RESEARCH ARTICLE

AWARENESS OF TYPE 2 DIABETES MELLITUS AMONGST NON -HEALTHCARE STUDENTS OF A UNIVERSITY IN MALAYSIA

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ABSTRACT

This study investigates the level of awareness about Type 2 Diabetes Mellitus (T2DM) among non-medical students at AIMST University, analysing the knowledge and misconceptions surrounding the causes, symptoms, and management of T2DM. The research aims to explore awareness differences across gender and ethnicity among students. Our sample size was 158 respondents, with participants being between 21-23 years of age from the faculties of engineering and business. Our study found that students possess varied levels of awareness, with the majority recognizing basic symptoms like frequent urination and thirst but many holding misconceptions about diet and exercise in managing diabetes. For example, a significant number mistakenly believe diabetes is best monitored by urine testing or that increased exercise heightens the need for insulin, highlighting the need for better health education. Only 65 out of 158 respondents (42%) were aware that diet and exercise are more important than medication to control Diabetes. Overall, this study identifies notable gaps in diabetes knowledge, emphasizing the importance of targeted educational strategies.

INTRODUCTION

According to the World Health Organization (WHO), diabetes mellitus is a chronic metabolic disease characterised by raised levels of blood glucose, which causes serious damage to the heart, eyes, blood vessels, nerves and kidneys in the long run. Prevalence of Diabetes Mellitus Worldwide & in Malaysia T2DM affects around 462 million people worldwide (6.28% of the world's population). Over the past two decades, the number of persons with diabetes mellitus in Southeast Asian nations has grown dramatically. China and India continue to have the highest overall number of people with this illness due to their greater populations (Khan *et al.,* 2020). According to a study by the International Diabetes Federation (IDF), the number of people with diabetes globally is predicted to rise from 451 million in 2017 to 693 million by 2045. Additionally, undetected diabetes affects almost 50% of the world's population. The Ministry of Health Malaysia estimates that 3.9 million adults, or 18.3% of the adult population, had elevated blood sugar levels in 2019. To track the clinical results of diabetics treated at the Ministry of Health (MOH) primary health clinics, the National Diabetes Registry (NDR) was established. According to NDR, 1,614,363 patients were registered, and 99.3% of them had Type 2 diabetes. The majority of diabetes in the NDR were (57.1%) Malays and 59.2% were females, with a mean age of 63 years. Malaysia has one of the highest diabetes prevalence rates in the Western Pacific, with a combined prevalence of 14.39%. (Akhtar *et al*, 2022)

Classification of Diabetes Mellitus: Diabetes mellitus is classified into Type 1 and Type 2. Type 2 diabetes is more common than Type 1 diabetes. Type 1 is an autoimmune disorder with sudden onset and usually affects younger people unlike Type 2 which is lifestyle related and usually develops gradually, and in older people.

Pathophysiology of Type 2 Diabetes Mellitus: Peripheral insulin resistance and relatively insufficient insulin production together create type 2 diabetes. Beta cells in the pancreatic islets of Langerhans make insulin. Due to elevated levels of pro-inflammatory cytokines in plasma, insulin resistance occurs. Insulin resistance causes less glucose being transported into the muscle, fat and liver cells and more hepatic glucose being produced. The reciprocal link between the glucagon-secreting alpha cell and the insulin-secreting beta cell is lost in type 2 diabetes mellitus. Due to this, hyperglucagonemia

develops, which increases hyperglycaemia as a result. Most overweight people have insulin resistance, although only those who are unable to substantially raise their insulin secretion to counteract their insulin resistance would develop diabetes. Beta-cell dysfunction develops early in the pathologic process of type 2 diabetes and does not necessarily follow insulin resistance. During the induction of insulin resistance (after a high-calorie diet, or physical inactivity), increased glucagon levels and increased glucose-dependent insulinotropic polypeptide (GIP) levels accompany glucose intolerance. However, the postprandial glucagon-like peptide-1 (GLP-1) response is unaltered initially (Bacha *et al*, 2013).

Numerous genetic variations that are linked to beta-cell function and insulin resistance have been discovered by genome-wide association analyses of single-nucleotide polymorphisms (SNPs), including those in the MTNR1B, FADS1, DGKB, and GCK genes. Genetic variations involving incretin hormones, which are secreted by endocrine cells in the gut and promote insulin secretion in response to food ingestion, may also have an impact on type 2 diabetes susceptibility. For instance, a variation in the gene that codes for the gastric inhibitory polypeptide receptor (GIPR) have been linked to decreased beta-cell activity. The insulin receptor gene (INSR) is significantly regulated by the high mobility group A1 (HMGA1) protein. The HMGA1 gene's functional variations are linked to a higher risk of developing diabetes. (Tsunoda *et al*, 2019). According to certain studies, the risk of future diabetes was at least 4 times higher in normoglycemic individuals with high fasting plasma concentrations of 3 amino acids (isoleucine, phenylalanine, and tyrosine). Concentrations of these amino acids were elevated up to 12 years prior to the onset of diabetes (Wang *et al*, 2020).

