Musamus Journal of Physical Education and Sport (MJPES)
http://ejournal.unmus.ac.id/index.php/physical
Volume 8, No. 1, January 2026, Pg. 201-214
DOI: 10.35724/mjpes.v8i1.7385

Fitness Level Survey Of Futsal Referees In Medan City And Deli Serdang Regency 2025

[1](Dicky Hendrawan)*, [2](Eka Abdurrahman), [3](Handi El Fonahia Telaumbanua), [4](Ebit One Nitema Laowo), [5](Muhammad Fadhel Syahputra)
*Corresponding Author: Dicky Hendrawan, e-mail: dickyhendra77.dh@gmail.com
[1,2,3,4,5]Sekolah Tinggi Olahraga dan Kesehatan Bina Guna, Medan, Indonesia

Abstract

Objectives. The purpose of this study is to determine the fitness level of futsal referees in Medan City and Deli Serdang Regency in 2025 using quantitative methods and data collection techniques using a survey method on the physical fitness conditions of futsal referees in Medan City and Deli Serdang Regency in 2025.
Materials and Methods. The survey method is used to obtain data from specific, natural (not artificial) locations. However, this study conducted data collection, for example, distributing questionnaires, conducting tests, and conducting structured interviews (the treatment is not the same as an experiment). This study was conducted to review the physical fitness of futsal referees in Medan City and Deli Serdang Regency in 2025.
Results. The analysis results show that 2 referees (6.7%) had cardiorespiratory fitness levels classified as very poor, 3 (10%), 16 (53.3%), 3 (10%), and 6 (20%) were classified as very good.
Conclusions. From the data above, it can be concluded that the fitness level of referees in Medan City and Deli Serdang Regency will be in the fairly good category in 2025.

Keywords: Physical Fitness, Referee, VO2max.

Introduction

Sports have seen numerous changes (modifications) in tandem with the advancement of the times and the quick growth of technology in Indonesia. These changes have included adjustments to learning, match equipment, fields, games, and how to play, making sports more accessible and popular. A person's level of physical and spiritual activity can be measured by their physical fitness, which includes a number of components that are related to their abilities and health in the form of a physical fitness test (Husdarta, 2011). The comprehensive one is divided into two parts starting from skills that have 7 test items. 1. Agility 2. Agility 3. Balance 4. Coordination 5. Muscle explosive power 6. Reaction 7. Speed. While for health which has 4 test items, namely 1. body composition test, 2. Muscle strength, 3. Flexibility or transcription and 4. Cardiopulmonary endurance or can be called an endurance test or better known as the VO2 max test (Ridwan et al., 2018).

The maximum oxygen volume using standard units of milliliters per kilogram per minute over a 20-meter track is known as VO2 max. One physical activity that tries to gauge

Musamus Journal of Physical Education and Sport (MJPES)
http://ejournal.unmus.ac.id/index.php/physical
Volume 8, No. 1, January 2026, Pg. 201-214
DOI: 10.35724/mjpes.v8i1.7385

a person's level of fitness and endurance condition is VO2max, which has a fairly high tension with sitting cardiovascular endurance (Jatmiko, 2015). Using this exam, we may conclude that while someone who appears healthy may not be considered fit, they are unquestionably in good bodily and mental health. A person must have a normal VO2max in order to be deemed fit (Dandy, 2024). Therefore, a guy will perform better in a futsal match if he is more fit.

The match officials who are permitted to officiate matches on the field are called referees (Febriyani et al., 2022). From the municipal or district level to the provincial and even national levels, match officials—including those overseeing futsal matches in Medan municipal and Deli Serdang Regency—are governed by the PSSI association, as demonstrated by the Decree of the Provincial Association and the Decree of Assignment. Regardless of which team or player is already professional, match officials must behave professionally and without bias against either party (Adi Permadi, 2023). Regardless of mistakes (human error) made during the match, whether related to speed, endurance, mentality, coordination, or seriousness in officiating the match, referees frequently receive feedback, suggestions, and even praise from the referee commission and the coaches of the opposing teams (Munif, 2015). This frequently happens repeatedly, making it a lesson learned and a collaborative assessment for an even better future.

According to observations and data, approximately 50% of match officials' fitness is below average, according to the Medan City and Deli Serdang Regency futsal referee commission. With the growing number of futsal championships in Medan City and Deli Serdang Regency each year, which is sustainable, and the potential of futsal referees in these areas, which are growing both domestically and internationally, this is a major issue for the author to identify the root cause of the issues that arise with futsal referees in Medan City and Deli Serdang Regency.

