



Survey of Body Mass Index and VO2 Max in Futsal Extracurricular Students

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Abstract

This study aims to determine the body mass index and VO2 Max endurance of futsal extracurricular students of State Junior High School 68 Jakarta. This research is a quantitative descriptive study with the futsal extracurricular students of State Junior High School 68 Jakarta as research subjects, totaling 20 people. The research sample was taken using the total sampling method. The data collection process was taken using measurement and test instruments: 1). Measurement of body weight and height (body mass index) 2). VO2 Max (bleep test). Overall, this study resulted in the average body mass index measurements of futsal extracurricular students of State Junior High School 68 Jakarta being 17.7, which was included in the thin category (Underweight). The average value of the VO2 Max endurance test of futsal extracurricular students of State Junior High School 68 Jakarta was 38.6, included in the Intermediate category. The findings can inform educators and policymakers about integrating fitness assessments into school curricula, fostering a culture of health and fitness among students. Addressing these aspects, the research contributes to the broader goal of promoting a healthier lifestyle and improving athletic outcomes in school sports programs.

Keywords: Futsal, Body Mass Index, VO2 Max

INTRODUCTION

Due to the busy activities at school, students have limited time to exercise. Activities usually influence a person's fitness in daily activities. Physical physical fitness is the most important factor and must be owned by students who study Physical Education and Sports subjects. Physical activity is crucial during growth, significantly contributing to physical and mental development. Regular exercise helps strengthen bones and muscles, promote cardiovascular health, and maintain a healthy weight. Furthermore, physical activity enhances coordination and motor skills, essential for overall agility and strength. Beyond the physical benefits, it fosters social interaction and teamwork, building confidence and



self-esteem in children and adolescents. The positive effects of exercise on mental well-being, including reduced anxiety and improved mood, are vital during these formative years, laying a foundation for a healthy lifestyle (Yunus, 2019).

Body mass index (BMI) estimates ideal weight calculated based on a person's height and weight. Body mass index is a reliable indicator for assessing body fatness in general. Although body mass index does not measure body fat directly, studies have shown a correlation between body mass index and body fat components. Body mass index can be used as an alternative to measuring body fat directly. In addition, the Body Mass Index measurement method is relatively easy and economical. It can be used as a screening tool to identify weight categories that can potentially cause health problems (Santika, 2015).

Cardiovascular-respiratory or cardiopulmonary endurance is the condition or state of a substantial body working for a long duration without feeling excessive fatigue. Physical fitness endurance includes aerobic endurance; with aerobic exercise, a person can increase oxygen uptake and reduce pulse rate during breaks or when carrying out activities (Zulbahri, 2019). Aerobic exercise is a type of physical activity performed continuously with an emphasis on using oxygen. In contrast, anaerobic exercise emphasizes the use of muscle strength. Cardiovascular-respiratory endurance and aerobic capacity can be measured through VO₂ Max measurement. VO₂ Max is a key parameter in exercise physiology and is often used to assess a person's level of cardiorespiratory fitness. VO₂ Max refers to the highest level of oxygen that can be taken up and utilized by an athlete's body during strenuous exercise. In other words, VO₂ Max reflects a person's ability to use oxygen maximally during physical activity or exercise. A high level of VO₂ Max indicates a high level of endurance during exercise, indicating that a person with a high VO₂ Max tends not to feel tired quickly, even after performing a series of physical activities (Wijaya & Yusuf, 2020).

Futsal is sports that attracts many fans worldwide nowadays, including among students. Among the various types of sports students prefer, futsal stands out as a favorite choice. Participation in this sport requires optimal physical condition, especially regarding agility (Pranata et al., 2019). Futsal is a team sport involving two teams facing each other. Each team consists of five players, with a specific duration of play, using a smaller field, ball, and goal than football. The game of futsal involves basic techniques such as passing, controlling, dribbling, and kicking the ball. With the dynamic nature of futsal, the more

dominant biomotor components to master include endurance, strength, speed, and standard body mass index. Therefore, not all motor components must be possessed perfectly without excluding others (Ashari, 2019).

This research is focused on carrying out a study to identify extracurricular students' body mass index and physical abilities, with the locus of research on SMP Negeri 68 Jakarta. Research on Body Mass Index (BMI) and VO2 Max among students participating in futsal is essential for understanding their physical fitness and overall health. Monitoring BMI helps identify students at risk of obesity or underweight, guiding interventions to promote a balanced lifestyle. Meanwhile, measuring VO2 Max provides insight into cardiovascular endurance, which is crucial for enhancing athletic performance in futsal. This research can inform coaches and educators about the physical capabilities of their players, enabling tailored training programs that optimize performance and reduce injury risk. Ultimately, understanding these metrics fosters a healthier, more competitive environment in school sports, supporting students' long-term well-being.

