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Knowledge and Attitude Towards the Management of People With Diabetes
Mellitus Among UNIMAS Undergraduate Nursing Students

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DECLARATION

I declare that the work in this thesis was carried put in accordance with the regulation of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.



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ABSTRACT

Diabetes mellitus (DM) has significantly reduced the quality of life and increased mortality as well as causing a global health burden, which require healthcare personnels, especially nurses, to be involved in the care of patients with DM. The previous studies have revealed gaps in nursing students' knowledge and attitude on DM management. This study aims to examine knowledge and attitude towards management of people with DM among UNIMAS undergraduate nursing students. A cross-sectional study was conducted among UNIMAS undergraduate nursing students. A total of 163 participants were selected through a simple random sampling. A structured item questionnaire adopted 23 items of the Diabetes Knowledge Test (DKT2) and 9 items of the Attitude towards Diabetes Questionnaire for data collection to assess level of knowledge and attitude towards DM management. The findings showed that majority (62%) of participants exhibited a moderate level of knowledge on diabetes management, with a total mean score was 14.79 ± 3.90 . Besides, majority (64.4%) of participants exhibited a positive level of attitude on diabetes management with a total mean score was 38.88 ± 3.56 . The analysis showed there was a weak positive correlation coefficient between the knowledge and attitude [$r_s(162) = .163, p < 0.05$]. The current study has highlighted a concern regarding moderate knowledge of DM management. Therefore, it is vital to emphasise the effort to overcome this issue through educational interventions such as material of education, workshops, training, and seminars to enhance the knowledge and attitude towards management of DM among nursing students.

Keywords: Diabetes mellitus, knowledge, attitude, management, UNIMAS

ABSTRAK

Diabetes mellitus (DM) telah mengurangkan kualiti hidup dan meningkatkan kadar kematian secara signifikan yang menyebabkan beban kepada kesihatan secara global dan memerlukan penglibatan petugas kesihatan, terutamanya jururawat, dalam pengurusan DM. Kajian-kajian lepas telah menunjukkan jurang dalam pengetahuan dan sikap pelajar kejururawatan terhadap pengurusan DM. Kajian ini bertujuan untuk menilai tahap pengetahuan dan sikap terhadap pengurusan pesakit DM dalam kalangan pelajar jururawat prasiswazah UNIMAS. Satu kajian keratan rentas telah dijalankan dalam kalangan pelajar jururawat prasiswazah UNIMAS. Seramai 163 orang peserta telah dipilih melalui pemilihan sampel secara rawak. Soal selidik berstruktur digunakan, melibatkan 23 soalan daripada Diabetes Knowledge Test (DKT2) dan 9 soalan daripada Attitude towards Diabetes Questionnaire bagi menilai tahap pengetahuan dan sikap terhadap pengurusan DM. Dapatan kajian menunjukkan majoriti peserta (62%) mempunyai tahap pengetahuan sederhana dalam pengurusan diabetes dengan skor min keseluruhan 14.79 ± 3.90 . Selain itu, majoriti peserta (64.4%) menunjukkan tahap sikap yang positif terhadap pengurusan diabetes dengan skor min keseluruhan 38.88 ± 3.56 . Analisis menunjukkan terdapat korelasi positif yang lemah antara pengetahuan dan sikap [$r_s(162) = .163, p < 0.05$]. Kajian ini telah menunjukkan kebimbangan terhadap tahap pengetahuan sederhana dalam pengurusan DM. Oleh itu, usaha perlu dipertingkatkan melalui intervensi pendidikan seperti bahan pembelajaran, bengkel, latihan, dan seminar bagi meningkatkan pengetahuan dan sikap pelajar kejururawatan terhadap pengurusan DM.

Kata kunci: *Diabetes mellitus, pengetahuan, sikap, pengurusan, UNIMAS*

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LIST OF ABBREVIATIONS

CME	Continuing Medical Education
CPD	Continuous Professional Development
DBKT	Diabetes Basic Knowledge Tool
DKT2	Diabetes Knowledge Test
DM	Diabetes Mellitus
DSRT	Diabetes Self-report Tool
EBP	Evidence-Based Practice
FMHS	Faculty of Medicine and Health Science
IDF	International Diabetes Federation
KAP	Knowledge-Attitude-Practice
NDR	National Diabetes Registry
SPSS	Statistical Package for Social Sciences
UNIMAS	Universiti Malaysia Sarawak

CHAPTER 1: INTRODUCTION

1.1 Introduction

The study will be conducted on the topic of knowledge and attitude towards the management of people with diabetes mellitus among UNIMAS undergraduate nursing students. The first chapter will explain the background of study and follow by the statement problem. In this section, research questions and research objectives will be further discussed along with the significance of the study, definition of terms and summary.

1.2 Background of Study

Diabetes mellitus is one of the chronic illnesses with the greatest rate of growth worldwide, which has a significant impact on both individuals and society (Sorensen, 2022). There are two types of diabetes which are categorised as Type 1 diabetes and Type 2 diabetes. Type 1 diabetes mellitus is due to autoimmune death of pancreatic beta cells. Type 2 diabetes mellitus occurs when the body becomes resistant to insulin and unable to produce enough insulin. As the prevalence of diabetes increases globally, it has threatened the health and well-being of society, at the same time affecting both mortality and morbidity over the years.

A recent global study highlighted that approximately around 643 million people worldwide, which is 11.3% of the population, suffer from diabetes mellitus, a serious health concern that is expected to increase to 783 million (12.2%) by 2045 (Hossain et al., 2024). The

International Diabetes Federation (IDF) has reported that the global impact of the disease is leading to a substantial concern for health care settings, as the estimated prevalence of diabetes will increase by 16% as the population ages. Due to the ageing population, middle-income nations are predicted to experience the greatest increase between 2021 and 2024 (Magliano et al., 2021). As a middle-income country, Malaysia is currently encountering junctures in its demographics, which are expected to involve an increasing ageing population in the future. Type 2 diabetes is more than ten times more common in people aged 60 than in those aged 20 to 29. The lowest prevalence of diabetes is in the age range of 20-29 (3.16%), while the 60 and above age group had the greatest prevalence (33.46%) (Akhtar et al., 2022). Besides, other studies by the National Diabetes Registry in 2023 have shown that there were 870,771 active diabetes patients in the NDR, and 1,698,683 people had signed up for the registry. The diagnosis of Type 2 DM was identified in 99.48% of the patients who were included in the NDR, the majority of diabetes patients were between 65 to 69 years old (Ramakrishnan & Khairul Amin, 2023). The outcomes of the prevalence study revealed the critical need for enhanced diabetes education and prevention initiatives in Malaysia.

In addition to an ageing population, there is the high prevalence of diabetes mellitus in populations across the world, which rapid urbanisation also contributed to other several factors, such as unhealthy diet and lifestyle changes. Urbanisation often causes a transition from traditional diets, which are high in grains, fruits and vegetables, to unhealthy diets, which are processed foods such as those with high sugars and fats. For instance, a study by Du et al., (2024) with over 13,000 middle-aged adults in a large US community-based has revealed that

there was a 2% higher risk of incident diabetes for each additional daily serving of ultra-processed food such as artificial sweetened beverages, ultra-processed meats and sugary snacks. Besides, urban environments often promote unhealthy lifestyles which lead to physical inactivity. A study by Strain et al., (2024) published in The Lancet Global Health stated the prevalence of physical inactivity increased approximately 31.3% in 2022 compared to 23.4% in 2000 among adults worldwide. According to the World Health Organisation (WHO) in 2024 reported that physical inactivity is a crucial risk factor for non-communicable diseases, including Type 2 DM. Therefore, rapid urbanisation that happens especially in developing countries causes a notable shift from traditional diets to high-calorie, processed meals at the same time a sedentary lifestyle with insufficient physical exercise leads to the rising of diabetes rate (Hossain et al., 2024).

As the first healthcare professionals at the bedside, nurses play a vital role in the care of patients with diabetes mellitus through monitoring, patient education and promotion of self-care of DM management. In addition, the role of nurses also addresses both physiological and psychological aspects of DM care. According to Alsolais et al., (2022) it is imperative to explore nursing students' level of knowledge towards DM to identify specific area that require improvement and ensure a high knowledge of diabetes care, as the foundation of nurses' knowledge is initially starting in the nursing programme. Therefore, to improve quality of care effectively, nursing education involvement is crucial in preparing future nurses who are knowledgeable and have clinical competencies in diabetes care.

1.3 Problem Statement

Diabetes has significantly reduced the quality of life and increased mortality as well as causing significant challenges in care, which cause a huge burden on societies throughout the world. Since diabetes is a common condition in the multiple countries, healthcare personnel need to be knowledgeable and aware of the disease. The treatment of diabetes has emphasised the demand for the patient to be involved in multiple collaborative approaches to address the complexities of the disease. Along with other healthcare professionals, nursing teams or specialist nurses are increasingly involved in the care of patients with diabetes mellitus. Educating people on self-management is important for successful diabetes management. Therefore, nurses are in a better position to care for and educate patients compared to other healthcare providers since nurses spend most of the time with patients (Dailah, 2021). In addition, nurses should comprehend the adverse effects, complications, and symptoms of diabetes mellitus since nurses have a vital role in patient care.

The holistic care of diabetes is vital to create a supportive environment to encourage adherence to the treatment and a better lifestyle. Poor nursing care for people with diabetes mellitus may result in serious complications and adverse health effects. According to the previous study by Chamine et al., (2022) it showed that the most common acute complications were infections, transient coronary artery ischaemia or myocardial infarction, metabolic abnormalities or abnormal blood glucose. Meanwhile, the chronic complications were endocrine

complications followed by neurological, renal, cardiovascular and ophthalmic complications (Chamine et al., 2022).

Nurses have a crucial role in educating and supporting patients and other healthcare professionals in providing patient care. Therefore, nurses who integrate knowledge, skills, and attitudes are necessary to provide comprehensive, safe, and effective care to the patient (Matlhaba et al., 2022). To prepare the nursing student to become a good, registered nurse in the future, it will be essential for nursing education to be improved or evolve rapidly throughout the years. A study by Ebere et al., (2023) found that nurses at Local Government Areas of Anambra State have poor knowledge on diabetes care (36.97%), which showed that there is a significant gap in knowledge that affects attitudes towards care. A study by Alsolais et al., (2022) among the nursing students in Saudi Arabia found that 7.3% of the nursing students scored poor knowledge toward diabetes mellitus, especially in relation to the patient's management, proper diet balance and how to administer insulin for diabetic patients (Alsolais et al., 2022). These topics are vital in patient education for both nurses and nursing students. Hence, to ensure that the nursing students obtained adequate knowledge to effectively manage diabetic patients, proper interventions need to be done, such as by providing additional education related to these topics.

Despite considerable diagnosis and management of diabetes mellitus among healthcare professionals. Research indicates that many healthcare workers, such as nurses, exhibit a negative attitude towards diabetes management, which may cause failure to achieve high-quality

therapeutic care. According to Oyewole et al., 2020 in Nigeria has shown that 48.9% of nurses exhibited a negative attitude towards the management of diabetic patients. For instance, a study by Asmar et al., (2024) showed that, although nursing students show a reasonable level of knowledge toward diabetes treatments, this study proved 60.6% of the nursing students had negative attitudes, which was unexpectedly high. Therefore, the management of diabetic patients plays vital roles in clinical settings, and the lack of favourable attitudes may hinder effective patient care.

Moreover, a study in Malaysia has revealed that there was disparity in DM knowledge and attitude among nurses, which hindered effective DM management. For instance, a study by Ng et al., (2020) assessing nurses' knowledge and attitude towards diabetic foot ulcers in Hospital Segamat found that (57%) scored a poor level of knowledge regarding foot ulcers and (72%) demonstrated poor knowledge of diabetes complications. This shows that there are still significant deficiencies in diabetes management knowledge and attitude, which may impact the quality of patient care. Therefore, it is essential to enhance continuous training and support among nurses to improve patient outcomes and quality of diabetes care (Kaur et al., 2024).

