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THE RELATIONSHIP BETWEEN CARBOHYDRATE INTAKE AND NUTRITIONAL STATUS IN PHYSICAL FITNESS AMONG STUDENTS OF THE 2023 CLASS OF PHYSICAL EDUCATION, HEALTH, AND RECREATION AT UNIVERSITAS MUHAMMADIYAH MUARA BUNGO

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ABSTRACT

Background: *University students are in the transitional age group towards adulthood and require sufficient carbohydrate and energy intake to support physical activity and fitness. One way to monitor nutritional status is by measuring body mass index (BMI). Food sources that supply adequate energy are crucial for daily consumption to positively impact physical fitness. The aim of this study is to determine the relationship between carbohydrate intake and nutritional status in physical fitness among students of the 2023 class of physical education, health, and recreation at Universitas Muhammadiyah Muara Bungo.*
Methods: *This study employed an observational approach with a cross-sectional design to analyze the relationship between the independent variables, namely carbohydrate intake and nutritional status. The study population consisted of 75 students, with a sample of 42 students. Inclusion criteria included students who participated, were at least 19 years old, and in good health. Primary data collected included respondent identity, carbohydrate intake, nutritional status, and physical fitness, obtained through interviews using a quantitative research questionnaire.*
Results: *The study found that 61.9% of students had inadequate carbohydrate intake, while 59.5% had normal nutritional status. Statistical analysis using the Spearman Rank test showed no significant relationship between carbohydrate intake and nutritional status with physical fitness, with a p-value of -0.189 for carbohydrate intake and 0.096 for nutritional status.*
Conclusion: *These findings indicate that adequate carbohydrate intake and good nutritional status do not significantly contribute to improving the physical fitness of students in the 2023 class of Physical Education, Health, and Recreation at Universitas Muhammadiyah Muara Bungo.*

Keywords: *physical fitness, nutritional status, carbohydrate intake*

INTRODUCTION

Students are an age group that is in a transition period towards adulthood, usually between the ages of 18 and 25. At this stage, they are required to be responsible for developing themselves, including maintaining health and implementing a healthy lifestyle as a provision for facing adulthood (Huluki, W & Djibran, 2018). However, attention to health among young people is still often neglected, even though this group is very vulnerable to malnutrition and other health problems. This period is also known as a period with dense activity, so a good balance is needed between physical activity and appropriate nutritional intake to support optimal growth and maintain body fitness (Dini et al., 2024).

Carbohydrates are one type of macronutrient that plays an important role as the main source of energy for the body, including the brain. In general, carbohydrates are divided into two types, namely simple carbohydrates and complex carbohydrates. Simple carbohydrates have a lower glucose content and are more easily absorbed by the body compared to complex carbohydrates (Diana Laila Rahmatillah, Kurnia Hendi Prayogi, Made Deny Sapta Giri, 2022). Examples of foods containing complex carbohydrates include potatoes, bananas, brown rice, oatmeal, and sweet potatoes.

Meanwhile, sources of simple carbohydrates can be found in foods such as candy, cakes, biscuits, concentrated fruit juices, and breakfast cereals.

The recommended composition of a balanced diet consists of around 60–65% carbohydrates, 20% fat, and 15–20% protein of the total daily energy requirement. For example, if someone needs 3000 calories per day, then carbohydrate intake should be around 1800–1950 calories, fat around 600 calories, and protein between 450–600 calories. One common obstacle experienced by athletes who undergo heavy training is prolonged fatigue or difficulty in recovering energy between training sessions. For athletes, energy needs—especially from carbohydrates—during training are much higher than during competition (Daryanto, 2015). Therefore, it is important to ensure daily carbohydrate reserves are restored, especially for those undergoing intensive training programs. A lack of daily carbohydrate intake can lead to reduced glycogen stores in the muscles and liver. Studies have shown that a gradual decrease in glycogen reserves can have an impact on decreased endurance and athlete performance. All elements in a balanced diet will go through the digestion process before being converted into energy, either through the aerobic or anaerobic system. In this case, carbohydrates play a crucial role in the chemical process of breaking down food into nutrients that can be absorbed by the small intestine, then utilized by the body to support various activities.

For teenagers who have a lot of physical activity or have excessive physical activity, such as being a soccer athlete or futsal athlete, it is expected to consume foods that contain a lot of carbohydrates, pay attention to meal times because the food is when they are training and playing. The food that is eaten is not digested immediately and takes time, because what is intended at the time before carrying out physical activity the player's body so that it can digest food optimally which has an impact on the ability to carry out activities optimally. The need for additional food for teenagers or players aged 13 to 15 years who have excessive physical activity because they participate in activities at school or participate in soccer and futsal sports activities, will require more energy when compared to other people, because they have an excessive activity load (Afandi & Avandi, 2022). Sports players need more food because high levels of activity mean they need more additional food compared to the average person, but these needs can be met by eating food every day, such as food that is high in carbohydrates and protein (Wijayanti, 2013).

