KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING DIABETIC FOOT CARE AMONG TYPE 2 DIABETIC PATIENTS AT HOSPITAL PAKAR UNIVERSITI SAINS MALAYSIA

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by

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DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and duly acknowledged. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research and promotional purposes.

Signature

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Siti Nornajwa Binti Aminudin Baki

Date: 3rd August 2025

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LIST OF ABBREVIATIONS

DFUs	Diabetic Foot Ulcers
DKA	Diabetic Ketoacidosis
DM	Diabetes Mellitus
HBM	The Health Belief Model
HPUSM	Hospital Pakar Universiti Sains Malaysia
HREC	Human Research Ethics Committee
KAP	knowledge, Attitude, and Practice
NCDs	No Communicable Diseases
PAD	Peripheral Arterial Disease
PPSP	School of Medical Sciences
SPSS	Statistical Package for Social Sciences
T1DM	Type 1 Diabetes Mellitus
T2DM	Type 2 Diabetes Mellitus
USM	Universiti Sains Malaysia

LIST OF APPENDICES

PENGETAHUAN, SIKAP DAN AMALAN BERKAITAN PENJAGAAN KAKI DIABETIS DALAM KALANGAN PESAKIT DIABETIS JENIS 2 DI HOSPITAL PAKAR UNIVERSITI SAINS MALAYSIA

ABSTRAK

Komplikasi kaki diabetes kekal sebagai isu kesihatan awam yang utama, terutamanya dalam kalangan individu yang menghidap Diabetes Mellitus Jenis 2 (T2DM). Kajian ini dijalankan untuk menilai tahap pengetahuan, sikap dan amalan (KAP) berkaitan penjagaan kaki diabetes serta meneliti hubungan antara KAP dan amalan penjagaan kaki dengan faktor sosio-demografi yang terpilih (umur, jantina, tahap pendidikan dan tempoh menghidap diabetes) dalam kalangan pesakit T2DM di Hospital Pakar Universiti Sains Malaysia (HPUSM). Satu kajian kuantitatif keratan rentas telah dijalankan melibatkan 158 orang pesakit T2DM yang dimasukkan ke wad-wad perubatan dan ortopedik terpilih. Data dikumpulkan menggunakan soal selidik sah yang dijawab sendiri oleh responden dan merangkumi maklumat demografi serta komponen KAP. Hasil kajian menunjukkan bahawa 50.6% responden mempunyai pengetahuan yang baik, 65.8% menunjukkan sikap yang positif, dan hanya 45.6% mengamalkan penjagaan kaki yang baik. Analisis statistik menunjukkan hubungan yang signifikan diantara pengetahuan dengan amalan, serta antara sikap dengan amalan ($p < 0.05$). Selain itu, faktor sosio-demografi seperti umur dan tempoh menghidap diabetes turut menunjukkan hubungan yang signifikan dengan tahap amalan penjagaan kaki. Kesimpulannya, intervensi yang disasarkan perlu dilaksanakan bagi menggalakkan perubahan tingkah laku, terutamanya dalam kalangan pesakit muda dan yang baru didiagnosis, bagi mengurangkan komplikasi serta merapatkan jurang antara pengetahuan dan amalan.

KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING DIABETIC FOOT CARE AMONG TYPE 2 DIABETIC PATIENTS AT HOSPITAL PAKAR UNIVERSITI SAINS MALAYSIA

