

The Effect of Ramadan Fasting on VO₂Max of Futsal Club Kawat Duri Athletes in Malang City Through the Bleep Test

Dhimas Zainurrosyid¹, Olivia Andiana²

^{1,2}Departemen Ilmu Keolahragaan, Fakultas Ilmu keolahragaan, Universitas Negeri Malang, Indonesia

Corresponding Author : dhimaszainurrosyid@gmail.com

Article Information	ABSTRACT
<p><i>Received:</i> 12.01.2026</p> <p><i>Accepted:</i> 12.04.2026</p> <p><i>Online First:</i> 25.04.2026</p> <p><i>Published:</i> 25.04.2026</p>	<p>This study aims to determine the effect of Ramadan fasting on the VO₂Max capacity of futsal athletes from Kawat Duri Club in Malang City. Using a quantitative approach and a quasi-experimental pre-test post-test design, this study involved 10 athletes aged 16–18 years selected through purposive sampling. Data were collected using the bleep test conducted before and after the month of Ramadan. Data analysis was carried out using normality tests, homogeneity tests, and paired t-tests with SPSS software. The results showed that 7 out of 10 athletes experienced an increase in VO₂Max values after fasting, while 3 athletes showed unchanged results. The t-test results produced a significance value of < 0.001, indicating that there is a significant difference between VO₂Max values before and after fasting. These findings indicate that Ramadan fasting can have a positive impact on improving athletes' aerobic capacity, as long as it is balanced with consistent physical training and proper nutrition management. Therefore, fasting does not become an obstacle in maintaining or even enhancing the physical fitness performance of futsal athletes, particularly in terms of VO₂Max, but rather can serve as a stimulus for beneficial physiological adaptations.</p> <p>Keywords: Ramadan fasting, VO₂Max, futsal athletes, physical fitness.</p>
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Introduction

VO₂max, or maximal oxygen volume, is an important measure in assessing a person's aerobic capacity, particularly in the context of strenuous physical activity such as competitive sports (Mahardhika et al., 2025). VO₂max describes the ability of the cardiovascular system—consisting of the heart, lungs, and blood vessels—to deliver oxygen to the body's muscles during intense exercise. According to (Jalil, 2020), VO₂max can be effectively measured through the bleep test, which has proven accurate for assessing athletes' physical fitness. (Strasser & Burtscher, 2018) explain that VO₂max can be classified into several fitness levels, from very poor (≤20%) to superior (≥90%). This ability is influenced by various factors, including age, weight, body mass index

(BMI), and exercise habits (Desfika Nasution, 2023).

Futsal, a popular team sport in Indonesia, is characterized by intense, dynamic gameplay that relies on speed and physical endurance. It is played by two teams of five players each, in a space smaller than a soccer field and with shorter game durations. According to FIFA (Federation Internationale de Football Association) rules, futsal uses a low-bounce ball, placing greater emphasis on ball control skills, speed, teamwork, and game strategy (Study et al., 2024). Because it relies on numerous short sprints and explosive movements, this sport requires a high VO₂max to maintain performance throughout the match.

Challenges arise when futsal athletes fast during Ramadan. In Islam, fasting is an obligation for Muslims, requiring them to refrain from eating and drinking from dawn to sunset (Arif Al Ardha et al., 2024). In addition to spiritual aspects, fasting also has physiological impacts on metabolism, body energy, and physical performance (Salahudin & Rusdin, 2020). This is a crucial issue because athletes continue training and even competing while fasting, where their bodies undergo significant changes in calorie intake, hydration, and daily biological rhythms. Various studies have shown that fasting can reduce the body's energy reserves, slow muscle recovery, and impair physical endurance, including lowering $VO_2\text{max}$ values.

The urgency of this research stems from the fact that many futsal athletes in Indonesia continue to train and compete during Ramadan. While they remain obligated to maintain optimal performance, they also have to fast, which restricts nutrient and fluid intake. Therefore, a scientific approach is needed to understand how Ramadan fasting affects $VO_2\text{max}$ in futsal athletes, so that coaches, athletes, and medical teams can develop appropriate training and nutrition strategies.

While previous studies have explored the effects of fasting on metabolism and general physical fitness, specific studies examining its impact on $VO_2\text{max}$ using the bleep test in futsal athletes are limited. This is where the novelty of this study lies: its focus on the relationship between Ramadan fasting and changes in $VO_2\text{max}$ values, as measured by the bleep test, in active futsal athletes (Bima et al., 2025).

The aim of this study was to scientifically analyze whether there is a significant effect between Ramadan fasting and $VO_2\text{max}$ values in futsal athletes from the Kawat Duri Club in Malang City. Using the bleep test as an accurate measurement tool, the results are expected to provide an objective picture of performance changes during fasting.