Risk Factors for Type 2 Diabetes Mellitus: Current studies show that abdominal obesity, family history of diabetes and being hypertensive contribute to progression of type 2 diabetes mellitus. (Zaki *et al*, 2018). Minority populations are also at higher risk, not only due to family history and genetics, but also because of poor dietary and exercise habits. There are also analyses that show gender, age group, ethnicity, marital status, obesity and hypertension are the risk factors which will lead to undiagnosed diabetes mellitus. (Ismail *et al*, 2016). Smoking has been linked to an increased risk of diabetes treatment, hospitalization, and mortality in both sexes. A study by Campagna *et al*, 2019 also stated that smoking might be a dangerous predisposition to pre-diabetes and diabetes as a whole. The close association between diabetes and hypertension is likely due to common processes including up-regulation of the renin-angiotensin-aldosterone pathway, oxidative stress, inflammation, and immune system activation. Additionally, according to several studies, long-term hypertension may raise the likelihood of developing insulin resistance. A high total cholesterol to high-density lipoprotein cholesterol (HDL-C) ratio, which is indicative of type 2 diabetes, has also been linked to worsening glucose tolerance, according to clinical research.

NEFA, glycerol, hormones, cytokines, proinflammatory chemicals, and other compounds that are involved in the development of insulin resistance are present in higher amounts in obese people. Additionally, it is well recognized that obesity alters the body's metabolism. Fat tissue releases free fatty acids and glucose into the circulation as a result of these changes. This has an impact on cells that are sensitive to insulin and lowers their sensitivity. Diabetes and physical inactivity are well-known to be related. A study demonstrates that engaging in any regular physical activity improves blood glucose regulation, preventing or at least postponing the onset of type 2 diabetes mellitus and there is strong evidence for an inverse association between physical activity and risk of type 2 diabetes, partly due to reduced adiposity. (Aune *et al*, 2015)

A growing body of research indicates that depression significantly increases the chance of getting type 2 diabetes mellitus. According to studies, the relative risk was 1.17 for women who reported having a sad mood and 1.25 for those who used antidepressants. Use of antidepressants may be a sign of more severe, persistent, or recurring depression, or antidepressant use itself may raise the risk of diabetes by affecting glucose homeostasis by encouraging weight gain. Conversely, type 2 diabetes mellitus has also been linked to an increased chance of developing depression. Patients with type 2 diabetes had twice as many depressive symptoms and serious depressive disorders as the general population. People who experience continuous stress (caused by things like work, family, chronic illnesses, recent physical or mental trauma, etc.) may release sympathetic hormones that cause cortisol and glucose levels to rise. Additionally, beta cells of the pancreatic Islets of Langerhans are known to stop functioning or function less efficiently under stress, which results in less insulin being produced. Type 2 diabetes risk has been connected to schizophrenia due to the use of second-generation antipsychotics that are linked to a higher risk of developing obesity and overweight. (Pan *et al* 2011).

Signs, Symptoms & Diagnosis of Type 2 Diabetes Mellitus: People with type 2 diabetes mellitus often complain of frequent urination (polyuria) and increased thirst (polydipsia). This is due to the increased filtration and excretion of excess sugar from blood into urine, by the kidneys. As polydipsia occurs, patients often experience increased thirst. Fatigue is caused by reduced utilisation of glucose by cells because of insulin resistance. Slower healing wounds and scar formation are also often notable as new cells responsible for healing and repair of old damaged tissue do not receive enough glucose for growth and proliferation. Diabetes also puts the body in a state of inflammation and decreases immunity leading to increased susceptibility to infections as well as longer recovery periods from diseases. Type 2 diabetes mellitus is commonly diagnosed after complete history taking and blood tests that reveal high pre and postprandial serum glucose levels, and raised HbA1c readings. (Sherwani *et al*, 2016)

Complications of Type 2 Diabetes Mellitus: With prolonged diabetes, atrophy of the pancreas may occur. One study (Kangrga, *et al*, 2016), looked at faecal elastase-1 measurements to confirm reduced pancreatic volume in individuals with a median 15-year history of diabetes mellitus (range, 5-26 years). The most prevalent abnormality of blood lipids in those with diabetes mellitus is hypertriglyceridemia. Serum triglyceride (TG) levels are associated with hyperinsulinemia caused by insulin resistance rather than only being elevated in proportion to the degree of hyperglycaemia. Low-density lipoprotein (LDL) contains free fatty acids (FFAs), which obstruct coronary arteries and lead to ischemic heart conditions like stable and unstable angina as well as myocardial infarction and stroke, because of atherosclerosis.

Long-term diabetics who have persistent hyperglycaemia may suffer damage to the capillary walls that supply oxygen and nutrients to their neurons, particularly in the legs. As a result, there may be tingling, numbness, burning, or pain, which typically starts at the tips of the toes or fingers and gradually moves upwards. Autonomic neuropathy may result in constipation, nausea, vomiting, diarrhoea, urinary retention, UTI and other digestive or urinary tract related issues. It might cause erectile dysfunction in men.

The blood-retinal barrier (BRB) disintegration and neurotoxicity that characterize diabetic retinopathy have been linked to oxidative stress and pro-inflammatory cytokines, which may function by activating their downstream target MAP kinase. The blood arteries supplying the retina are damaged by sugar in type 2 diabetes, which causes the blood vessels to leak fluid or bleed in the retina and macula. The eyes grow new, poorly functioning blood vessels to make up for these damaged blood vessels. These fresh blood vessels are also more prone to bleeding or leakage. Additionally, studies show that diabetics have an increased risk of cataract development (Shukla *et al*, 2023).