ABSTRACT

Diabetic foot complications remain a major public health concern, particularly among individuals with Type 2 Diabetes Mellitus (T2DM). Proper foot care practices are essential in preventing foot ulcers, infections, and amputations. This study aimed to assess the levels of knowledge, attitude, and practice (KAP) regarding diabetic foot care and to examine the association between KAP and association between foot care practice and selected socio-demographic factors (age, gender, education level and duration of diabetes) among T2DM patients at Hospital Pakar Universiti Sains Malaysia (HPUSM). A cross-sectional quantitative study was conducted among 158 T2DM who were admitted to the selected medical and orthopaedic in HPUSM. Data were collected using a validated, self-administered questionnaire covering demographic information, and KAP components. The results indicated that 50.6% of respondents had good knowledge, 65.8% showed a positive attitude, and 45.6% demonstrated good foot care practices. Statistical analysis revealed significant associations between knowledge and practice, as well as between attitude and practice ($p < 0.05$). Additionally, socio-demographic factors such as age and duration of diabetes showed significant relationships with the level of foot care practices. In conclusion, targeted interventions are needed to promote behavior change, especially among younger and newly diagnosed patients, to reduce complications and close the gap between knowledge and practice.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Diabetes mellitus (DM) is a metabolic disorder characterized by abnormally high blood sugar levels. While there are different types of DM, the two main forms are Type 1 and Type 2. Type 1 diabetes (T1DM) typically results from insufficient insulin production and usually occurs in children or teenagers (Sapra & Bhandari, 2023). In contrast, Type 2 diabetes (T2DM) is more common in adults, often due to prolonged high blood sugar linked to poor diet and lifestyle choices. T2DM is a significant contributor to global deaths from no communicable diseases (NCDs), responsible for around 1.6 million deaths (Cho et al., 2018). The Global Burden of Disease study provides a statistic of death from diabetes that compare between T1DM and T2DM from 1980-2021.

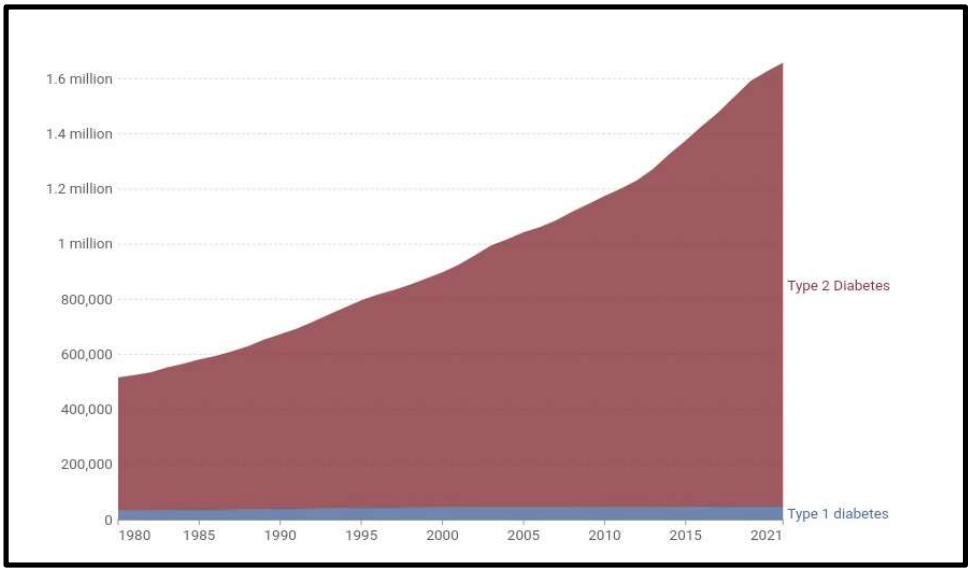

Figure 1.1 Statistic of death from diabetes, 1980-2021 (Deaths from Diabetes, by Type, 2021)

Diabetic foot ulcers (DFUs) are one of the commonest diabetic complications which involve the breakdown or ulceration of foot tissue. These ulcers are caused by

nerve damage (neuropathy) or poor blood circulation (peripheral arterial disease) in people with diabetes (Van Netten et al., 2020). The leading risk factor for DFUs in patients with diabetes, especially those with T2DM, is peripheral neuropathy. This condition occurs when prolonged high blood sugar damages the nerves, particularly in the lower limbs. As a result, people lose sensation in their feet, making it difficult to feel pain, pressure, or injuries. Without this awareness, small injuries or pressure points can go unnoticed and develop into ulcers (Gao et al., 2021). The International Diabetic Federation estimates the global prevalence of DFUs at 6.3% (Zhang et al., 2016), though some reports suggest it could be as high as 14% (Abdissa et al., 2020). In Malaysia, DFU rates generally range between 5–10% (Hadi et al., 2019), but one study in 2018, found the prevalence in Kuala Lumpur reached 42% among diabetic patients (Jamani & Muhammad, 2018).