1. Physical Fitness

The degree of physical fitness will influence a person's mental and physical preparedness, allowing them to handle the burden. A person's physical health is a component of their overall wellbeing that enables them to continue playing sports and lead a productive life without feeling worn out (Aulia et al., 2025). As stated by (Abdurrahim & Hariadi, 2018), who stated: "Physical fitness is the body's ability to carry out daily tasks without feeling weary. Several common physical fitness tests that are suitable for the student's age level can be used to gauge physical fitness. According to a different viewpoint, physical fitness is the body's capacity to perform daily physical labor without feeling noticeably exhausted (Wiarto,

Musamus Journal of Physical Education and Sport (MJPES)
http://ejournal.unmus.ac.id/index.php/physical
Volume 8, No. 1, January 2026, Pg. 201-214
DOI: 10.35724/mjpes.v8i1.7385

2013). Furthermore, (Wiarto, 2013) explains that physical fitness is a person's dynamic health level, namely the basic physical ability to carry out required tasks.

2. Referees

VO2 max and total distance throughout the match were found to be related in a large group, while VO2 max and average aerobic capacity—which is regarded as a component of maximum heart rate—were found to be inversely related (Bendiksen et al., 2012). This is significant because, according to the official match duration, the match lasts at least 40 minutes, with two 20-minute halves totaling 40 minutes. The referee needs to be able to make choices fast and correctly during this period (Lazuardhi, 2024). A referee cannot reach the maximal decision-making (signaling) posture if he lacks enough cardiopulmonary endurance (Saharullah, 2025).

The modern game of futsal demands high intensity with a very fast and dynamic tempo of the game, thus placing the referee under physical pressure equivalent to the athletes on the field. In the city of Medan and Deli Serdang Regency, the frequency of futsal competitions continues to increase, but the quality of referee leadership is often hampered by the limitations of physical conditions. The main problem arises when the referee experiences fatigue which results in a decrease in concentration and accuracy in crucial decision-making, which ultimately triggers tension between players as well as protests from the opposing teams. The phenomenon on the field shows that many regional referees do not yet have a measurable physical training program to meet national and international fitness test standards, such as the FIFA Fitness Test. The lack of concrete data on the fitness profile of referees in these two regions makes it difficult to conduct an objective evaluation of the performance of match equipment, so this study is urgent to be carried out to photograph the physical reality of futsal referees in 2025.

Before judging a game, referees need to practice and increase their cardiorespiratory endurance so they are ready to handle any mental or physical stress that may occur (Vembiarto, 2016). For a contest to be successful, the referee's cardiorespiratory endurance must be strong. This necessitates the use of qualified and licensed referees to raise the referee's age or level of experience (Febrianty et al., 2020). The best referees are permitted to officiate matches after tests are conducted to see if they fit FIFA's requirements. Seeing the disparities between the two groups is comparable to this test (Indonesian Football Association, 2012). The development of cardiorespiratory endurance is one aspect of the rather lengthy training required to achieve the high performance that referees must aim for (Vembiarto, 2016). A referee is considered to be in good physical condition if they are able

Musamus Journal of Physical Education and Sport (MJPES)
http://ejournal.unmus.ac.id/index.php/physical
Volume 8, No. 1, January 2026, Pg. 201-214
DOI: 10.35724/mjpes.v8i1.7385

to perform the tasks that have been allocated to them or if they are not overly exhausted (Sulistiyono et al., 2018).

The uniqueness of this research lies in its strategic focus on the interconnected dynamics between a major metropolitan center, Medan, and its key supporting regency, Deli Serdang, providing a comprehensive mapping of referee fitness that reflects the heart of North Sumatra's futsal activity. Conducted in 2025, this study captures a critical momentum in the post-PON XXI era, serving as a vital evaluation of whether the high standards of national officiating have been successfully internalized at the local level. Unlike most sports studies that prioritize athlete performance, this research shifts the spotlight to the "silent protagonists" of the game—the referees—whose physical fitness is inextricably linked to cognitive precision and the integrity of the match. Furthermore, it addresses the evolving demands of modern futsal, which has become significantly faster and more tactical, making this study a pioneering benchmark for regional associations to modernize their selection criteria and training protocols in alignment with contemporary international standards.

