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PENINGKATAN KINERJA FISIK ATLET FUTSAL MELALUI UJI KONDISI FISIK: STUDI KASUS OLAHRAGAWAN POHUWATO

ENHANCING FUTSAL PERFORMANCE WITH PHYSICAL CONDITION TESTS: POHUWATO SPORTS CASE STUDY

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ABSTRAK

Peningkatan kinerja fisik atlet futsal dapat dicapai melalui uji kondisi fisik yang tepat. Pengujian ini berperan penting dalam mengidentifikasi dan memperbaiki aspek-aspek fisik yang diperlukan untuk meningkatkan performa atlet secara keseluruhan. Penelitian ini bertujuan untuk menganalisis kondisi fisik atlet futsal Pohuwato dengan menggunakan serangkaian tes fisik yang mencakup kecepatan, kekuatan, dan daya tahan. Tes yang dilakukan meliputi *Sprint* 30 meter untuk mengukur kecepatan, *Vertikal Jump* untuk mengukur kekuatan otot tungkai, dan *VO_2max* melalui *Bleep Test* untuk mengukur daya tahan kardiovaskular. Hasil penelitian menunjukkan bahwa 20% atlet berada dalam kategori "Sangat Baik" dalam tes *Vertikal Jump*, 50% dalam kategori "Baik", dan 30% dalam kategori "Cukup". Pada tes *Sprint* 30 meter, 40% atlet berada dalam kategori "Sangat Baik", 40% dalam kategori "Baik", dan 20% dalam kategori "Cukup". Sementara itu, dalam tes *VO_2max*, 70% atlet berada dalam kategori "Sangat Baik" dan 30% dalam kategori "Baik". Temuan ini menunjukkan bahwa mayoritas atlet memiliki kondisi fisik yang baik, dengan kecepatan dan daya tahan yang menonjol, namun ada kebutuhan untuk peningkatan kekuatan otot tungkai pada beberapa atlet. Implikasi dari temuan ini menunjukkan bahwa meskipun mayoritas atlet memiliki kondisi fisik yang baik, peningkatan kekuatan otot tungkai masih diperlukan untuk mencapai performa optimal. Oleh karena itu, disarankan untuk merancang program latihan khusus yang fokus pada peningkatan kekuatan otot tungkai, selain mempertahankan dan meningkatkan kecepatan serta daya tahan. Implementasi program latihan yang terstruktur dan berkelanjutan akan membantu atlet mencapai performa terbaiknya dan berkontribusi pada kesuksesan tim secara keseluruhan.

Kata Kunci: kinerja fisik; Futsal

ABSTRACT

Improving the physical performance of futsal athletes can be achieved through proper physical condition testing. This testing plays an important role in identifying and improving the physical aspects necessary to improve an athlete's overall performance. This study aims to analyze the physical condition of Pohuwato futsal athletes using a series of physical tests that include speed, strength and endurance. The tests carried out include a 30 meter Sprint to measure speed, Vertical Jump to measure leg muscle strength, and VO_2max via the Bleep Test to measure cardiovascular endurance. The results showed that 20% of the athletes were in the

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"Very Good" category in the Vertical Jump test, 50% were in the "Good" category, and 30% were in the "Fair" category. In the 30 meter Sprint test, 40% of athletes were in the "Very Good" category, 40% in the "Good" category, and 20% in the "Fair" category. Meanwhile, in the VO_2max test, 70% of athletes were in the "Very Good" category and 30% in the "Good" category. These findings suggest that the majority of athletes are in good physical condition, with prominent speed and endurance, but there is a need for increased leg muscle strength in some athletes. The implications of these findings indicate that even though the majority of athletes have good physical condition, increasing leg muscle strength is still needed to achieve optimal performance. Therefore, it is recommended to design a special training program that focuses on increasing leg muscle strength, in addition to maintaining and increasing speed and endurance. Implementing a structured and sustainable training program will help athletes achieve their best performance and contribute to the overall success of the team.

Keywords: *physical performance; Futsal*

Introduction

Futsal as a very dynamic and fast sport requires excellent physical condition from each athlete. Speed, strength, and endurance are three key elements that determine the performance of a futsal athlete on the field (Apriantono et al., 2023). However, there is often a gap between the ideal physical needs and the actual physical condition of the athletes. In this context, a well-designed physical training program that suits the individual needs of each athlete becomes very important (Duhe et al., 2024; Fataha et al., 2021; Samin & Ramadan, 2023). An effective physical training program not only focuses on improving physical abilities, but also on aspects of sustainability, this is in line with what is explained by (Haryanto et al., 2021; Kim et al., 2021; Refiater et al., 2022) that the creation of a sustainable training program must undergo continuous improvement, improve the quality of physical trainers, and provide an overview of potential sports injuries.

