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Analysis of Vo2max Endurance of Spirit Cycling Community Members Pangkep

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Abstract. This research is a descriptive study that aims to determine the results of the analysis of the VO2Max endurance of members of the Pangkep Spirit Cycling Community. The variable analyzed in this study was VO2Max endurance. The population in this study were members of the Pangkep Spirit Cycling Community, while the sample of this study consisted of 16 members of the Pangkep Spirit Cycling Community. The research data was obtained by giving treatment running back and forth with a track distance of 20 meters using MFT (Multistage Fitness Test). The data analysis technique is using computer facilities through the SPSS22 program. It can be concluded that the VO2Max analysis of the Pangkep Spirit Cycling Community members is in good performance.

Keywords: VO2Max, MFT (Multistage Fitness Test), Bicycle

1 Introduction

Sport is a physical activity according to certain methods and rules, with the aim of increasing the efficiency of body functions (Rinaldi, 2022). The end result will be increased physical fitness which is influenced by the physical activities carried out. Exercise causes an increase in cardiac output which will be accompanied by increased distribution of oxygen to parts of the body that need it, while in parts that need less oxygen, vasoconstriction will occur which affects blood pressure (Astagna et al., 2010) .

Aerobic exercise is exercise that uses energy that comes from burning with oxygen, while anaerobic exercise is exercise that uses energy that comes from burning without oxygen. This type of aerobic exercise predominantly increases aerobic capacity, myoglobin, cell mitochondria (number and size), and muscle glycogen reserves, as well as increasing the concentration of oxidative enzymes in athletes. (Paradisis et al., 2014) .

The maximum capacity of the body to obtain and use oxygen during exercise increases, thereby indicating a person's physical fitness. VO2On the other hand, the anaerobic type of training is more dominant in increasing anaerobic capacity, the ATP-PC energy system and the athlete's anaerobic glycolysis (Kalmira, 2023). The energy system that occurs during exercise

is the aerobic energy system which requires more oxygen. Cycling is very useful for maintaining and improving the fitness of the heart, lungs, blood circulation, muscles, bones and joints. Cycling is recommended for people who have excess fat or who have medical problems with the bones or joints of the lower limbs such as the hips, knees and ankles. (S.R & Rismayanthi, 2016).

Measuring cardiorespiratory endurance for aerobic capacity can be done by measuring maximum oxygen consumption (VO2Max) (Hasyim, 2022). Measuring the VO2Max value can be used to analyze the effects of a physical exercise program. VO2Max is a person's ability to inhale and use oxygen optimally when carrying out activities or sports activities until they experience fatigue. VO2Max is the maximum amount of oxygen that can be consumed during intense physical activity until fatigue occurs (Intan et al., 2013).

A cyclist with good physical condition and good fitness will have good VO2Max endurance without experiencing significant fatigue. The athlete still has enough energy reserves to pedal a bicycle with a range of 10-20 kilometers. With the power they have, a cyclist is able to control their breath, strength and speed until they reach the finish line (Rahmad, 2016).

Based on the results of observations by conducting interviews with members of the Spirit Cycling Community Pangkep, researchers obtained information that in the last few years since the founding of the community, when participating in various events, members were able to reach the finish, but it took a long time because the bicycle speed was slowed down to maintain stamina when they were already tired. and heavy breathing before reaching the finish line. Meanwhile, VO2Max is an indicator of a person's aerobic endurance ability. As a cyclist, you are required to have good VO2Max ability in order to be able to ride continuously and in this case it can be said that one of the important factors in becoming a cyclist is VO2Max (Patlisana, 2021).

VO2Max is the maximum amount of oxygen that can be consumed during physical activity. The important elements contained in physical activity include strength, endurance, flexibility, balance, speed, agility, stamina, coordination. The most important cardiovascular response to physical activity. This increase is caused by an increase in cardiac output and heart rate which can reach around 95% of its maximum level (Intan et al., 2013).