However, there are only a few studies that were conducted related to knowledge and attitude of care for diabetes mellitus. Efforts to prevent diabetes mellitus should be prepared in advance, which means emphasising knowledge or information related to diabetes mellitus through education. Effective patient care outcomes depend on the nursing students' attitudes and knowledge regarding the care and management of DM.

Despite these alarming statistics, there is a growing recognition of the need for comprehensive diabetes care and management, in which nursing students play significant roles in the management of patients with diabetes mellitus. The involvement of nursing students is crucial in fostering a positive attitude and gaining the level of knowledge that leads to better clinical skills. The research showed that there is still a significant gap for focused educational interventions among nursing students. Therefore, this current study is conducted to examine knowledge and attitude in the management of people with diabetes mellitus among UNIMAS undergraduate nursing students.

1.4 Research Questions

1. What is the UNIMAS undergraduate nursing students' level of knowledge towards the management of diabetes mellitus patient?
2. What is the UNIMAS undergraduate nursing students' level of attitude towards the management of diabetes mellitus patient?
3. What is the relationship between knowledge and attitude towards the management of patient with diabetes mellitus among UNIMAS undergraduate nursing students?

1.5 General Research Objective

To determine the level of knowledge and attitude towards management of people with diabetes mellitus among UNIMAS undergraduate nursing students.

1.6 Research Objectives

1. To assess the UNIMAS undergraduate nursing students' level of knowledge in the management of diabetes mellitus patient.
2. To assess UNIMAS undergraduate nursing students' level of attitude towards the management of diabetes mellitus patient.
3. To determine the relationship between knowledge and attitude towards the management of patient with diabetes mellitus among UNIMAS undergraduate nursing students.

1.7 Hypotheses

Null Hypotheses

- There is no significant relationship between knowledge and attitude towards management of patient with diabetes mellitus among UNIMAS undergraduate nursing students.

Alternate Hypotheses

- There is significant relationship between knowledge and attitude towards management of patient with diabetes mellitus among UNIMAS undergraduate nursing students.

1.8 Significance of the Study

The significance of the study is to provide additional insight into the knowledge and attitude among UNIMAS undergraduate nursing students on the management of people with diabetes mellitus. Since nurses provide the most hands-on patient care in healthcare settings, nurses should comprehend the adverse effects, complications and symptoms of diabetes mellitus since nurses have a vital role in patient care. This study is important since there is still limited research that has been made that is necessary to be utilised in future research in Malaysia. It has been proven that continuous education in diabetes management is important for adapting to evolving healthcare advances in technology and practice. Therefore, educational intervention among nursing students is essential to bridge the knowledge and attitude gap and prepare the students to enhance the good quality of patient care, which ultimately leads to better understanding and outcomes once they become registered nurses. The significance of the study regarding diabetes mellitus management is crucial for future research, as diabetes continues to impose on healthcare globally, and research efforts must be done to understand the illness and develop interventions.

1.9 Definition of Terms

1. Knowledge

Knowledge is defined in the Cambridge Dictionary as information or understanding about a subject that is acquired through study or experience that is either known by one individual or people widely. In this study, knowledge refers to the understanding individuals have regarding several aspects of the disease, including its symptoms,

adverse effects, treatment, complications, and management practices. The knowledge level will be assessed using the Diabetes Knowledge Test (DKT2), developed by Fitzgerald et al., (2016). The questionnaire consists of 23 items representing two sections: general knowledge and insulin use. Each of the items has multiple-choice answers; the correct answer will score as 1, and the incorrect answer will score as 0. The total score will be categorized into three cut-off points: low (1-11 correct answers), moderate (12-18 correct answers), and high (19-23 correct answers).

2. Attitude

As stated by the Britannica Dictionary, attitude is the process of thinking and feeling towards people, objects, or ways of thinking that influence a person's behaviour. (Britannica Dictionary, 2024). In this study, attitude encompasses an individual's feelings, behaviours, and beliefs towards diabetes and its management. The attitude will be assessed using a questionnaire by Redhwan et al., (2017). There are 9 items in the questionnaire regarding attitude towards diabetes mellitus. The total score level of attitude will be categorised into positive attitude ($\geq 50\%$) and negative attitude ($\leq 50\%$). A five-point Likert scale will be applied to this study: "strongly agree" as 5, "agree" as 4, "do not know" as 3 "disagree" as 2 and "strongly disagree" as 1.

3. Management

According to the Collins Dictionary, management is the control and organising of a business or other organisation. In this study, management related to nursing involves a multiple approach aimed at ensuring the delivery of high-quality patient care through effective organisation and proper coordination of resources.

4. Diabetes mellitus

According to the WHO, diabetes is defined as a chronic metabolic disease that is characterised by high levels of blood glucose (or blood sugar), which leads to serious damage to the heart, blood vessels, kidneys, eyes, and nervous system (World Health Organisation, 2024).

5. Undergraduate nursing students

According to Collins Dictionary, a nursing student is a person who was trained to be a nurse at a hospital or nursing institution. In this study, nursing students who enrolled in the Bachelor of Nursing with Honours programme at UNIMAS received nursing training to become nurses.

1.10 Summary

To summarize, this chapter discusses the background of study which provides an overview of context and the rationale for the research being conducted. It is necessary for nursing students to understand why it is important to broaden the academic landscape regarding this issue and highlights existing gaps which need to be addressed in this research. The problem statement has clearly defined the issue that leads to the formulation of research objectives and research questions. The significance of study was also explained in this chapter to review the aims of this study for the UNIMAS undergraduate nursing students. Lastly, the conceptual definition of term was derived from an online dictionary and further explain for each term meaning to enhance the clarity and understanding of research topic, while the operational definition also included to define clearly with precise explanation of how variables will be measured in this study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In this chapter, the literature review will be further discussed to establish the overview of the knowledge and attitude towards management of diabetes mellitus among UNIMAS undergraduate students. This section will explain more about research questions and research objectives. Several online databases have been adopted from several sources for literature review, such as Google Scholar, PubMed, ResearchGate, MDPI, and other sources. The articles were chosen by the year of publication within 2020 and 2025, which obtained the most recent and updated published literature. There are eight articles found related to the research. The keywords used to find the relevant information are “knowledge”, “attitude”, “management”, “diabetes mellitus” and “nursing students”.

2.2 Knowledge Towards the Management of People With Diabetes Mellitus

Nurses play a pivotal role in educating patients about management of diabetes mellitus to improve clinical outcomes and quality of life (Anih Kurnia et al., 2024). Hence, the knowledge related to this chronic condition, such as diabetes, helps in improving health literacy, especially among nursing students. The findings indicate that enhancing and existing nursing students' knowledge is essential for improving the disease not only in terms of management but also fosters competent care and addressing the diverse attitudes towards care that lead to effective patient care with diabetes.

A cross-sectional study by Asmar et. al. (2024) investigated the level of knowledge and sociodemographic factors towards diabetes mellitus among the undergraduate bachelor's degree students from different specialities at Birzeit University, Palestine. There were 579 students who participated in a structured, self-administered questionnaire in this study. Most of the students (78%) showed a good level of knowledge, while (22%) had a poor knowledge level related to diabetes mellitus. The results offered important insights on public health strategies to provide effective prevention initiatives focused on modifiable risk factors toward DM management.

Besides, a cross-sectional study by Orok et al., (2024) examined the knowledge of diabetes mellitus among university students in southwestern Nigeria, highlighting the importance of knowledge, attitude and perceived risk related to DM. The study conducted a semi-structured online questionnaire among 349 university students from four different universities. The findings showed that 27.8% of the students had poor knowledge, 47.0% had fair knowledge, while 25.2% had good knowledge of diabetes mellitus. The research concluded that there was a need for education through a health programme and campaign to improve the knowledge of diabetes among the university students. Therefore, the findings demonstrated that the proportions of nursing students with fair knowledge of DM remain concerning, which may hinder the prevention of risk related to DM.

Research in Saudi Arabia by Alsolais et al. (2022), a descriptive, cross-sectional study, was done to examine the predictors of assessed and actual knowledge related to diabetes mellitus among undergraduate nursing students who enrolled in Hail University and Shaqra

University. The study was conducted among 330 undergraduate nursing students with a convenience sample by using the Diabetes Self-Report Tool (DSRT) and Diabetes Basic Knowledge Tool (DBKT). The findings showed that 43% of 348 undergraduate nursing students who participated in this study had a fair knowledge level of diabetes mellitus, 27.6% showed they had good knowledge, while 22.1% had excellent knowledge and 7.3% had poor knowledge of diabetes mellitus. These findings serve as an important basis for the development and implementation of educational interventions to ensure adequate diabetes-related knowledge among nursing students.

In addition, a study by Isa et. al. (2020) among health science students in UITM Puncak Alam, Selangor was done to determine the level of knowledge of diabetes mellitus type 2. A cross-sectional study using the Diabetes Knowledge Questionnaire-24 and the Attitude towards Diabetes Mellitus Questionnaire with 400 respondents was participated in among full-time degree and diploma health science students. The study proved that majority (58.5%) of the participants had moderate knowledge, 36.8% participants had good knowledge, while 4.8% obtained poor knowledge. Through this finding, it showed that half of the participants had moderate knowledge of diabetes mellitus. Thus, the findings emphasised the need to implement educational interventions regarding DM management into nursing curricula or awareness campaigns to ensure that the students are equipped with knowledge to manage and educate patients effectively.

Despite the moderate knowledge score among students, a study done in the Northwest of Iran by Farzaei et. al. (2023) examined nurses' knowledge of nutritional management of diabetes mellitus. The cross-sectional study consisted of 160 nurses from two tertiary teaching hospitals. The findings found that majority (61.2%) of nurses showed moderate knowledge related to diabetes mellitus and highlighted a need to improve the educational framework. The significant difference in level of knowledge, attitude and practice in DM management reflects the need for educational interventions and training strategies.

In contrast, a cross-sectional study by Gazzaz (2020), which investigated knowledge of DM management among university students at King Abdulaziz University, Saudi Arabia. There were 1428 registered foundation-year students from the Faculty of Medicine who were involved in the study. A study showed that 13% had a good knowledge score, 39.8% had a moderate knowledge score, while most of the students that scored poorly 47.1% were students who had not suffered from diabetes mellitus. Those who do not suffer from illness frequently have limited knowledge of diabetes mellitus. The finding revealed that a significant percentage of students have poor knowledge and awareness about diabetes, which is a serious health concern worldwide. Therefore, awareness campaigns should be emphasised to improve the knowledge and attitude among young generations regarding DM.

Based on a study by Alsolais et. al., (2022) who focused on nursing students, while Orok et. al., (2024) among the university students who enrolled in healthcare-related courses such as pharmacy and medicine, showed a similar trend in knowledge of diabetes mellitus management,

which both studies had a fair level of knowledge. University students exhibit a fair level of knowledge regarding diabetes mellitus (DM), influenced by various demographic and educational factors. Thus, students who were taking healthcare-related courses generally possessed a higher level of knowledge related to diabetes mellitus compared to those in non-healthcare fields. This has been demonstrated by students who from health courses, showed adequate knowledge regarding diabetes care, particularly in nursing and physical education programmes (Alice et al., 2022).

In conclusion, even though the majority of university students in these studies were aware of diabetes mellitus, only a small percentage of them demonstrated good knowledge about the disease to be effectively managed (Orok, 2024 & Gazzaz, 2020). There is similarity shown where the students had correctly defined through the questionnaire that diabetes may be avoided and managed with regular exercise and a balanced diet. Besides, the university students believed that diabetes could be managed with insulin, medications, consistency, and a healthy diet. (Asmar, 2024 & Orok 2024)

2.3 Attitude Towards the Management of People With Diabetes Mellitus

Five studies reported on attitudes towards diabetes mellitus that were investigated by determining their points through the questionnaire. Most of the studies show a positive attitude toward diabetes mellitus management. Interestingly, one study found that the students showed a relatively higher negative attitude than a positive attitude towards diabetes.

