COMPARISON OF DIABETES MELLITUS KNOWLEDGE AND SUGAR CONSUMPTION AMONG HEALTH AND NON-HEALTH STUDENTS IN MEDAN CITY

Wahyudi1, Nazwa Ayudhia1, Jahrani Manurung1, Nelsih Adelia1
1Faculty of Public Health, State Islamic University of North Sumatra, Medan, Indonesia
Corresponding email: apt.wahyudi@uinsu.ac.id

ABSTRACT

Diabetes mellitus (DM) is a long-term disease that occurs when the pancreas does not produce enough insulin or the body cannot use insulin effectively. In general, an increased understanding of diabetes mellitus and sugar consumption patterns among students is essential to prevent this disease in the future. This study aimed to describe the level of knowledge of diabetes mellitus and sugar consumption patterns among health and non-health students in Medan City. This descriptive study was conducted in four different universities, with a population of students from health and non-health study programs who were willing to be respondents and were not on leave. One hundred one students were recruited as research respondents representing the four universities. Data was collected through Google Forms in October 2024, and then, based on the scores obtained, they were classified into the categories of excellent (85-100), good (65-84.9), less good (40-64.9), and poor (<40). The results showed that the majority of health students had a good level of DM knowledge (49.0%), the majority of non-health students had a poor level of DM knowledge (46%), and the majority of respondents consumed ice cream (43.6%) and tea (37.6%). This study concludes that health students have a better level of DM knowledge than non-health students.

Keywords: Knowledge, diabetes mellitus, sugar consumption

INTRODUCTION

Diabetes mellitus is a metabolic disorder known for chronic high blood sugar levels (hyperglycemia) and disturbances in fat, protein, and carbohydrate metabolism. It is caused by damage to insulin secretion, function, or both. Over time, diabetes can cause serious damage to various organs, such as blood vessels, kidneys, eyes, nerves, and the heart (Setiawan, 2021).

Data from the World Health Organization (WHO) shows that around 422 million people in the world suffer from diabetes mellitus, with the majority coming from low- and middle-income countries (WHO, 2021). In Indonesia, the prevalence of diabetes mellitus ranks the country 7th in the world with 19.47 million cases. Based on the results of the Basic Health Research (Riskesdas), the prevalence of diabetes in individuals aged ≥ 15 years, based on physician diagnosis, was 1.5% in 2013 and increased to 2% in 2018. In addition, the prevalence of diabetes based on blood sugar testing in 2013 was 6.9% and increased to 8.5% in 2018. (Kemenkes, 2018).

The International Diabetes Federation (IDF) calculates that in 2019, approximately 463 million people aged 20-79 years worldwide had diabetes, which equates to a prevalence of 9.3% of the entire population in that age group. Based on gender, the prevalence of diabetes in women is predicted to be 9%, while in men, it reaches 9.65%. The prevalence of diabetes increases with age, reaching 19.9% or approximately 111.2 million people in the 65-79 age group. This number is predicted to increase further, with the number of sufferers estimated to reach 578 million by 2030 and 700 million by 2045. (Kementerian Kesehatan RI, 2020).

Diabetes mellitus is one of the four major non-communicable diseases that are the focus of global attention (Rochmawati et al., 2021). In people with diabetes mellitus, some common symptoms include polyphagia (excessive hunger), polydipsia (constant thirst), and polyuria (frequent urination), as well as weight loss for unknown cause. Also, people with DM often report other complaints such as fatigue, body weakness, easily infected with bacteria or fungi, itching, a very long wound healing process, tingling in the hands or feet, and blurred vision.

However, in some cases, people with diabetes mellitus do not show these symptoms. (Febrinasari, Sholikah and Dyonisa Nasirochmi Pakha, 2020).

A study conducted in the Galle district in Southern Sri Lanka showed that although the majority (77%) had moderate or above moderate knowledge about diabetes, their attitude towards diabetes prevention was poor (Herath et al., 2017). In addition, a study (Kholijah & Dewi, 2023) showed that the knowledge of students in Medan City regarding diabetes was classified as poor, with 63.5% answering incorrectly, 81.2% having a poor attitude, and their skills only reaching 51.8%. Meanwhile, another study also stated that most respondents who were health students had a sufficient level of knowledge about diabetes mellitus (DM), with 55.2% answering well about DM complications. However, only 44% knew the risk factors for DM, which could lead to inappropriate behavior and contribute to an increase in the incidence of DM every year (Nashuha et al., 2022).