DFUs greatly affect a person's quality of life, increase the likelihood of hospitalization, and put a significant strain on healthcare systems. However, the risk of developing these ulcers can be significantly lowered through proper foot care and early detection. Preventive measures, such as regular foot checks, wearing well-fitting shoes, and seeking timely medical care, are essential in reducing the incidence of DFUs and related complications. Poorly fitting footwear, often caused by structural changes in the feet due to motor neuropathy, is another key risk factor.

Given the high prevalence and serious risks of DFUs, it is crucial to evaluate the level of knowledge and attitude about diabetic foot care among patients at HPUSM. Understanding what patients know and how they care for their feet can highlight gaps in education and guide more effective interventions. Enhancing patient education on foot care practices could greatly reduce the occurrence of DFUs and related complications. This study aims to evaluate the knowledge, attitude and practice towards diabetic foot

care among T2DM patients at HPUSM. By pinpointing areas for improvement in patient education, the research hopes to contribute to better health outcomes for those living with diabetes.

1.2 Problem Statement

T2DM is a major global health concern, with the number of cases rising each year. Malaysia has the highest number of diabetes patients in Asia and the second highest in the world after Saudi Arabia. Family Medicine Specialist at the School of Medical Sciences (PPSP) of USM, Dr. Siti Suhaila Mohd Yusoff, said the increasing number of diabetes cases is very concerning, as nearly four million people in the country suffer from diabetes (Zaidi, 2022). In Malaysia, this increase is largely due to poor dietary habits and sedentary lifestyles, contributing to a growing number of diabetes-related complications like DFUs (Ho et al., 2014). Many diabetic patients are not sufficiently informed about the risks of DFUs or how to properly care for their feet. Research shows that a significant number of patients may not realize the importance of regular foot checks, good hygiene, and wearing suitable footwear (Sari et al., 2022).

Elderly individuals with diabetes are at a higher risk of developing foot ulcers, but many may struggle to access necessary information due to challenges in using online resources. Additionally, the risk of foot ulcers increases with the duration of diabetes, making it a greater concern for those who have lived with the condition for a long time (Hayes et al., 2022). Study from Muhammad-Lutfi et al. (2014), found in Terengganu, that there were no established guidelines or programs to educate patients during their hospital stay or before discharge. Even though many patients were admitted multiple times for diabetic foot complications, their knowledge and practices remained inadequate.

Despite the availability of foot care education programs, many individuals with T2DM still lack sufficient understanding about diabetic foot ulcers and do not follow proper foot care routines.

Research shows that educational interventions can greatly improve foot self-care knowledge, but many patients continue to neglect these practices due to a lack of understanding about their condition and its complications (Oluchi et al., 2023). This gap in knowledge and practice heightens their risk of developing DFUs, which can lead to severe infections, extended hospital stays, or even amputations. Without a clear understanding of how well patients are informed and whether they follow preventive measures, healthcare providers may find it difficult to implement effective strategies to lower the incidence of DFUs.

Cultural beliefs and misconceptions can also hinder understanding of diabetic foot care. In some cultures, traditional remedies or non-medical treatments may be favoured over modern healthcare, causing patients to delay or avoid seeking professional help. Misunderstandings about the causes or prevention of DFUs can further discourage proper foot care or prevent patients from recognizing the importance of preventive measures. Some individuals may even view foot ulcers as inevitable or a personal failure, making them less likely to engage with educational resources (Swaminathan et al., 2024).

Additionally, financial barriers, such as the cost of medical care, transportation, and essential foot care products like specialized shoes or orthotics, can make it difficult for some patients to access proper care. People from lower-income backgrounds may prioritize immediate financial needs over health education and foot care, which limits their engagement with available resources (Banik et al., 2020). As a result, even when patients are aware of the importance of preventive measures, they may be unable to follow through due to financial constraints. Cultural, educational, and socioeconomic factors can

all influence patients' knowledge about diabetic foot ulcers and their willingness or ability to adopt proper practices.

