JAMBI MEDICAL JOURNAL
Jurnal Kedokteran dan Kesehatan
Vol. 13 No.1 May 2025
DOI: 10.22437/jmj.v13i1.41056
Journal homepage: https://online-journal.unja.ac.id/kedokteran
p-Issn : 2339-269x
e-Issn : 2580-6874

Original Article

The Relationship Between Carbohydrate Intake and Physical Activity with Body Mass Index in Medical Students

[1]Novianti Syofira, [2]Raihanah Suzan, [2]Lipinwati, [2]Rita Halim, [2]Attiya Istarini

[1] Bachelor's Degree Program in Medical Education, Faculty of Medicine and Health Sciences, Universitas Jambi, Jambi, Indonesia
[2] Lecturer, Faculty of Medicine and Health Sciences, Universitas Jambi, Jambi, Indonesia

E-mail Corresponding: raihanah_suzan@unja.ac.id

Article History:
Submit: January 2025
Accepted: April 2025

Keyword:
Carbohydrate Intake;
Physical Activity;
Body Mass Index;

ABSTRACT

Background: The Body Mass Index (BMI) of medical students is influenced by dietary habits, lifestyle choices, and socio-cultural factors. The unique lifestyle and academic pressures faced by medical students make it essential to understand the relationship between carbohydrate intake, physical activity, and BMI in this population.

Methods: This cross-sectional analytical study was conducted among 102 medical students at Jambi University, selected through purposive sampling. Data were collected using the International Physical Activity Questionnaire (IPAQ), a 2x24-hour food recall questionnaire, and anthropometric measurements of height and weight. Statistical analysis was performed using the Spearman correlation test.

Results: The majority of respondents had low carbohydrate intake (85.3%), moderate physical activity levels (52.9%), and normal BMI (44.1%). Spearman correlation analysis showed no significant relationship between carbohydrate intake and BMI ($p = 0.3$, $r = 0.1$). However, a statistically significant negative correlation was found between physical activity and BMI ($p < 0.001$, $r = -0.43$), indicating that higher physical activity levels are associated with lower BMI.

Conclusion: This study found no significant relationship between carbohydrate intake and BMI but identified a negative correlation between physical activity and BMI among medical students. These findings highlight the importance of promoting physical activity as the key factor in maintaining a healthy BMI.

INTRODUCTION

The high Body Mass Index (BMI) issues among medical students is a public health problem, as they will become healthcare providers. Age, genetics, sex, dietary intake, physical activity, body image perception, the presence of infectious diseases and other factors affect BMI. Research observed the prevalence of overweight and obesity among medical students worldwide which is concerning and linked to high glycemic food intake and physical inactivity.[1]

A number of studies have investigated the association between BMI and dietary habits, especially carbohydrate consumption, and these results indicate an intricate and multi-dimensional interaction. For instace, Nurhasanah et al. (2022) indicated increased intake of carbohydrate and fatty rich food amongst the individual with overweight BMI.[2] Likewise, although Mangi's research showed that knowledge of nutrition was generally good among medical students, many reported poor dietary habits, such as high carbohydrate intake, which was a contributing factor to weight problems.[3] This is consistent with the findings of Deotale et al., who observed that even though most medical students were aware of the dietary guidelines, they had poor eating habits resulting in a higher prevalence of overweight and obesity.[4] In particular, fast food and carbonated drinks high in carbohydrates were mentioned as specific risk factors for increased BMI among medical students.[5]

The total level of physical activity of the medical students has also been involved in determining BMI. According to Pop et al., researchers established that medical students who maintain regular physical activity levels with a mean value of 221 minutes per week tend to have healthy BMI levels.[6] Results by Andrade et al. support this by indicating that besides contributing to proper weight management, physical activity also contributes to enhanced overall health and quality of sleep, leading to a consequent and healthy BMI.[7] The majority of medical students reported having low levels of physical activities, primarily because the nature of their study steers them toward a sedentary lifestyle.[1]

Therefore, the relationship between carbohydrate intake, physical activity, and BMI among medical students is multiple and multidimensional. While many students are well aware of healthy eating, their actual dietary practices often fail to reflect this understanding, particularly about carbohydrate intake. Furthermore, the high academic demands placed on medical students often result in reduced physical activity levels, further increasing the risk of overweight and obesity. To address this issue, this study aims to investigate *"The Relationship Between Carbohydrate Intake and Physical Activity with Body Mass Index (BMI) Among Medical Students."*

METHOD

This study employed an analytical observational design with a cross-sectional approach. It was conducted at the Faculty of Medicine and Health Sciences (FKIK), Jambi University, from August to November 2024. A purposive sampling technique was used to select participants, consisting of active medical students from Jambi University who met the inclusion and exclusion criteria. The total population of active medical students at Jambi University was 491 subjects.