According to the study by Orok et. al. (2024) stated that more than 50% showed a positive attitude towards diabetes mellitus. Most of the participants exhibited a positive attitude related to the disease due to the high level of awareness, and the participants obtained fair and good knowledge toward diabetes mellitus management. This can be compared to a study from Selangor, Malaysia, by Isa et al., (2020) among the health science students that showed positive results regarding attitude towards diabetes mellitus type 2. According to the findings, most of the participants scored 98% of positive attitude towards diabetes mellitus, which was more than 50% of the overall score (Isa et al., 2020). Therefore, it is important to possess a positive attitude towards diabetes in order to enhance the implementation of preventive strategies for chronic illness such as DM.

A study by Gazzaz et al., (2020) reported that 83.3% of the participants, which was more than half of the participants, had positive attitudes, while 16.7% of participants had negative attitudes regarding diabetes mellitus management. Unexpectedly, even though the knowledge score was poor, the attitudes were more positive. In addition, a study by Farzaei et al., (2023) showed that majority (86.92%) of participants exhibited positive attitudes. While 13.08% of participants demonstrated negative attitudes due to lack of personal experience or low health-related literacy towards management of diabetes nutrition.

In contrast, research by Asmar et al., (2024) on university students from Birzeit University, Palestine, indicated that from 579 students, 60.6% of students showed negative attitudes, while only 39.4% showed positive attitudes towards diabetes. Despite having good

knowledge of diabetes, majority of university students had a poor attitude towards the disease. Most of the students preferred to control the blood sugar levels in type 2 diabetes alone with diet, while some students preferred to control it through both diet and medications. Moreover, most of the students do not know that metformin does not cause kidney damage. The findings indicate a significant negative attitude among university students, despite their good knowledge of DM. Therefore, this study suggested the need to address the misconceptions, beliefs and perceptions through attitude-focused educational strategies among university students.

2.4 Relationship between knowledge and attitude towards management of Diabetes Mellitus

There are only a few studies that have been conducted to determine the relationship between knowledge and attitude towards the management of patients with diabetes mellitus among undergraduate nursing students.

According to a study by Asmar et. al., (2024), a Pearson correlation test was used to assess knowledge and attitude toward diabetes mellitus management. The finding showed that the correlation between knowledge and attitude of diabetes mellitus management was significantly positively correlated ($r_s=0.178, p < 0.001$). In this study, the researchers concluded that the students were more likely to adopt positive attitudes towards managing diabetes if they demonstrated more knowledge regarding its contributing factors. Therefore, the research emphasised that improving the educational exposure towards diabetes could enhance and foster more engagement and good health perspectives towards DM management.

Moreover, there are similar trends shown from a study by Isa et al., (2020) among health science students revealed that the relationship between knowledge and attitude score is significant ($r_s = 0.210, p < 0.001$) (Isa et al., 2020). By using the Pearson correlation test, there was a positive correlation between knowledge toward diabetes and attitude toward diabetes management. Therefore, this study has proven that knowledge is the vital factor that could be improved through educational interventions which contribute to more supportive and responsible attitude towards diabetes mellitus.

In addition, a study by Oyewole et al., (2020) in Nigeria investigated the association between knowledge and attitude of diabetes mellitus care among nurses. By using the Chi-square test, the findings showed that there was no significant association between knowledge of diabetes mellitus management and attitude of diabetes mellitus management ($1,88 = 1.592, p = 0.28$). The findings showed that the assumption of knowledge alone was sufficient to influence the attitude and may not contribute to the relationship between knowledge and attitude towards diabetes care, but it may imply that other factors, such as workload, clinical experience or personal beliefs, can shape the attitudes in managing diabetic patients. Therefore, it is crucial to explore in more depth the factors associated with nurses' knowledge in the care of patients with diabetes mellitus.

Lastly, a cross-sectional study by Hu & Jiang (2024) was conducted in China to investigate the knowledge, attitude, and practice of nurses in diabetes mellitus management, in which the Chi-square test was used to conduct this study. The finding showed that there was a

significant association between knowledge and attitude toward the comprehensive management of diabetes mellitus. The researchers stated that nurses who are knowledgeable were more likely to exhibit a positive attitude ($p < 0.001$). Through the findings, it was revealed that the level of knowledge not only enhanced clinical skill but also influenced the attitude of nurses to engage in patient care in diabetes management. Therefore, the study highlights the need for continuous education to improve the level of knowledge and may contribute to more good attitudes that lead to better patient outcomes.

To conclude, there are still obvious gaps regarding knowledge and attitude towards diabetes management since the study has been conducted generally or among patients with diabetes only, but very few studies have been conducted in Malaysia, especially among undergraduate nursing students. The management and burden of diabetes mellitus are strongly affected by individuals' attitudes towards its complications and extend to the disease itself.

2.5 Theoretical Framework

Knowledge-Attitude-Practice (KAP) Model by Schwartz (1976) will be applied in this study. This KAP model is a framework that has been utilised in public healthcare to assess knowledge that influences attitudes and practices, especially in managing illnesses such as diabetes among healthcare professionals. According to Schwartz (1976), there are correlations between knowledge and attitude, knowledge and practice, and attitude and practice. However, within the KAP model, it will be applied to assess the association between knowledge and attitude, providing structured insights into the management of patients with diabetes mellitus.

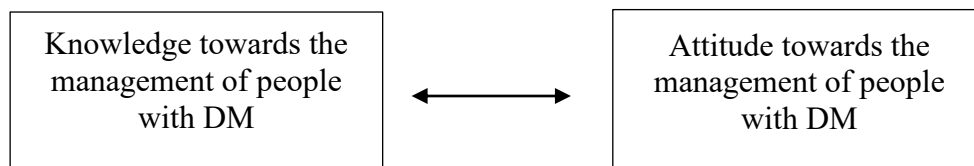
Thus, this model posits that increased knowledge will lead to positive attitudes, which subsequently improve health outcomes.

2.6 Conceptual Framework

The conceptual framework in this study represents the relationship between knowledge and attitude towards the management of people with diabetes mellitus. Research has supported that enhancing the knowledge will significantly improve attitudes towards patient care management. Therefore, through this conceptual framework, a better level of knowledge towards the management of DM is more likely to demonstrate a positive attitude, which ultimately may improve the patient care.

Figure 2.2

Conceptual framework



2.7 Summary

In conclusion, knowledge and attitude towards management of people with diabetes mellitus among nursing students are still not fully discovered yet. The studies that have been conducted in other countries only focused on nutritional management of diabetes mellitus and did not explore general management, especially among nursing students. Thus, the current study aims to contribute new findings of the knowledge and attitude towards management of people with diabetes mellitus among UNIMAS undergraduate nursing students in Faculty Medicine and Health Sciences, UNIMAS.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The research objectives are fully discussed and accomplished through the methodology of this chapter. This chapter includes research design, research setting, inclusion and exclusion criteria, sampling method and sample size, ethical consideration, study instrument, data collection procedure, limitation, data analysis, and the summary of the chapter.

3.2 Research design

A quantitative design method was used for this research project. Quantitative research involves systematic studies that measure variables and use statistical methods to analyse associations. This method aims to support the researchers in generalising the result from a sample to a broader population by providing empirical evidence (Mohajan, 2020). In quantitative research, research questions are often formulated at the beginning of the study and inquire about the association between variables being investigated.

A cross-sectional study was applied to conduct this study at Universiti Malaysia Sarawak (UNIMAS). Cross-sectional studies are observational studies that examine data from a population at one time, making this research design more time efficient and capable of providing immediate insight into the targeted population (Wang & Cheng, 2020).

3.3 Research settings

This study was conducted at the Faculty of Medicine and Health Science (FMHS) of UNIMAS in Kota Samarahan, Sarawak. This study involved the undergraduate nursing students from Year 1 until Year 4 in the faculty. The Bachelor of Nursing programme currently has fifty-one Year 1 students, sixty-three Year 2 students, fifty-seven Year 3 students, and sixty-four Year 4 students. The total population for all UNIMAS undergraduate nursing students will be 235 nursing students.

3.4 Sampling method and sample size

This study was using simple random sampling, which was commonly used in quantitative design for participant selection among undergraduate nursing students in UNIMAS. Simple random sampling is a method that provides each member of a population an equivalent opportunity of being chosen to suggest a generalised estimator of population variance (Soni & Pandey, 2023). This method is commonly used for its simplicity and effectiveness in generating an unbiased sample that represents the whole population. All lists of names of Year 1 to Year 4 undergraduate nursing students were selected randomly among 235 nursing students through Microsoft Excel. The list name of each year of students was entered into Microsoft Excel, using the formula to select a random sample or list name, which also ensured there was no repeating name from the list. By using the formula “=RANDBETWEEN ()” in Excel, at least 41 participants were randomly selected for this study.

The Taro Yamane formula (Yamane, 1973) was used to determine the research sample with a 95% confidence level.

- The calculation step using Yamane's formula:

$$n = \frac{N}{1 + Ne^2}$$

where, n = the sample size required

N = the size of population, which is equivalent to 235, whereas

e = the allowable error (%), equivalent to 0.05

The calculation for the sample size is shown below

$$\begin{aligned} n &= \frac{235}{1 + (235)(0.05)^2} \\ &= 148.03 \\ &= 148 \end{aligned}$$

Adding a non-response rate of 10%

n = 148 + 10% x number of sample size

n = 148 + (0.1) (148)

n = 162.8

n = 163

Based on the calculation, the total sample size needed for this study is 148 participants. 10% of the participants who dropped out were considered, with 163 participants for the final sample. This is to make up for participants who did not respond or were uncountable. The research did not include data from the pilot study's participants.

3.5 Inclusion and exclusion criteria

3.5.1 Inclusion criteria

The study included the first- to fourth-year undergraduate nursing students from Universiti Malaysia Sarawak (UNIMAS), who were actively enrolled for the programme.

3.5.2 Exclusion criteria

This study excluded the post-registration students who enrolled for Bachelor of Nursing with Honours to prevent biases that occurred during the research process.

3.6 Research Instrument

In this study, data was collected by using a structured questionnaire (refer Appendix D), comprised of three sections, which include Section A, Section B, and Section C. Section A is to gain the demographic information of the participants, which consists of (age, gender, year of study, and family history of DM).

In Section B, there are a total of 23 items to examine the level of knowledge towards the management of people with diabetes mellitus adapted from the Diabetes Knowledge Test (DKT2) by Fitzgerald et al., (2016). The first part of the questionnaire is general knowledge, which consists of 14 items, and the second part is insulin use with 9 items. Each right answer received a score of 1, while a wrong answer received a score of 0. To measure the level of knowledge, the cut-off points will be adapted from Zowgar et al., (2018), who also use the same

questionnaire for their research. The total score was categorised into the three categories: low (1-11 correct answers), average (12-18 correct answers), and high (19-23 correct answers). Written permission from the authors was obtained to adapt and modify the questionnaire which was suitable for the current study (refer Appendix C).

Lastly, Section C measures the attitude level towards the management of people with diabetes mellitus, which the questionnaire was adapted from Attitude towards Diabetes Questionnaire by Redhwan et al., (2017). There are 9 items in the questionnaire that use a 5-point Likert scale for each item. Participants were required to answer the questions from item 1 until 9 and tick the answer that describes their attitude towards diabetes. For "strongly agree" marks were given as 5, while "agree" as 4, "do not know" as 3 "disagree" as 2 and "strongly disagree" as 1. The minimum scores (less than 50%) on the Likert scale indicate a negative attitude, while the maximum scores (more than 50%) indicate a positive attitude towards diabetes mellitus management.