1.3 Research Questions

The research questions for this study are as follows:

1. What is the level of knowledge regarding diabetic foot care among T2DM patients at HPUSM?
2. What is the level of attitude towards diabetic foot care among T2DM patients at HPUSM?
3. What is the level of foot care practice among T2DM patients at HPUSM?
4. Is there any correlation between knowledge, attitude and practice of diabetic foot care among T2DM patients at HPUSM?
5. Is there any association between selected socio-demographic factors (gender, age, educational level, duration of diabetic) and level of foot care practices among T2DM patients at HPUSM?

1.4 Research Objectives

1.4.1 General Objectives

The general objective of this study is to determine the knowledge, attitude and practice regarding diabetic foot care among T2DM patients at HPUSM

1.4.2 Specific Objectives

The specific objectives for this study are as follows:

I. To determine the level of knowledge regarding diabetic foot care among T2DM patients at HPUSM.

II. To determine the level of attitude towards diabetic foot care among T2DM patients at HPUSM.

III. To determine the level of foot care practice among T2DM patients at HPUSM.

IV. To assess the correlation between knowledge, attitude and practice of diabetic foot care among T2DM patients at HPUSM.

V. To assess the association between selected socio-demographic factors (gender, age, educational level, duration of diabetic) and level of foot care practices among T2DM patients at HPUSM.

1.5 Research Hypothesis

Hypothesis 1 (H_0): There is no significant correlation between knowledge, attitude and practice related to diabetic foot care among T2DM patients at HPUSM.

(H_A): There is a significant correlation between knowledge, attitude and practice related to diabetic foot care among T2DM patients at HPUSM

Hypothesis 2 (H_0): There is no significant association between socio-demographic factors (gender, age, educational level, duration of diabetic) and level of foot care practices among T2DM patients at HPUSM.

(H_A): There is a significant association between selected socio-demographic factors (gender, age, educational level, duration of

diabetic) and level of foot care practices among T2DM patients at HPUSM.

1.6 Significant of Study

This study is significant as it aims to enhance the understanding of the knowledge, attitude and practices regarding diabetic foot care among patients with T2DM at HPUSM. Foot complications are a major cause of illness and amputations in diabetic patients, making proper foot care essential in preventing these severe outcomes. Knowledge about DFUs enables patients to recognize early signs of foot problems, facilitating timely intervention and reducing the risk of ulceration (Sari et al., 2022). A positive attitude towards foot care was prevalent among participants.

Evaluating the knowledge, attitude and practices regarding diabetic foot care of patients with 2TDM helps identify gaps in education. By understanding these gaps, healthcare providers can create educational programs tailored to the specific needs and challenges patients face (Letta et al., 2023). DFUs and their complications allows patients to enjoy a better quality of life, free from the physical and emotional strain of serious diabetic issues. This study will offer valuable insights into the shortcomings in patient education and the obstacles patients encounter in adopting effective foot care strategies.

1.7 Definitions of Conceptual and Operational Terms

Table 1.1 Conceptual and operational definitions

Terms	Conceptual Definition	Operational Definition

Type 2 Diabetes Mellitus (T2DM)	Chronic condition characterized by insulin resistance, where the body either does not produce enough insulin or cannot use insulin effectively (Lewine, 2018).	In this study, refers to patients who have been clinically diagnosed and confirmed through their medical records at by any healthcare centre.
Diabetic Foot Ulcer (DFU)	An open sore or wound on the foot of a person with diabetes, typically resulting from complications like poor circulation, nerve damage (neuropathy), or infection (Swaminathan et al., 2024)	In this study, a DFU refers to any ulcer, laceration or wound on the feet that has been reported by the patient during the survey or medical review.
Knowledge	Knowledge refers to the awareness, understanding, and familiarity that individuals have by experience of a fact or situation (Oxford Learner Dictionaries, 2023)	In this study, knowledge refers to respondent who are knowledgeable towards diabetic foot care. It will be evaluated in the section B and consist of 10 questionnaires.
Attitude	A feeling or opinion about something or a way of behaving (Oxford Learner Dictionaries, 2023)	In this study, attitude refers to a respondent's behavior towards foot care. It will be assessed in the section C and consist of 5 questionnaires.
Practice	Something that is usually or regularly done, often as a habit, tradition, or custom (Oxford Learner Dictionaries, 2023)	In this study, practices refer to a respondent's applicant of foot care practices and it was measured using a structured questionnaire consisting of 10 items on specific behaviors in the section D.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter provides a general review of the literature regarding the knowledge, attitude and practice regarding diabetic foot care among patient with Type 2 Diabetes Mellitus (T2DM) and the theoretical and conceptual framework which used in this study to guide this dissertation.