Renal blood vessels in the glomeruli are known to be harmed by diabetes, which impairs renal function and health. Similar effects are also caused by another diabetes's complication, hypertension. Proteinuria/albuminuria, a clinical indication of kidney impairment, is characterized by abnormal protein (albumin) excretion and is frequently observed in patients with long-standing type 2 diabetes. (Natesan *et al*, 2021)

Importance of Awareness on Type 2 Diabetes Mellitus amongst University Students in Malaysia: Awareness on type 2 diabetes mellitus among non-healthcare students is crucial in several ways. One of the many reasons to spread awareness on this chronic disease is to prevent more people from acquiring type 2 diabetes. Only by understanding what diabetes is, what causes it, and what raises one's risk of developing diabetes can we take steps to prevent it, as prevention is always better than cure.

Unlike healthcare professionals, who are taught about the disease and its consequences, people not from the healthcare field are less exposed to knowledge about diabetes. Thus, educating them via various methods could improve the understanding of causes and consequences of type 2 diabetes, including groups that are susceptible, complications of the disease, as well as symptoms to look for in prediabetes and diabetes. Next, through awareness of the condition, people from the non-medical backgrounds would be able to recognize early symptoms of type 2 diabetes. This allows for earlier intervention and more promising prognoses. Ensuring awareness among families can ensure that diabetic family members are well taken care of.

When the patient, as well as his/her family member(s) is well aware of diabetes, compliance to medication and proper diet control will improve. This improves the management of diabetes even among those who do not have a medical background.

METHODOLOGY

Despite the increasing prevalence of Type 2 Diabetes Mellitus, there is no research addressing the awareness of this condition among University students. This knowledge gap hinders efforts to develop effective educational strategies and preventive measures targeted at this specific population. It is important to investigate and compare the awareness of Type 2 Diabetes Mellitus among non-healthcare students at AIMST University. We compared the differences in awareness about Type 2 DM among male and female non-healthcare students, as well as racial differences in awareness.

Hypothesis: Non healthcare students in AIMST University lack awareness of Type 2 Diabetes Mellitus risk factors, causes and complications.

Research Questions

- What is the level of awareness of Type 2 Diabetes Mellitus (T2DM) and its risk factors?
- Is there a significant difference in this awareness among male and female non-healthcare students at AIMST University?
- Is there a difference in awareness among different races?

Study Design

This was a cross sectional study of different non-healthcare faculty students at one university in Kedah, Malaysia.

Inclusion criteria: AIMST Non-healthcare students (faculties of engineering and business)

Exclusion criteria

- Students from all healthcare faculties.
- Those who did not wish to participate in study.

Method of Analysis

The DKQ (diabetes knowledge questionnaire) was used to assess awareness. It is a valid measure for assessing diabetes knowledge. The DKQ-18 had satisfactory internal consistency (Cronbach's α= 0.732) (Hsieh *et al.,* 2022). The DKQ has three response options "yes", "no", and "don't know". One point is awarded for each correct option, whereas, no point or negative scoring for the incorrect option. Its scoring involves summing-up the points obtained by each participant. A higher score represents better disease knowledge. (Garcia, *et al.*, 2001).

The questionnaire was administered as a Google form online. It included a consent form and was self-answered. The questionnaire was randomly sent to every student from all years in the faculties of engineering and business until the sample size was achieved. Data was downloaded in excel and analysed.

Ethical considerations: Ethical clearance for the study was obtained from the University ethics committee. Only those who consented to take part in the survey were included in the study. In addition, no identifying data were collected.
Only the researchers had access to the data.

RESULTS

Age: The largest age group among the participants was 21-23 years (71), which suggests that the majority of the survey participants are in their early 20s.Other groups: 59 were between 18 to 20 years, and 28 were more than 24 years old.

Gender: The population is nearly evenly split between males (51.3%) and females (48.7%), with a slightly higher percentage of males.

Ethnicity: Indians made up the majority of respondents (50.6%), followed by the Chinese (25.3%) and Malay (23.4%) groups, with a very small representation of other ethnicities.

Faculty: 46.8% of respondents were from the Faculty of Engineering, 40.5% from the Faculty of Business, and 12.5% from other non-healthcare faculties.

Year of Study: Year 3 had the largest share of respondents at 32.3%, Year 2 were 23.4% of respondents and Year 5had the smallest visible share at 13.9%.

