



VO2Max Level of Convicted Students at Special Prisons for Child Development Institution (LPKA) Class II Bengkulu

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Article Info

Article History :

Received : August 2023

Revised : December 2023

Accepted: December 2023

Keywords:

Convicted Children,
LPKA,
Vo2max,

Abstract

The level of VO2 max has significance in relation to both physical activity and health. Nevertheless, it should be noted that there has been a lack of VO2Max tests conducted on convicted children at LPKA Class II Bengkulu. Therefore, this study aims to determine the VO2 max level among convicted children at LPKA Class II Bengkulu. This study used a quantitative descriptive approach to examine a sample of 91 children between the aged of 14 and 19 years. The VO2 max level test uses a multi-stage fitness test. The analysis of the research data involved the utilization of descriptive quantitative percentages, which were employed to compare the category tables. The study's findings indicated that a proportion of 1.1% exhibited VO2 max levels falling within the lower group, while a substantial majority of 98.90% showed VO2 max levels falling within the significantly lower category. Based on the study results, it was concluded that convicted children at LPKA Class II Bengkulu exhibited VO2Max levels that fell within the extremely bad range. Based on the findings of this study, LPKA supervisors should devise and execute a physical coaching regimen to enhance the VO2 max levels among convicted children.



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INTRODUCTION

Societal changes and a multitude of life challenges contribute to the engagement of youngsters in criminal behaviors. (Candra, 2020). Other variables contribute to the involvement of children in legal matters, such as the absence of familial affection and detrimental impacts from the social environment or peer groups (Yustitiantingtyas, 2020). Children engaging in criminal activities such as theft, drug-related offenses, fraud, physical altercations, instances of abuse, and even homicide have been documented in several studies (Hapsari et al., 2016; Prasetyo, 2020).

Violating legal norms leads to the imposition of criminal sanctions on children, resulting in their placement within the Special Prisons for Child Development Institution, usually referred to as LPKA. Even though children may be subject to criminal punishments, they must be afforded their inherent rights and governmental protection to cultivate the future generation of the nation (Juliana & Arifin, 2019). The state possesses the prerogative to furnish diverse amenities that are essential for children during the LPKA Field coaching procedure (Sofyan & Gunardi, 2019).

According to Law number 11 of 2012, specifically in paragraph 3 of section 85, the juvenile justice system grants children in LPKA the entitlement to educational opportunities, skills training, and other assistance that are advantageous for their development (Lantang et al., 2021). Nevertheless, it is essential to note that this realization has yet to be fully optimized, resulting in a lack of access to education and training rights for children (Budijanto, 2017). Furthermore, children residing in LPKA can access physical education services through engaging in sports activities and

their entitlement to education and skill development. Engaging in sports activities can allow children to channel and express their talents in the realm of sports (Adipradana et al., 2019). To provide opportunities for children displaying athletic talent, it is imperative to facilitate their participation in diverse championships organized by governmental bodies or other institutions. Furthermore, it has been argued that sports education not only facilitates the development of children's physical health but also has the potential to enhance their cognitive abilities (Pramana & Subroto, 2021).

According to the investigation's initial findings, it has been determined that LPKA Class II Bengkulu possesses a range of sporting amenities, including futsal balls, table tennis equipment, volleyball gear, and badminton racquets. Nevertheless, the sports facilities possessed by LPKA Class II Bengkulu must be increased, given the total number of 91 convicted children. Based on the observations, it has been determined that the regular sports coaching program conducted weekly, specifically on Friday mornings, entails the practice of aerobics exercises lasting for 20 minutes. While engaging in aerobic exercise might enhance physical fitness, its ideal impact may only be achieved if it is performed with adequate frequency and intensity (Ludyga et al., 2016).

According to the guidelines provided by the World Health Organization, to achieve an optimal level of physical fitness, it is advisable to engage in moderate-intensity physical activity for 60 minutes daily. It is recommended that adults engage in 150 minutes of physical activity daily (Bull et al., 2020). Research demonstrates a significant association between insufficient physical activity and cardiovascular disease and metabolic

syndrome problems in children (Zaqout et al., 2017). Engaging in moderate and consistent physical activity has demonstrated efficacy in mitigating the risk of heart disease, diabetes, obesity, and bone diseases in convicted children (Pivovarov et al., 2015).

One of the initiatives undertaken to assess the health status of children in LPKA Class II Bengkulu is the measurement of Vo_{2max} , which refers to the maximal volume of oxygen. The term " Vo_{2max} " pertains to the capacity of individuals to effectively utilize oxygen during aerobic exercise (Abut & Akay, 2015). Put simply, VO_2 max refers to the highest level of oxygen consumption that may be achieved during intense physical exertion. Therefore, VO_2 max is an indicator of physical fitness and is utilized as a criterion for assessing cardiovascular endurance (Cooper et al., 2005; Milanović et al., 2015). The relationship between VO_2 max and children's learning achievement has been established to have a positive association in terms of cognitive or academic characteristics (Andersen et al., 2016). It was further revealed that Vo_{2max} is a positive association between Vo_{2max} and mental well-being among children (Gu et al., 2016).