2.2 Diabetes Mellitus (DM)

DM is a chronic metabolic disorder characterized by persistent hyperglycaemia due to impaired insulin secretion, insulin action, or both. The condition encompasses several types, including Type 1, Type 2, and Gestational Diabetes Mellitus (GDM), each with distinct underlying mechanisms but often leading to similar complications (World Health Organization, Diabetes). Multiple factors contribute to the onset of DM. Genetic predisposition is a significant risk factor, particularly in Type 1 and Type 2 diabetes, where individuals with a family history are more susceptible. Modifiable factors, such as obesity, physical inactivity, and poor dietary habits, play a crucial role in the development of T2DM, highlighting the importance of lifestyle interventions in prevention (World Health Organization, Diabetes).

Uncontrolled diabetes can result in both acute and chronic complications. Acute complications, such as hypoglycaemia and diabetic ketoacidosis (DKA), pose immediate health risks. Over time, chronic complications may develop, including cardiovascular diseases, diabetic nephropathy, retinopathy, neuropathy, and diabetic foot ulcers (DFUs). DFUs are particularly concerning as they increase the risk of

infections and amputations, underscoring the need for effective foot care practices as a critical component of diabetes management (World Health Organization, Diabetes).

2.3 Diabetic Foot Ulcers (DFU)

DFUs are among the most severe complications associated with T2DM and present significant challenges for both patients and healthcare providers. These ulcers are characterized by slow-healing wounds, primarily developing on the feet. DFUs result from various factors, including peripheral neuropathy, peripheral arterial disease, and poor blood sugar control, all of which impair the body's ability to heal properly. Reduced sensation or poor circulation in the affected area makes these wounds more likely to occur. Without proper management, DFUs can lead to severe infections, hospitalizations, and, in extreme cases, amputations (Diabetic Ulcers: Causes, Symptoms, and Treatments, 2022).

These ulcers typically develop on weight-bearing areas of the foot, such as the heel, the ball of the foot, and the tips of toes. Although they are most common on the feet, ulcers can also appear on other parts of the body, including the legs, hands, and folds of skin on the abdomen. However, hand complications from diabetes are far less frequent, with a ratio of approximately 1:20 when compared to foot complications (CDC, 2024).

Diabetic ulcers often start as minor injuries but can quickly worsen due to factors like nerve damage and delayed healing. As a result, individuals may not detect the injury early, allowing it to develop into a serious ulcer. If left untreated, the ulcer can deteriorate into necrosis or gangrene, which may necessitate amputation. The most common causes of diabetic foot ulcers include peripheral neuropathy, peripheral arterial

disease (PAD), elevated blood sugar levels, infections, and wounds or irritation on the feet (Diabetic Ulcers: Causes, Symptoms, and Treatments, 2022). Figure below shows the early sign of DFUs that may go unnoticed by patient (CDC, 2024).

