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Physical performance analysis of Indonesian sepak takraw: Challenges facing the 2023 Cambodia Sea Games

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ABSTRACT

Background: Physical performance in Sepak Takraw is very important, including speed, agility, and strength. One of the important factors in supporting sepak takraw achievement is physical performance. Physical performance is important to evaluate, but the fact that empirically evaluating the physical performance of Sepak Takraw has not shown a comprehensive evaluation means that a more in-depth evaluation is needed. **Research Objectives**: This study seeks to assess the physical condition of Indonesian Sepak Takraw athletes throughout the general preparation stage. **Methods**: Participants in Sepak Takraw were 12 people aged 19-31 years, weighing ± 60-75 kg and ± 164-179 cm tall. The aspects evaluated consist of speed, endurance, agility, power, and muscle endurance. This study's instruments include a 20-meter sprint, a multistage fitness test, sit-ups, a 60-second backup, a shuttle run, and a vertical jump. The data was analysed using quantitative descriptive analysis and the nonparametric Wilcoxon test. **Findings and Results**: The results of mean speed values obtained in each test are 1 (3.03) and 2 (3.15), endurance test 1 (49.87) and 2 (53.63), situp test 1 (72) and 2 (84), back up test 1 (111) and 2 (119), agility test 1 (5.14) and 2 (5.01), power test 1 (62.83) and 2 (64.17). Regarding the Asymp.sig (2-tailed) value, speed obtained a value of 0.004, endurance 0.004, sit-up 0.010, and agility 0.018 with $p < 0.05$. Several aspects have seen substantial changes; however, the specific focus should be devoted to the speed aspect, which requires improvement. **Conclusion**: This evaluation provides information to improve physical performance. Further evaluation is needed to collect more comprehensive data. Future research can build on the findings of the current study, provide deeper insights and more comprehensive strategies to improve the physical performance of Sepak Takraw athletes.

Keywords: Physical condition evaluation; sepak takraw athletes; general preparation stage

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INTRODUCTION

Sepak Takraw is a combination of three games, namely football, volleyball, and badminton (Ridwan et al., 2024). A basic understanding of playing Sepak Takraw is that it is a game played on a rectangular field. The field is limited by a net that is right across the middle of the field (Sahabuddin, 2023). Two teams or groups carry out this game to play Takraw balls and return them to each other. The team that can enter the ball to the other team and cannot return the ball, then the team that enters the ball gets points (Purwanto et al., 2022). The Sepak Takraw game generally uses all body parts except the arms. The game begins with a service that is in the service circle (Said & Syam, 2022). Then, a hitter is in charge of serving using his feet. This player can be called Tekong (Yuliarti et al., 2020). The service is declared successful if it passes over the net, then the opposing party can return the ball a maximum of three touches, either by one person or a teammate, to return the ball across the net so that it falls in the opponent's court area. The game of Sepak Takraw has its own rules that distinguish it from other sports (Junaidi & Mushofi, 2019).

Sepak Takraw consists of two teams of three players each (Purwanto, 2022). Sepak Takraw requires strong physical fitness (Muhyi et al., 2021). Sepak Takraw athletes will undoubtedly achieve their best physical performance if they follow a systematic programme approach (Hirwana et al., 2023). In this case, Indonesian Sepak Takraw athletes will train for the SEA Games in Cambodia in 2023. Athletes must be in good physical condition to compete, and coaches must be able to manage the training programme as effectively as possible, including determining training dosages and applying various training models (Murray, 2017). Physical performance in Sepak Takraw is essential including speed, strength, agility, and power (Aji & Yudhistira, 2023). As a result, physical training must be planned systematically. Training is divided into four stages: general, special, pre-match, and main match preparation (Teixeira et al., 2021). This evaluation needs to be done so that the coaches and sports administrators know the weaknesses of the training programme they have run so far. With these weaknesses known, it is hoped that the administrators of Sepak Takraw sports can improve so that athletes' achievements increase in the future. The advantage of this research is that it can be used as a benchmark or reference for other researchers conducting research in similar fields (Bentley et al., 2019).