QUESTIONNAIRE

Category1. Knowledge of Diabetes Mellitus

1. Eating too much sugar and other sweet foods is a cause of diabetes.
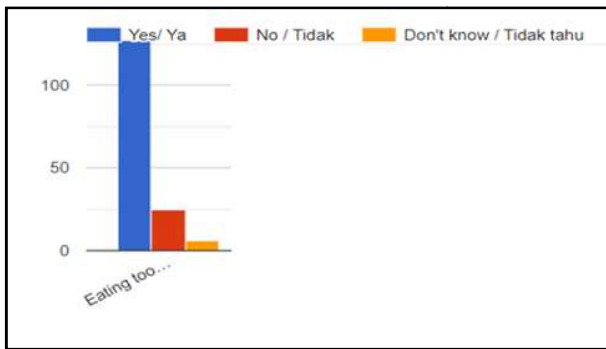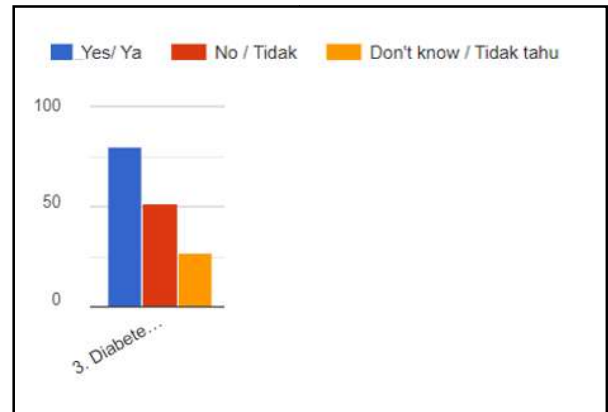

The bar graph illustrates the distribution of values across three different levels of awareness on the subject: Eating too much sugar and other sweet foods is a cause of diabetes. The bar graph shows that most respondents (total 127 respondents) had awareness and the least respondents (total 6 respondents) were not aware about the subject questioned.

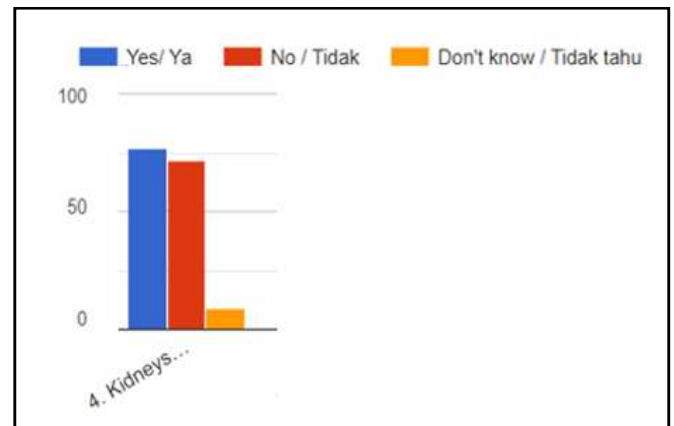2. The usual cause of diabetes is lack of effective insulin in the body**.**
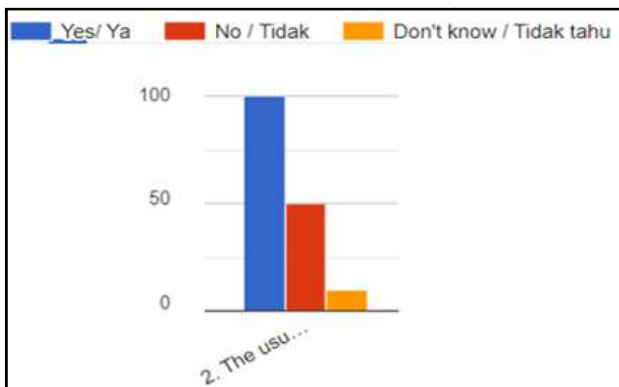
The bar graph shows the distribution of values across three different levels of awareness on the subject questioned, with most respondents (total 100 respondents) having awareness and the least respondents (total 10 respondents) not having awareness on the subject questioned.

3) Diabetes is caused by failure of the kidneys to keep sugar out of the urine.

The bar graph shows that most respondents (total 80 respondents) felt this was true while least respondents (total 27 respondents) were not aware on the subject questioned.

4) Kidneys produce insulin.

The bar graph shows the distribution of values across three different levels of awareness on the subject questioned, with most respondents (total 77 respondents) agreed and the least respondents (total 9 respondents) were unaware on the subject questioned.

5) There are two main types of diabetes: Type 1 (insulin-dependent) and Type 2 (non-insulin dependent).
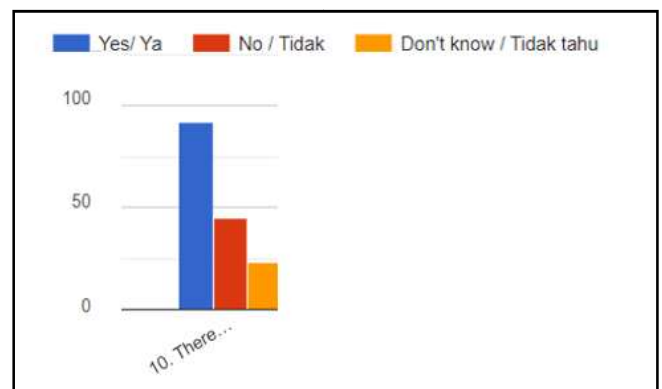
Most respondents (total 92 respondents) were aware and the least respondents (total 23 respondents) were unaware on the subject questioned.
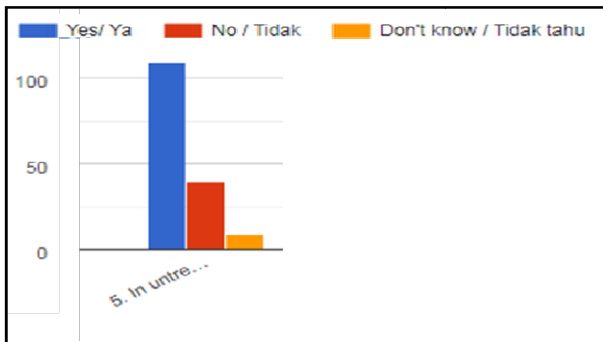
6) Diabetes can be cured.
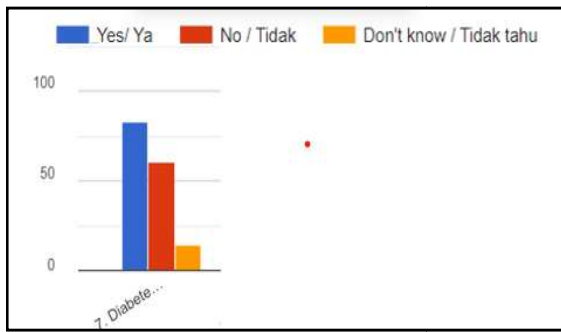
83 respondents felt diabetes cannot be cured and 14 respondents felt it could.