The results of previous studies mentioned above show that, in general, students' DM knowledge level is still in the moderate to poor category. A good level of DM knowledge will prevent DM disease in the future and increase awareness of healthy lifestyle applications. This study compares explicitly the level of DM knowledge of health and non-health students; this needs to be done because non-health students are minimally exposed to health-related materials, especially DM. This type of research is very limited in Indonesia; it is hoped that it can be an input for stakeholders at universities and health policymakers in Indonesia.

METHOD

This research using a descriptive quantitative method was conducted in October 2024. The population in this study included all students from health and non-health study programs at four universities in Medan City. The health students referred to are students of the faculties of public health, nutrition, pharmacy, nursing, and midwifery. In contrast, non-health students are students in the faculties of teaching, business, culture, education, arts, social sciences, and so on. All respondents were recruited from the State Islamic University of North Sumatra, the University of North Sumatra, Medan State University, and Medan Health Polytechnic, which were selected based on the consideration that these universities are favorite universities in Medan City. Researchers used the non-probability sampling technique and the accidental sampling method. This method is done by distributing questionnaires with a Google form link through the WhatsApp group for each campus. Students willing to become respondents then fill out the online questionnaire voluntarily. The target respondents in this study were 100 students. To be able to compare proportionally, the researcher projected the ratio of health and non-health students to approach/reach 1:1

The initial part of the questionnaire contained information related to the study's purpose and the principles of voluntary participation and protection of respondents' data. Students willing to become respondents then confirmed the informed consent and filled out the questionnaire. The data of respondents who filled out the questionnaire were then analyzed and selected according to the inclusion criteria in this study. The inclusion criteria in this study include:

1. Respondents are active students on the campus (based on data on the PDDIKTI website)
2. Expressed willingness to become a respondent by confirming informed consent
3. Aged 17-22 years old
4. Is a student who studies on a campus located in the Medan City area
5. Willing to answer all questions on the questionnaire.

Based on the above provisions, 101 students were recruited as respondents in this study. The subsequent questionnaire data were scored and categorized as follows:

1. Very good (85-100)
2. Good (65-84.9)
3. Less good (40-64.9)
4. Poor (<40).

The following categorized data was compared between medical and non- medical students.

RESULT AND DISCUSSION

Gender is divided into two categories (male and female), age is broken down by year based on the general range of student age (17, 18, 19, 20, 21, and 22 years), university origin is presented according to where students study, and study programs are presented into health and non-health.

Table 1. Respondent Characteristics

Characteristic	Frequency	Percentage
Gender		
Male	16	15,8%
Female	85	84,2%
Age of Respondent		
17 years old	7	7,0%
18 years old	26	25,7%
19 years old	19	18,8%
20 years old	40	39,6%
21 years old	7	7,0%
22 years old	2	1,9%
University of Origin		
Universitas Islam Negeri Sumatera Utara	30	29,7%
Universitas Sumatera Utara	19	18,8%
Universitas Negeri Medan	28	27,7%
Politeknik Kesehatan Medan	24	23,8%
Study Program		
Bidang Kesehatan	51	50,5%
Bidang Non-Kesehatan	50	49,5%

Source: Primary Data, 2024

Based on the data obtained, the majority of respondents were female (84.2%) and male (15.8%), with a ratio of (50.5%) health students, namely 51 respondents, and (49.5%) non-health students, namely 50 respondents, for a total of 101 respondents. The most respondents were obtained at the age of 20, namely 40 students (39.6%). Most of the respondents came from students from University A, as many as 30 students (29.7%).

Table 2. Diabetes Mellitus Knowledge Level in Medical and Non-Medical Students

Knowledge	Frequency	Percentage
Medical Student		
• Very good (85-100)	13	25,5%
• Good (65-84,9)	25	49,0%
• Less good (40-64,9)	11	21,5%
• Poor (<40)	2	4,0%
Total	**51**	**100%**
Non-Medical Student		
• Very good (85-100)	6	12,0%
• Good (65-84,9)	12	24,0%
• Less good (40-64,9)	9	18,0%
• Poor (<40)	23	46,0%
Total	**50**	**100%**

Source: Primary Data, 2024

This study shows that students in the health and non-health fields at Universities A, B, C, and D have varying levels of knowledge about DM. In health students, most respondents fell into the category of good knowledge level, with 25 students (49.0%). Meanwhile, the percentage of respondents with very good, poor, and good knowledge about DM was almost the same, namely 25.5%, 21.5%, and 4%. Meanwhile, among non-health students, most respondents fell into the poor knowledge category, with 23 students (46%). Meanwhile, the

percentage of respondents with very good, poor, and good knowledge about DM was almost the same, namely 12%, 24%, and 18%.