Determining the level of a child's Vo_{2max} can be accomplished through the utilization of several tests that have undergone rigorous examination to establish their validity and reliability. Among these tests, the Bleep test stands as a notable example. The bleep test, or the multi-stage fitness test (MFT), assesses an individual's cardiovascular endurance by performing shuttle runs over 20 meters on level terrain. The present examination employs an auditory cue as a beep to prompt individuals to begin running and make contact with the finish line by touching at least one foot upon it. The beep test score indicates an

individual's performance level and the number of runs they have completed. The successful completion of this exam necessitates a high level of physical fitness (Paradisis et al., 2014).

While the significance of VO_2 max in the lives of children is acknowledged, there has been no examination of VO_2 Max levels in convicted children at LPKA Class II Bengkulu. Hence, this study aims to ascertain the profile of VO_2 max measurements by employing the bleep test on convicted children at LPKA Class II Bengkulu. The present study can provide valuable insights for the education and development department of LPKA Class II Bengkulu in formulating a sports coaching program tailored to convicted children.

METHODS

The study employed a quantitative descriptive approach to assess the profile of VO_2 max measurements. This was achieved by administering the bleep test to convicted students at LPKA Class II Bengkulu. This study is classified as cross-sectional due to its singular time frame, lacking a comparative analysis across multiple time points. The research data collection occurred between July 12 and July 13 at the Class II Special Development Institute for Children in Bentiring, Muara Bangka Hulu District, Bengkulu, Bengkulu.

Participants

This study encompassed the entire population of convicted students in LPKA Class II Bengkulu, consisting of 91 children as of July 12-13, 2023. The age range of the participants was between 14 and 19 years. The demographic attributes of the participants are presented in Table 1.

Table 1. Participant criteria

No	Age	Frequency	%
1	12-16	30	33
2	17-25	61	67
Total		91	100

Sampling Procedures

The research employed a total sampling approach for the sampling procedure.

Data Collection Techniques

Data in this study were collected using the bleep test or multi-stage fitness test (MFT). This test was carried out on a level ground situated at a distance of 20 meters, where the participants engaged in a series of back-and-forth movements while being exposed to the auditory stimulus of a "tut" sound played from a recording. The auditory stimulus exhibits an initially protracted temporal profile, gradually increasing in speed over time. The implementation of this test is straightforward. However, it offers high precision in determining VO₂ max for various reasons (Fenanlampir & Faruq, 2015). The test's validity coefficient is 0.915, indicating a high level of validity. Similarly, the test's reliability coefficient is 0.868, suggesting a good level of dependability.

Procedures

The research processes conducted involved coordination with LPKA officers, preparation of test equipment and apparatus, explanation of MFT test technique and objectives, execution of the test, analysis of data, and compilation of reports. The implementation of the MFT is carried out in several stages as follows: 1) divide 1 group consisting of 10 children in the first session, 2) the first session was held at 11.00 a.m, 3) the children must run as long as possible, 4) the children must run and touch or step on one of the feet at the finish line and turn around, to start running again after the

sound (wait until the sound of "tut" is heard), 5) children are considered unable to take the test if they cannot touch or set their feet on the line twice in a row after the sound of "tut", 6) the children only did one test. 7) On the first day there were 4 sessions for 40 children, 8) On the second day was carried out with the same procedure for 41 children who had not taken the test

Data Analysis

The research data were analyzed using comparing the test scores with the criteria table (Mackenzie, 2005).

Table 2. VO₂ max level (13-19 years old)

No	Interval	Criteria
1	> 55.9	Superior
2	51.0-55.9	Excellent
3	45.2-50.9	Good
4	38.4-45.1	Fair
5	35.0-38.3	Poor
6	<35.0	Very Poor

RESULT

Table 3. The result of Vo₂max

Interval	Criteria	f	%
> 55.9	Superior	0	0%
51.0-55.9	Excellent	0	0%
45.2-50.9	Good	0	0%
38.4-45.1	Fair	0	0%
35.0-38.3	Poor	1	1.1%
<35.0	Very Poor	90	98.9%

The research findings shown in Table 3 demonstrate that guilty pupils possess just two levels of Vo₂max, specifically poor and very poor. In the poor category, there is 1 student; in the very poor category, there are 90 convicted students.