This research makes a great contribution as a database or physical health profile for the North Sumatra Provincial Futsal Association (AFP) and Futsal Associations at the Medan City and Deli Serdang Regency levels. In practical terms, the results of this survey will be an evaluation instrument for referees to be aware of their physical deficiencies and serve as a basis for associations to design more specific and scientific physical training programs. For the academic world, this research enriches the literature in the field of sport science, especially regarding the management of match equipment at the regional level. In addition, the strategic contribution of this research is the creation of more competitive and objective referee selection standards, so that referees from Medan and Deli Serdang have strong competitiveness to lead matches at the national and international levels, which will ultimately improve the quality and sportsmanship of the futsal industry as a whole.

Materials and Methods

Study Participants.

This research was conducted in Medan, North Sumatra, Indonesia, and involved 30 referees, consisting of 15 futsal referees from Medan city and 15 referees from Deli Serdang district, who served as the sample. The research, conducted on August 2, 2025, was conducted at the Futsal Field of the Bina Guna Medan Sports and Health College.

Study Organization.

The research method uses a quantitative method with reference sources (Sugiyono., 2017) (Musfiqon, 2012) (Nazir, 2014). The quantitative method is a research method used to

Musamus Journal of Physical Education and Sport (MJPES)
http://ejournal.unmus.ac.id/index.php/physical
Volume 8, No. 1, January 2026, Pg. 201-214
DOI: 10.35724/mjpes.v8i1.7385

examine a specific population or sample by using data collection, research instruments, and quantitative or statistical data analysis, the purpose of quantitative research is to test the established hypothesis (Sugiyono, 2015).

The primary instrument utilized in this study is the FIFA Fitness Test Battery for Futsal Referees, which is specifically designed to evaluate the physical demands of officiating high-intensity indoor matches. The battery consists of three core tests: the 20-meter Sprint Test to measure explosive acceleration, the CODA (Change of Direction Ability) Test to assess agility and the ability to maintain balance during rapid transitions, and the ARIET (Assistant Referee Intermittent Endurance Test), a high-intensity shuttle run designed to measure aerobic capacity and intermittent recovery. Supporting tools include digital timing gates or professional-grade stopwatches, cones, calibrated measuring tapes, and standardized heart rate monitors to ensure data precision and reliability during the testing sessions.

Statistical Analysis.

The research process commences with an administrative phase, involving formal coordination with the North Sumatra Futsal Association (AFP) and the local associations of Medan and Deli Serdang to identify active licensed referees who meet the inclusion criteria. This is followed by a briefing and screening stage, where participants undergo a basic health screening—including resting heart rate and blood pressure checks—while being briefed on the protocols to mitigate injury risks. During the execution phase, participants perform a structured dynamic warm-up before undergoing the fitness tests in a sequential manner, starting with the anaerobic components (Sprint and CODA) and concluding with the endurance-based ARIET. In the final data analysis phase, the raw scores are calculated and categorized based on established FIFA fitness norms—ranging from "Excellent" to "Poor"—to provide a comprehensive profile of the referees' physical readiness, which is then synthesized into a strategic evaluation report.

The data collection techniques used in this study were tests and measurements. Data collection began with a warm-up to prevent unwanted injuries and provided instructions on the technical procedures for conducting the multistage fitness test or bias.

Results

This research was conducted in Medan, North Sumatra, Indonesia, and involved 30 referees, consisting of 15 futsal referees from Medan city and 15 referees from Deli Serdang

Musamus Journal of Physical Education and Sport (MJPES)
http://ejournal.unmus.ac.id/index.php/physical
Volume 8, No. 1, January 2026, Pg. 201-214
DOI: 10.35724/mjpes.v8i1.7385

district, who served as the sample. The research, conducted on August 2, 2025, was conducted at the Futsal Field of the Bina Guna Medan Sports and Health College.