The majority of respondents were able to answer more than ten questions correctly out of all questions asked. More than half of the respondents (54.45%) had a good knowledge of diabetes mellitus. This study shows that most students with a good level of knowledge about diabetes mellitus are health students. Respondents showed variations in their knowledge about diabetes mellitus (DM), including basic information about DM, glycemic control, and preventing complications for people with diabetes mellitus (Supriyati et al., 2024). However, several aspects of respondents' knowledge should be improved in non-health students to increase their insight and knowledge related to diabetes mellitus.

Medical professional students need to become role models in a healthy lifestyle. Various studies have shown that healthy role models are very influential in encouraging people's healthy living behavior, including in efforts to prevent and control diabetes mellitus. Therefore, health workers, lecturers, and students in the health sector should be a good example of healthy living. This is in line with research conducted by (Kinivaldy et al., 2023) on students of the Faculty of Medicine, Udayana University, which involved 247 respondents. Of the total respondents, 91.5% showed good knowledge about diet as a risk factor for type 2 diabetes mellitus. In addition, 81.4% of respondents showed a good attitude towards a healthy diet. These results also align with research conducted by (Kholijah and Dewi, 2023), which states that students' knowledge about diabetes is influenced by the majors they choose. This fact is reflected in the fact that students from public health majors have a better understanding than students from non-public health majors.

Sugar Consumption Patterns in College Students

Table 3. Perbedaan Banyaknya Konsumsi Makanan Manis dalam Sehari

Number of Consumption in a Day	Frequency	Percentage
Medical Student		
• 1 Time per Day	27	52,9%
• 2 Time per Day	20	39,2%
• 3 Time per Day	4	7,8%
• More than 3 times a day	0	0%
Total	**51**	**100%**
Non- Medical Student		
• 1 Time per Day	20	40%
• 2 Time per Day	21	42%
• 3 Time per Day	5	10%
• More than 3 times a day	4	8%
Total	**50**	**100%**

Source: Primary Data, 2024

This study shows that students in the health sector choose to consume sweets more than once a day, as many as 27 (52.9%), while non-health students choose to consume sweets more than twice a day, as many as 21 (42%). Then, from the results of the study, there were no health students who chose to consume sweets more than three times a day, while in non-health students, there were 4 (8%) students who chose to consume sweets more than three times a day.

Table 4. Differences in Time of Consumption of Sweets in Medical and Non- Medical Students

Time of Consumption	Frequency	Percentage
Medical Student		

• Morning	9	17,6%
• Afternoon	32	62,7%
• Night	10	19,6%
• Before Sleep	0	0%
Total	**51**	**100%**
Non- Medical Studemt		
• Morning	5	10%
• Afternoon	31	62%
• Night	13	26%
• Before Sleep	1	2%
Total	**50**	**100%**

Source: Primary Data, 2024

This study shows that students in the health and non-health fields choose more time to consume sweets during the day, namely 32 (62.7%) health students and 31 (62%) non-health students. Most health and non-health students do not choose the time to consume sweets at bedtime, whereas no health students choose at that time, and only 1 (2%) students choose to consume sweets at bedtime.

This study shows that most students consume sugary foods or drinks daily. Consuming sugar during the day is often considered more enjoyable due to several factors related to physiology and eating habits. First, after lunch, the body usually requires additional energy to overcome the typical decline in stamina. Sugary foods can provide a quick energy boost, helping to improve focus and productivity. (Gorgom, 2024).

Table 5. Differences in Time of Consumption of Sweets in Medical and Non- Medical Students

Banyaknya Konsumsi Dalam Sehari	Frekuensi	Persentase
Medical Student		
• None	10	19,6%
• 1 Cup	35	68,6%
• 2-3 Cups	5	9,8%
• More than 3 Cups	1	2%
Total	**51**	**100%**
Non-Medical Student		
• None	10	20%
• 1 Cup	28	56%
• 2-3 Cups	9	18%
• More than 3 Cups	3	6%
Total	**50**	**100%**

Source: Primary Data, 2024

This study shows that students in the health and non-health fields mostly choose to consume sweet drinks in a day as much as one glass, namely 35 (68.6%) health students and 28 (56%) non-health students. There are 10 (19.6%) health students and 10 (20%) non-health students who choose not to consume sugary drinks daily. Then only 1 (2%) of health students and 3 (6%) of non-health students chose to consume more than 3 cups of sweetened drinks a day.

