



# Vo2max Level and Fat Levels as the Impact of Decreasing Physical Activity in School During the 2.5 Year Covid Pandemic in Junior High School Students

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**Abstract.** The aim of this study was to determine the VO<sub>2</sub>max capacity and fat content of seventh grade students after online school for 2.5 years. The method used in this research is a survey method with a descriptive type of research and a quantitative approach. The instrument used is a beep test to determine the level of VO<sub>2</sub>max and a fat content test using a skinfold caliper. The subjects in this study were all students of class VII SMP Lab UM, totaling 195 students. The results of this study are the average VO<sub>2</sub>max level in male students is 28.95 which is included in the very poor category, while female students are 24.22 in the very poor category. The fat content of male students was 19.39 in the low category (high fat content) and 21.91 for female students in the moderate category (normal fat content). The conclusion is that VO<sub>2</sub>max in SMP Lab UM students is very bad where this is equivalent to high fat levels in male students who are tall and worrying because usually men are more inclined and do more moderate-high physical activity before the covid-19 pandemic. Compared to female students who spend more time studying and reading.

## 1 Introduction

At the end of December 2019, cases of acute and infectious respiratory syndrome were reported from Wuhan, China, the virus was named as corona virus 2019 (Covid-19) by the World Health Organization (WHO) [1]. The impact caused by COVID-19 from January 2020 to December 2021 is the number of excess deaths of more than 14.91 million people from various countries [2]. So that the whole world is in lockdown [3], including the Indonesian government issued a policy in Article 1 PP number 21 of 2020 concerning PSBB, namely limiting social activities suspected of being infected with COVID-19 and preventing its spread by closing schools and workplaces, restrictions on religious activities, as well as activities in public places or facilities such as physical activity, pedestrian and vehicle mobility, and access to food [4, 5].

Education as one of the impacts of the COVID-19 pandemic is related to the implementation of non-pharmaceutical interventions including school closures so that distance learning strategies are implemented synchronously (offline/offline) and asynchronously

(online/online) [6, 7]. The most visible impact on PJOK subjects are assumed to be subjects that contribute to increasing movement activity in school children [6]. This restriction on group activities, sports, and player activities occurred in more than 200 million children and adolescents, of which 180 million primary and secondary school students and 47 million preschool age children, where they had to undergo quarantine at home [8]. Studies show that students' relationships with classmates and opportunities for physical activity may be greatly decreased by school closures and forced isolation [9, 10]. In addition, sedentary activities and screen time are increasing due to social distancing restrictions [9].

The level of physical activity in school children can be seen from their physical fitness where a higher  $vo_{2max}$  value indicates that the activity is stronger and in good body condition [11]. However, a study at an East Java Junior High School showed that the physical fitness of its students was in the moderate category during the COVID-19 [12]. Another study at a West Java high school showed an average score of 15.9% of students' physical fitness levels during the COVID-19 pandemic [13]. Activity lockdowns during the COVID-19 pandemic have also caused junior high and high school students with an age range of 12–18 years to experience obesity due to reduced physical activity and increased sedentary activity [14]. In addition, obesity that occurs in adolescents is caused by excessive intake of macronutrients, frequent consumption of fast food, inactive physical activity, having parents with obesity status, and not eating breakfast [15].

As a result of the study above, the perceived impact of the COVID-19 pandemic is very large, causing adverse impacts on all levels of society and education. Based on these conditions, it is necessary for this research to provide valid data related to physical fitness as measured by looking for data on aerobic capacity and fat content of students of SMP Lab State University of Malang as learning evaluation material, especially for PJOK teachers after the covid-19 pandemic that occurred for 2 years, 5 years.

## 2 Methods

The design of this study used a survey method, while this type of research was descriptive with a quantitative approach. This research was conducted by identifying fat content using skinfold measurements and maximum oxygen capacity by performing a beep test. The subjects involved in this study were all students of class VII with the research location at the State University Malang Laboratory Junior High School, amounting to 75. The data collection technique used was total sampling.

The data collection stage was carried out in sampling, namely obtaining approval from the school which included the principal and PJOK teachers, then determining the schedule for data collection, followed by filling out forms as student consent in participating in the research, and carrying out data collection. The data analysis technique used is descriptive statistics to determine the minimum, maximum, average, and percentage of research data processed from each research variable.