METHOD

The research design utilized in this study is a quantitative descriptive approach. This study used a total sampling technique of all futsal extracurricular students of SMP Negeri 68 Jakarta, which consisted of 20 male students. This study is non-experimental; in collecting data, researchers use instruments to measure and predict the nutritional status and physical abilities of futsal extracurricular students of SMP Negeri 68 Jakarta.

Data collection for research on Body Mass Index (BMI) and VO2 Max among students in futsal extracurricular activities involves a systematic approach. Two types of tests were applied in this study. The two tests are nutritional status measurements to measure body mass index and physical ability tests to measure VO2 Max using the bleep test. Initially, researchers measured the height and weight of participants to calculate BMI, ensuring accurate classifications of body composition. Subsequently, VO2 Max is assessed through a standardized exercise test to evaluate cardiovascular endurance. Once data is collected, statistical analysis is performed to identify correlations between BMI, VO2 Max, and performance metrics. This analysis helps draw meaningful conclusions about how body composition influences athletic capability, informing future training and health strategies for the students.

RESULTS

This study describes the nutritional status and physical abilities of futsal extracurricular students of SMP Negeri 68 Jakarta, including body mass index measurements and cardiovascular endurance tests. The data presented is obtained from implementing tests and measurements of each variable needed, including body weight and height, to determine nutritional status and a bleep test to measure the endurance of futsal extracurricular students of SMP Negeri 68 Jakarta.

The data from the measurements are then recorded, which will then be processed, analyzed, and presented in the form of descriptions and tables. Table 1 shows the results of data analysis from body mass index measurements given to extracurricular futsal students of SMP Negeri 68 Jakarta, totaling 20 people, which can be reviewed below:

Table 1. Results of Data Description Analysis of Research Variables

Variable	Mean	Maximum	Minimum	Standard Deviation
Body Mass Index	17,7	23,5	14,4	18,5
VO2 Max	38,6	43,3	35,4	42,4

Table 1 presents the key research variables, specifically Body Mass Index (BMI) and VO2 Max, which are critical for assessing the physical fitness of students engaged in futsal. The mean BMI of the participants is reported at 17.7, indicating a relatively healthy weight status, although it falls on the lower end of the normal range. The maximum and minimum values are 23.5 and 14.4, respectively. It suggests student body composition variability, highlighting the importance of tailored fitness programs that accommodate diverse body types.

Conversely, VO2 Max averages 38.6, reflecting the participants' aerobic capacity and cardiovascular endurance. This value is essential for understanding the students' potential performance levels in futsal, where endurance is crucial. The maximum VO2 Max recorded is 43.3, while the minimum is 35.4, indicating a range of aerobic fitness levels. The standard deviations for both variables—18.5 for BMI and 42.4 for VO2 Max—further illustrate the variability within the sample, suggesting that some students may require additional support to enhance their physical fitness. Overall, Table 1 provides significant insights into the physical attributes of students, serving as a foundation for developing effective training interventions in sports education. Table 1 shows that the body mass index

of extracurricular futsal students of SMP Negeri 68 Jakarta obtained an average result of 17.7, which included the thin category (underweight). In contrast, the results of VO2 Max of extracurricular futsal students of SMP Negeri 68 Jakarta obtained an average result of 38.6, which was in the good category.

Table 2. Results of Frequency Distribution Analysis of Body Mass Index

	Category Frequency (n)	Percentage (%)
Underweight	11	55%
Normal	9	45%
Overweight	0	0%
Jumlah (n)	20	100%

Table 2 provides of Body Mass Index (BMI) categories among the participants, offering valuable insights into the nutritional status of the students involved in the study. The data reveals that 11 out of 20 participants, or 55%, fall into the Underweight category, indicating that more than half of the students may require nutritional interventions to achieve a healthier body weight. This prevalence of underweight individuals is concerning, as it could impact their overall health and athletic performance in futsal.

In contrast, 9 participants, representing 45%, are classified as Normal weight, suggesting that a significant portion of the group maintains a healthy BMI. Notably, no participants are categorized as Overweight category, indicating a lack of excess weight within this sample. The absence of individuals in the overweight category may reflect the active lifestyle associated with participation in futsal, a sport that demands physical exertion and cardiovascular fitness.

Table 3. Results of Frequency Distribution Analysis of VO2 Max Test with Bleep Test

	Category Frequency (n)	Percentage (%)
Bad	0	0%
Poor	3	15%
Intermediate	11	55%
Good	6	30%
Extremely Good	0	0%
Outstanding	0	0%
Total (n)	20	100%

Table 3 presents the frequency distribution analysis of VO2 Max test scores, as assessed through the bleep test among the student participants. The data indicates a diverse range of aerobic fitness levels within the group. Notably, there are no participants categorized as "Bad," "Extremely Good," or "Outstanding," suggesting that the lowest and highest levels of aerobic fitness are absent in this sample. It could imply that the students possess a baseline level of cardiovascular fitness that is adequate for their age and activity level.