Interesting things were found in the analysis of the physical condition of soccer (Akhiruyanto et al., 2022), analysis of the physical condition and body mass index (Simanjuntak et al., 2022), analysis of the determinants of Sepak Takraw talent (Taqy et al., 2024). Some of the studies above focus more on soccer and martial arts, while one study discussed sepak taraw, which discussed only partially conducted a one-time survey. In this case, to see the comparison, there must be an initial test, observation empirically, and a final test, but the previous study has not explained it this way. The facts in the field of the author as a performance analysis and evaluation coach have not shown a comprehensive study. In this context, coaches as well as academics see the gaps that exist and are inspired to conduct performance analysis and evaluation. Given this, it is very important to face the prestigious match, namely the 2023 Cambodia SEA Games. Of course, it is very clear that the research to be carried out has differences from previous research; this difference lies in the status of athletes as elite; there is strict control in the performance of testing exercises carried out twice, assisted by a team that has competence in the field of Sepak Takraw. In this context, the purpose of the research is to analyse the performance and evaluation of the Indonesian sepak takraw sport to face the 2023 Cambodia SEA Games.

METHOD

Type of Research

This is a quantitative descriptive study using a cross-sectional design (Abduh et al., 2022; Chindarkar et al., 2021; Kurniyawan et al., 2022; Safi et al., 2023). The main objective of this study is to measure and analyse the physical aspects required in the sport of Sepak Takraw. In a descriptive design, this study showed the physical condition of athletes measured at the general preparation stage. In addition, the collected research data was analysed to determine the athletes' physical strengths and weaknesses (Mustafa et al., 2022).

Participants

The technique used for sampling was complete sampling. Data-gathering approaches include field testing, observational testing, and analysis in the form of relevant article documents, which found a sample of 12 Indonesian Sepak Takraw athletes between the ages of 19 and 31, with weights of ± 60-75 kg and heights of ± 164-179 cm.

Instrument

Data collection techniques used observation and test testing. A 20-meter sprint speed test, multistage fitness endurance test, abdominal sit-up muscle endurance, 60-second backup back muscular endurance, shuttle run agility, and power vertical jump were among the research instruments used (Dawes et al., 2023).

Research Procedures

This research was conducted in Sukabumi for three months, from September 7 to November 22, 2022. Data from the physical tests was carefully collected and recorded for further analysis. The results of the study was statistically analysed and compiled in a report to provide relevant recommendations for the athlete's training programme.

Data Analysis

Quantitative data analysis techniques were used to determine minimum, maximum, mean, and standard deviation values. The results of the first and second tests were compared using Wilcoxon nonparametric analysis because the data found were not normal using the help of the SPSS version 25 application.

RESULTS AND DISCUSSION

Based on the results and discussion, the physical data of Sepak Takraw athletes showed that mean values for general fitness and endurance improved significantly after the intensive training period. Descriptive analysis showed a positive variation in performance parameters, with most athletes reaching the standards expected for high-level competition. In addition, Wilcoxon testing confirmed significant differences between baseline and end-line data, indicating the effectiveness of the preparation programme ahead of the 2023 Cambodia SEA Games. The results are presented below.

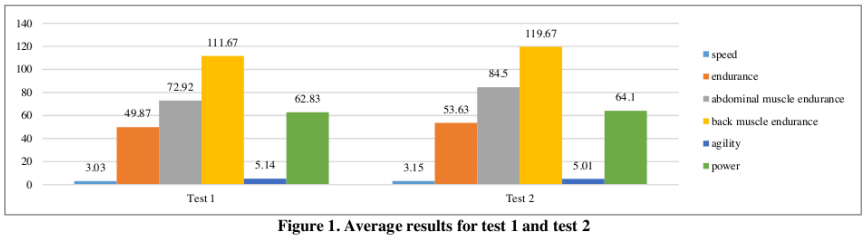

Figure 1. Average results for test 1 and test 2

The following tables, 1 and 2, are shown below based on the descriptive analysis findings. Based on the data, the physical improvement of Sepak Takraw athletes, including strength and endurance, is given after the training programme. In the Wilcoxon analysis table, the difference shows a significant difference between the initial measurement before and after the test:

Table 1. Descriptive Data Results for Test 1 and Test 2

Descriptive Data	N	Min	Max	Mean	Std. Dev
Test 1					
Speed	12	2.86	3.23	3.03	.14550
Endurance	12	43.9	56.6	49.87	3.9907
Abdominal muscle endurance	12	60	87	72.92	7.525
Back muscle endurance	12	85	138	111.67	15.511
Agility	12	4.71	5.55	5.14	.27200
Power	12	52	74	62.83	6,250
Test 2					
Speed	12	2.96	3.28	3.15	.11019
Endurance	12	48.7	60.0	53.63	3.3909
Abdominal muscle endurance	12	64	116	84.50	13.049
Back muscle endurance	12	95	152	119.67	14.625
Agility	12	4.63	5.39	5.01	.22947
Power	12	53	74	64.17	5.781

Table 1 shows the mean value obtained from the first and second tests. The mean value of the first speed test is 3.03, the second is 3.15, and the first endurance test is 49.87; the second is 53.63. The first abdominal muscular endurance test resulted in a score of 72.92, whereas the second yielded 84.50. The first back muscular endurance test resulted in a score of 111, while the second yielded 119. The result of the first agility test is 5.14, and the second is 5.01. The first test result for power is 62.83, while the second is 64.17. This demonstrates that several aspects of the second test improved over the first, with the exception of agility, which declined.

Table 2. Results of Wilcoxon Analysis Comparison of Test 1 and 2

Variable	Mean	Difference	Asymp. sig. (2-tailed)
Speed 1	3.03	0.12	0.004
Speed 2	3.15		
Endurance 1	49.87	3.76	0.004
Endurance 2	53.63		
Abdominal Muscle Endurance 1	72.92	11.58	0.010
Abdominal Muscle Endurance 2	84.50		
Back muscle Endurance 1	111.67	8	0.059
Back muscle Endurance 2	119.67		
Agility 1	5.14	0.13	0.018
Agility 2	5.01		
Power 1	62.83	1.34	0.152
Power 2	64.17		

Based on Table 2, the Wilcoxon analysis results show that the Asymp.sig(2-tailed) value for the speed aspect is 0.004 < 0.05, endurance 0.004 < 0.05, abdominal muscle endurance 0.010 < 0.05, back muscle endurance 0.059 > 0.05, agility 0.018 < 0.05, and power 0.152. If the Asymp.sig(2-tailed) value is $p < 0.05$, it indicates a significant difference; otherwise, if $p > 0.05$, no significant difference is found. In this instance, it is evident that while there is a significant difference in the speed aspect, the first test's mean value is better than the second, indicating that this aspect requires extra attention. There is also no significant difference in the back muscle endurance aspect, but the second test's mean value is better than the first. Lastly, there is no significant difference in the power aspect, but the second test is better than the first.

A further in-depth evaluation revealed that aspects of back muscle endurance and power were undoubtedly good, but the findings of the second test were not significant; this could be due to other factors such as an overly busy training schedule and the athlete's level of seriousness during the test. However, speed requires special attention. Even though there is a significant difference, the second test is not superior to the first test. Indeed, the increase in speed associated with running cannot be significant because it is determined by heredity. It can, however, be enhanced in several ways, including improving running technique and frequency, as well as strength training, which is power-based. Another crucial factor is recovery management, which

includes excellent nutrition, massage treatment, and rest (Adamczyk, 2023; Azhar et al., 2023). Furthermore, psychological management is also required, specifically through an approach to athletes who are having difficulties outside of training (Ruzain et al., 2023; Sujarwo et al., 2023).