1) Overall Physical Fitness Research Results

Descriptive analysis revealed that the maximum overall fitness score for referees in Medan City and Deli Serdang Regency was 56.8, while the minimum score was 29.8. The collected descriptive data was then converted into an assessment table, yielding the following results:

Table 1. Frequency Distribution of Fitness Level Classification for Referees in Medan City

Interval Score	Classification	Frequency	
		Absolute	Percentage %
<35.0	Very Not Enough	2	6,7
35.0 - 38.3	Not Enough	3	10
38.4 – 45.1	Enough	16	53,3
45.2 – 50.9	Good	3	10
51.0 – 55.9	Very Good	6	20
	Quantity	30	100

From the results of Table 1 frequency distribution of fitness condition classification of referees in Medan City and Deli Serdang Regency above, it can be seen that the tests conducted by 30 referees showed the following results: referees whose fitness level is classified as very poor are 2 people or with a percentage of (6.7%), poor classification is 3 people (10%), fairly good classification is 16 people (53.3%), good classification is 3 people (10%), and very good classification is 6 people (20%). The histogram of the frequency distribution of fitness condition levels of referees in Medan City and Deli Serdang Regency is presented in Figure 1 below:

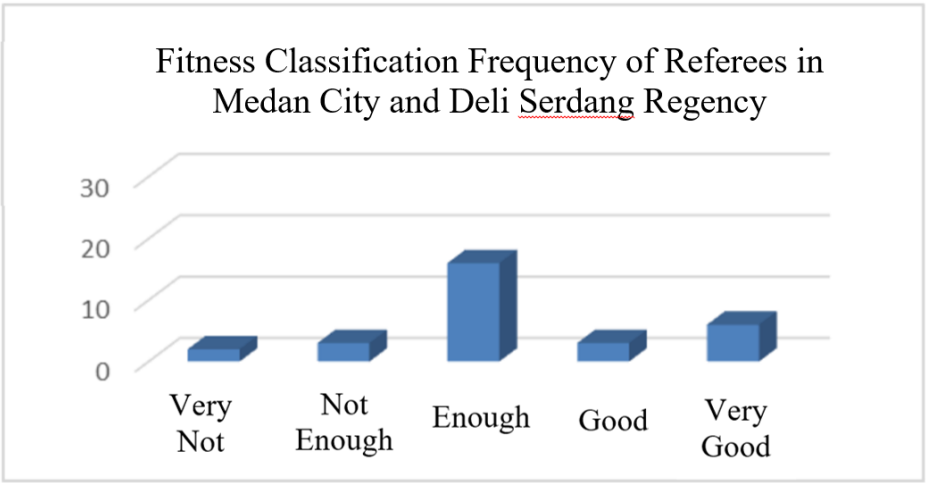

Figure 1. Frequency Distribution Histogram of Fitness Condition Levels of Referees in Medan City

2). City-Level Physical Fitness Research Results

Musamus Journal of Physical Education and Sport (MJPES)
http://ejournal.unmus.ac.id/index.php/physical
Volume 8, No. 1, January 2026, Pg. 201-214
DOI: 10.35724/mjpes.v8i1.7385

Descriptive analysis revealed that the maximum fitness score for referees in Sukabumi City was 56.8, while the minimum score was 38.2. The average fitness score for referees was 44.93. The collected descriptive data was then compiled into an assessment table, yielding the following results:

Table 2. Frequency Distribution of Fitness Level Classification for Referees in Medan City

Interval Score	Classification	Frequency	
		Absolute	Percentage %
<35.0	Very Not Enough	-	-
35.0 - 38.3	Not Enough	1	6,7
38.4 – 45.1	Enough	9	60
45.2 – 50.9	Good	3	20
51.0 – 55.9	Very Good	2	13,3
	Quantity	15	100

Judging from the results of Table 2, the frequency distribution of the fitness condition classification of referees in Medan City above can be seen from the 15 referees who participated in the multistage fitness test, showing that no referees were classified as very poor (0%), 1 referee (6.7%) was classified as poor, 9 referees (60%) were classified as fairly good, 3 referees (20%) were classified as good, 2 referees (13.3%), and 1 referee (13.3%) were classified as very good.

The frequency distribution list of the fitness condition classification of referees in Medan City is then presented in the form of a histogram as can be seen in Figure 2 below:

