletes during feeding exercises, so that they can practice their responses and techniques under more realistic conditions.

The training model is grouped based on position on the field (service line and base line) and movement variations (e.g. one step to the right, two steps forward, and so on) (Rohan, S., & Macey, J., 2023). This grouping helps in creating a systematic and easy-to-follow exercise structure. The training model is divided into two main groups: Model S (Shadow) and Model M (Movement). Model S focuses on mastering the basic technique of forehand groundstroke with a shadowing movement without a ball. This model helps athletes learn and master the correct technique before they practice it with the ball. Meanwhile, the Model M focuses on applying forehand groundstroke in various positions and movements on the court and involves interaction with the ball.

For example, the Model S1 involves practicing Shadow forehand in the middle of the field. This exercise focuses on the basic technique of groundstroke forehand without a ball, allowing athletes to concentrate on the correct movement and body position. The equipment needed includes tennis courts, athletes, tennis rackets, and cones. The procedure is for the athlete to stand on the red cone at the center mark and do a forehand shadow using a racket.

Figure 1. Model S1 Forehand Shadow

The M10 model involves forehand groundstroke training on the service line using a variety of equipment, such as tennis courts, athletes, feeders, tennis rackets, tennis balls, and cones. In this exercise, the ball is given by the coach as a feeder, and the athlete must respond with the right movements and correct technique.

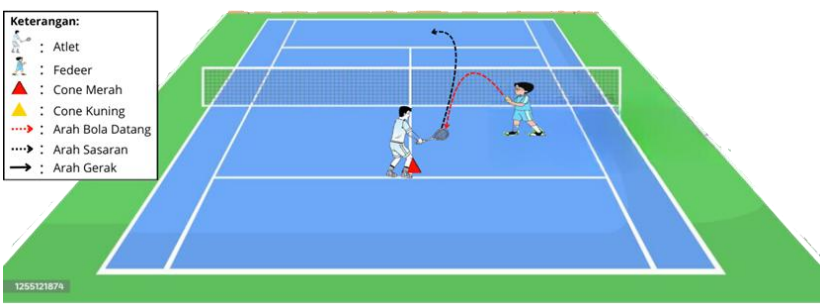

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Figure 2. Model M10 Groundstroke Forehand

The M25 model involves Rally forehand training on the baseline, where athletes practice forehand groundstrokes in more dynamic Rally situations that demand precision and consistency. The equipment needed includes tennis courts, athletes, tennis rackets, and tennis balls. The procedure is for the athlete to stand on the baseline and do a forehand groundstroke rally.

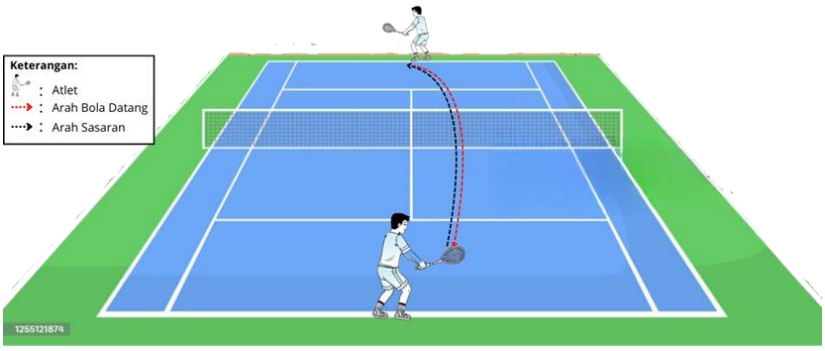

Figure 3. Model M25 Rally Groundstroke Forehand

In order to ensure that this exercise model is feasible and effective, the researcher decided to conduct an expert test. This expert test involves professionals in the field of tennis who have in-depth knowledge and experience in tennis technique and training. Input from these experts is indispensable to revise and improve the training model to match the expected standards and truly benefit the tennis players. In the expert test, various elements such as shadow training (Shadow), Multiball, and Rally became the main focus for validation and evaluation of the feasibility of the model that has been created.

A total of 25 training model items were compiled and presented to a panel of experts for evaluation. This expert panel consisted of Dr. Kurnia Tahki, M.Pd (UNJ tennis lecturer), Dr. Bambang Kridasuwarso, M.Pd (UNJ sports biomechanics lecturer), and Sonny Ratag (SRTC tennis coach). These experts provide an in-depth assessment of each exercise item based on their knowledge and experience. From the assessment, 20 training models were declared suitable for continuing, while the other 5 models were declared unsuitable for use due to difficult and improper movement patterns. This evaluation is very important in the process of refining the training model. The input obtained from experts is used to improve and refine the SMR training model so that it is more effective and can be better applied in the field. Expert advice includes revision of movements and techniques to make the training more realistic and in line with the training needs of the tennis players.