The inclusion criteria required participants to be active medical students aged over 18 years, enrolled at Jambi University, and willing to participate in the study. Exclusion criteria included students who did not complete the questionnaire, were pregnant or breastfeeding, had medical conditions such as heart disease, diabetes mellitus, cancer, or infectious diseases, or were on a special diet.

To assess food intake, the study utilized the 2x24-hour food recall method, while physical activity levels were measured using the International Physical Activity Questionnaire (IPAQ) short-form. Dietary intake data were analyzed using the Nutrisurvey application. Anthropometric measurements, including weight and height, were recorded using a digital scale and a microtoise, respectively.

Data analysis involved both univariate and bivariate techniques. Univariate analysis was employed to describe demographic variables, such as age and gender, while bivariate analysis used the Spearman correlation test to examine relationships between variables.

RESULTS

Shown in Table 1, the majority of the 102 research subjects were in the 21-year-old age group, comprising 30 individuals (29.4%). Additionally, the majority of participants were female, accounting for 74 individuals (72.5%). The average carbohydrate intake among the study participants was 174 grams, categorizing it as "insufficient" carbohydrate intake. Specifically, the majority of subjects, 98 individuals (96.1%) fell into the "insufficient" category. Regarding physical activity, the average physical activity level was 1346.8 MET, which falls within the "moderate" category. the majority of subjects, 54 individuals (52.9%) had "moderate" activity. For BMI, the average BMI was 22.3, placing most participants in the "normal" weight category.

Table 1. Patient Demographic Data

Variable	Body Mass Index				
	Underweight (%)	Normal (%)	Overweight (%)	Obesity Class I (%)	Obesity Class II (%)
Carbohydrate Intake					
Less	19	44	12	7	5
Adequate	-	1	9	2	1
High	-	-	-	-	2
Physical Activity					
Low	4	20	6	2	5
Moderate	8	22	15	6	3
High	6	3	1	1	-

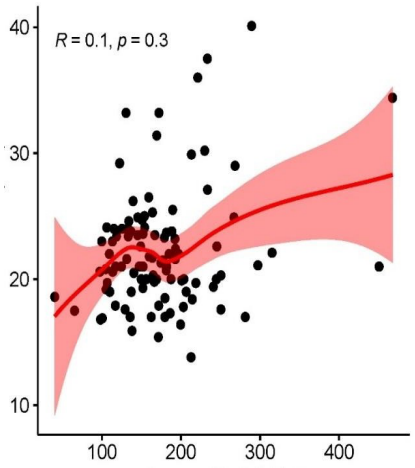

Figure 1. The Relationship Between Carbohydrate Intake and Body Mass Index (BMI)

The results of the Spearman correlation analysis, as shown in the scatter plot above, yielded a p-value of 0.3 (>0.05), indicating no significant relationship between carbohydrate intake and Body Mass Index (BMI). Furthermore, the correlation coefficient (r) of 0.1 suggests a very weak positive relationship, implying that as carbohydrate intake decreases, BMI tends to decrease slightly. However, this relationship is minimal and not statistically significant.

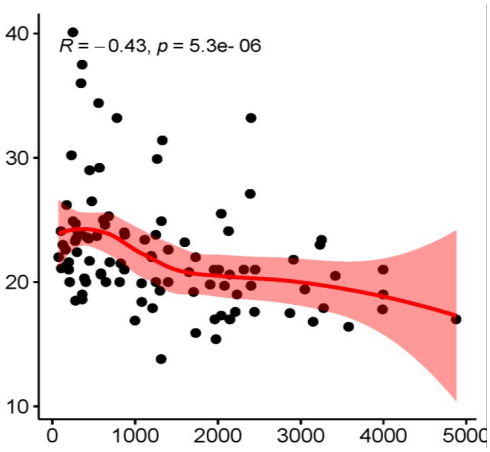

Figure 2. The Relationship Between Physical Activity and BMI

The results of the Spearman correlation analysis, as depicted in the scatter plot above, yielded a p-value of $5.3x10^{-6}$ (0.0000053) (<0.05), indicating a statistically significant relationship between physical activity and Body Mass Index (BMI). The correlation coefficient (r) of -0.43 suggests a moderate negative relationship, meaning that as physical activity increases, BMI tends to decrease.

