

EVALUATION OF THE FITNESS LEVEL OF ELEMENTARY SCHOOL STUDENTS USING VO2MAX THROUGH MULTI-STAGE FITNESS TEST METHOD

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ABSTRACT

Keywords:

VO2max
Multi-Stage Fitness Test
Physical fitness
Elementary school students
Physical education.

This study evaluates the fitness level of elementary school students by measuring VO2max using the Multi-Stage Fitness Test (MFT) method. A quantitative descriptive design was used with 36 students (20 males and 16 females) participating in the fitness test. The results showed that the average VO2max for male students was 33.7 mL/kg/min, while for female students it was 28.0 mL/kg/min. Both groups were found to be below the ideal fitness category, highlighting a concerning level of physical fitness that may impact their health and cognitive development. Factors influencing fitness levels included physical activity, understanding of nutrition, and the effectiveness of physical education programs. The study underscores the need for structured, engaging physical education initiatives to increase students' participation in physical activity and potentially improve their overall fitness and health outcomes.

INTRODUCTION

The level of physical fitness of children, especially elementary school students, is an important concern in today's health and education context. One measure often used to assess this fitness is VO2max, which is the maximum amount of oxygen the body can use during intense physical activity. VO2max reflects cardiovascular capacity, which is important for long-term health and physical performance. Decreased physical activity among school children, often triggered by increased sedentary lifestyles due to gadget use and less time for exercise, may contribute to a decline in cardiovascular fitness in the young population (Sagita et al., 2023) (Wahid & Kurniawan, 2023).

There is a consensus that physically active children tend to have better health and develop better social skills than those who are less active (Permatasari et al., 2022). In addition, good physical fitness in childhood is often associated with lasting healthy habits in adulthood, including a reduced risk of chronic health conditions such as obesity, type 2 diabetes, and heart disease (Salamah & Setiawan, 2022).

According to (Sagita et al., 2023), cardiovascular fitness is strongly influenced by the physical activities that adolescents and children engage in. Their research shows that the quality of physical fitness is not only determined by genetic factors, but is also strongly influenced by children's daily activity patterns and dietary habits (Sagita et al., 2023). Good physical fitness not only provides physiological benefits, but also influences children's mental and emotional development, thereby improving their overall quality of life (Rejeki et al., 2024).

In addition, good health education, particularly physical activity and nutrition education, can have a positive impact on children's fitness in elementary school. Through innovative educational programs, students gain not only theoretical knowledge but also motivation to actively participate in physical activity. Research by Permatasari et al. showed that a structured nutrition education intervention can improve students' understanding of the

importance of a balanced diet and its impact on their physical fitness (Permatasari et al., 2022).

Identifying and assessing students' physical fitness levels through VO₂max measurement is an essential step in understanding their overall health. This method provides an overview of physical fitness and opens opportunities for better intervention in school physical education programs. Involving educators in the design and implementation of planned and enjoyable physical activity programs is essential to increasing active participation among students. This is supported by the research of Rejeki et al. which shows that game-based learning models are able to stimulate students' interest in physical activity while improving their fitness (Salamah & Setiawan, 2022).

Through this study, the authors sought to assess the fitness level of elementary school students through VO₂max measurements and analyze the various factors that may influence it, including the level of physical activity, understanding of the importance of a balanced diet, and the effectiveness of existing physical education programs. They will also examine how students' demographic characteristics, such as gender and age, may play a role in their physical fitness outcomes. It is hoped that the results of this study will provide a more comprehensive picture of children's physical fitness and formulate more effective intervention strategies in the future.

RESEARCH METHOD

This study used a quantitative approach with a descriptive design. The purpose of this design is to evaluate the level of physical fitness of elementary school students based on the estimation of VO₂max values using the Multi-Stage Fitness Test (MFT) method. Since the data were collected only once without any treatment or intervention, this study was classified as non-experimental.

The subjects of this study were elementary school students, a total of 36 people, consisting of 20 male students and 16 female students. The sample was purposive, i.e., students who were willing and met the physical criteria to participate in the physical fitness test.

The instrument used in this study is the Multi-Stage Fitness Test (MFT), also known as the beep test. This test is an indirect measure to estimate maximal aerobic capacity (VO₂max). The results of the MFT are then converted to VO₂max values using a standard formula that has been validated in the physical fitness literature. Data collection was conducted with a onetime administration of the multistage fitness test. Prior to administering the test, students were first given instructions and demonstrations to ensure understanding of the administration procedure. Upon completion of the test, the final score (level and last shuttle) was recorded and used to calculate each participant's estimated VO₂max.

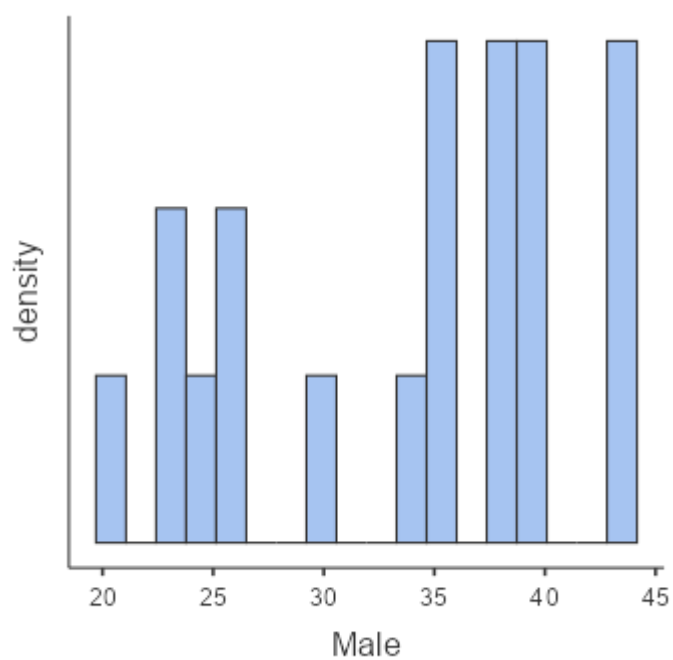
Data from VO₂max measurements were analyzed using Jamovi software. The analysis performed is descriptive quantitative, which includes mean, median, standard deviation, maximum and minimum values, and distribution by gender. This analysis aims to describe the level of physical fitness of the students in general and per gender group.