This research's contributions are both theoretical and practical.

Theoretically, this study will expand scientific studies in the field of sports science, particularly on cardiovascular endurance and physiological adaptations in athletes during Ramadan. Practically, the results of this study can serve as guidelines for coaches and athletes in developing more adaptive training schedules

and effective nutritional strategies during the fasting month, ensuring optimal performance and avoiding significant declines (Siregar, 2021). This research will also benefit relevant parties, such as sports nutritionists and team managers, in designing training policies for Muslim athletes during Ramadan, which is increasingly important in the context of international competition.

Thus, this research not only provides new scientific insights, but also concrete solutions that can be applied in the practice of training and coaching professional athletes who fast.

Methodology

This research is a quantitative research with an experimental approach that aims to measure and analyze the effect of Ramadan fasting on $VO_2\text{max}$ futsal athletes of the Kawat Duri Club, Malang City. The research design used is a pre-test post-test control group design, by comparing the results of $VO_2\text{max}$ before and after the fasting month. The location of the research was carried out at the Kawat Duri Futsal Club, Malang City during the month of Ramadan, with a time span of approximately one month.

The population in this study were 20 active futsal athletes who are members of the club, while samples were taken as many as 10 athletes using a purposive sampling technique based on certain criteria such as age 16–18 years, good physical fitness, and willingness to follow fasting and all stages of the research. The data collection instrument was carried out through a bleep test to measure $VO_2\text{max}$ directly, which was carried out in two stages, namely a pre-test before Ramadan and a post-test after Ramadan, with treatment in the form of programmed training activities during the fasting period twice a week for six weeks.

Data analysis was conducted using descriptive and inferential statistical approaches with the help of SPSS software, starting from the normality test using the Shapiro-Wilk method, the homogeneity test using the F formula, and the hypothesis test using the paired sample t-test with a significance level of 0.05. The t-test was used to compare the VO₂max results between before and after fasting in the same sample, with the aim of determining whether there were significant differences.

If the data were normally distributed and homogeneous, then the parametric t-test was used, and if the calculated t value was greater than the t table, then the null hypothesis (H₀) was rejected, which means there was an effect of Ramadan fasting on the VO₂max of futsal athletes. All stages of this analysis aimed to scientifically test the changes in athletes' VO₂max due to fasting and provide a scientific basis for training and fitness management during Ramadan.

Result

The data from this study were obtained by conducting a Bleep test on 10 futsal athletes from the Kawat Duri Club, Malang City, at the Ken Arok Sports Hall, Malang City. The study was conducted during fasting on March 19, 2025, and after fasting on April 13, 2025. This study aims to determine the effect of fasting and after fasting on the physical fitness of Futsal Athletes from the Kawat Duri Club, Malang City.

Table 1. Bleep Test Results

Nama Atlet	Hasil Bleep test Selama Puasa	Hasil Bleep test Setelah Puasa
A	43.34	46.80
B	43.34	43.34
C	46.80	46.80
D	43.34	46.80
E	50.26	50.26
F	43.34	44.11
G	43.34	46.80
H	46.80	50.26
I	39.88	46.80
J	43.34	43.77

This study aimed to determine the effect of fasting on changes in VO₂Max capacity. Based on data collected from 10 samples, it was found that 7 samples

experienced an increase in VO₂Max values after fasting, while 3 samples showed stable results. These results indicate that most individuals experienced an increase in VO₂Max capacity, meaning an increase in the body's ability to transport and utilize oxygen during physical activity. This increase can be attributed to metabolic adaptations and the efficiency of the respiratory and cardiovascular systems that occur during the fasting period. Therefore, fasting can be considered a factor supporting increased physical fitness, particularly VO₂Max capacity.

In addition to examining changes in VO₂Max values before and after fasting, this study also needs to be supplemented with statistical analysis to determine whether the differences are truly significant. This statistical analysis is essential for more accurate and reliable research results. Furthermore, other factors that may influence Bleep Test results during fasting, such as diet, rest periods, and exercise intensity, should also be considered. Thus, this study can provide a more complete picture of the effect of fasting on VO₂Max in futsal club players from Kawat Duri, Malang City.

Table 2. Hypothesis Test Results with T-Test

Hasil Penelitian	Df	P	Sig 5%
Hasil Bleep Test	10	<0.001	0.05

From the T test analysis data, the significance value was found to be <0.001 because the bleep test Thitung (-53.709) < Ttabel (1.812) was found, the sprint test Thitung (-52.711) < Ttabel (1.812) was found, the squat jump test Thitung (-25.471) < Ttabel (1.812) and the shuttle run test Thitung (-20.224) < Ttabel (1.812) was found, so H₀ was rejected and the significance (<0.0001) < (0.05) then H₁ was accepted so that it can be said that there is an effect of fasting and after fasting on the physical fitness of futsal athletes in Kawat Duri, Malang City.