DISCUSSION

Adequate food intake is essential to provide sufficient energy, nutrients, and fiber for maintaining overall health.[9] In this study, the majority of respondents demonstrated low carbohydrate consumption, with white rice and noodles being the primary carbohydrate sources. The medical profession, known for its challenging and stressful nature, can significantly impact daily routines, including dietary choices. The reduction in carbohydrate intake may be brought about by numerous factors such as delayed meals, preference for other macronutrients like fats, and the total caloric value of meals. However, in the present study, these aspects were not considered.[8]

This study did not find any significant relationship between carbohydrate intake and BMI, which agrees with the results of Simanoah et al. (2022).[10] On the other hand, Evan et al. (2017) indicated a significant relation between carbohydrate intake and students' BMI, which might reflect a difference in the population under study or in the methodology adopted.[11] BMI is affected by many variables other than carbohydrate consumption, such as age, sex, genetics, infectious diseases, and lifestyle factors like exercise, besides other dietary factors like protein and fat consumption.[12] The total consumption of calories has an especially pivotal role in determining BMI, which Silvano et al. (2013) evidenced with the significant correlation of BMI with the general pattern of diet. The focus on carbohydrate intake might have been a limitation in the way that larger influences were accounted for in the present study. Further research in this area should consider total caloric intake and an overall dietary and lifestyle examination to offer stronger interpretations of what factors drive changes in BMI.[12]

The demanding schedules of medical studies and assignments often cause students to neglect important aspects of maintaining a healthy lifestyle, like regular physical activity.[14] Most of the respondents in this study had moderate levels of physical activity and a normal BMI, which clearly suggests that moderate exercise plays a key role in achieving a healthy weight.[15] In fact, there is a statistically significant moderate negative correlation between physical activity and BMI, meaning that as physical activity increases, BMI tends to decrease.[16] These findings align with the research of Nurkhopipah et al. (2017), which also identified a significant relationship between physical activity and BMI.[17] However, they contradict the results of Silvano et al. (2013), which reported no significant relationship between these variables.[12]

Physical activity is a key determinant of BMI, with insufficient activity often associated with higher BMI values, while increased activity can help achieve more optimal BMI levels.[18] However, excessive physical activity without

adequate nutritional intake may lead to underweight BMI. Maintaining a healthy BMI is vital for long-term health and academic performance, as it supports physical well-being and enhances cognitive focus.[19] Evidence suggests that engaging in at least 30 minutes of daily physical activity, including walking and a combination of leisure and work-related activities, can significantly reduce the risk of obesity.[20] Future studies should explore the interaction between physical activity, dietary habits, and other lifestyle factors to provide a comprehensive understanding of BMI regulation.[1]

CONCLUSION

This study underscores the multifactorial nature of BMI regulation among medical students, highlighting the roles of dietary habits and physical activity. While no significant correlation was found between carbohydrate intake and BMI, physical activity demonstrated a moderate negative correlation with BMI, indicating that increased activity is associated with lower BMI levels. These findings emphasize the importance of balanced dietary patterns and regular physical activity in maintaining a healthy BMI.

Given the demanding routines of medical students, promoting a healthy lifestyle is essential for both physical well-being and academic performance. Regular physical activity, such as 30 minutes of daily walking, combined with adequate nutritional intake, can help achieve and sustain an optimal BMI. Future research should integrate a comprehensive analysis of caloric intake, dietary diversity, and lifestyle behaviors to better understand and address the determinants of BMI in this population

.

REFERENCES

1. Khan ZN, Assir MZK, Shafiq M, Chaudhary A e G, Jabeen A. High prevalence of preobesity and obesity among medical students of Lahore and its relation with dietary habits and physical activity. Indian J Endocrinol Metab. 2016;20(2). https://doi.org/10.4103/2230-8210.17635
2. Nurhasanah N, Pardede IT, Nauli F, Hayati I, Nasution FR, Hermawan AR. Analisis Asupan Karbohidrat dan Lemak pada Dewasa Muda dengan Obesitas Sentral di Fakultas Kedokteran Universitas Riau. Jurnal Ilmu Kedokteran (Journal of Medical Science). 2022;16(1):16. https://doi.org/10.26891/jik.v16i1.2022.16-21
3. Mangi RA, Saleem P, Kalhoro A, et al. Current Assessment of Dietary Habits, Physical Activity, and Related BMI among Students of People's University of Medical & Health Sciences for Women, Nawabshah (SBA). Journal of Health and Rehabilitation Research. 2024;4(2):739-744. https://doi.org/10.61919/jhrr.v4i2.886
4. Deotale MK, Ranganathan U, Akarte S V. Prevalence of overweight and obesity among medical students and their knowledge, attitude and practices about obesity. International Journal of Scientific Reports. 2015;1(1):74. https://doi.org/10.18203/issn.2454-2156.intjscirep20150206
5. Guleri SK, Panika RK, Mahore RK. Assessment of body mass index and prevalence of obesity among undergraduate medical students: an observational study in a tertiary care teaching hospital of Madhya Pradesh. Int J Community Med Public Health. 2019;6(6):2706. https://doi.org/10.18203/2394-6040.ijcmph20192088
6. Pop L, Iorga M, Muraru ID, Petrariu FD. Assessment of Dietary Habits, Physical Activity and Lifestyle in Medical University Students. Sustainability. 2021;13(6):3572. https://doi.org/10.3390/su13063572
7. Andrade OGC de, Pereira L de C, Sousa GRV de. Impact of Physical Activity on Stress Levels in Medical Students. Brazilian Journal of Development. 2020;6(7):46062-46073. https://doi.org/10.34117/bjdv6n7-292
8. Islam Hashmi MRU, Shoaib S, Sajjad SS, et al. Effects of Diet and Physical Activity on BMI of Medical Students: Cross Sectional Study. Pakistan Journal of Medical and Health Sciences. 2022;16(12):125-127. https://doi.org/10.53350/pjmhs20221612125
9. Eby Juana Sabrima1, Riona Sanjaya, Surmiasih YDS. Carbohydrate Intake Of Medical Students And Its Relation To Waist Circumference And Blood Pressure. Biomed J Indones. 2020;6(3). https://doi.org/10.32539/BJI.v8i2.153