Category 2: Symptoms and Complications of Diabetes

1)In untreated diabetes, the amount of sugar in the blood usually increases.

The bar chart shows that while a large majority (109) of the respondents are aware of diabetes complications, a notable portion (49 people) still either lack awareness (40) or are unsure (9). This indicates that while the general awareness level is good, there's room for improvement, particularly in educating the smaller group that remains uninformed or uncertain.

2) Diabetes often causes poor circulation.
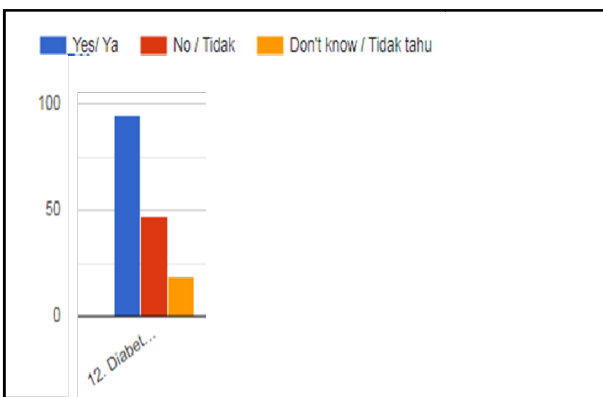
While the majority (95) are aware of the circulatory issues caused by diabetes, a significant number of respondents (66) are either unaware (47) or unsure (19). This indicates a need for further education to address the knowledge gaps among this group.

3) Cuts and abrasions on diabetics heal more slowly.
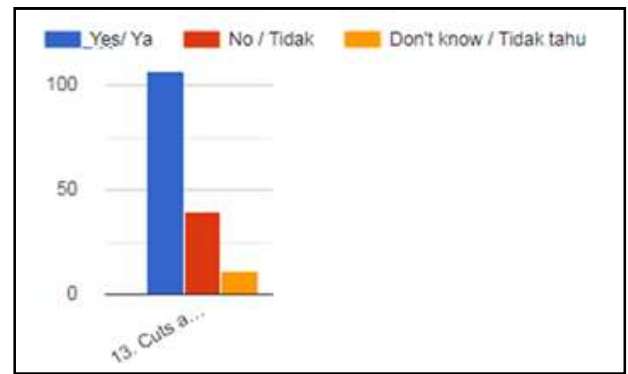
Most respondents (107) understand that diabetes slows down wound healing. However, 51 respondents lacked this knowledge, while 40were uncertain. This indicates that while awareness is high, some gaps in understanding persist and require additional education.

4) Diabetes can damage my kidneys.
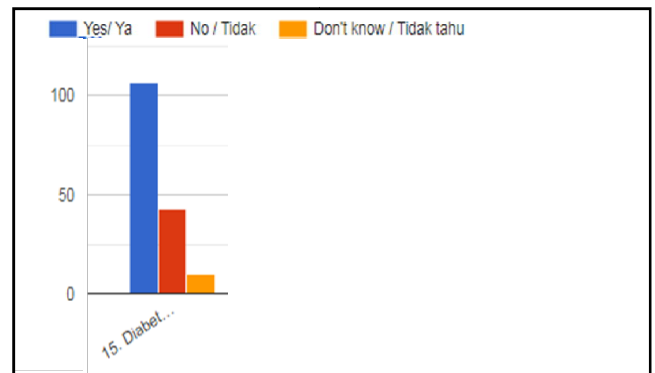
A majority of respondents (107) are aware of the risk of kidney damage from diabetes, but there is still a significant number (53) who either does not know (43) or are unsure (10). This suggests the need for ongoing education about the risks of diabetic nephropathy, particularly for those who remain uninformed.