### 3 Result and Discussion

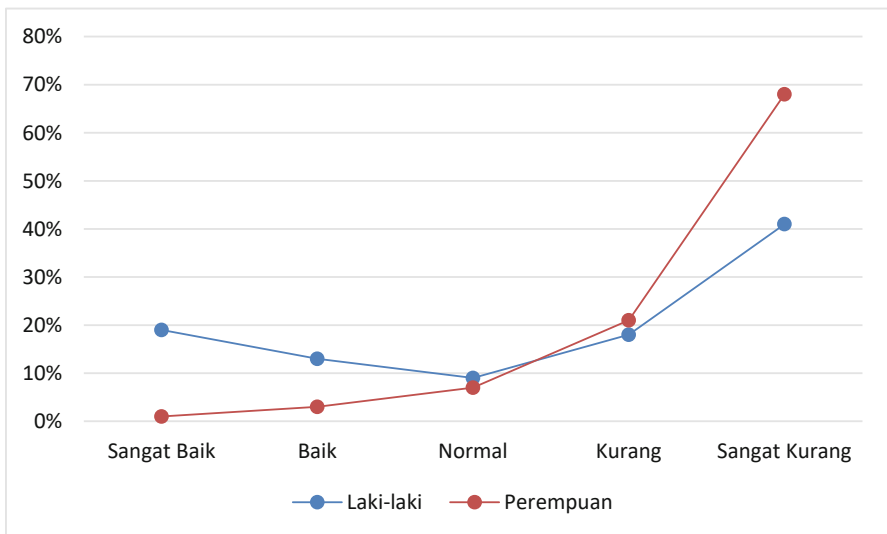
Based on Table 1, it can be seen that the highest VO2max frequency in male students is 49 students in the very poor category. Meanwhile, female students have a higher frequency than male students with a total of 51 students in the same category.

It can be seen in Fig. 1 which shows the highest percentage of female students with a very poor category at the VO2mak capacity level. Meanwhile, the highest percentage of male students is also in the very poor category. However, there is still a considerable difference, female students have the highest percentage in that category.

Based on Table 2, it can be seen that the highest frequency of fat levels in male students is the less category as many as 38 students. The next highest frequency was in the very poor category with a total of 31 students. This is very worrying for the seventh

**Table 1.** VO2max Level in Class VII Students of SMP Lab UM

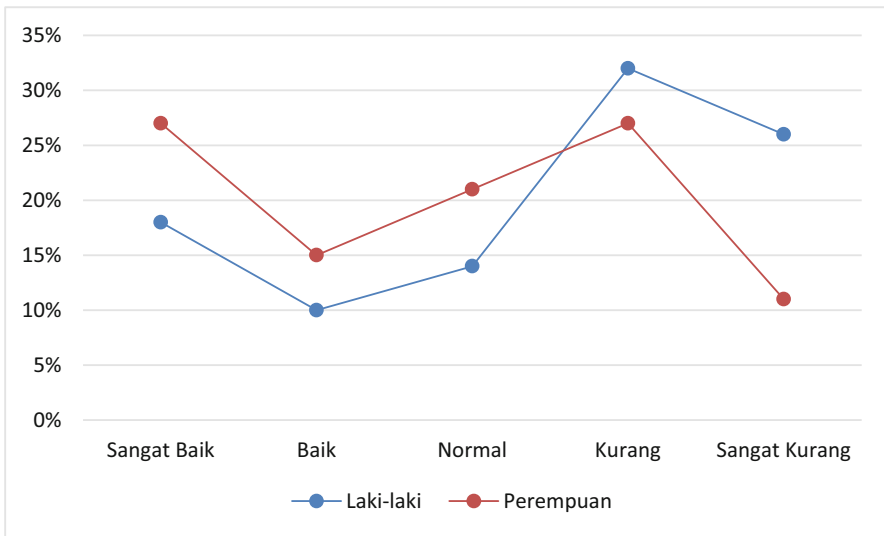
Criteria	Boy Student		Female student	
	Frequency	Percentage	Frequency	Percentage
Very Good (5)	23	19%	1	1%
Good (4)	15	13%	2	3%
Normal (3)	11	9%	5	7%
Poor (2)	22	18%	16	21%
Very Poor (1)	49	41%	51	68%
Total	120	100%	100	100%