Another study showed that sugar consumption has become a daily habit for the community, with some respondents admitting to consuming coffee more than three times a day (Gani et al., 2023). Sugar consumption patterns are very relevant and critical in the knowledge of diabetes mellitus. Consuming excessive amounts of sugar has been found to have a direct

relationship with an increased risk of diabetes mellitus. As in this study, most respondents consume sugary foods or drinks at least once daily.

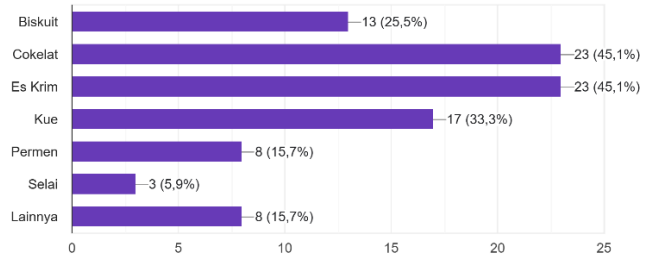

Figure 1. Types of Sweet Foods Most Often Consumed by Medical Students

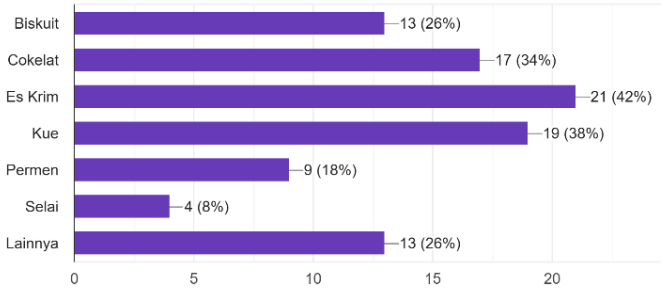

Figure 2. Types of Sweet Foods Most Frequently Consumed by Non-Medical Students

This study shows that students in the health and non-health fields choose ice cream as one of the sweet foods they consume most often, namely 23 (45.1%) in health students and 21 (42%) in non-health students. A total of 23 (45.1%) health students and 21 (42%) non-health students chose chocolate, then 13 (25.5%) health students and 13 (26%) non-health students chose biscuits. 17 (33.3%) health students and 19 (30%) non-health students chose cakes. A total of 8 (15.7%) of health students and 9 (18%) of non-health students chose candy, and the least selected food type was jam, with 3 (5.9%) of health students and 4 (8%) of non-health students. Then there were 8 (15.7%) health students and 13 (26%) non-health students who consumed other types of sweets.

In this study, it was found that the majority of students chose ice cream and Chocolate as the most frequently consumed foods. The main ingredient of ice cream is sugar, which plays a role in increasing blood glucose levels. Ice cream contains added sugars, such as sucrose or corn syrup, with high fructose content, which the body quickly converts into glucose. When consumed, the sugar is absorbed into the blood, increasing blood glucose levels (Ilmi et al., 2023). Meanwhile, Chocolate with a lower glycemic index tends to produce a higher blood sugar increase than Chocolate with a high glycemic index (Manaker, 2023). The most commonly consumed types of Chocolate are Milk Chocolate and White Chocolate, which contain 20-25% cocoa, have a high glycemic index, and can increase blood sugar. Dark Chocolate is the safest Chocolate to consume, which is pure dark Chocolate containing 70-90% cocoa, has a low glycemic index, and does not increase blood sugar levels. In addition, dark Chocolate can help maintain healthy blood vessels, improve blood circulation, and protect the body from type 2 diabetes. The flavonoids in dark Chocolate can reduce insulin resistance by helping the body's cells to utilize insulin more efficiently. (Ketahui 7 Manfaat Coklat Hitam yang Luar Biasa, 2022).ommonly consumed types of Chocolate are Milk Chocolate and White Chocolate, which contain 20-25% cocoa, have a high glycemic index, and can increase blood sugar. Dark Chocolate is the safest Chocolate to consume, which is pure dark Chocolate containing 70-90% cocoa, has a low glycemic index, and does not increase blood sugar levels.