DISCUSSION

This study aims to reveal the VO₂max level among convicted children in LPKA Class II Bengkulu. The findings from the data analysis indicate that a significant majority, specifically 98.90%, of children who have been convicted

exhibit Vo₂ max levels falling within the classification of "very poor." The findings of a prior investigation conducted by Susanto et al. (2022) similarly indicate that children incarcerated in LPKA exhibit significantly low Vo₂max levels. According to various theoretical investigations and empirical findings, multiple factors influence an individual's VO₂ max level. It is well acknowledged that numerous factors encompassing heredity, gender, age, medical history, dietary intake, and nutritional status, physical activity, as well as ambient temperature and humidity exert an influence on Vo₂max levels (Williams et al., 2017; Achmad et al., 2020; Adelia et al., 2022).

Genetic factors influence 25-40% on an individual's VO₂ max level (Khan et al., 2014). Moreover, it was elucidated that genetics exerted a significant impact of 40% on vo₂max, 50% on heart rate, and a potential influence of up to 60% on maximum oxygen capacity. Genetic factors exert a significant influence on an individual's body composition, as well as their lung and heart capacity, body weight, and muscle fiber characteristics (Bays et al., 2022). Gender is a significant determinant of VO₂ max levels. Research has indicated a notable disparity between boys and girls in terms of lung capacity, body composition, and muscle size, which consequently contributes to the potential for boys to exhibit a superior Vo₂max compared to girls. Girls have lower levels of Vo₂max compared to boys of the same age due to hormonal disparities, hemoglobin levels, and body fat composition. (Roy, 2015). Adipose tissue plays a role in determining body weight, although it does not facilitate oxygen uptake during high-intensity physical exertion (Edvardsen, 2014).

The influence of age on VO₂ max has been documented. Between 6 and 8

years old, an individual's maximum oxygen uptake (VO₂ max) will continue to exhibit an upward trajectory. During the age range of 18 to 20 years, individuals typically exhibit the maximum VO₂ max. The decline in Vo₂max levels with advancing age can be attributed to various factors, including diminished cardiac function, reduced blood volume, and loss of muscle mass (Kim et al., 2016).

The presence of an illness substantially impacts an individual's Vo₂max level, particularly in relation to cardiovascular health. The study's findings demonstrate that individuals afflicted with medical conditions such as asthma or tuberculosis have a vo₂max level that falls within the classification of extremely poor (Shi et al., 2022). This phenomenon may arise due to disruptions in the functioning of the cardiovascular and respiratory systems, impeding their ability to perform their respective functions optimally. Previous research findings indicate a negative association between an individual's VO₂ max and blood pressure levels (Shin & Ha, 2016).

The performance of an individual in physical exercise is determined by their dietary consumption and nutritional state (Sapika et al., 2022). The optimal nutritional intake is the amount of nutrients the body requires to support and sustain physical activities adequately. Excessive food consumption will lead to obesity, while insufficient intake will result in malnutrition. Children who are obese often face constraints in terms of available space for engaging in a range of physical activities, resulting in reduced maximal oxygen consumption (Vo₂ max). Similarly, this principle applies to children who suffer from malnutrition (Menang et al., 2023).

The level of Vo₂max is mainly influenced by an individual's engagement in physical exercise. Engaging in

moderate-intensity aerobic exercise benefits VO₂ max (van Baak et al., 2021). Nevertheless, engaging in physical exercise at excessively high-intensity levels can have a detrimental impact on Vo₂max. Consequently, selecting an appropriate form of physical activity is crucial to enhance one's VO₂ max.

The ambient temperature and humidity levels within an individual's surroundings are additional factors that influence the maximal oxygen consumption (Vo₂max) capacity. This phenomenon can be attributed to evaporation or the elimination of sweat from the skin. In situations where there is a combination of elevated ambient temperature and humidity, the process of evaporation becomes less efficient, hence adversely affecting the human body. Consequently, it is imperative to prioritize the regulation of temperature and humidity to uphold the optimal state of bodily fluids (Che Muhammad, 2016).

CONCLUSION

Based on an analysis of several influencing elements, it can be inferred that determinants impacting the vo₂max of convicted children encompass insufficient engagement in physical activities, variations in temperature or humidity, as well as the influence of prior testing encounters. The researchers posit this hypothesis based on the knowledge that the lpka class ii bengkulu has not yet incorporated physical exercise, particularly endurance sports, into its program. In conclusion, it was found that convicted students' vo₂max profile was very poor. Although not investigated in this study, it is worth noting that age and body mass index have been found to be significantly correlated with VO₂ max levels in children and adolescents. Therefore, it is recommended that future research includes additional analyses of

these factors to explore their potential relationships further.

ACKNOWLEDGEMENT

This research is part of the Directorate of Research, Technology, and Community Service service activity with contract number 4884/UN30.15/PM/2023.

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