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Relationship Between Eating Patterns, Physical Activity, and Obesity Incidence Among Madrasah Tsanawiyah (MTs) Students

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ABSTRACT

Obesity is a chronic disease characterized by excess body fat, increasing the risk of type 2 diabetes, heart disease, bone disorders, reproductive issues, and cancer, while also affecting quality of life, including sleep and mobility. According to WHO, the prevalence of overweight children and adolescents aged 5–19 years increased from 8% in 1990 to 20% in 2022. Recent data from the Ministry of Health in 2023 shows a high prevalence of central obesity among those aged 15–24 years, with 8.3-9.2% in males and 23.4-24.7% in females. This quantitative research employs an observational analytic design with a cross-sectional approach, using SPSS with the Chi-Square test to identify the relationship between dietary patterns and physical activity with the incidence of obesity among MTS students in Gowa Regency. Results indicate no significant relationship between dietary patterns (FFQ and IDDS) and obesity incidence, with p-values of 0.895 and 0.066, respectively. Similarly, physical activity showed no significant relationship with BMI, with a p-value of 0.056. Future studies should consider expanding variables to include factors influencing students' dietary patterns and physical activity, and conduct in-depth analyses using multiple regression.

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Introduction

Overweight and obesity are defined as abnormal or excessive accumulation of fat, which results in adverse effects on one's health (1). Obesity is a complex chronic disease characterized by excess body fat, which can increase the risk of type 2 diabetes mellitus, heart disease, bone health problems, reproductive issues, and cancer. Obesity also affects the quality of life, including sleep and mobility (2). Inactive lifestyles and unhealthy diets, such as foods high in sugar and refined carbohydrates, are now recognized as the main causes of the obesity epidemic in many parts of the world (3). In 2022, approximately 37 million children under the age of 5 and over 390 million children and adolescents aged 5–19 were overweight. The prevalence of overweight among children and adolescents aged 5–19 increased from 8% in 1990 to 20% in 2022 (2). Data from SKI 2023 shows that the prevalence of central obesity in the 15–24 age group is quite high, with men reaching 8.3%-9.2% and women between 23.4%-24.7% (4). Based on SSGI data (2022), the prevalence of obesity in children aged 5–12 years is as follows: overweight is 10.8%, and obesity is 9.2%, which means 1 in 5 children in this age group experience weight problems due to lack of physical activity (5). In the study "The Interplay of Eating Habits and Physical Activity," it was shown that eating habits and physical activity are consistently interrelated, influencing energy balance and consequently impacting body weight status. By gaining a better understanding of the specific behaviors that shape energy balance at various life stages and across different populations, as well as the personal, social, demographic, and environmental factors that influence these behaviors, we can develop more effective and tailored interventions to address obesity and related chronic diseases (6). Dietary patterns are defined as the quantity, proportion, variety, or combination of different foods and drinks in a diet, as well as the frequency of consuming them (7).

Furthermore, inadequate dietary patterns (such as skipping breakfast and/or replacing lunch with snacks) can lead to an individual feeling they are not getting enough nutrients from their food (8). Physical activity influences energy balance, enhances fitness and mood, and reduces the risk of chronic diseases. A healthy lifestyle and good physical fitness are associated with healthy body weight in school children, while an unhealthy lifestyle increases the risk of obesity up to tenfold (9). Insufficient physical activity decreases fitness and leads to overweight in adolescents (10). Research by Siti Soleha (2024) indicates a connection between dietary patterns and obesity occurrence among children following poor eating habits (11). This study aligns with findings by Asnidar et al. (2022), who concluded that there is a correlation between dietary patterns, physical activity, and obesity prevalence among junior high school students at SMP Negeri 1 Bulukumba (12).

Dietary patterns and physical activity are interrelated, influencing energy balance and consequently impacting body weight status. Understanding specific behaviors that shape energy balance and the factors influencing these behaviors can help develop effective interventions to address obesity and related chronic diseases. This study aims to analyze the relationship between physical activity and dietary patterns on the incidence of obesity among junior high school students in Gowa Regency, identify specific lifestyle and eating habits contributing to obesity, and provide recommendations for effective interventions to reduce obesity risk in this age group.

Methods

This research is a quantitative study using an observational analytic design with a cross-sectional approach. A cross-sectional design studies the relationship between exposure or risk factors (independent) and their impact or effects (dependent) by collecting data simultaneously at one point in time for both the risk factors and their effects (13). The data used are primary data, collected from each individual through a rapid survey method using standardized questionnaires. The population in this study consists of all students from 4 MTS (Islamic junior high schools) in Gowa: MTS Guppi Samata, MTS Al-Muqiit Bontomarannu, MTS Manggarupi, and MTS Arifah Gowa. The inclusion criteria for this study encompass all students currently enrolled and actively participating in classes in grades 7 and 8, regardless of age and gender. This study uses a total sampling method, resulting in a sample size of 206 individuals.

Data collection was conducted using interviews and anthropometric assessments. Interviews were conducted using questionnaires, specifically the Food Frequency Questionnaire (FFQ), Individual Dietary Diversity Score (IDDS), and Physical Activity Level (PAL). The FFQ was used to gather information about the frequency of food consumption, while the IDDS measured the diversity of individual dietary patterns. The PAL questionnaire assessed physical activity to obtain data on respondents' physical activity levels. For anthropometric measurements, particularly height and weight, digital scales and microtoises were used. The aim was to assess the nutritional status of students in two categories: normal and not normal. The data were then analyzed using SPSS software with the Chi-Square test to determine the relationship between dietary patterns and physical activity and the occurrence of obesity among junior high school students. All instruments underwent validity and reliability testing to ensure the accuracy and consistency of the collected data. Data analysis was performed using SPSS with the Chi-Square test to determine the relationship between dietary patterns and physical activity and the incidence of obesity among MTS students.