Cardiorespiratory endurance plays a fundamental role in determining an athlete's overall physical performance, particularly in endurance-based activities such as cycling. As aerobic metabolism becomes the dominant energy system during prolonged physical exertion, the body's ability to utilize oxygen efficiently—reflected in an individual's VO_2Max—serves as a primary indicator of fitness and performance capacity. In community-based sports settings, such as cycling clubs, evaluating VO_2Max is essential not only for monitoring training outcomes but also for designing appropriate exercise programs that support sustained participation, prevent fatigue, and reduce injury risk. This urgency becomes even more relevant as recreational cycling communities continue to grow, yet lack structured scientific assessment of their physiological readiness.

Although numerous studies have examined VO_2Max across competitive athletes, adolescents, and university students, limited empirical attention has been given to community-level cyclists who engage in non-professional yet high-frequency cycling activities. Many cycling communities participate in long-distance events and endurance rides, but their performance often varies due to unmonitored physical conditioning. Preliminary observations from the Spirit Cycling Community Pangkep show that members frequently complete cycling

events but experience early fatigue, reduced speed, and difficulty maintaining breath control toward the finish line. These symptoms indicate potential disparities between perceived fitness and actual aerobic endurance levels, emphasizing the need for objective measurement.

The research gap arises from the scarcity of descriptive VO_2Max analyses specifically targeting adult community cyclists who train recreationally but consistently. Most existing literature focuses on professional or semi-professional athletes, making it unclear how aerobic endurance trends manifest in non-competitive yet physically active populations. Furthermore, studies seldom apply standardized field-based assessments, such as the Multistage Fitness Test (MFT), within community cycling groups despite its practicality, low cost, and suitability for large samples. As a result, there is limited evidence regarding the aerobic fitness profile of such groups and how their training habits translate into measurable physiological outcomes.

Therefore, this study addresses this gap by analyzing the VO_2Max endurance of Spirit Cycling Community Pangkep members using the MFT protocol. Understanding their aerobic capacity will provide a scientific basis for designing more targeted training programs, optimizing performance during community cycling events, and contributing to broader literature on non-professional endurance athletes.

2 Method

Multistage Fitness Test / bleep test is a method for predicting VO2Max without spending a long time and complicated equipment in the test procedure which is very attractive. One of these tests, 20 meter running back and forth or multi stage fitness test / bleep test which only requires a little equipment (radio tape) and is very suitable for testing with large numbers of people (Prayuda & Firmansyah, 2017).

The steps taken in this trial include:

1. Preparation of instruments, research permission letter to the Spirit Cycling Community administrators.
2. Determination of research subject groups
3. Experiment and introduction to the MFT (multistage fitness test) test model
4. Implementation of the MFT test (multistage fitness test)
5. Data collection, data selection, data classification based on VO2Max results
6. Data processing using SPSS 22

The VO2Max criteria are based on Nurhasan, namely

1. Poor category: VO2Max < 36;
2. Fair Category: VO2Max 37-47;
3. Good category: VO2Max 48-57;
4. Very Good Category: VO2Max 58-74;
5. Perfect category: VO2Max > 75.

This study employed a descriptive quantitative research design aimed at analyzing the VO_2Max endurance level of members of the Spirit Cycling Community Pangkep. The descriptive approach was selected to obtain an objective portrayal of participants' aerobic capacity without manipulating variables or administering specific training interventions. Data were collected

through standardized field testing using the Multistage Fitness Test (MFT), which is widely recognized for its practicality, efficiency, and suitability for assessing cardiorespiratory endurance in large groups.

The research procedure consisted of several stages, including instrument preparation, obtaining research permission from the community administrators, participant briefing, implementation of the MFT protocol, data collection, classification of VO_2Max results based on established norms, and statistical analysis using SPSS 22. The entire procedure adhered to safety and ethical considerations, ensuring that participants were physically fit and voluntarily consented to take part in the test.

The population in this study comprised all registered members of the Spirit Cycling Community Pangkep. Using a total sampling technique, the researcher selected 16 community members as the sample, ensuring that all individuals met the inclusion criteria:

1. Active participation in community cycling activities,
2. Free from injuries or medical conditions that could affect aerobic performance, and
3. Willing to participate in the VO_2Max test.

This sampling approach allowed for comprehensive representation of the community's fitness profile and minimized sampling bias.