According to (Afanasyev et al., 2023; Haryanto et al., 2022; Nopiyanto et al., 2024) Physical condition status can reach an optimal point if training starts at an early age and is carried out continuously throughout the year, tiered and guided by the principles of training correctly. The training program compiled according to (García-Ortega et al., 2023) must be systematically adapted to the needs of the athlete's condition and biomotor components. In futsal games (Castillo et al., 2022; Habsyi et al., 2024; Hidayat et al., 2024; Ismail et al., 2024) that the dominant physical condition components when performing movements in futsal games are endurance, explosive power, speed and agility.

The physical condition of futsal athletes in a team requires a scientific approach that provides a clear picture of the athletes' physical condition. This approach aims to assist coaches in designing more effective and efficient training programs, as noted by (Al-Azzawi et al., 2023). In this context, testing is conducted using specific tests such as the 30-meter sprint to measure speed, the Vertical Jump to assess leg muscle strength, and the Bleep Test to evaluate VO_2max endurance. This aims to provide a comprehensive overview of the athletes' physical condition. The data obtained from these tests is not only useful for understanding the current physical

condition but also can be used to design more targeted and specific training programs tailored to each athlete's needs (Ruiz-Pérez et al., 2023). This is important to ensure that each athlete can achieve optimal physical condition and contribute maximally in every match.

However, to date, there is still a lack of research providing a clear picture of the specific physical condition of futsal athletes for performance improvement (Costa et al., 2022). Yet, this data is highly needed by coaches to improve and develop more effective training programs. Therefore, this research aims to fill that gap by conducting physical testing on the athletes of the Sporting Pohuwato Team located in Pohuwato Regency, Gorontalo Province.

There has been much discussion about the importance of physical condition in futsal sports. For instance, a study by (Kobayashi et al., 2022) emphasized the importance of building a strong foundation in physical fitness, which is crucial for enhancing futsal athletes' performance in various tournaments, both national and international. Additionally, according to (Torres et al., 2022), speed, strength, and endurance are the main components in improving physical condition (Naser et al., 2017), in their research on the evaluation of physical condition programs conducted in Tangerang, revealed that structured training programs aligned with organizational goals can significantly improve physical capacity and overall athletic performance.

Despite numerous studies emphasizing the importance of physical condition and coach quality (Machado et al., 2023), few specifically evaluate the physical condition of athletes in specific regions like Pohuwato. Therefore, this research aims to fill that gap by providing an in-depth analysis of the physical condition of athletes in Pohuwato using testing and measurement guidelines. The (Mackenzie, 2008) Physical Performance Evaluation Test is a powerful tool that provides comprehensive insights into an individual's functional state, making it a crucial component of clinical practice and research across various domains (Sheppard et al., 2013). However, even though many studies have highlighted the importance of physical condition in futsal, there is still a lack of research integrating various physical tests comprehensively to provide a complete picture of athletes' physical condition. According to (Yoshida et al., 2023) These studies generally focus only on one or two aspects of physical condition, such as speed or endurance, without considering how the three elements (speed, strength, and endurance) interact and affect overall performance.

This research hypothesizes that physical condition testing involving speed, strength, and endurance tests will provide a more accurate picture of futsal athletes' physical condition (Rahimi et al., 2020). The main objective of this research is to provide empirical data that coaches can use to design more effective training programs (Tomsovsky et al., 2021). This research includes an analysis of physical condition through the 30-meter sprint test, the Vertical Jump test, and the Bleep Test using the performance evaluation test (Mackenzie, 2008).

Method

This research is a descriptive quantitative study. The method used in this research is a survey by conducting a single action. The subjects of this study were 10 Futsal Sporting Pohuwato athletes selected using purposive sampling techniques. The test instruments employed

included a 30-meter sprint test for speed, a vertical jump test for leg muscle strength, and a multistage fitness test for endurance through the Performance Evaluation Test instrument (Mackenzie, 2008). Furthermore, to determine the frequency with mean values and standard deviations obtained from various tests and relative measurements, the percentage of each category was calculated using the formula (Arikunto, 2010):

$$P = \frac{f}{n} \; x \; 100\%$$

Explanation:

p : Percentage

f : Frequency

n : Number of Respondents

Results

The research results can be explained through the analysis of all the data by calculating the frequency distribution of test norms and measurements (Shewhart, 2022) . This categorization was performed using frequency distribution tests through statistical analysis software SPSS version 24 (Johar, 2018). The physical tests conducted on the Sporting Pohuwato futsal athletes included a speed test using a 30-meter sprint, a strength test using the Vertical Jump, and an endurance test using the Multistage Fitness Test (VO_2max). The following are the results of the Performance Evaluation Test (Mackenzie, 2008) and the frequency distribution of each physical component of the Sporting Pohuwato futsal athletes.