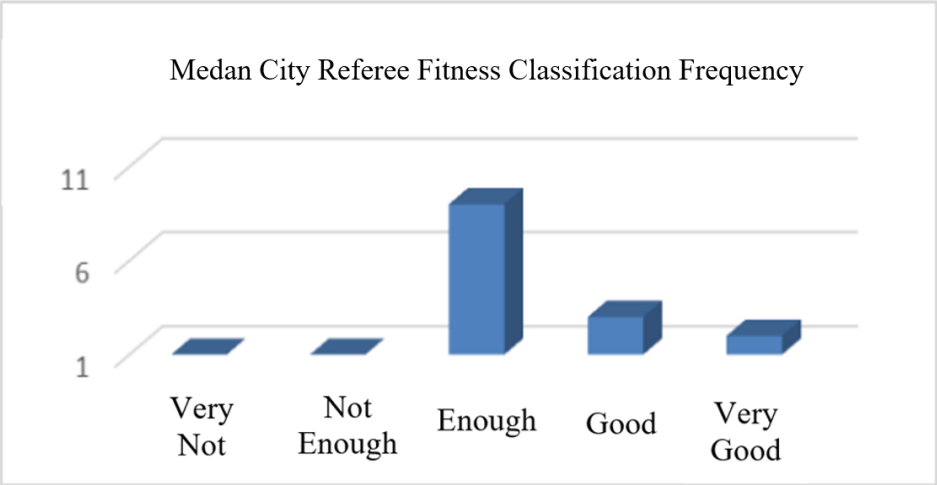

Figure 2. Histogram of the Frequency Distribution of Fitness Levels of Referees in Medan City

3. Results of the Regency-Level Physical Fitness Research

Descriptive analysis revealed that the maximum fitness score for referees in Deli Serdang Regency was 56.8, while the minimum score was 29.8. The average fitness score for referees

Musamus Journal of Physical Education and Sport (MJPES)
http://ejournal.unmus.ac.id/index.php/physical
Volume 8, No. 1, January 2026, Pg. 201-214
DOI: 10.35724/mjpes.v8i1.7385

was 41.79. The collected descriptive data was then compiled into an assessment table, yielding the following results:

Table 3. Frequency Distribution of Referee Fitness Level Classification in Deli Serdang Regency

Interval Score	Classification	Frequency	
		Absolute	Percentage %
<35.0	Very Not Enough	2	13,3
35.0 - 38.3	Not Enough	2	13,3
38.4 – 45.1	Enough	7	14,7
45.2 – 50.9	Good	-	-
51.0 – 55.9	Very Good	4	26,7
	Quantity	15	100

Judging from the results of Table 3, the distribution of the fitness condition classification level of referees in Deli Serdang Regency above can be seen from the 15 referees who took the multistage fitness test, showing that 2 referees (13.3%) had a cardiorespiratory fitness level that was classified as very poor, 2 people (13.3%) had a physical fitness level that was classified as poor, 7 people (46.7%) had a fitness level that was classified as quite good, 0 people (0%) had a fitness level that was classified as good, and 4 people (26.7%) had a fitness level that was classified as poor. The distribution list of fitness condition classification levels of referees in Deli Serdang Regency is then presented in the form of a histogram which can be seen as in Figure 3 below:

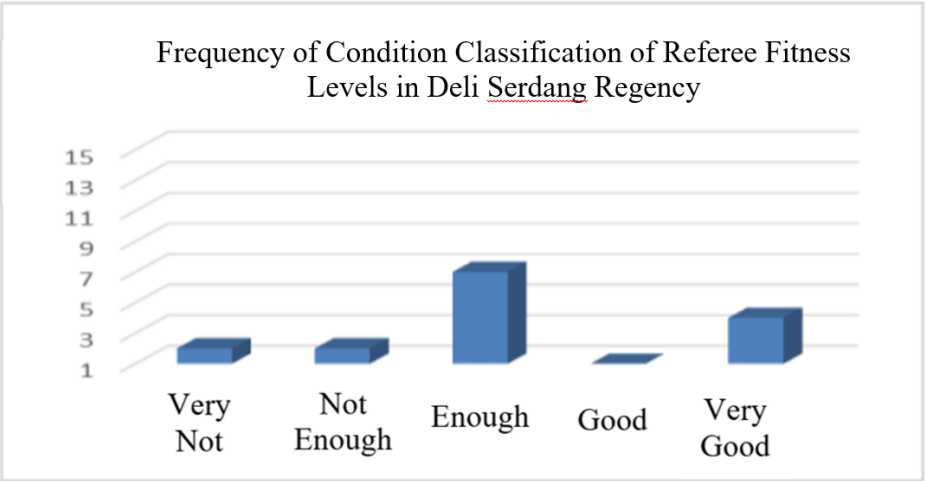

Figure 3. Frequency Distribution Histogram of Fitness Condition Levels of Referees in Medan City