**Fig. 1.** Comparison of the Percentage of VO2max Levels in Class VII Students of SMP Lab UM

**Table 2.** Fat Content in Grade VII Students of SMP Lab UM

Criteria	Male Student		Female student	
	Frequency	Percentage	Frequency	Percentage
Very Good (5)	22	18%	20	27%
Good (4)	12	10%	11	15%
Enough (3)	17	14%	16	21%
Height (2)	38	32%	20	27%
Very High (1)	31	26%	8	11%
Total	120	100%	75	100%



**Fig. 2.** Comparison of the Percentage of Fat Levels in Class VII Students of SMP Lab UM

grade male students of SMP Lab UM. While the frequency of female students in the very good category and the less category has the same frequency of 20 students.

Judging from the highest graph in Fig. 2, namely in the less category by male students. While the lowest graph is also by male students with good categories. While the lowest graph for female students is in the very poor category, which means that female students still have hope for low levels of fat.

Based on Table 3, it can be seen that the overall data in the category of VO2max capacity of male and female students are in the very poor category. As for fat content, male students are more concerned than female students. Female students are still in the sufficient category or can be said to be normal, while the male students are in the category which means high fat content.

In line with the results of this study in Table 3 which shows that the capacity of VO<sub>2</sub>max as physical fitness in male and female junior high school students is in the very poor category. Another study showed that the VO<sub>2</sub>max value had a significant effect on movement activity or physical activity [16]. In addition, students spend more time sitting, such as studying and the like during the covid-19 pandemic, so they have a low VO<sub>2</sub>max level [17]. The VO<sub>2</sub>max level in students aged 13 years is more than 36.8 in male students, 37.2 in female students is a very good [18]. The results of Table 1 show that only 1% of female students are included in these criteria. This is related to female students participating more in reading activities with a percentage of 63.79% and other learning activities [19, 20].

During the Covid-19 pandemic lockdown, it was associated with being overweight with a pattern of consuming fried foods 3 times per week, low water consumption, and sitting for 6 h per day [21]. Changes in physical activity also showed a statistically significant increase in body fat in both male and female students during the covid-19 blockade, this study showed that male students experienced an increase in body mass and female students increased body fat [22]. Table 3 shows that male junior high school students belong to the same high category as the previous study. Another study also showed that male students experienced an increase in BMI by 1.8 kg/m<sup>2</sup> during the covid-19 pandemic because the energy balance between food consumption and physical activity was severely disturbed [23]. Supporting research in Table 3 which contains the results that fat in female students is included in the sufficient category, the study also found that there was a decrease in physical activity but had no effect on body composition [24].

During the covid-19 pandemic, students experienced a decrease in physical activity compared to before the covid-19 pandemic [3]. All schools implement distance learning with one of their learning tools, namely e-learning during the covid-19 pandemic [25, 26]. This is related that students' weekly physical activity is more spent in school, especially physical education and rest time participating in students' physical fitness related to sports and dance [3]. Meanwhile, WHO has provided guidelines for children and adolescents aged 5–17 years to carry out physical activity with a duration of at least 60 min with moderate to high intensity [27]. In addition, a good diet, physical activity, and active rest may be protective factors for weight gain during the COVID-19 lockdown [21]. Meanwhile, to suppress susceptibility to disease, physical activity is needed that

**Table 3.** Min, Max, Mean VO<sub>2</sub>max and Fat Scores for Class VII Students of SMP Lab UM

	Minimum	Maximum	Average	St. Dev	Criteria ( $\bar{x}$ )
VO <sub>2</sub> max					
Male	18.8	47.7	28.95	7.48	Very poor
Female	18.8	37.5	24.22	3.94	Very poor
Fat Content *Smaller numbers better results					
Male	7	42	19.39	8.04	Tall
Female	2	40.5	21.91	8.01	Enough

provides the amount, intensity, and type of activity to promote the public as a whole [28].

## 4 Conclusion

This study illustrates that physical activity carried out by class VII students of SMP Lab UM has an impact on the vo2max level as physical fitness and body fat levels. Both male and female students had very low vo2max levels. However, on the results of fat content, male students are included in the high category where they usually spend their time on physical activity compared to female students who spend more time sitting, studying, and reading.

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