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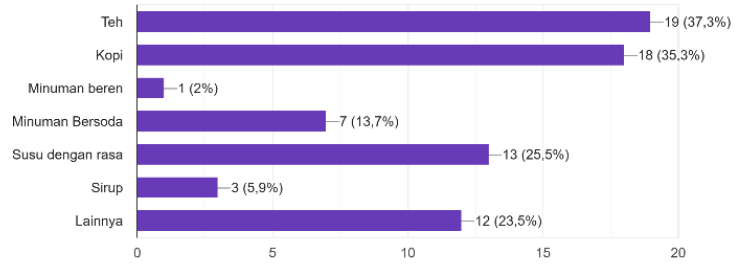

Figure 3. Types of Sugary Drinks Most Often Consumed by Medical Students

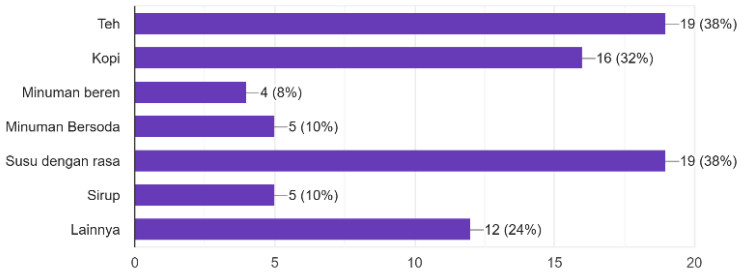

Figure 4. Types of Sugary Drinks Most Frequently Consumed by Non- Medical Students

This study shows that students in the health and non-health fields mostly choose instant/ready-to-drink tea as one of the sweetened drinks they consume most often, namely 19 (37.3%) health students and 19 (38%) non-health students. As many as 18 (35.3%) health students and 16 (32%) non-health students chose instant/ready-to-drink coffee, then as many as 13 (25.5%) health students and 19 (38%) non-health students chose flavored milk. A total of 7 (13.7%) health students and 5 (10%) non-health students chose soft drinks. A total of 3 (5.9%) health students and 5 (10%) non-health students chose syrup, and the least selected type of drink was energy drinks, with 1 (2%) health students and 4 (8%) non-health students. Then there are 12 (23.5%) health students and 12 (24%) non-health students who choose other types of sweet drinks to consume.

Most university students choose tea and coffee as their daily beverages. The majority of students consume ready-to-drink black tea with added sugar. Tea is safe to consume if it does not exceed 5 cups daily and should be drunk without added sugar. Meanwhile, green tea is well known for its many health benefits, one of which is controlling blood sugar levels (Among Many Types of Tea, Which One is Healthier? 2018). This aligns with research (Anoto, Basuki, and Setiyabudi, 2024), which showed that the average blood glucose level before consuming green tea was 287 mg/dL. However, after consumption, the average blood glucose level dropped to 242 mg/dL. According to (Meng et al., 2019), non-green teas, such as black tea, also regularly provide antioxidant and anti-inflammatory effects. White tea contains higher polyphenols and has better antioxidant activity than black tea. Yellow tea has been shown to improve glucose intolerance and insulin resistance without relying on a specific dose. Overall, different types of tea show potential antidiabetic effects, both in in vitro and in vivo studies.

Both caffeinated and decaffeinated coffee are associated with a reduced risk of developing type 2 diabetes mellitus in individuals who consume them. Instant powdered coffee sachets commonly consumed by the public contain an average of 8-23 grams of sugar per package, while coffee drinks in bottles, cans, or boxes contain around 12-32 grams per

package (Agrestryana, 2017). Research results (Mezza, 2021) show that coffee without added sugar, creamer, milk, or other sweeteners can reduce blood glucose levels in patients with type 2 diabetes mellitus. This is due to the content of compounds in coffee, such as caffeine, chlorogenic acid, cafestol, kahweol, magnesium, and trigonelin, which can help regulate the decrease in blood glucose levels. This finding aligns with research (Hariyadi et al., 2024), which states that coffee-drinking therapy can be an effective alternative treatment to reduce blood glucose levels in patients with diabetes mellitus.

CONCLUSION

This study shows that health students have a better DM knowledge level than non-health students, so education is needed. Health and non-health students have almost the same sugar consumption habits in terms of the amount and type consumed. The findings in this study indicate that health and non-health students need to be educated regarding a healthy diet.

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