There are various factors that influence physical fitness, including heredity, maturity level, age, nutritional intake, and other behavioral factors, as well as the surrounding environment (Hendrawati, 2017). Nutritional intake plays a crucial role in sports performance, where proper diet and dietary behavior can improve physical fitness. One important element that influences this is carbohydrate intake, which is needed for the production of ATP as an energy source. Adequate carbohydrate intake is essential for athletes to maintain energy reserves in the form of glycogen in the muscles. Low glycogen stores can result in faster fatigue, reducing the intensity and performance of athletes. Physical activity also contributes to physical fitness; active individuals tend to have better cardiovascular fitness than inactive individuals (Triandari et al., 2021).

METHODS

This study used an observational approach with a cross-sectional design to analyze the relationship between independent variables, namely carbohydrate intake and nutritional status, with the dependent variable, namely physical fitness, in Physical Education, Health and Recreation students of Class of 2023 at Muhammadiyah University of Muara Bungo. The study population consisted of 75 students

with inclusion criteria that included participating students aged at least 19 years, healthy. In collecting data, this study used primary data that included respondent identity, carbohydrate intake, nutritional status and physical fitness. Primary data were obtained through interviews using quantitative research questionnaire questions.

After the data collection process is complete, the final stage of this study is to analyze the data using coding methods and statistical analysis techniques to evaluate the relationship between variables. The analysis carried out includes univariate analysis to describe the frequency distribution of each variable, as well as bivariate analysis involving normality tests and correlation tests to determine the existence of a significant relationship between carbohydrate intake, nutritional status, and physical fitness levels of students.

In the data processing process, the results of the statistical analysis will be interpreted and compiled in the form of a report. This study is expected to provide deeper insight into the effect of carbohydrate intake and nutritional status on students' physical fitness, as well as offer relevant recommendations to improve fitness conditions in physical education study program students. With a structured and systematic approach, this study aims to provide a clear picture of the factors that influence physical fitness, along with their implications for students' health and performance in daily activities.

RESULTS AND DISCUSSION

Carbohydrate Intake

Based on the research findings, 26 students (61.9%) had a low carbohydrate intake, while 15 students (35.7%) had a normal carbohydrate intake, and 1 student (2.4%) had an excessive intake. Given this, carbohydrate consumption should generally be higher. This aligns with the theory stating that carbohydrates are the primary source of energy and are relatively cheaper food sources compared to other nutrients. Carbohydrates are primarily converted into glucose, which then serves as the body's main energy source. Excess carbohydrate intake will be converted into fat and stored in the body in unlimited amounts. Conversely, when the body lacks energy intake, it will break down these fat reserves (Bculu, 2017).

Table 1 Carbohydrate Intake Among Students of The 2023 Class of Physical Education, Health, and Recreation at Universitas Muhammadiyah Muara Bungo

Carbohydrate Intake	n	%
Low	26	61.9
Normal	15	35.7
High	1	2.4
Total	42	100

When food intake is insufficient, the energy expended by the body also decreases. This occurs when the energy consumed through food is not enough to compensate for the energy that has been used. An individual may experience undesirable outcomes, such as a normal body weight becoming underweight. Conversely, someone who aims to have excess energy must be mindful of how much energy they expend. After accounting for the energy used, any remaining energy is converted and stored by the body as fat, which can lead to excessive weight gain (Wahidah, 2023).

Nutritional Status

Table 2 Nutritional Status Among Students of The 2023 Class of Physical Education, Health, and Recreation at Universitas Muhammadiyah Muara Bungo

Nutritional Status	n	%
Underweight	15	35.7
Normal	25	59.5
Overweight	2	4.8
Total	42	100

Based on the results of the study, students who have underweight are 15 people (35.7%), normal nutritional status is 25 people (59.5%) and overweight is 2 people (4.8%). Nutritional status is a description of the balance of the body receiving nutrients with what is

needed by the body. (Putro & Winarno, 2022). The nutritional needs of men are different from women, the cause of malnutrition is due to an unbalanced diet. Women prioritize maintaining proportional body weight so that not enough nutrients are consumed. While men tend to have more energy intake, they have unknowingly fulfilled the nutrients needed by the body. Men experience a more rapid increase than women in terms of height, weight, lean body mass so that they need more energy than women (Putro & Winarno, 2022).

A person must need energy to meet their daily needs as a mover and to care for the body so that when doing activities they can be optimal, at least the energy needed is around 70-80% of their daily activities. Knowing their age, weight as what has been determined to know the energy needs. Absorbing food into the body that produces energy is played by the body to digest and manage food for the smooth running of daily activities that a person does in general (Afandi & Avandi, 2022).

Physical Fitness

Table 3 Physical Fitness Among Students of The 2023 Class of Physical Education, Health, and Recreation at Universitas Muhammadiyah Muara Bungo

Physical Fitness	n	%
Low	28	66.7
Good	14	33.3
Total	42	100

Based on the results of the study, students who have low physical fitness are 28 people (66.7%) and good category is 14 people (33.3%). There are differences in physical fitness between men and women related to maximum muscle strength. Although the physical fitness of men and women is almost the same, the differences tend to increase after puberty, especially in terms of cardiorespiratory power. This is due to several factors, including differences in body composition, where women tend to have more fat tissue, as well as hormonal differences characterized by different levels of testosterone and estrogen, and lower hemoglobin levels in women. In addition, the results of physical fitness measurements show that men generally have higher physical activity than women (Azka & Winarno, 2020).