5) Diabetes can cause loss of feeling in my hands, fingers, and feet.
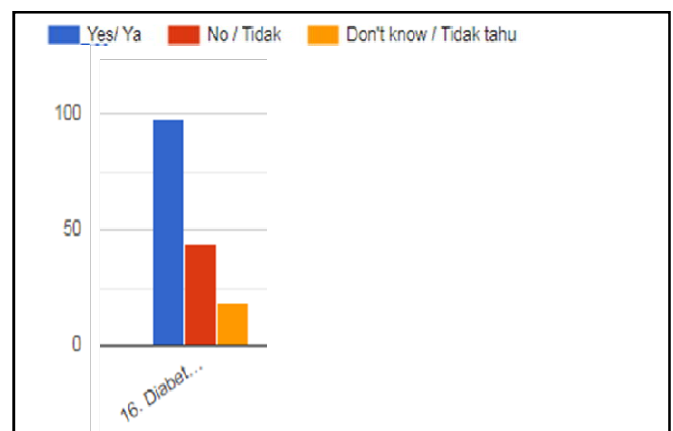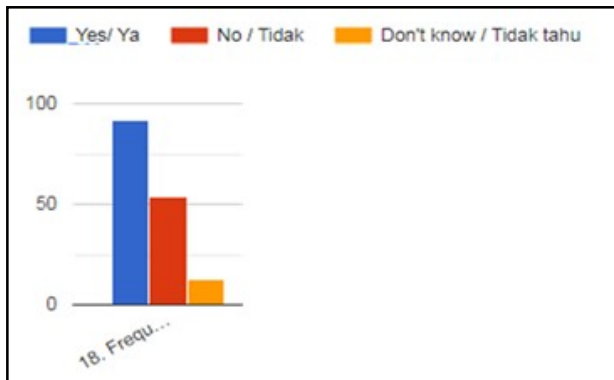

While most respondents (98) understand that diabetes can cause neuropathy, a considerable portion (63 respondents) still either lack awareness (44) or are unsure (19). This demonstrates the need to raise awareness of the neurological complications associated with diabetes.

6) Shaking and sweating are signs of high blood sugar.
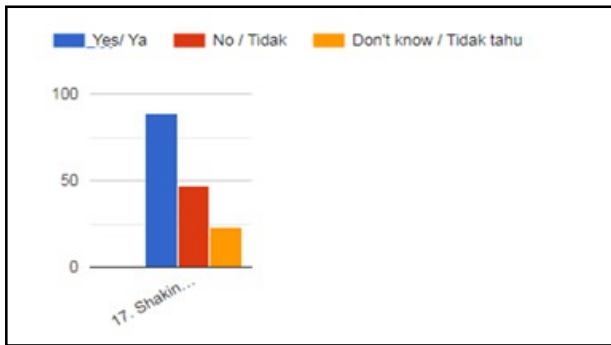
Shaking and sweating are typically signs of low blood sugar (hypoglycemia), not high blood sugar (hyperglycemia). The fact that 89 respondents incorrectly associate these symptoms with high blood sugar reveals a significant misunderstanding. Only 47 respondents correctly identified this, suggesting that more education is needed to clarify the differences between the symptoms of hypoglycemia and hyperglycemia.

7) Frequent urination and thirst are signs of low blood sugar.

Frequent urination and thirst are common symptoms of high blood sugar (hyperglycemia), not low blood sugar. The fact that 92 respondents mistakenly associate these symptoms with low blood sugar indicates a widespread misunderstanding. Only 54 respondents correctly disagreed, demonstrating that there is a need for better education to ensure people can accurately differentiate between the symptoms of hyperglycemia and hypoglycemia.

Category 3: Management and Prevention

1)If I am diabetic, my children have a higher chance of being diabetic.
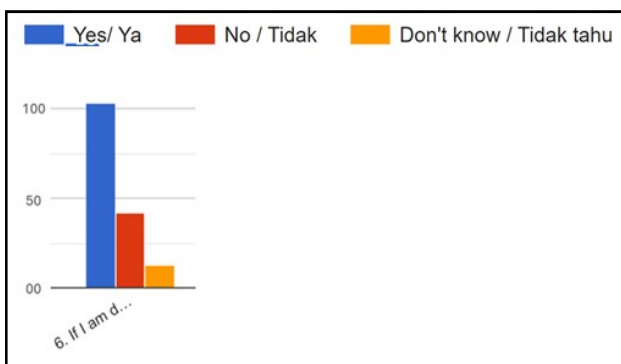
While most respondents (103) understand that diabetes can be inherited, a considerable portion (55 respondents) still either lack awareness (42) or are unsure (13). This demonstrates the need to raise awareness of risk factors.

2) The best way to check my diabetes is by testing my urine.
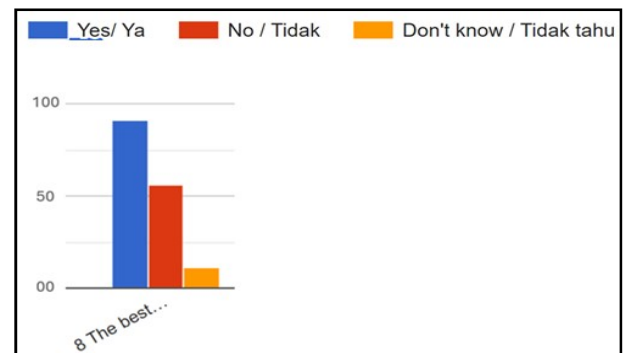
The most reliable way to check for diabetes is through blood sugar and HbA1c, not urine glucose test. The fact that 91 respondents mistakenly feel this is an accurate test to diagnose diabetes mellitus indicates a widespread misunderstanding. Only 56 respondents correctly disagreed, demonstrating that there is a need for better education on the diagnostic test for diabetes mellitus.