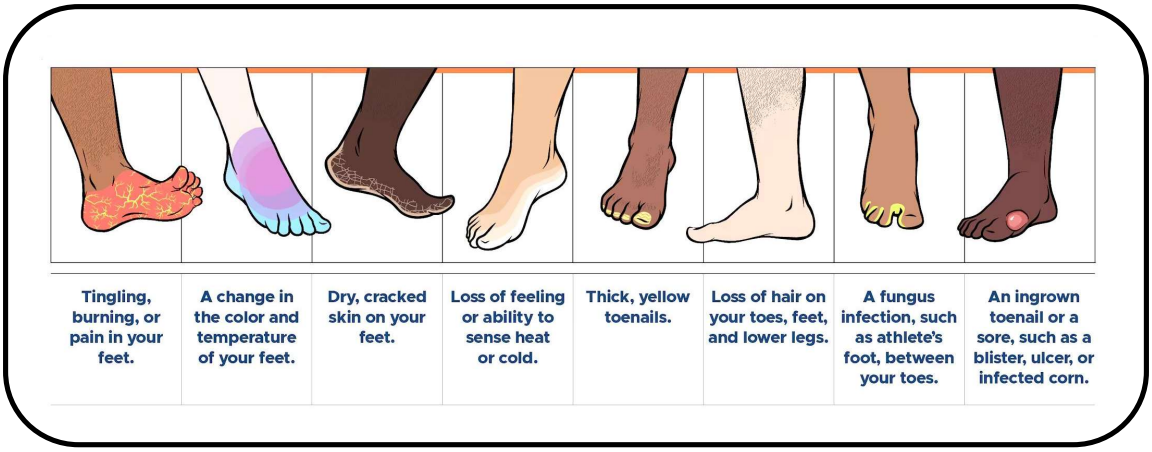

Figure 2.1 Early sign of DFUs (CDC, 2024)

2.3.1 Peripheral Neuropathy

Peripheral neuropathy refers to damage to the peripheral nerves, which connect the brain and spinal cord to the rest of the body (Boulton, 2023). This condition is often caused by prolonged high blood sugar levels, leading to nerve damage, especially in the lower limbs. It impairs sensory, motor, and autonomic functions, reducing the ability to feel pain or injury in the feet. Consequently, minor injuries like cuts, blisters, or pressure from ill-fitting shoes may go unnoticed, allowing them to progress into ulcers over time.

In addition to sensory damage, motor neuropathy weakens the muscles in the legs and feet, disrupting balance and causing deformities such as hammertoes, claw toes, or Charcot foot. These deformities change how pressure is distributed across the foot, making certain areas more susceptible to skin damage, calluses, and ulceration (CDC, 2024). Autonomic neuropathy further complicates matters by impairing the nerves that control moisture and blood flow in the feet. Reduced sweating leaves the

skin dry and prone to cracking, creating an entry point for bacteria. Poor circulation slows down the healing process, making it harder for even minor wounds to recover fully (National Institute of Diabetes and Digestive and Kidney Diseases, 2019).

2.3.2 Peripheral Arterial Disease (PAD)

Peripheral Artery Disease (PAD) happens when the blood vessels in the legs and feet become narrowed due to fatty deposits. This reduces blood flow, which means less oxygen and nutrients reach the skin and tissues (Mayo Clinic, 2022). As a result, even small wounds or cuts can take longer to heal and are more likely to become ulcers.

Ulcers often form on pressure areas like the soles or toes, where circulation is already poor. PAD can cause symptoms like leg pain, cold feet, or numbness sometimes hiding the early signs of a foot ulcer. If the patient also has diabetic nerve damage (neuropathy), they may not feel pain, which delays detection and treatment of the wound. In serious cases, PAD can lead to critical limb ischemia, where blood flow is so low that parts of the foot or leg may begin to die (Cleveland Clinic, 2019). This can result in gangrene and may require amputation to prevent the infection from spreading. PAD is one of the main reasons diabetic foot ulcers (DFUs) can become so severe.

2.3.3 High Blood Sugar Level

Persistent hyperglycaemia or chronically elevated blood sugar levels, plays a critical role in the development and worsening of DFUs (Kim, 2023). Prolonged high glucose levels cause extensive damage to various systems, especially nerves and blood vessels, increasing the risk of foot-related complications in people with diabetes. Poor blood sugar control also hinders the healing process by impairing essential functions.

Specifically, elevated glucose disrupts collagen production, a protein crucial for tissue repair, and weakens the performance of immune cells responsible for wound healing (Lin et al., 2023). As a result, even with appropriate wound care, recovery from DFUs can be slow or incomplete if blood sugar levels remain uncontrolled.

2.3.4 Immunology

In people with diabetes, high blood sugar weakens the immune system, making it harder for the body to fight infections and heal wounds (Berbudi et al., 2020). This is a key reason why diabetic foot ulcers (DFUs) often take a long time to heal and can lead to serious problems like infections, gangrene, or even amputation. High glucose levels reduce the function of white blood cells, especially neutrophils, which are responsible for killing bacteria. These cells react slower, have a weaker ability to fight germs, and can't clean wounds properly (Zhang et al., 2021).