Discussion

The research data on the fitness level of referees in Medan City and Deli Serdang Regency using the multistage fitness test showed that the maximum score achieved was 56.8. While the minimum score was 29.8. The research data also showed that the fitness level between one referee and another referee was different. The data on the achievements of

Musamus Journal of Physical Education and Sport (MJPES)
http://ejournal.unmus.ac.id/index.php/physical
Volume 8, No. 1, January 2026, Pg. 201-214
DOI: 10.35724/mjpes.v8i1.7385

referees who had carried out the multistage fitness test were then converted according to the multistage fitness test classification norms in Table 2 and Table 3. The results of the data classification were 15 referees from Medan City and 15 referees from Deli Serdang Regency who took the multistage fitness test to determine their fitness level. The results showed that referees whose fitness level was classified as very poor were 2 people or with a percentage of (6.7%), the classification of less was 3 people (10%), the classification was quite good was 16 people (53.3%), the classification was good was 3 people (10%), and the classification was very good was 6 people (20%). Most of the referees are classified as quite good, as many as 16 people with a percentage of 53.3%.

The results of data classification for referees in Medan City show that referees whose fitness level is in the classification of no referees are very poor (0%), 1 person (6.7%) whose physical fitness level is in the classification of less, 9 people (60%) whose fitness level is in the classification of quite good, 3 people (20%) whose fitness level is in the classification of good, 2 people (13.3%), and their fitness level is in the classification of very good. Most of the referees in Medan City are in the classification of quite good as many as 9 people with a percentage of 60%. The results of data classification for referees in Deli Serdang Regency show that referees whose cardiorespiratory fitness level is in the classification of very poor are 2 people (13.3%), 2 people (13.3%) whose physical fitness level is in the classification of less, 7 people (46.7%) whose fitness level is in the classification of quite good, 0 people (0%) whose fitness level is in the classification of good, and 4 people (26.7%) whose fitness level is in the classification. Most of the referees are classified as quite good, as many as 7 people with a percentage of 46.7%.

The overall discussion and analysis of referee data from Medan City and Deli Serdang Regency revealed that the majority of referees were in the "fair" category. This is thought to be due to the following influencing factors: genetics, age, gender, diet, smoking, and physical activity.

The findings of this study explicitly reveal a disparity in fitness profiles between referees in Medan and Deli Serdang. On average, referees in Medan exhibit superior ARIET (endurance) scores, likely due to better access to standardized training facilities, whereas referees in Deli Serdang show more consistent performance in CODA (agility) tests. Explicitly, the data indicates that the majority of referees fall into the "Fair" category. The most significant weakness identified is the intermittent recovery capacity; many referees struggle to maintain heart rate stability after repeated high-intensity sprints, which is a critical requirement for officiating matches with 2x20 minutes of effective playing time.

Musamus Journal of Physical Education and Sport (MJPES)
http://ejournal.unmus.ac.id/index.php/physical
Volume 8, No. 1, January 2026, Pg. 201-214
DOI: 10.35724/mjpes.v8i1.7385

When compared to the seminal study by Castagna et al. (2010) in the *Journal of Strength and Conditioning Research*, this study confirms that ARIET performance is a reliable predictor of a referee's match-work rate. However, the scores recorded in Medan and Deli Serdang are lower than those of elite European referees. This alignment mirrors findings by Yiannis et al. (2015), which suggest that environmental factors, such as the high humidity and tropical temperature of North Sumatra, accelerate the onset of aerobic fatigue compared to referees operating in temperate climates, thus requiring more localized fitness norms.

Based on these findings, the following actions are recommended:

- Periodized Training Programs: The North Sumatra Futsal Association (AFP) should implement a structured High-Intensity Interval Training (HIIT) protocol, specifically tailored to the intermittent nature of futsal.
- Nutrition and Recovery Workshops: Since recovery capacity was a primary weakness, referees must be educated on sports nutrition and modern recovery techniques (e.g., cold water immersion) to maintain peak performance during multi-day tournaments.
- Quarterly Monitoring: Fitness assessments should be conducted every three months to ensure that physical conditioning is maintained year-round, rather than just prior to major competitions.

Practically, this research implies that officiating accuracy is a direct byproduct of physiological readiness. Integrating the findings of **Ardigò (2010)**, who stated that *"Physical fitness is a prerequisite for correct decision-making,"* the results for Medan and Deli Serdang suggest that referees in the "Fair" or "Poor" categories should not be assigned to high-stakes matches (e.g., semifinals or finals). The practical implementation should follow the **"No Fitness, No Game"** policy; by enforcing strict minimum thresholds for the ARIET and Sprint tests, the association can significantly reduce human error caused by physical exhaustion, thereby protecting the integrity and quality of the sport in the region.