Dicussion

This study aimed to determine the effect of fasting on increasing VO₂Max in 10 futsal athletes from Kawat Duri, Malang City. This study was conducted during fasting on March 19, 2025, and after fasting on April 13, 2025. The results showed that fasting had an effect on increasing VO₂Max in Kawat Duri, Malang City futsal athletes, as indicated by the time difference between the fasting and post-fasting tests.

Fasting is a form of conscious self-control in which a person refrains from eating, drinking, and various activities that could invalidate the fast for a certain period (Rahmi, 2015). In a religious context, fasting is an act of worship performed with the intention of seeking Allah SWT, from dawn to sunset. However, in the context of health and sports science, fasting is also understood as a diet method or eating pattern known as intermittent fasting. Intermittent fasting is defined as a method of restricting daily eating, where a person only consumes food during a specific window (e.g., 8 hours) and fasts (abstains from eating and drinking) for the remaining time (e.g., 16 hours) of the day (Correia et al., 2020).

Correia et al., 2020, in a meta-analysis examining the effects of intermittent fasting on physical fitness, found a significant increase in VO₂max after individuals underwent intermittent fasting. In this study, combined with an appropriate physical exercise program (Abai'dia et al., 2020). This is due to physiological adaptations that occur during fasting, such as increased fat oxidation, decreased body fat mass, increased insulin sensitivity, and increased efficiency of oxygen utilization by body tissues. By reducing fat mass and increasing metabolic efficiency, the heart's workload is reduced, resulting in more effective respiratory and circulatory systems. This can lead to increased VO₂max capacity.

In futsal athletes from Kawat Duri, Malang City, observations and bleep tests showed a significant increase in VO₂Max values after fasting for one month. This was determined based on VO₂Max test results conducted before, during, and after the

Ramadan fast. VO₂Max, an indicator of the body's ability to absorb and utilize oxygen during maximum physical activity, increased after the fasting period, indicating an improvement in the athletes' aerobic fitness. This increase in VO₂Max did not occur suddenly or without cause, but was influenced by several important factors that supported the athletes' physical condition during fasting. One of the main factors that played a significant role was a consistent physical training program throughout the fasting month (Bezuglov et al., 2021). Despite fasting, the Kawat Duri futsal athletes continued to train regularly at the same intensity as before fasting. This is important because the body still receives the training stimulus needed to maintain and even increase the working capacity of the heart, lungs, and muscles during physical activity (Al-Nawaiseh et al., 2021).

Regular exercise during fasting allows for physiological adaptations in the body, such as increased cardiovascular efficiency and increased muscle oxygen utilization. These adaptations contribute to an overall increase in VO₂Max. Furthermore, training during fasting can also enhance fat adaptation, or the body's ability to use fat as a primary energy source, which is particularly beneficial in aerobic-based sports like futsal (Supriyanto, 2021). Another crucial contributing factor is the athletes' well-maintained nutritional intake during fasting. Although mealtimes are limited to pre-dawn meals (suhour) and breaking the fast (iftar), Kawat Duri futsal athletes still receive balanced and adequate nutrition to support their energy needs and recovery processes. Adequate nutrition, particularly complex carbohydrates, protein, healthy fats, and vitamins and minerals, helps maintain endurance, accelerate muscle recovery after exercise, and maintain a stable metabolism during fasting.

According to Yunus & Raharjo (2022), the combination of structured and regular training and good nutritional management during fasting is the main factor in increasing VO₂Max values in futsal athletes from Kawat Duri, Malang City. These findings indicate that fasting is not a

barrier to improving athlete performance, as long as athletes maintain good training and nutrition patterns. In fact, when approached appropriately, fasting can be a moment of physiological adaptation that is beneficial for improving physical fitness, including aerobic capacity, as reflected in VO₂Max values.

Conclusions

Based on the results of the research conducted, it can be concluded that Ramadan fasting has a significant effect on increasing VO₂Max capacity in futsal athletes from the Kawat Duri Club in Malang City. This increase is demonstrated by the results of bleep tests before and after fasting, which showed positive changes in most athletes. This confirms that fasting, when accompanied by a structured training program and proper nutritional management, does not hinder athlete performance, but can instead provide momentum to increase the body's physiological efficiency, especially in the cardiovascular and energy metabolism aspects.

These findings align with the results of several previous studies that stated that intermittent fasting can improve aerobic endurance. Therefore, coaches and management teams are advised to design adaptive training programs and diets during Ramadan to maintain optimal athlete performance. This research is also expected to serve as a reference for academics and sports practitioners in developing strategies for developing Muslim athlete development, especially in the context of tournaments held during the fasting month.

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