The primary research instrument used to measure VO_2Max was the Multistage Fitness Test (MFT), also known as the 20-meter shuttle run test or bleep test. This test is a validated and widely utilized tool for predicting maximal oxygen uptake in field settings due to its simplicity, minimal equipment requirements, and strong correlation with laboratory-based VO_2Max assessments.

Instruments and Materials Used:

1. A 20-meter running track
2. An audio recording containing the standardized MFT beep intervals
3. A speaker or radio tape for audio playback
4. Cones and markers to designate track boundaries
5. Recording sheets for documenting performance level, stage, and calculated VO_2Max
6. Stopwatch and observation checklist

Procedure for the MFT Instrument:

1. Participants run back and forth along a 20-meter track in time with audio beeps.
2. The speed increases progressively at each level.
3. Participants continue until they can no longer maintain the required pace.
4. The final level and shuttle achieved are recorded.
5. VO_2Max scores are calculated based on standardized MFT conversion tables.

VO_2Max Classification Criteria (Nurhasan Standard):

1. Poor: < 36
2. Fair: 37–47
3. Good: 48–57
4. Very Good: 58–74

5. Perfect: > 75

These criteria were used to categorize each participant's aerobic endurance level objectively.

3 Result

The results of the Multistage Fitness Test on members of the Spirit Cycling Community Pangkep with statistical results from 16 samples, obtained statistical data with a range of 26.50, minimum value of 51.10, maximum value of 77.60, sum of 932.20, mean/average value of 58.2625, standard deviation of 7.13497 and variance of 50.908

Tabel 1. MFT Descriptive Analysis Results

Variabel	**Multistage Fitness Test**
N	16
Range	26.50
Min	51.10
Max	77.60
Sum	932.20
Mean	58.2625
Std. Deviation	7.13497
Variance	50.908

The criteria for the results of the VO2Max analysis using the Multistage Fitness Test on members of the Spirit Cycling Community Pangkep then obtained data from 16 samples as follows: 1 member or (6.5%) members are in the (perfect) category with the results of the Mutlistage Fitness Test or (31%) members are in the (very good) category, 10 members (62.5%) are in the (good) category. Thus it can be concluded that the VO2Max results of Spirit Cycling Community Pangkep members are in the good category. With the average value as in the descriptive analysis table, it shows a value of 58.2625.

Table 2. Criteria for Multistage Fitness Test Results

Category	**Range**	**Frequency**	**Percentage**
Not enough	<36	0	0%
Enough	37-47	0	0%
Good	48-57	10	62.5%
Very well	58-74	5	31%
Perfect	>75	1	6.5%

Total	**16**	**100%**

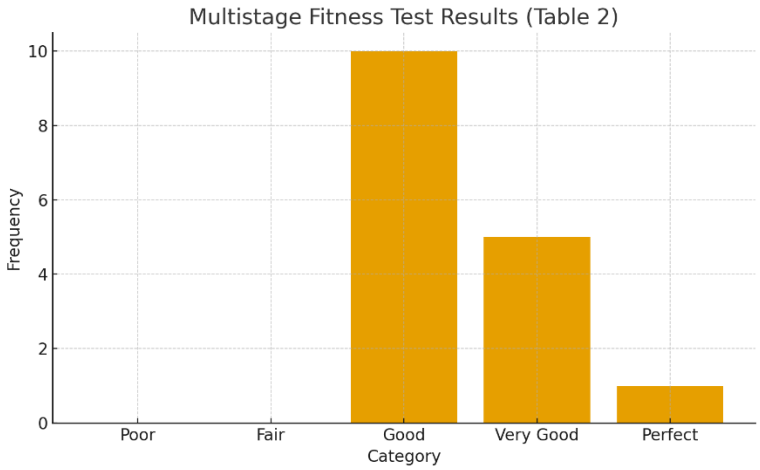

Figure 1. Criteria for Multistage Fitness Test Results

Good or getting a score in the 48-57 category in accordance with established rules such as being able to survive the Mutlistage Fitness Test for the 10th level, the 4th level to the 12th level, the 11th level.