RESULTS AND DISCUSSION

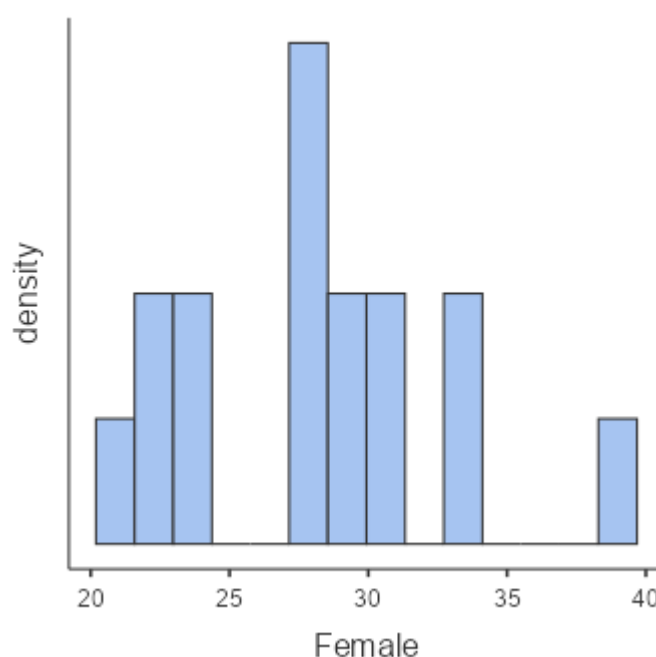
Tabel 1. Deskriptive

	Male	Female
N	20	16
Mean	33.7	28.0
Median	35.6	28.4
Std. Deviation	7.45	4.93
Minimum	20.9	20.4
Maximum	44.0	38.5

Tabel 2. Histogram male



Tabel 3. Histogram female



The results showed from the research conducted, there was a maximum vo2max that reached 44.0 for male students and 38.5 for female students. Meanwhile, their minimum vo2max reached only 20.9 for male students and 20.4 for female students. The average obtained from the measurements taken was 33.7 for male students and 28.0 for female students. Based on (Carayanni et al., 2022), the measured male students have a very poor fitness level because it is below $<35 \text{ mL / kg / min}$. As for the female students, they are also at the same level of fitness as the male students. This indicates that the sample studied in this study had a low level of fitness on average, which of course could affect their cognitive aspects, thus affecting the effectiveness in understanding the material (Saputra et al., 2023).

The physical fitness of elementary school students is one of the most important aspects in the development of children's health and well-being. Several studies have shown that students' physical fitness levels are strongly influenced by the physical education activities in which they participate. For example, Friskawati et al. found that physical education serves as a preventive measure to increase students' physical activity, which has a positive impact on their dynamic health (Friskawati et al., 2020). This study confirms the importance of physical education not only for physical fitness, but also for knowledge of healthy lifestyles among elementary school students.

The role of the school environment and parental support is very important in improving children's physical fitness. Putro and Winarno emphasize that collaboration between educators and parents in promoting physical activity is key to addressing students' physical fitness problems (Putro & Winarno, 2022). This is in line with the findings of Hakim and Yudasmar, who showed the positive influence of the play method in increasing students' participation in physical education learning, thus helping to achieve better fitness levels (Hakim & Yudasmar, 2018).

The results of this study show the importance of physical activity in improving cardio-respiratory fitness in children. With the increase in sedentary lifestyles due to the use of gadgets, children's physical fitness has decreased. Therefore, a structured and enjoyable physical education program is needed to encourage students' active participation in physical activity. Research by Rejeki et al. (2024) showed that a game-based learning model can increase students' interest in physical activity, which should be implemented in the physical education curriculum.

CONCLUSION

This study shows that the level of physical fitness of elementary school students, as measured by VO2max estimation, is still at an inadequate level. The average VO2max for male students was 33.7 mL/kg/min, while the average VO2max for female students was 28.0 mL/kg/min. These results show that both groups of students were below the ideal fitness category, which could affect their health and cognitive development.

Factors such as physical activity levels, understanding the importance of a balanced diet, and the effectiveness of physical education programs at school play an important role in determining students' fitness levels. Therefore, more structured and enjoyable efforts are needed in physical education programs to increase students' active participation in physical activity. This study suggests collaboration between educators and parents to support the improvement of students' physical fitness through more consistent and enjoyable physical activities.

The results of this study are expected to provide a more comprehensive understanding of children's physical fitness and help develop more effective intervention strategies in the future. This section can conclude the study, recapitulate the main findings, describe the implications of the results, and make some suggestions and recommendation.

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