3) Regular exercise will increase the need for insulin or other diabetic medication.
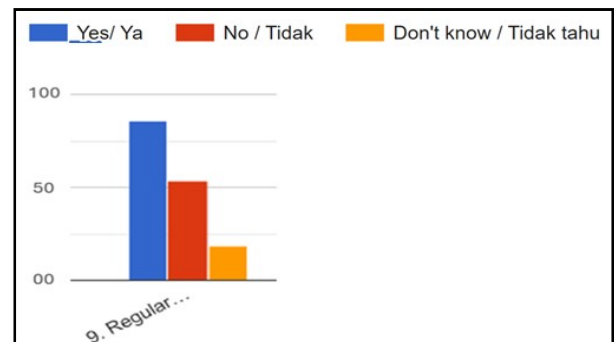
Regular exercise will not increase the need for insulin or other diabetic medication but improve insulin sensitivity, reduce blood glucose spike and weight management. The fact that 86 respondents mistakenly associate that as true indicates a widespread misunderstanding. Only 54 respondents correctly disagreed, demonstrating that there is a need for better education to ensure the benefits of regular exercise for managing and preventing diabetes mellitus.

4) Medication is more important than diet and exercise to control my diabetes.
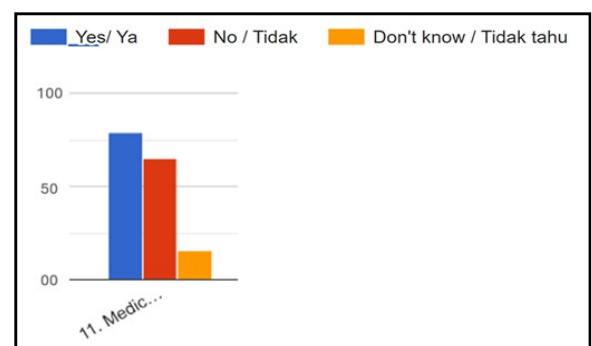
Although medication plays an important role, especially for individuals with advanced type 2 diabetes, diet and exercise are just as important. The fact that 79 respondents mistakenly associate that is true indicates a widespread misunderstanding. Only 65 respondents correctly disagreed, demonstrating that there is a need for better education to ensure the importance of diet, exercise and medication to manage and prevent diabetes mellitus.

5) Diabetics should take extra care when cutting their toenails.
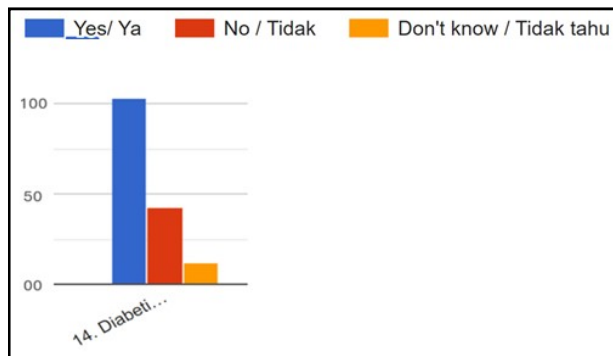
While most respondents (103) understand that minor injury can cause infection if it is not taken care of, which can lead to diabetic foot ulcer, a considerable portion (55 respondents) still either lack awareness (43) or are unsure (12). This demonstrates the need to raise awareness of the prevention of diabetic foot ulcer.

6) A diabetic diet consists mostly of special foods
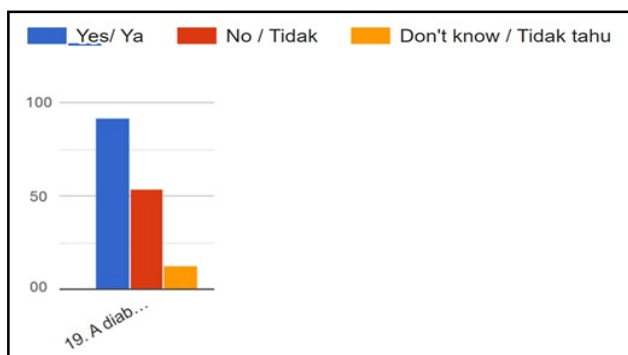
A diabetic diet does not consist of special foods but a healthy balanced diet. The key focus is on controlling blood sugar (glucose) levels, managing weight, and preventing complications. The fact that 92 respondents mistakenly associate that is true indicates a widespread misunderstanding. Only 54 respondents correctly disagreed, demonstrating that there is a need for better education to ensure the benefits of healthy balance diet to manage and prevent the complications of diabetes mellitus.

DISCUSSION

A total of 127 respondents out of 158 (equivalent to 82%) are aware that eating too much sugar and other sweet food is a cause of Diabetes Mellitus.

100 respondents (equivalent to 65%) have knowledge that the usual cause of diabetes is lack of effective insulin in the body.

80 respondents in total (equivalent to 52%) feel that Diabetes is caused by failure of the kidneys to keep sugar out of the urine; and only 72 out of 158 respondents (46%) are aware that insulin is not produced by the kidneys.

Type 1 is an autoimmune disorder with sudden onset and usually affects younger people unlike Type 2 which is lifestyle related and usually develops gradually in older people. According to our survey, majority of the respondents (92 out of 158) were aware that there are two main types of diabetes: Type 1 (insulin-dependent) and Type 2 (non-insulin dependent).