Table 4 Distribution of Students Based on Physical Fitness

Variable	Minimal	Maximal	Mean $\pm$ SD
Physical Fitness	1	3	2.33 $\pm$ 0,954

Based on the table above, the physical fitness scores of students show that the lowest number is 1 time, while the highest number reaches 3 times. The average physical fitness measured is 2.33 with a standard deviation of 0.95. Physical fitness is a physical condition that shows the body's capacity and the individual's ability to complete certain tasks efficiently without experiencing excessive fatigue. In other words, a fit person is able to carry out physical activities without feeling very tired. This concept also involves the efficiency of the body's cell function and metabolic processes during daily activities (Sudiana, 2014). From the concept of physical fitness, each person needs different physical fitness, depending on the nature of the physical challenges they face.

Physical fitness will increase if there is an increase in muscle strength, muscle endurance, and cardiovascular and respiratory endurance, which are generally influenced by physical activity. Physical fitness itself is the body's ability to adapt to the environment and the demands of physical activity. In basketball, the elements of fitness that play a role include balance, agility, strength, speed of movement and reaction, muscle and cardiovascular endurance, flexibility, and coordination. A basketball athlete with a good level of fitness is able to shoot the ball a longer distance thanks to optimal muscle strength (Daryanto, 2015).

The Relationship Between Carbohydrate Intake In Physical Fitness

Table 5 The Relationship Between Carbohydrate Intake In Physical Fitness Among Students Of The 2023 Class Of Physical Education, Health, And Recreation At Universitas Muhammadiyah Muara Bungo

Carbodyrate Intake	Physical Fitness				Total		P value
	Low		Good				
	n	%	n	%	n	%	
Low	17	65,4	9	34,6	26	100,0	0.189
Normal	11	73,3	4	26,7	15	100,0	
High	0	0	1	100,0	1	100,0	
Total	28	66,7	14	33,3	42		

Based on calculations using the Spearman test, a p-value of -0.189 was obtained, so it can be concluded that H0 is accepted and H1 is rejected, meaning that there is no significant relationship between carbohydrate intake and physical fitness. This is not in line with the research of Triandari et al. (2021) which supports this finding, showing a relationship between carbohydrate intake and physical fitness with the results of the study as many as 57.1% of respondents having good carbohydrate intake with good physical fitness. The relationship between carbohydrate intake and physical fitness shows that carbohydrates play an important role in the body. Carbohydrates are the main source of energy, and the need for their intake increases during exercise, because glucose circulation in the blood also increases during long-lasting activities (Sa'adah et al., 2023).

Imbalance of carbohydrate intake that does not meet the needs of students. The main source of energy and plays a very important role especially for an athlete in doing sports especially endurance sports is carbohydrates. Glucose and glycogen in the body obtained from carbohydrates will be stored in the muscles and liver. The formation of energy and the provision of carbohydrates aims to replenish muscle and liver glycogen reserves that have been used in muscle contractions is the role of glycogen stored in the muscles. Based on the Ministry of Health (1997), an athlete or athlete who has very little glycogen will experience fatigue quickly, fatigue quickly and lack achievement.

The Relationship Between Nutritional Status In Physical Fitness

Table 6 The Relationship Between Nutritional Status In Physical Fitness Among Students Of The 2023 Class Of Physical Education, Health, And Recreation At Universitas Muhammadiyah Muara Bungo

Nutritional Status	Physical Fitness				Total		P value
	Low		Good				
	n	%	n	%	n	%	
Underweight	13	86,7	2	13,3	15	100,0	0.096
Normal	14	56,0	11	44,0	25	100,0	
Overweight	1	50,0	1	50,0	2	100,0	
Total	28	66,7	14	33,3	42		

Based on the calculation using the Spearman test, a p-value of 0.096 was obtained, so it can be concluded that H0 is accepted and H1 is rejected, meaning that there is no meaningful or significant relationship between nutritional status and physical fitness. The results of the hypothesis test indicate that there is no significant relationship between the level of energy adequacy and the level of physical fitness of students in the physical education, health and recreation study program. Judging from the results obtained, this study is in line with the results of research conducted by (Pratiwi et al., 2022). The results of the study

showed results that were not in line with the theory that states that improving nutritional status, increasing physical endurance, and increasing productivity can be obtained by consuming balanced energy and nutrients. Balanced energy and nutrient levels are the main requirements for determining the level of work productivity (Depkes, 2010).

CONCLUSION

The conclusion obtained from this study is that there is a negative relationship between carbohydrate intake and fitness. There is a negative relationship between nutritional status and fitness. Variations in the amount of carbohydrates consumed are needed to have a significant effect on students' fitness conditions. Differences in nutritional status are also not directly related to students' fitness levels.

CONFLICT OF INTEREST

The author declares no conflict of interest in the publication of this article.

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