3.7 Ethical consideration

Before conducting the study, the ethics approval has been obtained from the Research and Ethics Committee of the Faculty of Medicine and Health Sciences. The questionnaire was filled out by the participants after the consent form was signed prior to the participants in this research. Participants in this study were voluntary, and they were free to withdraw from this study without penalty (refer Appendix B). This study maintained the confidentiality and

anonymity of the participants. The permission to use and modify the survey instrument for this research was obtained from the original authors (refer Appendix C).

3.8 Data collection procedures

3.8.1 Pilot study

The pilot study was conducted before the actual data collection had been done. 10% of participants were chosen for the purpose of the pilot study, as the number of participants required for the pilot study was recommended by Hertzog (2008). The total number of participants for the pilot study was 16 participants. The participants in the pilot study were excluded from the actual study. Face validity was utilised in this pilot study. According to Allen et al., (2023) face validity is defined as the degree to which the respondent perceives the relevance and appropriateness of the test's content. The face validity of this pilot study was measured and discussed with the supervisor before distributing the pilot study's questionnaire. This pilot study has provided some feedback, where the participants have commented that the content of the questionnaire was systematic and well-structured and that they were able to understand the instructions and questions very well. Therefore, this pilot study had proven a high face validity.

The reliability of the questionnaire was analysed for the pilot study research data by using Statistical Package for Social Science (SPSS) version 27. A Likert scale questionnaire that measures the knowledge and attitude level toward diabetes mellitus was using Cronbach's alpha. Cronbach's alpha is an important statistical measurement to assess the reliability of research instruments in questionnaires. By ensuring the items consistently test the same construct, Cronbach's alpha enhances the validity of the research tools. According to George and Mallery

(2021), a Cronbach's alpha coefficient below 0.50 indicates unacceptable, 0.50 is poor, above 0.60 is questionable, above 0.70 is acceptable, above 0.80 is good, and above 0.90 is excellent (refer Table 3.8). In this pilot study, the Cronbach's alpha for the Diabetes Knowledge Test (DKT2) was 0.82; meanwhile, for the Attitude towards Diabetes Questionnaire, it was 0.80. Thus, both questionnaires presented good reliability for this research.

Table 3.8

Cronbach's Alpha Value

Cronbach's Alpha	Internal Consistency
$\alpha \geq 0.90$	Excellent
$0.80 \leq \alpha < 0.90$	Good
$0.70 \leq \alpha < 0.80$	Acceptable
$0.60 \leq \alpha < 0.70$	Questionable
$0.50 \leq \alpha < 0.60$	Poor
$\alpha < 0.50$	Unacceptable

Note: Source by George & Mallery (2021)

Therefore, to achieve the research objectives and ensure the quality of the instruments, it is a crucial process for researchers to select the instruments or consider creating the new ones (Taber, 2018).

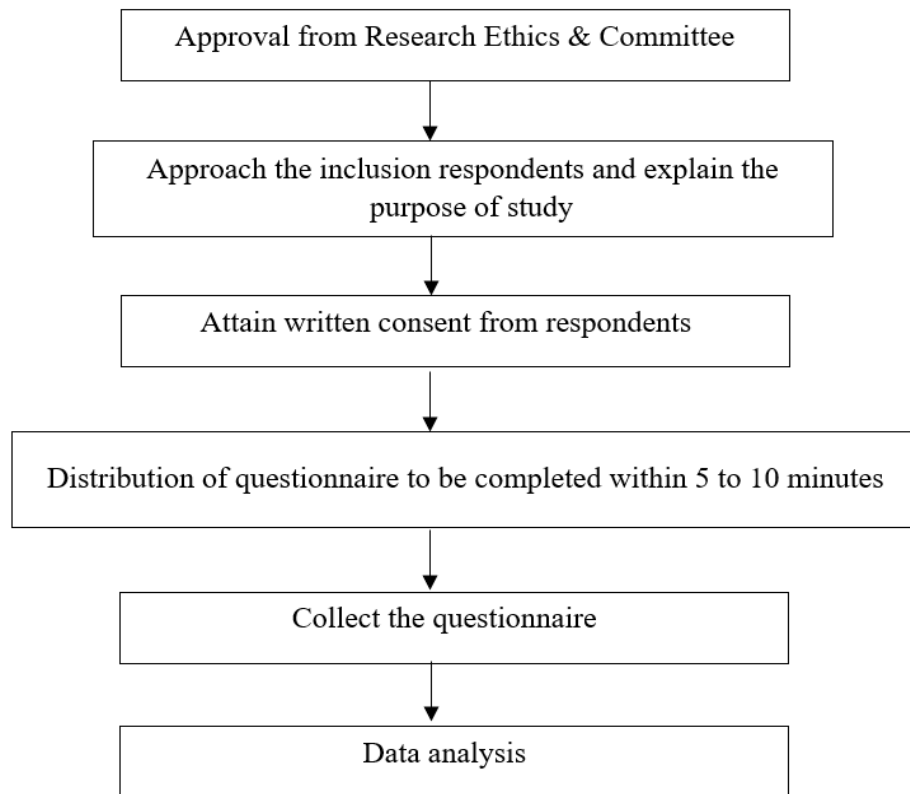
3.8.2 Actual Study

This research was conducted once the ethical approval from the Research and Ethics Committee of the Faculty of Medicine and Health Science was obtained. The actual study for this study had been done by giving a self-administered questionnaire that was distributed physically to first- until fourth-year UNIMAS undergraduate nursing students, and data was

collected. Participants that meet the inclusion criteria were involved in the questionnaires. The consent had been obtained, and the purpose of the study was explained to gain their cooperation. The participants were notified that all personal information gathered throughout this study will remain anonymous and confidential. The time allocated for filling out the questionnaire took around 5 to 10 minutes. The questionnaire was obtained from each year of class representatives once the respondents had finished answering all the questions within three days of distribution. A Gantt chart was used to show the planning of research activities (refer Appendix E).

Figure 3.8

Flow chart of data collection



3.9 Data analysis method

The data collected was analysed using software, SPSS version 27. The information was analysed to examine the level of knowledge towards management of diabetes mellitus, attitude towards management of diabetes mellitus, and the association between knowledge and attitude towards management of diabetes mellitus.

This study was analysed using two methods, which were descriptive statistics and inferential statistics. Descriptive statistics analysis demonstrated the socio-demographic data, level of knowledge, and attitude toward diabetes mellitus. The categorical data (age, gender, and year of study) had been obtained for the frequencies and percentages. Meanwhile, the mean and standard deviation were determined from the continuous data.

Inferential statistical analysis was used to determine the association between knowledge and attitude toward management of people with diabetes mellitus among UNIMAS undergraduate nursing students. The total score for knowledge and attitude for all respondents was calculated through Microsoft Excel, and the data was transferred to SPSS. The normality of the data was analysed using the Kolmogorov-Smirnov test in SPSS. This test was the most suitable method for handling a larger sample size ($n \geq 50$) for this research. A Pearson correlation coefficient test will be used if the data obtained is normally distributed, which assesses the relationship between knowledge and attitude toward the management of people with diabetes mellitus. However, if the data is not normally distributed, the Spearman correlation coefficient has been used for the study.

3.10 Summary

The methodology used to conduct the research has been described fully in this chapter. This study was using a quantitative cross-sectional study design. This study was conducted at the Faculty of Medicine and Health Science (FMHS), UNIMAS, which involved 163 undergraduate nursing students. Prior to data collection, ethical approval had been obtained for this study. Data analysis was developed by using SPSS software and analysed using the descriptive and inferential statistics from the data.

CHAPTER 4: RESULT

4.1 Introduction

This chapter presents the findings of knowledge and attitude towards the management of people with diabetes mellitus among UNIMAS undergraduate nursing students based on data collection and analysis. The result from data analysis consists of 4.2 Socio-demographic characteristics of UNIMAS undergraduate nursing students, 4.3 Knowledge towards the management of people with DM among UNIMAS nursing students, 4.4 Attitude towards the management of people with DM among UNIMAS nursing students, 4.5 Relationship between knowledge and attitude towards the management of people with DM among UNIMAS undergraduate nursing students.

4.2 Socio-demographic characteristics of UNIMAS undergraduate nursing students

This research was conducted among 163 participants, representing UNIMAS undergraduate nursing students from Year 1 to Year 4, with a mean age of 21.78 ± 1.33 and a range between 20 and 26. (refer Table 4.2). Out of 163 participants, majority of participants are female (n=134, 82.2%). Different years of students were involved in this study, with the highest participants from Year 3 (25.8%). Most of the participants are from ethnic groups categorised as “others”, which include Chinese, Indian, Bumiputera Sarawak and Bumiputera Sabah (n=84, 51.5%).

Additionally, more than half of the participants, which consists of 85 (52.1%) nursing students, reported having relatives or a family history of DM. There are no outliers or extreme values from screening data for each socio-demographic characteristic.

Table 4.2

Socio-demographic characteristics of UNIMAS undergraduate nursing students (n=163)

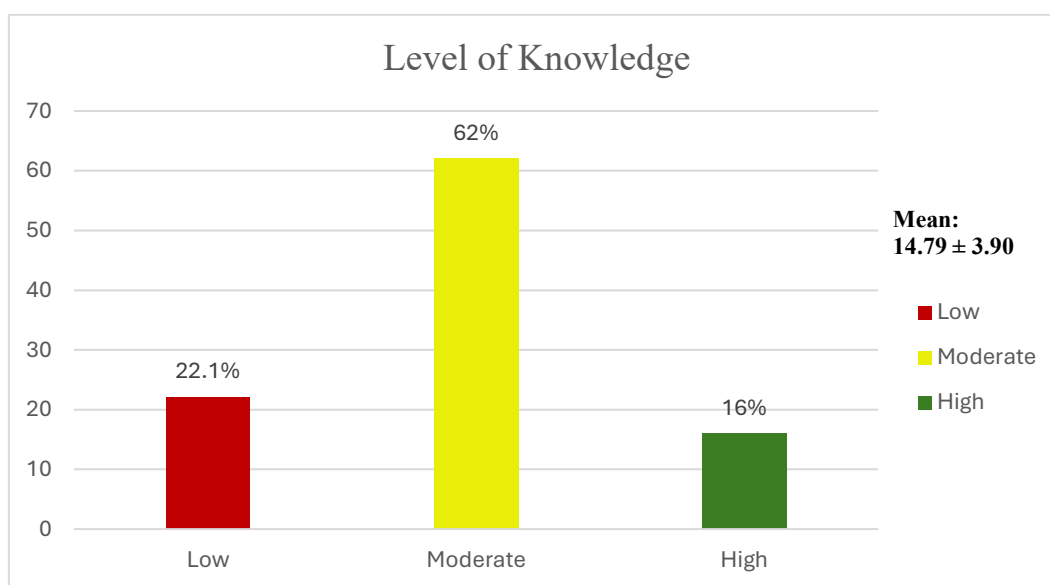
Characteristics	Frequency (n)	Percentage (%)	Mean (SD)
Age			
20-21 years old	73	44.8	21.78 ± 1.33
22-23 years old	74	45.4	
24-26 years old	16	9.8	
Gender			
Male	29	17.8	
Female	134	82.2	
Ethnicity			
Malay	72	44.2	
Others	91	55.8	
Year of Study			
Year 1	40	24.5	
Year 2	41	25.2	
Year 3	42	25.8	
Year 4	40	24.5	
Family/relative history of DM			
Yes	85	52.1	
No	78	47.9	

4.3 Knowledge towards the management of people with DM among UNIMAS nursing students

The total mean score for the 23-item DKT on knowledge level towards the management of DM is 14.79 ± 3.90 , with a minimum score of 5 and a maximum score of 23. The total score was categorised into three cut-off points, which are adapted from Zowgar et al., (2018). Overall, majority of participants exhibit a moderate level of knowledge on diabetes management ($n=101$, 62%).