Results

Table 1. Relationship Between Eating Patterns, Physical Activity, and Obesity Incidence Among Madrasah Tsanawiyah (MTs) Students

Independent Variable		BMI				P
		Normal		Not normal		
		n	%	n	%	
Food Frequency Questionnaire (FFQ)	Less	46	22,32	59	28,64	0.541
	Enough	40	19,42	61	29,62	
Individual Dietary Diversity Score (IDDS)	Low	12	5,82	7	3,39	0.066
	Medium	51	24,75	87	42,23	
	High	23	11,17	26	12,64	
Physical Activity	Light	51	41,3	34	28,64	0.67
	Heavy	69	58,7	52	29,62	
Total		120	41,74	86	58,26	

Based on table 1, there is no strong evidence to suggest that dietary patterns (as measured by FFQ

and IDDS) or physical activity are significantly associated with obesity among the MTs students in the study. The p-value for the FFQ is 0.541, which is greater than 0.05. This means there is no significant relationship between the frequency of food consumption and obesity among these students. The p-value for the IDDS is 0.066, which is very close to 0.05. While not statistically significant at the conventional 0.05 level, it hints at a possible, but weak relationship between dietary diversity and obesity. However, more research is needed to confirm this. The p-value for physical activity is 0.67, which is greater than 0.05. This indicates no significant relationship between the level of physical activity and obesity among these students.

Discussion

The primary cause of obesity is an imbalance between the calories consumed and the calories burned. On the other hand, technological advancements, socioeconomic status, and cultural factors contribute to changes in dietary patterns, leading people to prefer fast food that is high in calories, fat, and cholesterol. Excessive eating habits can be a cause of obesity. Obesity happens when an individual takes in more calories than they expend. The body needs calories for survival and physical activity, but to maintain weight, there must be a balance between energy intake and energy output. This energy imbalance can lead to weight gain and obesity (14). Someone at high risk of obesity needs to manage their diet and engage in sufficient physical activity, as failing to do so can have very serious health consequences (15). Based on tables 1 it can be concluded that there is no significant relationship between dietary patterns based on FFQ and IDDS and the incidence of obesity. The FFQ statistical test results show a p-value of 0541 > 0.005 and IDDS 0.066 > 0.005, indicating that there is no statistically significant relationship between the FFQ and IDDS variables and the BMI variable.

Several factors can explain why there is no significant relationship between meal frequency and food diversity with BMI among students in the four MTS schools. First, the four schools do not have regulations regarding the food sold in the canteen, resulting in minimal control over the students' eating patterns. Second, the variation in the quality and type of food consumed by students in the canteen may have a disproportionate impact on their BMI. Third, factors such as physical activity, genetic factors, and home environment also significantly influence students' BMI. This is consistent with the research conducted by Ayu Lestari (2021), which states that there is no relationship between meal frequency and food diversity among school children, as they spend their midday at school, where the snacks they consume vary widely. Eating behavior is also influenced by a person's knowledge or perspective on nutritional issues. Eating behavior essentially reflects the application of eating habits (16).

Based on Table 1 there is no significant relationship between physical activity and students' body mass index (BMI) with a p-value of 0.670. Several factors may contribute to the lack of relationship between physical activity and BMI. Interviews revealed that many students engage in physical activity for a short duration, which does not require much energy expenditure. Additionally, some students reported rarely engaging in strenuous activities such as sports, as physical education classes are only held once a week. The distance between the school and students' homes is not too far, so it does not require much walking time, and many students use private vehicles to go to school. This study aligns with the research conducted by Miko and Pratiwi (2017), which states that there is no significant relationship between eating patterns and physical activity with the incidence of obesity among college students. The researchers assumed that the results of this study were not related because the sample was engaged in moderate and heavy activities in recent times (17).

Physical activity correlates with obesity; the lower the physical activity, the higher the likelihood of increased Body Mass Index (BMI). People who exercise less and are less active tend to have a BMI in the overweight category and are at greater risk of becoming obese (18). Physical activity leads to energy expenditure, so the more active a teenager is, the more energy is used. If a teenager is less active, body fat will accumulate due to the lack of energy burning. Conversely, being overweight can also affect physical activity. Overweight individuals tend to be less active and prefer sleeping, sitting, resting, and eating (19).

Physical activity, including incidental exercise related to daily activities and planned exercise, impacts energy balance. Exercise can also improve physical fitness and yield several benefits, such as enhanced mood and reduced risk of chronic diseases (20). Argon and Martin et al. found that adopting a healthier lifestyle and achieving good physical fitness, measured by an international fitness scale, are associated with healthier weight status in school children. Similarly, unhealthy lifestyle behaviors and poor physical fitness increase the risk of being overweight or obese by ten times (21).

Conclusion

This study found no significant relationship between dietary patterns (FFQ and IDDS) and obesity

incidence among MTS students in Gowa Regency. Similarly, physical activity showed no significant relationship with BMI. Future research should expand variables to include school environmental factors influencing dietary patterns and physical activity. In-depth analyses using multiple regression and additional interviews or observations could enhance understanding of the relationships between these variables and obesity incidence.

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Conflicts of Interest: The authors declare no conflict of interest

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