The "Poor" category includes three participants, accounting for 15% of the total, indicating that a small group segment may need to focus on improving their aerobic capacity. The majority, comprising 11 participants or 55%, fall into the "Intermediate" category, reflecting moderate cardiovascular endurance. Over half of the students are achieving a level of fitness that can support their participation in futsal effectively. Additionally, six participants, or 30%, are classified as "Good," indicating a commendable level of aerobic fitness. Overall, these findings highlight the need for targeted training interventions for those in the poorer categories while also recognizing the solid performance of the majority in supporting their athletic endeavors.

DISCUSSION

In the body mass index component using the weight and height measurement instrument, the average results of 11 male students, or 55%, were included in the Underweight category with an average body mass index of 17.7. It can be categorized that futsal extracurricular students of SMP Negeri 68 Jakarta have a thin body mass index with a mild level of weight deficiency. In contrast, the results of measuring the body mass index of Ganthari Soccer School students obtained an average of 26 students, or 87% included in the normal category, with an average body mass index of 20.09 (Pandada, 2023). In extracurricular sports participants of SMP Negeri 1 Bululawang Malang Regency, the average results of 26 participants, or 65%, were included in the normal category, with an average result of 20.23 (Fadli, 2023). The results of this study are irrelevant to the results of Ganthari Soccer School research, which shows most of the sample results in the normal category with a percentage of 87% and an average of 20.09 (Pandada, 2023). One way to maintain the quality of body mass index is by maintaining body weight and height by the existing norm classification so that an ideal body mass index value can be obtained.

Body mass index is a term commonly used to determine the proportional category of a person's nutritional status (Irmawati, 2017). Through this body mass index, a person can determine whether their daily nutritional status is obese or thin category. Body mass index is a method of measuring body proportions. A statistician from Belgium named Adolphe Quetelet developed this method to work on physics problems. According to the inventor's name, this method is also known as the Quetelet Index (Hasibuan, 2021).

In the cardiovascular endurance test component (VO2 Max) using the bleep test, the average results of 11 male students, or 55%, were in the Intermediate category, with an average result of 38.6. It can be categorized that futsal extracurricular students of State Junior High School 68 Jakarta have quite good cardiovascular endurance (VO2 Max). In contrast, the results of the cardiovascular endurance test (VO2 Max) of Persepu UPGRIS Football School students obtained an average result of 16 students, or 40% included in the Intermediate category, with an average VO2 Max of 45.67 (Maliki, 2017). In extracurricular futsal, students of SMP Negeri 1 Rejoso, the average results of 10 students, or 50%, fell into the inferior category, with an average result of 33.97 (Muzakki, 2023). The results of this study are irrelevant to the results of research at SMP Negeri 1 Rejoso, which shows most of the sample results are in the normal category, with a percentage of 40% and an average of 45.67 (Maliki, 2017).

The components of physical fitness involve cardiopulmonary endurance, muscle strength, muscle endurance, flexibility, and body composition. Cardiac endurance is a relevant parameter in assessing a person's physical fitness level. A good level of cardiac endurance can be observed from the ability of the heart to perform tasks optimally and over a long period without causing excessive fatigue. This maximum capacity is known as VO2 Max, which is the maximum level of oxygen a person uses during exercise. The higher the VO2 Max value, the higher the ability to bear the workload and the faster the recovery of physical fitness after heavy activity (Widiawati, 2020).

Endurance is key when facing a game strategy that involves a fast rhythm of play. In a futsal game, opponents can use this tactic to test the patience and endurance of opposing players. However, players can more effectively deal with these strategies with good endurance. They can maintain a good position on the field and control the game. Good endurance is helpful for players to stay focused, consistent, and able to respond effectively to the fast tempo of the game, thus providing an advantage in the face of

prolonged game strategies (Rahman, 2018).

From the acquisition of the study, cardiovascular endurance is still on a good scale, so cardiovascular endurance (VO2 Max) needs to be improved for SMP Negeri 68 Jakarta to reach the good category. Endurance is essential in futsal games. Programmed training can be used as the proper training method to ensure that the endurance of extracurricular futsal students at SMP Negeri 68 Jakarta has increased so that students reach the extraordinary category.

CONCLUSION

The findings of this research illustrate a clear picture of the physical fitness levels among students participating in futsal, as indicated by their Body Mass Index (BMI) and VO2 Max assessments. Many participants are classified as underweight, highlighting the need for nutritional interventions to support their health and athletic performance. Additionally, while most students exhibit intermediate aerobic fitness levels, a noteworthy percentage falls into the good category, suggesting an overall commendable cardiovascular capacity. These insights underscore the importance of tailored training and nutritional programs to enhance students' physical well-being and optimize their performance in sports.

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