Figure 4.3

Level of knowledge towards management of people with DM among UNIMAS undergraduate nursing students ($n=163$)

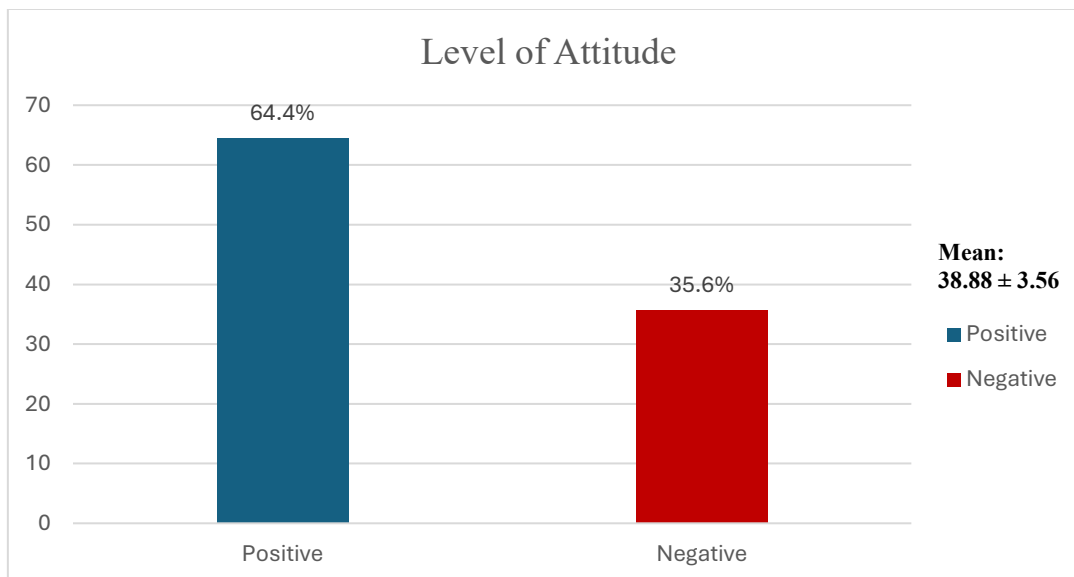


4.4 Attitude towards the management of people with DM among UNIMAS nursing students

The total mean score for level of attitude towards the management of DM is 38.88 ± 3.56 , with a minimum score of 27 and a maximum score of 45. The total score for each participant was collected and calculated through SPSS, and categorisation was made using visual binning, which adapts from Redhwan et al., (2017). After visual binning, the total score was converted into two categories, which are positive attitude and negative attitude toward management of DM. According to Figure 4.3, more than half of the participants ($n=105$, 64.4%) exhibit a positive level of attitude.

Figure 4.4

Level of attitude toward the management of people with DM among UNIMAS undergraduate nursing students ($n=163$)



4.5 Relationship between Knowledge and Attitude towards the management of people with DM among UNIMAS undergraduate nursing students

The relationship between knowledge and attitude towards the management of people with DM among UNIMAS undergraduate nursing students is assessed using a non-parametric test of the Spearman correlation coefficient. Preliminary analyses have been performed, and there is a violation of assumptions of normality knowledge towards the management of people with DM $D(163) = .070$, $p = .052$, and attitude towards the management of people with DM $D(163) = .120$, $p < .001$. The analysis shows there is a weak positive correlation coefficient between the knowledge and attitude with $[r_s(162) = .163, p < 0.05]$ (refer Table 4.5). This indicates that as the level of knowledge towards the management of DM increases, the attitude towards the management of DM is likely to be increased.

Table 4.5

Relationship between knowledge and attitude towards the management of people with DM among UNIMAS undergraduate nursing students

Correlations				
			Total Knowledge Score	Total Attitude Score
Spearman's rho	Knowledge	Correlation Coefficient	1.000	.163*
		Sig. (2-tailed)	.	.037
		N	163	163
	Attitude	Correlation Coefficient	.163*	1.000
		Sig. (2-tailed)	.037	.
		N	163	163

*. Correlation is significant at the 0.05 level (2-tailed).

4.6 Summary

In conclusion, the findings revealed half of the UNIMAS undergraduate nursing students, 101 (62%), had moderate knowledge on management of DM, with total mean score 14.79 ± 3.90 (Figure 4.3), minimum score of 5 and maximum score of 23. Besides, 105 (64.4%), with the total mean score was 38.88 ± 3.56 (Figure 4.4) and the minimum score of 27 and maximum score of 45. Through the Spearman Rank-order correlation test, the relationship between the variables has determined that there was a weak positive correlation and statistical significance between the knowledge and attitude towards the management of people with DM [$r_s(162) = .163, p < 0.05$] (Table 4.5)

CHAPTER 5: DISCUSSION

5.1 Introduction

This chapter discusses the study's findings, which present several sections. Section 5.2 describes the major study findings and further divided into three subsections: (i) 5.2.1 Level of knowledge towards the management of people with DM, (ii) 5.2.2 Level of attitude towards the management of people with DM, (iii) 5.2.3 Relationship between knowledge and attitude towards the management of people with DM. On the other hand, section 5.3 presents the summary of findings, while section 5.4 and 5.5 discuss the implications of the study and the study limitations of the study respectively. Final section 5.6 summarises the chapter.

5.2 Major study findings

5.2.1 Level of knowledge towards the management of people with DM

The findings in this research provide helpful observations about the level of knowledge regarding the management of people with DM. This study discovers that the level of knowledge among UNIMAS undergraduate nursing students is moderate, with a total mean score of 14.79 ± 3.90 . Majority (62%) of the respondents have a moderate level of knowledge regarding the management of DM.

Similar finding was reported in a previous study by Isa et al., (2020). Isa et al., (2020) conducted a study aimed to assess the level of knowledge and attitude towards Type 2 DM among health science students who consisted of nursing, optometry, medical imaging, occupational therapy and physiotherapy students in UiTM Puncak Alam, Selangor. This study

found that majority (58.8%) of health science students have moderate levels of knowledge on DM management (Isa et al., 2020). A moderate level of knowledge towards DM management in this study may indicate a lack of comprehensive understanding of DM management, likely due to the limited time of theoretical classes of DM management. According to Alkubati et al., (2023), the minimal amount of time or attention given to nursing classes regarding diabetes management may contribute to the significant knowledge gaps. Thus, the existing classes or curriculum may cover core aspects of diabetes as the prevalence of DM among the worldwide population increases, but effective education regarding DM management should be emphasised.

Similarly, a study by Orok et al., (2024) found that majority of the university students who enrolled in a healthcare course in Southwestern Nigeria reported that the participants exhibited a moderate level of knowledge (47%) in assessing the question related to DM knowledge. Orok et al., (2024) found that most of the students (77.7%) exhibited an understanding of disease based on students' family history of diabetes. According Khlafiat et al., (2020), students with a family history of diabetes frequently reported higher knowledge scores due to personal experiences and the need to understand the disease for family support. This is consistent with the current study, where more than half of participants (52.1%) have family history or relatives who have diabetes mellitus. Therefore, this study indicates that personal and familial experience of family with DM can enhance students' understanding and awareness of DM.

Other than that, a study done by Alsolais et al., (2023) among nursing students in Saudi Arabia demonstrated that half of the participants had a moderate perception of knowledge (47%) with the total mean score of the students was 48.31 ± 5.71 . Similar to a study by Alkubati et al., (2023), conducted in Saudi Arabia among nursing internship students who exhibited a moderate level of knowledge (67.9%). Both studies revealed a common trend where most of the nursing students had answered incorrectly in areas such as insulin administration, proper diet management and self-care of DM. Additionally, both studies highlighted the significance of theoretical education and clinical training as important factors of knowledge level. Therefore, to overcome the issue, it is important to focus on theoretical learning and skill training in the nursing education, which enhances nursing students' critical thinking and decision-making related to clinical practice (Rababa & Al-Rawashdeh, 2021).

This study has correspondingly with Cale et. al. (2024), which assessed college students, with the majority (34.9%) of the participants from nursing and others from non-healthcare participants. Findings also revealed that most (67%) of the students exhibited a moderate level of knowledge on DM, but there was a significant misconception that persisted in insulin knowledge. For instance, only 21.6% of participants correctly identified that insulin dependency occurred due to the inability of the pancreas to produce insulin in type 1 diabetes. Similarly with the current study, most of the participants (71.8%) had answered incorrectly regarding the action that should be done when a diabetic patient started experiencing an insulin response. These common trends between both studies may indicate a lack of training in clinical areas or structured simulation, which affects the understanding of DM management. Hence, researchers suggested ways to improve those who have low knowledge regarding DM through collaboration

with educators and healthcare professionals to organise seminars, stimulation workshops, and Q&A sessions (Cale et al., 2024). In addition, assessment could be done through surveys and group discussion to determine gaps in knowledge and misconceptions regarding DM. Thus, a study proved that the programme helped in gaining students' knowledge of DM and promoting health practices to prevent DM (Alzaben et al., 2023).

Quite interestingly, it was observed that a study by Oyewole et al., (2020) assessed the knowledge of primary health care among nurses in the local government area of Ibadan. The findings revealed that 58% of the nurses had an adequate level of knowledge towards diabetes care. This study showed a significant number of nurses who have working experience over 21 years and above, which contributed to their clinical competence in diabetes care. Years of experience and high exposure to diabetic patients enhance the knowledge and competencies in clinical settings. Compared to nurses in the local government area of Ibadan, the current study among UNIMAS undergraduate nursing students exhibited only 62% a moderate level of knowledge. There is a significant different level of knowledge between nurses and nursing students due to nurses often participating in continuous education programs which influence clinical competence among nurses in the care of diabetic patients (Albagawi et al., 2023). Meanwhile, the opportunities for effective continuing education have decreased among nursing students due to lack of facilities, educational resources, and supportive educators in clinical settings, which hinders the nursing students from improving their level of knowledge in DM management (Jafarian-Amiri et al., 2020). The nature of diabetes needs continuous education to keep aligned with evolving guidelines and treatment (Wolley et al., 2020). Therefore, to improve

the students' knowledge and practice on diabetic patients, additional educational hours and clinical practice should be implemented.

This finding contrasts with a study by Asmar et. al. (2024) that the majority (78%) of university students had a high level of knowledge towards diabetes. In this research, it showed that those who were studying scientific subjects had higher diabetes knowledge compared to literacy ones. Besides, the students who studied in these health-related fields which related to scientific subjects were more likely to access the information about the human body, metabolism and the role of insulin to control blood sugar in the body, which gives a deeper understanding of diabetes. The research revealed that health science students possessed better scores on knowledge of diabetes, with significant correlation to the field they were pursuing and understanding of DM (Lounis, 2024). However, students who are not pursuing a healthcare field may have a basic understanding, although they might not have in-depth knowledge of diabetes. Conversely, even though health-related courses enhance knowledge, it is important to identify that health programmes and awareness campaigns may help non-health students learn significant knowledge which can bridge the knowledge gap.

In addition, a study by Asmar et. al., (2024) has included both healthcare and non-health students, causing a significant difference in the findings, where a high level of knowledge may be driven by a subgroup of health-related students. Unlike the current study, it solely concentrates on the student with health-related backgrounds. Despite the four years of clinical training, the findings demonstrate a moderate level of knowledge due to outdated diabetes knowledge guidelines or low exposure to the management of diabetic patients during clinical

training. The difference in participant categories and factors of lack of understanding in DM management likely explain the reason for the difference between both studies. Therefore, the recommendation by Alkubati et al., (2023) explained the need to extend the education interventions and clinical practice to ensure adequate knowledge on management for people with diabetes should be emphasised among nursing students.