A small-group trial at the SRTC club with 10 athletes aged 14-16 yielded some important findings regarding the grouping of categories of ineffective items and movements. The entire training model items are categorized into three main types: Shadow, Multiball, and Rally. This category makes it easier for trainers to organize more structured and focused training sessions. However, in the trial, it was found that some movements in the Shadow category were not effective when performed by athletes with different skill levels. The Shadow movements that are supposed to be the basis of the technique are often ignored or performed in the wrong way due to a lack of deep understanding from the athletes. Therefore, the coach suggested providing more detailed explanations and more concrete demonstrations so that athletes understand and are able to carry out these movements correctly.

Adjustment of movements with a more detailed concept is the focus of the second phase of revision. Based on the results of observations and input from coaches, it was found that the training model can be applied to athletes aged 14-16 years, but it needs to be adjusted depending on the level of ability of each athlete. This adjustment process involves changes in the intensity of the exercises and the teaching methods used. In the details of the training stages, movement

instructions and movement examples must be conveyed more clearly to avoid mistakes that can cause injury or hinder the development of the athlete's technique. The coach also emphasized the importance of optimizing training time to ensure that each session runs effectively and efficiently, without sacrificing the quality of the training provided

The correction stage of movements that do not go well is an important part of ensuring an optimal training model before a large group trial is conducted. The results of the second stage of revision carried out after the small group trial highlighted the need to improve the instructions and examples of movements. Some forehand drive movements that are not performed correctly by athletes require special attention. Corrections are made by providing targeted feedback and gradual re-demonstration of the movement. A large group trial involving 20 athletes showed that with the right direction, the SMR training model is worthy of being used as reference material by coaches. The main emphasis is on improving the forehand drive movement instructions, ensuring that each athlete is able to carry out the movement with the correct technique, so that forehand groundstroke exercises can run more effectively and provide maximum results.

The SMR training model for the forehand groundstroke technique in tennis has undergone a series of intensive and comprehensive trials before being declared as the final product. In the early stages, the model was tested in a small group of 10 athletes aged 14-16 years, where all items in the model were declared feasible for forehand groundstroke training. After this trial, the first stage of revision was carried out which focused on adjusting movements and details of training stages based on coach input and researcher observations. Follow-up trials in large groups of 20 athletes further strengthened the validity of this model, showing that the entire training model item does not require further revision. Thus, this model is considered to have reached the optimal level of feasibility and is feasible to be applied for training at large.

The research conducted to evaluate the effectiveness of the SMR training model involved 40 tennis athletes who were divided into two groups: an experimental group using the SMR model (20 athletes) and a control group using a conventional training model (20 athletes). Effectiveness measurements were carried out through pretest and posttest to evaluate the improvement of forehand groundstroke ability scores. The results of the data analysis showed that the experimental group experienced a significant increase in scores, with the average pretest score of 25.25 (standard deviation of 2.863) increasing to 32.80 (standard deviation of 2.858) in the posttest. Meanwhile, the control group only experienced a smaller increase, from an average pretest score of 24.80 (standard deviation of 3.019) to 27.10 (standard deviation of 2.654) on the post test. This data clearly indicates that the SMR training model is more effective in improving the groundstroke ability of the athlete's forehand compared to the conventional model.

Table 1. Data on pretest and posttest results of the experimental group and control group

Statistics

		Pretest Eksperimen	Postest Eksperimen	Pretest Kontrol	Postest Kontrol
N	Valid	20	20	20	20
	Missing	0	0	0	0
Mean		25.25	32.80	24.80	27.10
Median		25.00	33.00	25.50	27.50
Mode		25	36	22[a]	24
Std. Deviation		2.863	2.858	3.019	2.654
Variance		8.197	8.168	9.116	7.042
Range		11	9	9	7
Minimum		20	27	20	24
Maximum		31	36	29	31
Sum		505	656	496	542

To ensure the validity of the research results, the pretest and posttest data in both groups were tested for normality using the One-sample Kolmogorov-Smirnov test. The test results

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showed that the data in both groups, both the experimental and control groups, were normally distributed (p-value > 0.05). In addition, the variance homogeneity test conducted using Levene Statistic in SPSS software showed that the data variance between the experimental and control groups was the same (homogeneous), with a p-value > 0.05. This normality and homogeneity test is important to ensure that the comparison between the two groups can be made validly and that the results are reliable. With normally distributed data and homogeneous variance, it can be concluded that the difference in score increase between the experimental and control groups is significant and not the result of uncontrolled data variability.