Very good or get a category score of 58-74 in accordance with established rules such as being able to survive. Mutlistage Fitness Test during the 13th level, back to the 5th, up to the 17th level, back to the 12th.

Perfect or getting a category score > 75 in accordance with established rules such as being able to survive the Mutlistage Fitness Test for the 18th level, the 3rd level to the 21st level, the 16th level.

4 Discussion

Based on the results of research by conducting a Multistage Fitness Test on members of the Spirit Cycling Community Pangkep, researchers obtained results that in the last few years since the founding of the community, when participating in various events, members were able to reach the finish, because their VO2Max was in the good category (Sumintarsih, 2023). A long period of cycling activity does not make members of the Spirit Cycling Community Pangkep tired and feel heavy breathing before reaching the finish line. Meanwhile, VO2Max is an indicator of a person's aerobic endurance ability. As a cyclist, you are required to have good VO2Max ability in order to be able to ride continuously and in this case it can be said that one of the important factors in becoming a cyclist is VO2Max. This is something that members of the Spirit Cycling Community Pangkep often practice so that they remain in top performance. Based on the results of observations and interviews by members of the Spirit Cycling Community Pangkep, researchers found that members who have a VO2Max in the perfect category routinely spend time cycling every morning or evening covering a distance of at least 20 kilometers and running short distances every Sunday morning of at least 5 kilometers, while

Members who have VO2Max in the good and very good categories follow routine cycling training procedures every holiday or week covering a minimum distance of 30 kilometers.

The results of this study show that the majority of Spirit Cycling Community Pangkep members possess a good level of VO_2Max, with 62.5% categorized as good, 31% as very good, and 6.5% as perfect. These findings indicate that the community members exhibit adequate aerobic endurance to complete long-distance cycling activities without experiencing excessive fatigue. The results align with the initial observations made through interviews, where members reported being able to finish cycling events, although some required slower pacing to manage stamina.

These findings are consistent with previous studies emphasizing the relationship between regular aerobic exercise—such as cycling—and improved cardiorespiratory endurance. For example, Intan et al. (2013) found that aerobic training significantly increases VO_2Max by enhancing oxygen consumption efficiency and cardiac output. Similarly, Paradisis et al. (2014) highlighted that the Multistage Fitness Test (MFT) is an effective field method for assessing aerobic capacity, showing strong correlation with laboratory-based VO_2Max measurements. This supports the appropriateness of using MFT in evaluating community cyclists.

Research by S.R & Rismayanthi (2016) also demonstrated that individuals engaged in regular endurance training exhibit higher oxygen uptake and hemoglobin levels, both of which contribute to better aerobic performance. In addition, Patlisana et al. (2021) confirmed that consistent aerobic activities such as aerobic gymnastics can significantly enhance VO_2Max in adult populations, reinforcing the notion that structured and sustained physical activity plays a crucial role in improving cardiovascular endurance.

The findings of this study further align with Sumintarsih et al. (2023), who reported that athletes with higher BMI control and structured training showed greater improvements in VO_2Max. The Spirit Cycling Community members who achieved very good and perfect categories were observed to engage in more frequent cycling sessions—up to 20–30 kilometers regularly—confirming the strong connection between training volume and aerobic adaptation.

From the field data, individuals categorized as perfect were those who not only cycled daily but complemented their routine with short-distance running activities. This cross-training effect improves both aerobic and anaerobic systems, contributing to greater endurance capacity. On the other hand, members in the good and very good categories participated in cycling primarily on weekends or holidays, demonstrating that even moderate training frequency can sustain a satisfactory VO_2Max level.

Overall, the research findings emphasize that routine cycling activity positively impacts VO_2Max levels, supporting previous literature that positions cycling as one of the most effective aerobic exercises for improving cardiovascular and pulmonary function. The results also highlight the need for community members to adopt more structured training programs if they aim to achieve higher VO_2Max categories and enhance their performance consistency during long-distance events.

5 Conclusion

The conclusion is that the VO2Max of Spirit Cycling Community Pangkep members is in good performance. This research suggestion can be used by community leaders as a reference for improving the physical condition of community members by increasing their exercise portion, so as to increase VO2Max endurance.

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