Table 1. Results of the Performance Evaluation Test

Sample	Vertical Jump	Strength Classification	30 M Sprint	Speed Classification	VO_2max	Endurance Classification
1	55	Fair	4.42	Fair	47.0	Excellent
2	61	Good	4.32	Good	45.9	Good
3	64	Excellent	4.28	Good	45.2	Good
4	68	Excellent	4.22	Good	47.0	Excellent
5	62	Good	3.59	Excellent	44.0	Good
6	60	Good	3.66	Excellent	48.0	Excellent
7	58	Fair	3.91	Good	47.4	Excellent
8	59	Good	3.61	Excellent	49.0	Excellent
9	62	Good	3.67	Excellent	51.9	Excellent
10	55	Fair	4.42	Fair	47.0	Excellent

Based on Table 1 above, from the test results involving 10 samples, the athletes' performance in the Vertical Jump mostly falls into the "Good" category (5 athletes) and "Fair"

category (3 athletes), with two athletes showing "Excellent" strength. In the 30 M Sprint test, the speed of most athletes is classified as "Excellent" (5 athletes) and "Good" (3 athletes), while two athletes fall into the "Fair" category. For the VO_2max test, the endurance of the majority of athletes is in the "Excellent" category (6 athletes) and "Good" category (4 athletes). Overall, the tests indicate that most athletes have excellent speed and endurance, with strength fairly evenly distributed between the "Good" and "Fair" categories.

Table 2. Frequency Distribution of Athletes' Physical Condition Based on PET Standards

Class	Strength Norm	Frequ e	Perce n	Speed Norm	Frequ e	Perce n	Endurance Norm	Freque	Perce n
Excellent	≥ 63	2	20.0%	≥ 3.58	4	40.0%	≥ 46.5	7	70.0%
Good	59-62	5	50.0%	3.92-4.34	4	40.0%	42.5-46.4	3	30.0%
Fair	35-58	3	30.0%	4.35-4.72	2	20.0%	36.5-42.4	0	0.0%
Poor	20-34	0	0.0%	4.73-5.11	0	0.0%	33.5-36.4	0	0.0%
Very Poor	≤ 19	0	0.0%	≤ 5.50	0	0.0%	≤ 33.4	0	0.0%

Based on Table 2 above, the frequency distribution results of the physical condition of futsal athletes from Sporting Pohuwato for each physical component through the test norms and measurements (Mackenzie, 2005) indicate the following For strength, 20.0% of athletes fall into the Excellent classification (≥ 63), 50.0% into the Good classification (59-62), and 30.0% into the Fair classification (35-58), while no athletes are in the Poor (20-34) or Very Poor (≤19) classifications. In the Speed Norm category, 40.0% of athletes fall into the Excellent classification (≥3.58), 40.0% into the Good classification (3.92-4.34), and 20.0% into the Fair classification (4.35-4.72), while no athletes are in the Poor (4.73-5.11) or Very Poor (≤5.50) classifications. In the Endurance Norm category, 70.0% of athletes fall into the Excellent classification (≥ 46.5), 30.0% into the Good classification (42.5-46.4), and no athletes are in the Fair (36.5-42.4), Poor (33.5-36.4), or Very Poor (≤33.4) classifications.