In contrast, a study by Gazzaz (2020) regarding DM in Jeddah, Saudi Arabia, encompassed 1428 foundation-year students. The majority (47.1%) of university students had a poor level of knowledge regarding DM management. Most of the students were from non-healthcare courses, particularly foundation-year students who may not receive any structured medical education. The foundation-year students likely did not get sufficient knowledge related to DM, which led to limited understanding of DM. However, compared to the current study, participants demonstrated a moderate level of knowledge due to all of the participants are nursing students who are from healthcare courses. Thus, differ from healthcare students, the awareness of DM among non-healthcare students is vital to prevent more people from acquiring DM and ensure early interventions, especially type 2 diabetes mellitus (Sundar et al., 2025). Emphasising regular educational talks or programme about DM and other associated non-communicable diseases is recommended to increase students' knowledge of DM (Orok et al., 2024).

In summary, this study revealed that the majority (62%) of undergraduate nursing students have a moderate level of knowledge regarding the management of people with DM, which is consistent with findings from studies by Alkubati, (2023), Alsolais, (2023), Isa, (2020)

and Qadri, (2025). According to findings from multiple studies, it was consistently demonstrated that students' level of knowledge would be satisfying due to participants most likely being in the healthcare field. Studies by Asmar et. al. (2024) and Oyewole et. al. (2020) demonstrated higher knowledge of DM management among participants. Most of the participants from both studies were able to understand the disease process, prevention, and management. However, it was undeniable because a contrast finding was reported by Gazzaz et. al. (2020) who found a poor level of knowledge towards DM management due to the participants of the research being healthcare-related students. These findings underscore the importance of efforts to improve educational efforts and health strategies to address the knowledge gap among nursing students.

5.2.2 Level of attitude towards the management of people with DM

The attitude displayed by healthcare professionals, which includes nursing students towards a disease, plays a vital role in influencing effective DM management and patient outcomes. The study's finding revealed that most of the participants have a positive attitude towards the management of people with DM among UNIMAS undergraduate nursing students. More than half of the participants (64.4%) exhibited a positive attitude; meanwhile, the remaining participants (35.6%) exhibited a negative attitude, with the total mean score was 38.88 ± 3.56 . Thus, the positive attitude could be attributed to high awareness of disease at the same time, the implementation of DM management and prevention strategies.

This is supported by a study carried out by Orok et al., (2020), where the university students possessed a positive attitude towards DM management. Another study by Cale et al.,

(2024) showed that the students had a positive attitude towards DM management. These studies were conducted among university students in healthcare-related courses that have more exposure to medical knowledge, clinical training and patient-centred care frameworks, which attribute to their positive attitude. According to Asmar et al., (2024), students with a good knowledge regarding risk factors, prevention and management of diabetes were most likely to show positive attitudes towards care of diabetes. Therefore, a positive attitude enhances the students' confidence and readiness to manage better care for diabetic patients in healthcare settings.

Besides, the finding was congruent with a recent study by Isa et al., (2020) in Selangor, Malaysia, which proved that 50% of health science students displayed a positive attitude regarding DM. Since most health science students in their third and fourth years had been exposed more in the clinical area, they demonstrated a good score in attitude towards DM management. This may explain why the current study reports a positive attitude towards DM management, as majority of participants were Year 3 and Year 4 nursing students, who most likely received more clinical exposure. Through clinical learning and simulation practice, where more real-world situation hands-on experience in university has reinforced a positive attitude to manage patients with DM. The immersive clinical settings helped students apply knowledge or judgement and enhance the comprehension of psychological aspects, leading to a positive DM management attitude (Moran et al., 2021).

Oyewole et al., (2020) conducted a study among nurses at local government areas of Ibadan revealed similar findings. The study found that more than half (51.1%) of nurses had a relatively positive attitude towards DM management. More positive attitudes among nurses are attributed to continuous professional development that can increase nurses' confidence and competency in providing care to diabetic patients, which in turn develops more proactive and empathetic approaches. It has been demonstrated that nurse-led interventions driven by positive attitudes enhance psychological outcomes and reduce hospitalisation rates for DM patients (Abdulkarim et al., 2024).

A study by Gazzaz et al., (2020) revealed similar trends, where the majority (83.3%) of students had a positive attitude towards DM prevention. Around 55% of participants who had a relative with DM were most likely to exhibit a positive attitude related to the DM due to high exposure to personal experience, which was relevant to the disease. Students with greater knowledge of diabetes mellitus have been exposed to information and discussion about diabetes prevention and management within their family members. The current study among undergraduate nursing students reveals similar findings, where the study finds that more than half (52.1%) of the nursing students have a family history of DM. The exposure of family history of DM increases the knowledge of DM, fostering a better attitude towards DM management (Fachirah & Sari, 2021). Hence, this personal connection or experience regarding family history appears to increase motivation to learn about disease, which enhances the students to adopt a better attitude regarding DM management and prevention.

However, a study by Asmar et al., (2024) revealed opposite findings compared to the current study, where most of the participants (60.6%) showed a negative attitude towards DM management, with the mean score was 2.38 ± 0.98 . This suggested that the participants exhibited a lack of awareness or emphasis on DM and its management. There was a significant trend that revealed that more than half of the students (63.9%) believed that diet alone is sufficient to control blood glucose levels in Type 2 diabetic patients rather than combining diet with medications. In contrast with the current study, most of the participants (50.9%) agree that a planned diet helps in controlling diabetes, while 58.9% strongly agree on the importance of proper medication management for diabetic patients. The Health Belief Model explains that individuals perceive the disease and make decisions on how they behave in terms of their health (Alyafei & Easton-Carr, 2024). Hence, aligned with the theory, if students perceive that DM can be controlled with diet alone, they may undervalue the importance of medicine, which leads to a negative attitude towards the medical intervention approach. This finding concluded that the need for educational strategies among the targeted population should be increased, not only to improve knowledge but also to prevent misconceptions and promote positive evidence-based attitudes regarding DM management.

In summary, the notable findings reveal that the majority (64.4%) of the participants possessed a negative attitude towards the management of DM with a total mean score of 38.88 ± 3.56 , highlighting the high awareness of the disease while implementing DM management and preventive strategies. This current study finding was similar to the study by several studies from different researchers that exhibited a positive attitude toward the management of DM. In contrast, a study by Asmar et al., (2024) found a negative attitude prevalent among university

students due to misconceptions regarding the complexity or progression of the disease, leading to poor perception of medical treatment of DM. Therefore, it is important to emphasise the effort to increase the level of attitude towards DM among the population because positive attitudes enhance better health-seeking behaviour, greater acceptance of educational strategies and improved disease outcomes, especially in chronic illnesses such as DM.

5.2.3 Relationship between knowledge and attitude towards the management of people with DM

The current study exhibits a weak positive correlation and statistical significance between knowledge and attitude towards the management of people with DM among UNIMAS undergraduate nursing students [$r_s(162) = .163, p < 0.05$]. This result indicates that despite nursing students possessing a moderate level of knowledge towards the management of DM, the nursing students still show a positive attitude because students' attitudes may be shaped by various factors such as personal experience, clinical exposure or cultural beliefs towards the disease. In addition, nursing students may have sufficient knowledge but lack clinical experience, where lack of clinical exposure may contribute to a negative attitude, especially in their early years of the undergraduate programme. Thus, clinical exposure influences professional attitudes, empathy, and confidence towards the management of chronic disease (Moran et al., 2021).

The result is consistent with the study done by Asmar et al., (2024) investigated the relationship between knowledge and attitude towards diabetes among university students. The

findings indicated that there was a statistically significant positive correlation between knowledge and attitude [$r_s (579) = .178, p < 0.001$], suggesting that university students with better knowledge regarding diabetes tended to exhibit a more positive attitude towards managing and preventing the disease. Students who have better knowledge regarding diabetes tended to exhibit a more positive attitude towards managing and preventing the disease. The majority (60.1%) of the students were female and enrolled in health-related disciplines (56.6%). Similarly to a current study where the majority (82.2%) of the participants are female and all the participants are enrol in a healthcare-related field. The positive correlation stated in this study can be attributed to an awareness of risk factors, where it has been demonstrated that awareness campaigns and educational interventions enhance knowledge and attitude among students who have a stronger academic foundation, especially those in the health sciences field, suggesting that students with high knowledge are more incline to adopt healthy practices (Orok et al., 2024). Therefore, knowledge plays an important role in order to influence attitude and motivate preventive health behaviours (Naaz, 2021).

Furthermore, another study done by Isa et al., (2020) investigated the relationship between knowledge and attitude towards Type 2 DM among health sciences students in Selangor found similar findings. The findings revealed that there was a statistically significant positive fair correlation between students' level of knowledge and attitude towards DM management [$r_s (400) = .210, p < 0.001$]. This suggested that due to curriculum and clinical exposure related to DM knowledge, health science students are likely to develop greater insights of the challenges experienced by diabetic patients, which can result in a more empathetic and positive attitude. Consistent with the current study, Year 2 to Year 4 nursing students had more

practical exposure in managing diabetic patients in clinical settings, which contributed to better knowledge and attitude. Thus, proper education, such as Continuing Medical Education (CME), fosters a positive attitude, motivating healthcare professionals to improve knowledge and skills continuously, which leads to better patient care in DM (Lim et al., 2020).

The findings of this study differ from the research conducted by Farzei et al., (2023), who studied the relationship between knowledge, attitude, and practice towards nutritional management of DM. The finding demonstrated that there was not a statistically significant weak negative correlation between knowledge and attitude [$r_s (160) = -.0.67$ $p = 0.423$], indicating that the relationship between nurses' knowledge and attitude among nurses was neither strong nor consistent. One possible explanation was that despite the fact that knowledge can influence attitudes, researchers indicated that most healthcare professionals, including nurses, may possess adequate knowledge but still have less favourable attitudes towards diabetic care such as severity of disease, patient autonomy or strict glycaemic control. Besides, the possible reason that explains the differences with the current study is that this happens might be due to several stressors in the workplace that create challenging work conditions, lead to burnout, job dissatisfaction and intention to quit, which have an impact on nurses' attitudes towards the nursing profession (Galanis et al., 2024). Hence, this disparity shows the difficulty of converting knowledge into positive attitude and emphasised the necessity of educational strategies that address both cognitive and affective aspects of DM management (Muhammad et al., 2024).

In conclusion, this study revealed a statistically significant but very weak relationship between knowledge and attitude towards the management of people with DM among UNIMAS undergraduate nursing students. The findings proved that while students had a moderate level of knowledge, the level of attitude may be influenced by several factors such as personal experiences, clinical exposure and cultural beliefs. The results contrast with other studies, where positive correlations were identified by Asmar et al., (2024) and Isa et al., (2020). Both studies indicate that a higher level of knowledge contributed to a more favourable attitude due to awareness campaigns, curriculum integration and continuous education. In addition, Farzaei et al., (2023) demonstrated a weak negative correlation between nurses' knowledge and attitude. It suggests that even if nurses possess high knowledge, attitude may be less favourable in the management of DM. Therefore, all studies had highlighted the gap between knowledge and affective attitude and emphasised the need for educational interventions that enhance diabetes care.

5.3 Summary of findings of the study

Overall, most UNIMAS undergraduate nursing students have moderate knowledge towards the management of people with DM (62%). Meanwhile, the majority (64.4%) of nursing students exhibit a positive attitude towards the management of people with DM. There is a statistically significant weak positive relationship that demonstrates the knowledge and attitude towards the management of DM [$r_s(162) = .163, p < 0.05$].

5.4 Implication of the study

5.4.1 Nursing practice

According to this study, most of UNIMAS undergraduate nursing students had moderate knowledge of the management of DM. Through identifying students' level of knowledge and attitude, early action can be done to prevent any misconception regarding insulin administration, dietary planning, and understanding of the disease's pathophysiology or medical error, which leads to poor patient quality of care. These findings have highlighted the importance of proper nursing curricula or coursework to ensure the nursing students are prepared with comprehensive knowledge and skills in the management of chronic disease, including DM. Theoretical knowledge may be provided in current teaching in nursing programmes, but they might not be able to apply the knowledge into clinical practice. Therefore, up-to-date modules of diabetes care should be emphasised for nursing education, which includes the latest guidelines of evidence-based practice and patient-centred approaches.