The effectiveness of the SMR training model in improving forehand groundstroke ability was also tested using several statistical methods, including N-Gain Score and t-test. The results of the N-Gain Score test showed that the experimental group achieved an average score of 0.75 which was included in the "High" category, indicating a significant improvement in ability. In contrast, the control group only achieved an average score of 0.21 which fell into the "Low" category, suggesting that the conventional exercise model did not provide a significant improvement. In addition, the t-test results showed a t-count value of 33.809 with df = 19 and a p-value (Sig.) of 0.000 < 0.05. This confirmed that there was a significant difference in the improvement of forehand groundstroke ability between the experimental and control groups. From these results, it can be concluded that the SMR training model is more effective than the conventional model, making it a better choice for forehand groundstroke training in tennis athletes aged 14-16 years.

Table 2. Results of the T-Test of the Experimental Group and Control Group

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	Pretest Eksperimen - Postest Eksperimen	-7.550	.999	.223	-8.017	-7.083	-33.809	19	.000
Pair 2	Pretest Kontrol - Postest Kontrol	-2.300	.923	.206	-2.732	-1.868	-11.139	19	.000

This plan provides a structured framework for the development of a forehand groundstroke training model. These models are expected to provide clear and diverse guidance for athletes in mastering the basic techniques of groundstroke forehand on tennis courts. By following the training models that have been designed, athletes can improve their skills gradually and systematically. In addition, variations in training models also help keep athletes motivated and interested, as they get new challenges that can improve their overall abilities. This is important to ensure that the exercise remains engaging and effective in the long run.

The SMR groundstroke training model of forehand tennis has been shown to significantly improve the technique and stroke placement of the players. The data of significant test results using SPSS showed a significant difference between the pretest and posttest results, with an average score of 7,550 and a t-count of 33,809 (df = 19, p<0.05). However, in order for this model to be implemented more effectively in the field, a number of improvements are needed. First, more detailed guidelines must be provided so that it is easy for coaches and athletes to understand and apply. Second, the preparation of training items needs to be more structured to ensure that all

desired technical and tactical aspects are achieved. Finally, training timing should be more directional so that players can maximize their training time and get optimal results. With these improvements, the training model is expected to not only improve the quality of the game but also help with the overall skill development of the athletes.

The SMR groundstroke forehand tennis training model provides a variety of exercises such as Shadow, Multiball, and Rally that can help the coach in the on-court training sessions. The main advantage of this model is the variety of training provided by it, which not only makes the training more dynamic and interesting but also encourages the improvement of playing techniques. This model is also divided into three stages that make it easier for coaches to set the difficulty level and focus on training according to the development of the athlete (Diler et al, 2024). With these variations and stages, the training model can help reduce the boredom that athletes often experience when going through a monotonous training routine. In addition, the model also provides training references that are beneficial to trainers, giving them additional tools to design more effective and diverse training programs. These advantages make the SMR training model an attractive alternative for trainers looking to improve the quality of their athletes' training and performance.

Research on the SMR groundstroke forehand tennis training model also has several limitations that need to be considered. First, the limited scope of research may not be able to represent the variation of conditions in the wider field. The variety of existing exercises can also be improved to make it richer and more challenging. Second, the model is currently only designed for athletes aged 14-16 years, which limits its application to older or younger age groups. Third, the training media used in this model can be more varied to increase effectiveness and attract athletes. Finally, the availability of outstanding research subjects is also limited, which may affect the results of the research and its generalization. By understanding and overcoming these limitations, further research can be developed to improve the training model so that it is more comprehensive and beneficial for various groups of athletes.

CONCLUSION

Overall, this study shows that the SMR training model for forehand groundstroke in tennis is very effective in improving the technical ability of tennis athletes aged 14-16 years. Through trials involving the experimental group and the control group, the results of the pretest and posttest showed a significant increase in scores in the experimental group compared to the control group, with an increase in the average score from 25.25 to 32.80. This shows that the SMR model can provide a greater improvement in forehand groundstroke capability compared to conventional models. In addition, the results of the normality and homogeneity test ensure that the data obtained is valid and reliable, with a normal distribution of data and homogeneous variance. Further effectiveness tests with N-Gain Score and t-test confirmed that the improvement of abilities in the experimental group was in the "High" category with an average N-Gain value of 0.75, while the control group was only in the "Low" category with an average N-Gain value of 0.21. With consistent and valid results, the SMR training model can be considered the best option for forehand groundstroke technique training, providing structured and diverse guidance, and keeping athletes motivated through varied and challenging exercises. The implementation of this model is expected to improve the quality of training and athlete performance in the long term.

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