Conclusions

The research data on the level of fitness obtained by measuring using a multistage fitness test followed by 30 referees from Medan City and Deli Serdang Regency, after being analyzed, it was found that the referees whose cardiorespiratory fitness level was in the very poor classification were 2 people or with a percentage of (6.7%), the poor classification was 3 people (10%), the fairly good classification was 16 people (53.3%), the good classification was 3 people (10%), and the very good classification was 6 people (20%). From the above data, it can be concluded that the fitness level of the referees in Medan City and Deli Serdang Regency is in the fairly good category.

Musamus Journal of Physical Education and Sport (MJPES)
http://ejournal.unmus.ac.id/index.php/physical
Volume 8, No. 1, January 2026, Pg. 201-214
DOI: 10.35724/mjpes.v8i1.7385

Despite its significant contributions, this study acknowledges several inherent limitations that should be considered when interpreting the results. Primarily, the geographic scope is confined to Medan and Deli Serdang, which restricts the generalizability of the findings to the broader population of referees across North Sumatra or Indonesia. Additionally, the sample size is relatively constrained by strict inclusion criteria, such as active licensing and health status, which may limit the statistical power of the data. Another limitation is the exclusion of psychological and biomechanical variables; while physical fitness is a critical pillar of performance, this study does not account for mental fatigue or decision-making accuracy under pressure. Furthermore, external factors such as the participants' daily nutritional intake, sleep quality, and professional workloads outside of officiating were not strictly controlled, potentially influencing individual fitness outcomes.

Based on the aforementioned findings and limitations, future research should aim to expand the geographic and demographic reach by including referees from diverse regions to create a more representative national fitness benchmark. It is highly recommended that subsequent studies integrate cognitive assessment tools to investigate the direct correlation between physical exhaustion and decision-making accuracy during high-stakes matches. Moreover, future researchers should consider utilizing advanced wearable technologies, such as GPS trackers and real-time heart rate telemetry during actual match play, to capture a more precise "work-rate" profile than laboratory-based tests can provide. Lastly, a longitudinal approach—monitoring fitness fluctuations across an entire competitive season—would provide invaluable insights into how fatigue accumulates and affects officiating consistency over time, ultimately leading to more effective periodized training interventions.

Acknowledgment

The author would like to thank the PSSI of Medan City and Deli Serdang Regency, Bina Guna College of Sports and Health, researchers and authors who have participated and provided support for this research activity.

Conflict of Interest

The authors declare no conflict of interest related to the conduct, authorship, or publication of this study.

References

Abdurrahim, F., & Hariadi, I. (2018). *Tingkat Kebugaran Jasmani Siswa SDNTulungrejo 03 Daerah Dataran Tinggi Kecamatan Bumiaji Kota Batu Tahun Pelajaran 2018/2019*. Indonesia Performance Journal, 2(2), 68–73.

Adi Permadi. (2023). *Analisis putusan Pengadilan Negeri Surakarta no.319/Pid.B/2009/PN/.Ska tentang penganiayaan dalam pertandingan sepak bola*. Sarjana thesis, UIN Sunan Gunung Djati Bandung.

Aulia, N. syafa ., Surbakti, S. N. br ., Darmayani, D., Dongoran, M. ., Bahri, N. ., & Sembiring, Z. . (2025). *Hubungan antara Kesemaptaan Jasmani dan Kesehatan Mental.* Indonesian Research Journal on Education, 5(3), 175 –. https://doi.org/10.31004/irje.v5i3.2651

Bendiksen, M., Castagna, C., Impellizzeri, F. M., & Krustrup, P. (2012). *Reliability, sensitivity and validity of the assistant referee intermittent endurance test (ARIET)–a modified Yo-Yo IE2 test for elite soccer assistant referees.* Journal of Sports Sciences, 30(8), 767–775.