10. Simanoah KH, Muniroh L, Rifqi MA. Hubungan antara Durasi Tidur, Tingkat Stres dan Asupan Energi dengan Indeks Massa Tubuh (IMT) pada Mahasiswa Baru 2020/2021 FKM UNAIR. Media Gizi Kesmas. 2022;11(1). https://doi.org/10.20473/mgk.v11i1.2022.218-224
11. Evan, Wiyono J, Candrawati E. Hubungan Antara Pola Makan Dengan Kejadian Obesitas Pada Mahasiswa Di Universitas Tribhuwana Tunggadewi Malang. Nurs News (Meriden). 2017;2.DOI: https://doi.org/10.33366/nn.v2i3.707
12. Silvano K H, Darmono SS, Anggraini MT. Hubungan Tingkat Konsumsi dan aktivitas fisik dengan IMT (Index Massa Tubuh). J Kedokt Muhammadiyah. 2013;1(2):49–53. https://103.97.100.145/index.php/kedokteran/article/view/1348
13. Pearlie MM, Eliza Y, Lubis P, Delfian T. The relationship between physical activity and Body Mass Index among medical students. J Prim Med Sains. 2024;6(1):25–8.DOI: https://doi.org/10.34012/jpms.v6i1.4722
14. Suzan, R. ., Halim, R., & Ayudia, E. I. (2022). HUBUNGAN ANTARA ASUPAN MAKAN, STATUS GIZI DAN AKTIVITAS FISIK DENGAN KEJADIAN COVID-19 PADA ORANG DEWASA OVERWEIGHT DAN OBESITAS . Jambi Medical Journal : Jurnal Kedokteran Dan Kesehatan, 10(3), 458–466. Retrieved from https://online-journal.unja.ac.id/kedokteran/article/view/19595
15. Halim, R., Hana, M., & Mardhiyah, M. (2018). GAMBARAN ASUPAN CAIRAN DAN STATUS GIZI PADA MAHASISWA KEDOKTERAN UNIVERSITAS JAMBI. Jambi Medical Journal : Jurnal Kedokteran Dan Kesehatan, 6(1), 68–75. https://doi.org/10.22437/jmj.v6i1.4822
16. JMJ, J., & Syauqy, A. (2017). HUBUNGAN INDEKS MASSA TUBUH DENGAN KEBUGARAN JASMANI MAHASISWA PRODI KEDOKTERAN UNJA. Jambi Medical Journal : Jurnal Kedokteran Dan Kesehatan, 5(1). https://doi.org/10.22437/jmj.v5i1.4506
17. Nurkhopipah A, Probandari AN, Anantanyu S. Kebiasaan Makan, Aktivitas Fisik Dan Indeks Massa Tubuh (Imt) Mahasiswa S-1 Universitas Sebelas Maret Surakarta. J Kesehat Kusuma Husada. 2018;19–25.DOI: https://doi.org/10.34035/jk.v9i1.342
18. Ramadhaniah, R., Julia, M. and Huriyati, E. (2014) 'Durasi tidur, asupan energi, dan aktivitas fisik dengan kejadian obesitas pada tenaga kesehatan puskesmas', Jurnal Gizi Klinik Indonesia, 11(2), p. 85. https://doi.org/10.22146/ijcn.19011
19. Suryadinata, R.V. and Sukarno, D.A. (2019) 'PENGARUH AKTIVITAS FISIK TERHADAP RISIKO OBESITAS PADA USIA DEWASA', The Indonesian Journal of Public Health, 14(1), pp. 104–114. https://doi.org/10.20473/ijph.v14i1.2019.104-114
20. Sudikno, S. et al.(2015) 'FAKTOR RISIKO OVERWEIGHT DAN OBESE PADA ORANG DEWASA DI INDONESIA (Analisis Data Riset Kesehatan Dasar 2013)', GIZI INDONESIA, 38(2), pp. 91–104. https://doi.org/10.36457/gizindo.v38i2.183