83 people out of 158 think Diabetes can be cured. Survey on awareness of symptoms and complication of Diabetes revealed that 109 out of 158 respondents (equivalent to 71%) are aware that in untreated Diabetes, the amount of sugar in the blood usually increases while 95 respondents know that Diabetes causes poor circulation.

Our survey revealed that 92 respondents felt that frequent urination and thirst are signs of low blood sugar. Diabetes has the potential to cause significant damage to the kidneys, leading to a condition known as diabetic nephropathy. Majority of respondents (107 out of 158) were aware of the harmful effects of Diabetes on the kidneys and another 107 respondents were aware that cuts and abrasions in diabetics heal more slowly. 98 respondents out of 158 (equivalent to 63%) knew that Diabetes can cause loss of feeling in the fingers and feet.

Also, 89 thought that shaking and sweating are signs of high blood sugar. Current studies show that family history of Diabetes besides obesity and hypertension is a risk factor of type 2 diabetes mellitus. A total of 103 respondents were aware that if they are diabetic, their children have a higher chance of being diabetic. 91 respondents thought that the best way to check for diabetes was by testing the urine.

Majority of respondents were not aware that regular exercise will decrease the need for insulin or other diabetic medication (only 54 respondents out of 158were aware). Only 65 out of 158 respondents (equivalent to 42%) were aware that diet and exercise are more important than medication to control Diabetes. A total of 103 respondents were aware that Diabetics should take extra care when cutting their toenails. Only 54 respondents (equivalent to 35%) knew that a Diabetic diet does not consist mostly of special foods.

CONCLUSION

Our study on T2DM awareness among non-medical University students in a Malaysian university highlights both areas of knowledge and significant misconceptions. Key findings among the 158 respondents who were 51.3% male, and 48.7% female, an almost balanced gender representation, were that 127 (80.4%) showed some awareness of T2DM's causes, while 31 (19.6%) either lacked awareness or held misconceptions. Additionally, 25.3% of Chinese students, 23.4% of Malay students, and 50.6% of Indian students participated, with the majority demonstrating similar levels of basic awareness but holding various misunderstandings about diabetes management and symptoms.

Awareness varied by gender, with approximately 82% of male and 79% of female students being aware of basic T2DM concepts, though both groups demonstrated gaps in understanding specific aspects, such as the role of kidneys in insulin production and the effects of physical activity.

These results underscore the need for ongoing education, particularly around common myths and misconceptions. Overall, 80.4% of students displayed basic awareness, while 19.6% demonstrated gaps that reveal opportunities for targeted interventions. By addressing these findings, AIMST University can foster an environment that emphasizes preventive health education, encouraging informed decisions about lifestyle and health practices.

RECOMMENDATIONS

T2DM is a growing public health concern, and raising awareness amongst young adults, particularly university students who are not studying healthcare-related fields, can help in early detection and prevention. It is essential to promote increased knowledge and understanding of this chronic condition. Some of the recommendations to improve awareness include:

1. Organize Regular Educational Workshops and Seminars: Educational campaigns should focus on informing students about the risk factors of T2DM, including obesity, sedentary lifestyles, and poor dietary habits, which are prevalent in many university settings. Workshops, seminars, and health talks can be organized to engage students and provide practical tips on maintaining a healthy lifestyle, balanced nutrition, and regular physical activity, which are crucial in preventing T2DM.

2. Peer-Led Health Awareness Initiatives: Encourage collaboration between healthcare and non-healthcare students by implementing peer-led awareness programs. Healthcare students can act as ambassadors or mentors to share knowledge with non-healthcare students through informal group discussions or mentorship programs. This approach will make the information more relatable and create a supportive environment where students feel comfortable discussing health topics and learning from their peers.

3. Digital Health Campaigns and Social Media Engagement: Utilize social media and university digital platforms to run health campaigns focused on T2DM awareness. Educational content such as infographics, short videos, and quizzes can be shared to engage students and spread information about the prevention and risk factors of diabetes. This online approach can reach a wider audience, allowing students to easily access information and resources at their convenience, fostering greater awareness.

4. Collaboration with University Cafeterias for Healthier Food Options: Partner with campus food services to provide healthier meal options and display nutritional information prominently. Meals with lower sugar content, high fibre, and balanced macronutrients can be highlighted as part of the diabetes prevention initiative. Educating students on making healthier food choices within the university dining spaces can have a long-term impact on their eating habits, promoting better lifestyle choices to reduce the risk of diabetes.

5. University Health Screenings and Risk Assessments: Organize regular health screenings that include checking blood glucose levels, BMI, and other risk factors associated with T2DM. These screenings should be open to all students, with counselors on hand to explain the results and provide personalized advice. By offering students the opportunity to assess their personal risk, this initiative promotes early detection and encourages students to take preventive measures if necessary.

6. Fitness Challenges and Active Lifestyle Promotion: Launch university-wide fitness challenges that encourage students to adopt an active lifestyle. Programs such as walking challenges, fitness competitions, or group exercise classes can help students increase their physical activity levels. Regular exercise is one of the key preventive strategies for T2DM, and promoting it through fun and competitive events can make staying active more appealing to non-healthcare students.

No Conflict of Interests.

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