In addition, realistic scenarios during clinical stimulation can provide good practice on DM management, such as blood glucose monitoring, insulin administration and patient education, without causing any harm during prior practice. This method helps to gain more application of theoretical and evidence-based skills, particularly for students with limited exposure to diabetic patients in clinical settings. Hence, integrating clinical simulations into nursing curricula helps to overcome the issue of limited clinical exposure among students, which can ensure the prevention of the risk of harming patients during care of diabetes mellitus.

5.4.2 Nursing education

Moreover, the nursing profession should influence the development and implementation of clinic competencies for management of DM through nursing education. As the newly graduated nurses, these efforts will enhance the skills and confidence during practice of care. For example, Continuous Professional Development (CPD) programmes should be highlighted with DM care, which involves clinical decision-making, management of complications or patient education. Besides, integrating Evidence-Based Practice (EBP) into clinical settings is vital to enable the healthcare professionals to keep up to date with current guidelines and ensure the safe care of diabetic patients. Integrating comprehensive DM management into the nursing curriculum is important to prepare nursing students to provide safe care for diabetic patient. Thus, healthcare institutions should implement the policy that provides ongoing education and training, such as CPD program or EBP not only for students but also for registered nurses with good experience in clinical settings.

5.4.3 Future research

As diabetes continues to become a major health concern globally, it is vital to equip future nurses with evidence-based skills in glycaemic monitoring, lifestyle counselling and patient education. Future research in the nursing field should investigate students' clinical competencies, confidence, and skills to gain deeper insights regarding the management of patients with DM. Nurses not only as educators or individuals who provide holistic care towards patients but also as researchers who investigate the clinical problem, evaluate the findings and generate evidence which serves as a guide in best practices. The nurses' role in clinical settings

gives them valuable experience into patient needs which contribute to the research purposes. Understanding these issues will provide a guide for curriculum development and improve the quality of patient care provided by ensuring that nursing practice remains current and evidence-based care.

5.5 Limitations of the study

There are several limitations that have been identified throughout this study conducted. Firstly, the research's data collection was limited to nursing students at the Faculty of Medicine and Health Sciences, UNIMAS; nursing students from other universities in Malaysia were not included for this study. It does not represent other institutions, which leads to poor variability in this study. In addition, time constraints are also one of the limitations that could be found in this study, where the course timespans are for a short period and a packed schedule of classes and practicum. Lastly, some of the selected participants did not complete the questionnaire according to the instructions provided, which needed the additional participants who met the inclusion criteria.

5.6 Conclusion

The findings from the current study highlight a concern regarding the issue of moderate knowledge and attitude towards the management of patients with DM. It is important to emphasise the effort to overcome this issue through targeted educational interventions such as material of education, workshops, training, and seminars to enhance the knowledge and attitude towards management of DM among nursing students. Nursing students with constructive and informed perspectives are more likely to apply evidence-based interventions, encourage preventive behaviours and contribute to the reduction in disease burden as future frontline healthcare professionals. Therefore, addressing the knowledge and attitude gaps will influence the overall quality of DM management and patient well-being as preparation to be a staff nurse in the future.

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APPENDIX A: ETHICAL APPROVAL APPLICATION LETTER

Pejabat Akademik
Fakulti Perubatan dan Sains Kesihatan
Academic Office
Faculty of Medicine & Health Sciences
☎: 581000 samb 7768
📠: 665152

UNIVERSITI MALAYSIA
SARAWAK
94300 Kota Samarahan

MEMORANDUM

Reference : UNIMAS/NC-21.05/03-03 Jld. 8(110)

To : Nurhaziqah Binti Ismail (78442)
Bachelor of Nursing with Honours
Faculty of Medicine and Health Sciences

From : Dean
Faculty of Medicine and Health Sciences

Date : 05 March 2025

Subject : **Final Year Project - Research Approval: Knowledge and Attitude Towards The Management of People with Diabetes Mellitus among UNIMAS undergraduate nursing students**

The above matter is referred.

The Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak (UNIMAS) has granted the **RESEARCH APPROVAL** for this Final Year Project research based on the appraisal by the Department of Nursing, Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak (UNIMAS) on 24 February 2025. The Final Year Project research details stated below:

Student Name : Nurhaziqah Binti Ismail

Student ID : 78442

Programme : Bachelor of Nursing with Honours

Research Title : *Knowledge and Attitude Towards The Management of People with Diabetes Mellitus among UNIMAS undergraduate nursing students*

Supervisor Name : Madam Azylina Anak Gunggu

Supervisor H/P : +60 19-468 3120

All records and data are to be kept strictly **CONFIDENTIAL** and can only be used for the purpose of this study. All precautions are to be taken to maintain data confidentiality. Permission from the all relevant heads of departments/units where the study will be carried out must be obtained prior to the study.

Please note that the approval is valid from **February 2025** to **November 2025** only. The reference number for this letter must be stated in all correspondence related to this study to facilitate the process.

Thank you with regards and well wishes.

Yours sincerely,

A handwritten signature in black ink, appearing to be 'Asri bin Said', written in a cursive style.

Professor Dr. Asri bin Said
Dean

c.c : Deputy Dean of Undergraduate
: Head of Nursing Department
: Bachelor of Nursing with Honours
: MDJ4653 Final Year Project 1 Course Coordinator

APPENDIX B: PARTICIPANT'S INFORMED CONSENT FORM

1. Introduction:

It is important that you understand why the research is being done and what it involves. Please take your time to read through and consider this information carefully before you decide if you are willing to participate. Ask the study staff if anything is unclear or if you would like more information. After you are properly satisfied that you understand this study, and that you wish to participate, you must sign this informed consent form.

Your participation in this study is voluntary. You do not have to be in this study if you do not want to. You may also refuse to answer any questions you do not want to answer. If you volunteer to be in this study, you may withdraw from it at any time. If you withdraw, any data collected from you up to your withdrawal will still be used for the study. Your refusal to participate or withdrawal will not affect any medical or health benefits to which you are otherwise entitled.

2. What is the purpose of the study?

The purpose of this study is to determine the level of knowledge and attitude towards management of people with diabetes mellitus. This research is necessary to improve the understanding of UNIMAS undergraduate nursing students of the management of people with diabetes mellitus. Additionally, we aim to foster a positive attitude and gain the level of knowledge that leads to better clinical skills among nursing students. This research will be conducted for a duration of 10 months (07/10/2024 till 03/08/2026). The expected number of participants is 162 individuals, with 41 participants in each group.

3. Who can participate in this study?

In this study targeting undergraduate nursing students, the inclusion and exclusion criteria have been obtained to delineate eligible participants. Inclusion criteria comprise Year 1 to Year 4 UNIMAS undergraduate nursing students. Besides, participants must willingly participate in this study. Conversely, exclusion criteria are established to exclude individuals with potential confounding factors that might cause bias to this study. This consists of university students from other courses or universities. Furthermore, post-registration nursing students who enrolled in Bachelor of Nursing with Honor program. These criteria collectively aim to create a participant group which ensure the study's precision, validity, and relevance to the targeted research objectives.

4. What are my responsibilities when taking part in this study?

It is important that you answer all the questions asked by the study staff honestly and completely which will take about 10-15 minutes of your time. You will be given a physical survey form to be answered. This form contains 3 sections which will enquire about knowledge and attitude towards management of diabetes mellitus. Subsequently, you may not receive the survey form straight away on the same day it is being distributed. Following this, the members of the study staff will collect the survey form within one week through each year's class representative after your delivery of the questionnaire. The study team will also access your medical records for the following information.

5. What are the potential risks and side effects of being in this study?

Participation in this study will not affect your treatment, and the risk is minimal. You are free to decline to answer any of the questions that you feel uncomfortable with, and you can opt to withdraw from studies without incurring any penalties.

6. What are the benefits of being in this study?

There may or may not be any benefits to you. However, this management of patients with diabetes mellitus study holds significant benefits for nursing students. By enhancing the knowledge and attitude related to diabetes mellitus, this study aims to provide valuable insights into effective strategies to enhance and improve the nursing students' knowledge and attitude. Increased prevalence of good knowledge and attitude towards diabetes mellitus will positively impact the nursing students' skill in clinical settings, which leads to better nursing care in the future. The findings could also inform broader public health initiatives at enhancing the good insight of management related to diabetes mellitus, contributing to the overall improvement of global health. However, it is important to note that feedback on study findings will not be provided at the end of the study.

7. Who is funding the research?

This study does not receive any external funding, is fully sponsored by the main study researcher. You will not be paid for participating in this study. There are also no plans to develop commercial products through this study.

8. Will my medical information be kept private?

All your information obtained in this study will be kept and handled in a confidential manner, in accordance with applicable laws and/or regulations. When publishing or presenting the study results, your identity will not be revealed without your expressed consent. Individuals involved in this study, qualified monitors and auditors, and governmental or regulatory authorities may inspect the study data, where appropriate and necessary.

9. Who should I call if I have questions?

If you have any questions about the study or if you think you have a study related injury and you want information about this study, please contact the main study researcher, Nurhaziqah Binti Ismail Nasiruddin at telephone number 013-5640160 or supervisor of this study, Madam. Azylina Anak Gunggu who can reach through the email address: gazylina@unimas.my

If you have any questions about your rights as a participant in this study, please contact: The Secretary, Medical Research & Ethics Committee, Ministry of Health Malaysia, at telephone number 03-3362 8407/8205/8888.

INFORMED CONSENT FORM

Title of Study: Knowledge and Attitude Towards the Management of People with Diabetes Mellitus Among UNIMAS Undergraduate Nursing Students

By signing below I confirm the following:

- I have been given oral and written information for the above study and have read and understood the information given.
- I have had sufficient time to consider participation in the study and have had the opportunity to ask questions and all my questions have been answered satisfactorily.
- I understand that my participation is voluntary and I can at anytime free withdraw from the study without giving a reason and this will in no way affect my future treatment. I am not taking part in any other research study at this time. I understand the risks and benefits, and I freely give my informed consent to participate under the conditions stated. I understand that I must follow the study doctor's (investigator's) instructions related to my participation in the study.
- I understand that study staff, qualified monitors and auditors, the sponsor or its affiliates, and governmental or regulatory authorities, have direct access to my medical record in order to make sure that the study is conducted correctly and the data are recorded correctly. All personal details will be treated as STRICTLY CONFIDENTIAL
- I will receive a copy of this subject information/informed consent form signed and dated to bring home.
- I agree/disagree* for my family doctor to be informed of my participation in this study. (**delete which is not applicable*)

Subject:

Signature:

I/C number:

Name:

Date:

Investigator conducting informed consent:

Signature:



I/C number: 020603-13-0196

Name: Nurhaziqah Binti Ismail Nasiruddin

Date: 1/4/2025

Impartial witness:

Signature:

I/C number:

Name:

Date:

APPENDIX C: PERMISSION TO USE QUESTIONNAIRE

RE: Permission to Use Diabetes Knowledge Test (DKT2) Questionnaire

Revised Diab...doc The Dia...24968.pdf

Fitzgerald, Tom <tfitz@med.umich.edu>
To: NURHAZIQA BINTI ISMAIL

Revised Diabetes Know Test 37 KB
The Diabetes Educator-2016~... 383 KB

2 attachments (420 KB) Save all to OneDrive - UNIMAS Download all

Start reply with: Thank you so much! I really appreciate it! Thank you! Great, thank you so much!

Hello,
You have our permission to use the DKT2 for your research project. I have attached the test and the related article. If you have any questions, please contact me. Good luck with your research.