The novelty in this research is the discovery of in-depth test results that were previously not known carefully. As the results of the first and second power tests do not have significant assessments that were previously unknown still seen from observational facts, thus this becomes a reference material for developing training programmes systematically, individually, and progressively to improve physical performance properly. Based on these findings, it is clear that improving physical condition is an art, namely the art of developing a solid and appropriate training programme. A good training programme is systematic, tiered, and adheres to training principles, training dose settings, and, most significantly, periodisation stages (Manuel Clemente et al., 2024; Galán-Rioja et al., 2023; Nasution et al., 2023). Periodisation is highly important, especially during the general preparation stage. The general preparation stage focuses on building speed related to coordination and harmonisation of movements, boosting fundamental strength as much as feasible, endurance as high as possible, and gradually increasing static and dynamic flexibility (Yudhistira, 2023). A trainer's responsibility extends beyond coaching and requires essential abilities such as teaching, management, analysis, and leadership (Yulianto et al., 2021). Physical condition evaluation is a practical application of these core skills. It is envisaged that this research will be conducted not only to assess physical condition but also to provide valuable information to academic audiences and the general public who are interested in the sport of Sepak Takraw. Furthermore, establishing athletic success is not as simple as turning over the palm of your hand; it takes effort, perseverance, and discipline to get the greatest results.

In addition to addressing the significant differences observed in speed, it is essential to consider the underlying factors that may have influenced these results. One possible explanation for the decreased performance in speed during the second test could be attributed to accumulated fatigue from an intensive training schedule. Overtraining without adequate recovery can lead to a decline in physical performance, as muscles do not have sufficient time to repair and strengthen (la Torre et al., 2023; Sulistiyono et al., 2021). This emphasises the importance of incorporating periodisation and recovery strategies into training programmes. Proper periodisation, which involves alternating periods of high-intensity training with periods of lower intensity, can help prevent overtraining and ensure that athletes are at their peak performance during key competitions (Dolci et al., 2020).

Moreover, the psychological state of athletes can significantly impact their performance. Stress, anxiety, and external pressures can negatively affect concentration and physical output (Harris et al., 2021). Psychological support, including mental conditioning and stress management techniques, should be integrated into the training regimen. This can help athletes manage the pressures associated with high-level competition and maintain optimal performance levels. Addressing mental health and providing a supportive environment can enhance overall well-being and contribute to improved performance in various physical aspects, including speed (Jimenez et al., 2021).

Lastly, it is crucial to recognise the role of nutrition in athletic performance. Adequate nutritional intake supports muscle repair, energy production, and overall physical health (Setiawan et al., 2023). Specific nutrients, such as carbohydrates, proteins, and fats, play critical roles in fuelling performance and aiding recovery. Implementing a well-balanced diet tailored to the needs of Sepak Takraw athletes can help optimise performance outcomes. Additionally, hydration strategies are vital to maintain electrolyte balance and prevent dehydration, which can impair physical and cognitive functions. Thus, a comprehensive approach that includes periodisation, psychological support, and nutritional planning is essential for enhancing the physical performance of Sepak Takraw athletes.

CONCLUSION

It is concluded that the physical performance of Sepak Takraw has significantly improved in the aspects of endurance, agility, and abdominal muscle strength, while leg muscle strength and back muscle endurance have not improved significantly. In this context, it is recommended to provide the evaluation to improve aspects of the physical aspects of Sepak Takraw. In addition, it is very important to conduct training mentoring and

establish good communication between coaches and managers in order to get the best performance at the 2023 Cambodia SEA Games; however, this research still has limitations, including still focusing on physical aspects, while aspects such as physiology, psychology, and nutrition need to be evaluated. In addition, the research method is still focused on quantitative; it is hoped that there will be qualitative results as support. Then only focus on Sepak Takraw while other sports need a scientific approach to improve performance.

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CONFLICT OF INTEREST

All authors declare no conflict of interest.

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