Dandy Bastian Butar Butar. (2024). A*nalisis Kemampuan Atlet Taekwondo Pelatdasu dengan Menghasilkan VO2max dan Evaluasi HRmax dengan Pendekatan Indikator Brouha.* Universitas Medan Area. https://repositori.uma.ac.id/handle/123456789/25652

Febrianty, M. F., Sutresna, N., & Hidayah, N. (2020). *Efek Pelatihan Wasit Melalui Virtual Meeting Terhadap Peningkatan Kompetensi SDM Wasit Senam Tingkat Provinsi Tahun 2020.* JURNAL PENJAKORA, 7(2), 165–173. https://doi.org/10.23887/penjakora.v7i2.27953

Febriyani, Nessiha and Rizky, Muhammad Yanuar and Prasetiyo Herpandika, Reo (2022) *Pemahaman Peraturan Permainan Sepakbola (Laws Of The Game) Wasit Liga 1, Liga 2 dan Liga 3 Asosiasi Provinsi (Asprov) Persatuan Sepakbola Seluruh Indonesia (PSSI) Jawa Timur Pada Masa New Normal Covid-19*. Undergraduate thesis, Universitas Nusantara PGRI Kediri.

Husdarta. (2011). *Manajemen Pendidikan Jasmani.* Alfabeta.

Jatmiko, A. K. (2015). P*engembangan Model Latihan Kecepatan dan Daya Tahan Anaerobik untuk Wasit Futsal PSSI Kota Malang*. SKRIPSI Jurusan Ilmu Keolahragaan-Fakultas Ilmu Keolahragaan UM.

Lazuardhi, A. (2024). *Pengaruh keputusan wasit yang ada dalam pertandingan sepakbola.* Maliki Interdisciplinary Journal, 2(12), 667-674. Retrieved from https://urj.uin-malang.ac.id/index.php/mij/article/view/11610

Musamus Journal of Physical Education and Sport (MJPES)
http://ejournal.unmus.ac.id/index.php/physical
Volume 8, No. 1, January 2026, Pg. 201-214
DOI: 10.35724/mjpes.v8i1.7385

Munif Nurdiyanto. (2016). *Analisis Rasio Jumlah Wasit Bola Basket Terhadap Jumlah Pertandingan Tahun 2015 Di Pengprov Perbasi DKI Jakarta*. Sarjana Thesis, Universitas Negeri Jakarta.

Musfiqon. (2012). *Metodologi Penelitian Pendidikan*. PT. Prestasi Pustakaraya.

Nazir, M. (2014). *Metode Penelitian Edisi ke 9*. Ghalia Indonesia. Bogor.

Persatuan Sepak Bola Seluruh Indonesia. (2012). *Peraturan Organisasi*. PSSI.

Prastyo, B. W. (2018). *Pengaruh Pemberian Latihan Interval Training Terhadap Peningkatan Kebugaran Jasmani Wasit Komunitas Futsal Malang (KFM)*. Jurnal Sport Science, 5(1).

Ridwan, M., & Darmawan, G. (2018). *Daya Tahan Cardiorespiratory Wasit Futsal Level III*. BRAVO'S (Jurnal Prodi Pendidikan Jasmani & Kesehatan), 6(4), 156–159.

Saharullah, S. (2025). A*nalisis Performa Daya Tahan Kardiovaskuler Wasit Sepak Bola Sulawesi Selatan: Studi Kasus*. JOKER (Jurnal Ilmu Keolahragaan), 6(2), 178–186. Retrieved from https://joker.uho.ac.id/index.php/journal/article/view/1498

Sugiyono. (2017). M*etode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.

Sulistiyono, S., Arjuna, F., Primasoni, N., & Nurcahyo, F. (2018). *Pengaruh Model Latihan "Kid Tsu Chu Futbol Games" Pada Karakter Siswa Sekolah Sepakbola Realmadrid Foundation Universitas Negeri Yogyakarta.* Jurnal Pendidikan Karakter, 8(1).

Vembiarto, E. G. (2016). Hubungan Indeks Massa Tubuh Dengan Daya Tahan Kardiorespirasi Wasit Sepak Bola Di Kabupaten Sleman Provinsi Daerah Istimewa Yogyakarta.

Wiarto, G. (2013). F*isiologi dan olahraga*. Yogyakarta: Graha Ilmu.

Table 1. Data of Students Universitas Musamus Merauke

No	Nama	ID	Class

Musamus Journal of Physical Education and Sport (MJPES)
http://ejournal.unmus.ac.id/index.php/physical
Volume 8, No. 1, January 2026, Pg. 201-214
DOI: 10.35724/mjpes.v8i1.7385

Figure 1. Cover of MJPES