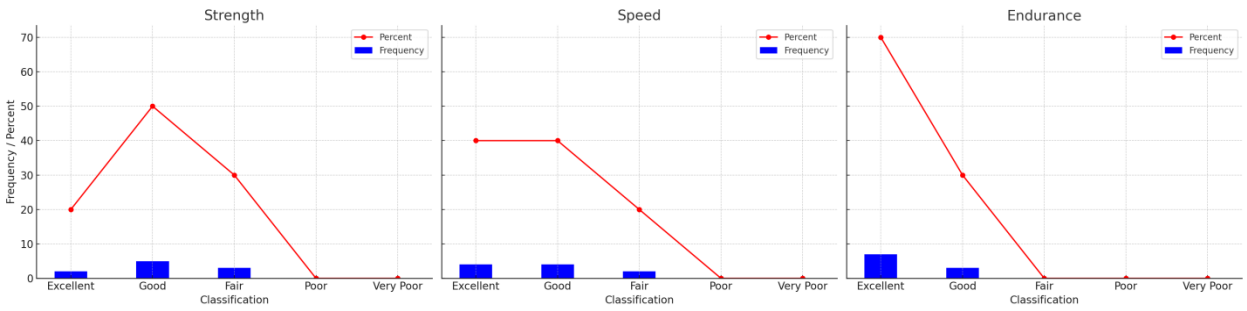

Figure 1. Frequency Distribution of Physical Condition Levels of Futsal Athletes

The figure displays three charts comparing frequency (blue bars) and percentage (red line) across three variables: Strength, Speed, and Endurance, based on different classifications (Excellent, Good, Fair, Poor, Very Poor). In the Strength category, the 'Good' classification stands out with the highest percentage of about 50%, indicating that most data falls into this category, despite the low frequency. For Speed, the 'Excellent' and 'Good' classifications dominate with a percentage of around 40%, with low frequency, suggesting that the majority of the data is within these categories. In Endurance, the 'Excellent' classification dominates with a percentage of about 70%, indicating that most data falls into this category, although the frequency is low. Overall, the 'Good' classification shows good performance in the Strength and Speed variables, while the 'Excellent' classification demonstrates excellent performance in Speed and Endurance.

Table 4. Descriptive Statistics of Overall Physical Condition of Pohuwato Futsal Athletes.

Statistics Total			
N	Valid	10	
	Missing	0	
St	Strength	Speed	Endurance
Mean	60.4	3.95	47.14
Std. Dev.	4.32	0.32	2.24
Min	55	3.59	44.0
Max	68	4.42	51.9

Based on Table 4 above, The descriptive analysis of the statistical test data for 10 samples indicates that the mean value for strength (Vertical Jump) is 60.4 cm with a standard deviation of 4.32 cm, ranging from 55 cm to 68 cm. Speed (30 M Sprint) has an average time of 3.95 seconds with a standard deviation of 0.32 seconds, with minimum and maximum values of 3.59 seconds and 4.42 seconds, respectively. Endurance (VO_2max) shows a mean value of 47.14 ml/kg/min with a standard deviation of 2.24 ml/kg/min, with the lowest value being 44.0 ml/kg/min and the highest being 51.9 ml/kg/min. There are no missing data in this set, indicating good data integrity and completeness for further analysis.

Discussion

Based on the research results, it is evident that the physical condition of Sporting Pohuwato futsal athletes shows significant variation across the three main components: strength, speed, and endurance. According to (Agung Nanda et al., 2023), the combination of physical components such as strength, speed, and endurance is crucial for optimizing player performance on the field. The physical test results indicate that most athletes perform well in terms of speed and endurance. This is further supported by the study of (Putra & Gustiana Mega Anggita, 2022), which shows that specific preparation over three months improves sprinting, jumping, agility, and endurance in futsal players. highlighting the need for tailored training programs to enhance

these physical capacities, while strength tends to vary from fair to excellent (Machado et al., 2023). This variation indicates that although athletes generally have good physical condition, individual differences need to be considered when designing training programs.

In the descriptive analysis of the physical abilities of Sporting Pohuwato futsal athletes, the test results show diverse performance across various main physical components. In terms of strength, the Vertical Jump test revealed that 20% of athletes are in the "Excellent" category, 50% in the "Good" category, and 30% in the "Fair" category. No athletes fall into the "Poor" or "Very Poor" categories. This indicates that most athletes have adequate leg muscle strength, but there is a need for improvement for those in the "Fair" category. Meanwhile, in the aspect of speed, the 30-meter Sprint test shows that 40% of athletes are in the "Excellent" category, 40% in the "Good" category, and 20% in the "Fair" category, with none in the "Poor" or "Very Poor" categories. This suggests that speed is a relative strength for the athletes, with the majority showing good to excellent performance.

Finally, the cardiovascular endurance of the athletes, measured through the VO_2max test, reveals very impressive results with 70% of athletes in the "Excellent" category and 30% in the "Good" category, with none in the lower categories. This shows that endurance is the strongest physical component among the athletes, with the majority demonstrating outstanding cardiovascular capabilities.

Conclusion

This study shows that the physical condition of Sporting Pohuwato futsal athletes is generally in the good to excellent categories, especially in terms of speed and endurance. However, there is significant individual variation that needs to be considered when designing training programs. Coaches are expected to use this data to create more specific and targeted training programs that meet the needs of each athlete to achieve optimal performance.

It is important for the coaching team to continuously monitor and assess the physical condition of the athletes regularly and make adjustments to the training program based on comprehensive evaluation results. By doing so, it is hoped that the physical performance of the athletes can be continuously improved, allowing them to make the maximum contribution in every match.

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