James T. Fitzgerald, PhD
Professor Emeritus
Department of Learning Health Sciences
University of Michigan
tfitz@umich.edu

RE: Permission to Use Diabetes Knowledge Test (DKT2) Questionnaire

Revised Diab...doc The Dia...24968.pdf

Sent: Monday, November 11, 2024 4:43 AM
To: tfitz@umich.edu
Subject: Permission to Use Diabetes Knowledge Test (DKT2) Questionnaire

Dear Professor James Thomas Fitzgerald,

My name is Nurhaziqah Binti Ismail Nasiruddin. I am a final-year undergraduate nursing student at University of Malaysia Sarawak (UNIMAS). I am currently conducting a research project and the title of my project is *"Knowledge and Attitude Towards The Management of People With Diabetes Mellitus among UNIMAS Undergraduate Nursing Students."*

In the course of research project, I came across the *Diabetes Knowledge (DKT2)* test was developed by you, and I believe it would be a useful tool in assessing the study based on the title. After extensive consultation concerning the variables of my research study, I would like to request for permission to use your tool as a part of my questionnaire.

Your consideration concerning my request will be greatly appreciated.

Thank you,

Yours truly,
Nurhaziqah Binti Ismail Nasiruddin

Re: Follow-up on permission to use the questionnaire from journal Diabetes Mellitus among Selected Malaysian Population: A Cross-Sectional Study

DM Questionn...pdf

On Saturday, November 9, 2024 at 05:41:12 PM GMT+3, NURHAZIQA BINTI ISMAIL <78442@siswa.unimas.my> wrote:

Dear Redhwan Ahmed Al-Naggar,

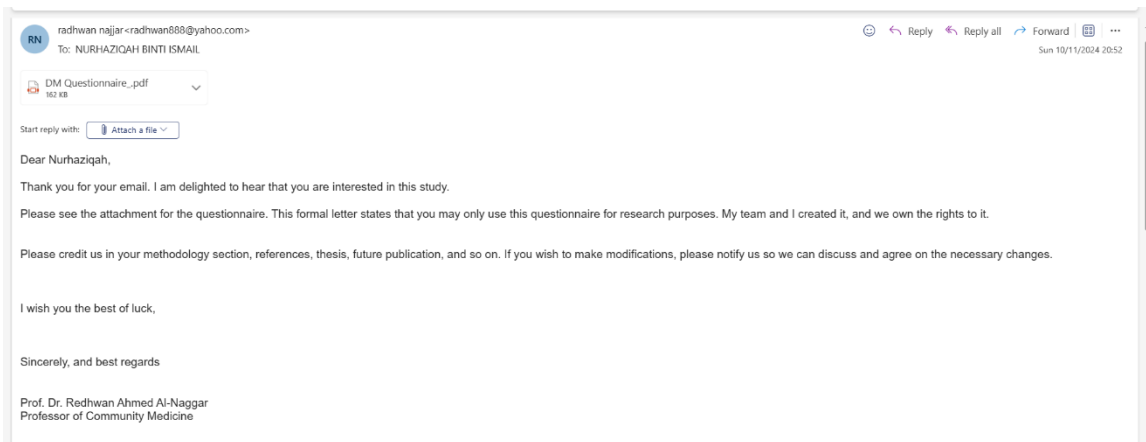
My name is Nurhaziqah Binti Ismail Nasiruddin. I am a final-year undergraduate nursing student at University of Malaysia Sarawak (UNIMAS). I am currently conducting a research project and the title of my project is *"Knowledge and Attitude Towards The Management of People With Diabetes Mellitus among UNIMAS Undergraduate Nursing Students"*

In the course of my research, I came across the questionnaire developed by you, and I believe it would be a useful tool in assessing the study based on the title. The questionnaire was from journal of *"Diabetes Mellitus among Selected Malaysian Population: A Cross-Sectional Study"* After extensive consultation concerning the variables of my research study, I would like to request for permission to use your tool as a part of my questionnaire.

Your consideration concerning my request will be greatly appreciated

Thank you,

Yours truly
Nurhaziqah Binti Ismail Nasiruddin



APPENDIX D: DATA COLLECTION INSTRUMENT

Instruction: Please tick (✓) on the boxes provided for the answer that you feel correct and write your answer in the blank space provided.

Section A: Socio-demographic Information

1. Age: _____ years old
2. Gender:
 - a. Male ☐
 - b. Female ☐
3. Ethnicity
 - a. Malay ☐
 - b. Chinese ☐
 - c. Indian ☐
 - d. Others: _____
4. Year of Study
 - a. Year 1 ☐
 - b. Year 2 ☐
 - c. Year 3 ☐
 - d. Year 4 ☐
5. Do you have any family/relatives who have Diabetes Mellitus (DM)?
 - a. Yes ☐
 - b. No ☐

Section B: Knowledge towards Management Diabetes Mellitus

There are 23 questions related to knowledge towards diabetes. Please read each question and then circle only ONE answer that you think it is correct.

1. The diabetes diet is:
 - a. the way most Malaysian people eat
 - b. a healthy diet for most people
 - c. too high in carbohydrate for most people
 - d. too high in protein for most people
2. Which of the following is highest in carbohydrate?
 - a. Fried rice
 - b. Baked chicken
 - c. Peanut butter
3. Which of the following is highest in fat?
 - a. Low fat (2%) milk
 - b. Orange juice
 - c. Corn
 - d. Honey
4. Which of the following is a “free food”?
 - a. Any unsweetened food
 - b. Any food that has “fat free” on the label
 - c. Any food that has “sugar free” on the label
 - d. Any food that has less than 20 calories per serving
5. HbA1c is a measure of your average blood glucose for the past:
 - a. Day
 - b. Week
 - c. 2-3 months
 - d. 6 months
6. Which is the best method for home glucose testing?
 - a. Urine testing
 - b. Blood testing
 - c. Both are equally good

7. What effect does unsweetened fruit juice have on blood glucose?
 - a. Lowers it
 - b. Raises it
 - c. Has no effect
8. Which should not be used to treat a low blood glucose?
 - a. 3 hard candies
 - b. Pro
 - c. 1 cup diet soft drink
 - d. 1 cup skim milk
9. For a person in good control, what effect does exercise have on blood glucose?
 - a. Lowers it
 - b. Raises it
 - c. Has no effect
10. What effect will an infection most likely have on blood glucose?
 - a. Lowers it
 - b. Raises it
 - c. Has no effect
11. The best way to take care of your feet is to
 - a. Look at and wash them each day
 - b. Massage them with alcohol each day
 - c. Soak them for one hour each day
 - d. Buy shoes a size larger than usual
12. Eating foods lower in fat decrease your risk for
 - a. Nerve disease
 - b. Kidney disease
 - c. Heart disease
 - d. Eye disease
13. Numbness and tingling may be symptoms of:
 - a. Kidney disease
 - b. Nerve disease
 - c. Eye disease
 - d. Liver disease

14. Which of the following is usually not associated with diabetes
- Vision problems
 - Kidney problems
 - Nerve problems
 - Lung problems
15. Sign of ketoacidosis (DKA) include:
- Shakiness
 - Sweating
 - Vomiting
 - Low blood glucose
16. If you are sick with the flu, you should:
- Take less insulin
 - Drink less liquids
 - Eat more protein
 - Test blood glucose more often
17. If you have taken rapid-acting insulin, you are most likely to have a low blood glucose reaction in:
- Less than 2 hours
 - 3-5 hours
 - 6-12 hours
 - More than 13 hours
18. You realize just before lunch that you forgot to take your insulin at breakfast. What should you do now?
- Skip lunch to lower your blood glucose
 - Take the insulin that you usually take at breakfast
 - Take twice as much insulin as you usually take at breakfast
 - Check your blood glucose level to decide how much insulin to take
19. If you are beginning to have blood glucose reaction, you should:
- Exercise
 - Lie down and rest
 - Drink some juice
 - Take rapid-acting insulin

20. A low blood glucose reaction may be caused by
- a. Too much insulin
 - b. Too little insulin
 - c. Too much food
 - d. Too little exercise
21. If you take your morning insulin but skip breakfast, your blood glucose level will usually:
- a. Increase
 - b. Decrease
 - c. Remain the same
22. High blood glucose may be caused by:
- a. Not enough insulin
 - b. Skipping meals
 - c. Delaying your snacks
 - d. Skipping your exercise
23. A low blood glucose reaction may be caused by
- a. Heavy exercise
 - b. Infection
 - c. Overeating
 - d. Not taking your insulin

Section C: Attitude towards Management Diabetes Mellitus

There are 9 questions attitude towards diabetes. Please read each question and then circle only ONE answer in the provided boxes. The question will ask regarding your attitude towards management diabetes mellitus. Strongly agree: 5 ; Agree: 4 ; Do not know: 3; Disagree: 2 ; Strongly disagree:

Item	Attitude	Strongly Agree	Agree	Do not know	Disagree	Strongly disagree
1.	Diabetes mellitus is preventable	5	4	3	2	1
2.	Diabetes mellitus is treatable	5	4	3	2	1
3.	Regular exercise helps controlling diabetes	5	4	3	2	1
4.	Following a controlled and planned diet will help in controlling progression of diabetes mellitus	5	4	3	2	1
5.	Regular checking of blood sugar level is important in diabetic patient	5	4	3	2	1
6.	Diabetic patients should keep in touch with their physician	5	4	3	2	1
7.	It is necessary for diabetic patients to take medication properly and regularly	5	4	3	2	1
8.	Missing doses of diabetic medication will have a negative effect on the disease control	5	4	3	2	1
9.	Smoking exacerbates vascular complications due to diabetes	5	4	3	2	1

APPENDIX E: GANTT CHART

Activity	MONTH											
	2023				2024							
	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	
Determination of research title												
Literature review												
Meeting with supervisor												
Submit oral defense slides												
Submission of first draft												
Ethical approval												
FYP 1: Submission of research proposal												
Data collection												
Data analysis												
Writing up report												
Submit final draft												
FYP 2: Submission of final project												

APPENDIX F: BUDGET PLANNING

No	Item	Quantity	Price per unit	Price
1	Internet Plan Data (Unlimited)	6 (per month)	RM 35.00	RM 210.00
2	Printing and binding services for FYP report	1	RM100.00	RM 100.00
3	SPSS V27	1	RM 5.00	RM 5.00
4	Transport (for consultation with supervisors	3-4 trips	RM 5.00	RM 20.00
5	Printing questionnaire	162	RM 0.20	RM32.40
TOTAL PRICE				RM 367.40

APPENDIX G: TURNITIN SIMILARITY INDEX REPORT

turnitin_NURHAZIQA ISMAIL			
ORIGINALITY REPORT			
13%	9%	6%	5%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS
PRIMARY SOURCES			
1	ir.unimas.my Internet Source		2%
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3	vital.seals.ac.za:8080 Internet Source		1%
4	Edidiong Orok, Yetunde Kabiawu, Zainab Aderohunmu, Danielle Obiwulu. "Knowledge, attitude, and perceived risks related to diabetes mellitus among university students in Southwestern Nigeria", Heliyon, 2024 Publication		1%
5	Faulknor, Mavis Camalita. "Actual Diabetes Mellitus Knowledge Versus the Perceived Diabetes Mellitus Knowledge of Nurses.", William Carey University Publication		1%
6	Submitted to Institute of Research & Postgraduate Studies, Universiti Kuala Lumpur Student Paper		1%
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32	Submitted to Monash University Student Paper	<1 %

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47	Arpana Pandit, Biswash Sapkota, Nishan Poudel, Renu Karki, Bharat Poudel, Ramakanta Lamichhane. "Evaluation of knowledge and awareness of diabetes in higher secondary level students of Kaski district: A cross-sectional study", PLOS ONE, 2025 Publication	<1 %
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63	Klemp, Florian. "The Impact of Organizational Culture on the Servant Leadership Approach in SMEs", Sheffield Hallam University (United Kingdom), 2024 Publication	<1 %