Diabetes also affects macrophages, another type of immune cell that helps clear dead tissue and supports healing. In diabetic patients, these cells stay in a state of long-lasting inflammation, which slows down healing (Wu et al., 2022). Additionally, the natural proteins that help fight infection are less effective in diabetics. When combined with poor blood flow to the feet, this weak immune system makes even small wounds more likely to become infected and hard to treat.

2.4 Epidemiology of Diabetic Foot Ulcers

DFUs represent one of the most serious complications of diabetes mellitus, affecting millions globally. Understanding the epidemiology of DFUs is critical, as it sheds light on their prevalence, incidence, risk factors, and associated outcomes, which

are essential for effective healthcare planning and management of diabetic patients. The incidence of DFUs is rising in tandem with the increasing prevalence of diabetes, which currently affects an estimated 463 million people worldwide and is projected to rise to 700 million by 2045 (Zhang et al., 2016). DFUs account for 85% of non-traumatic lower-limb amputations (Jason McKean MD, 2024), making them a major contributor to disability among those with diabetes.

In Asia, including Malaysia, the prevalence of DFUs is also increasing. Malaysia has the highest rate of diabetes in the Western Pacific region and ranks among the highest globally (Ganasegeran et al., 2020). Reports indicate that the prevalence of diabetes in Malaysia ranges from 7.3% to 23.8% (Harris et al., 2019). Among Malaysian diabetic patients, the prevalence of DFUs varies from 4.6% to 15%, depending on the population and healthcare setting (Rosedi et al., 2022). This situation places a significant burden on the Malaysian healthcare system, as DFUs are associated with prolonged hospital stays, high medical costs, and a diminished quality of life for patients.

2.5 Knowledge of DFUs Care among Type 2 Diabetic Patients

Knowledge encompasses the awareness, understanding, and familiarity individuals gain through experience regarding a particular fact or situation (Oxford Learner Dictionaries, 2023). In this research, knowledge about DFUs includes understanding their causes, prevention strategies, and the importance of regular foot care. Muhammad-Lutfi et al. (2014) highlighted that insufficient self-care knowledge can lead to poor long-term metabolic control, increasing the risk of complications like neuropathy. Patients who are well-informed are more likely to adopt preventive

measures, such as performing regular foot inspections and choosing appropriate footwear, whereas those lacking this knowledge often neglect these practices, heightening their risk of developing ulcers.

Patient education is fundamental to effective diabetes management and significantly enhances understanding of diabetic foot ulcers. Educational initiatives should focus on providing comprehensive information about the risk factors, signs, and symptoms of foot ulcers, as well as the importance of preventive measures. Research has shown a significant correlation between education level and knowledge of diabetic foot care (Hasnain S; Sheikh NH, 2014). However, Muhammad-Lutfi et al. (2014) found that most patients with limited knowledge and poor practices had only completed secondary education, with no notable difference compared to those with tertiary education. This discrepancy may be due to insufficient promotion of diabetic awareness within the community, leading to inadequate information on foot care for both educated and less educated patients.

By deepening their understanding of DFUs, patients can be empowered to engage in proactive self-care behaviours that lower their risk. By prioritizing patient education and addressing barriers to knowledge, healthcare systems can enable individuals with diabetes to take proactive steps in managing their foot health. As the global prevalence of diabetes continues to rise, it is crucial for patients and healthcare providers to collaborate in addressing the challenges posed by DFUs, ensuring that effective prevention and management strategies are implemented.

2.6 Attitude of Type 2 Diabetic Patients towards DFUs

According to the Oxford Advanced Learner's Dictionary (2023), "attitude" is defined as "the way that someone think and feel about something or behave towards something that shows how they think and feel. The attitude of Type 2 diabetic patients towards DFUs is a critical factor in the prevention and management of these complications. Recent studies underscore the importance of several key elements that shape patients' attitudes towards DFU care and prevention.

One of the primary factors is knowledge and awareness. Patients who possess a higher level of knowledge about DFUs, their complications, and their potential impact on health often exhibit more positive attitudes towards preventive measures. Education plays a pivotal role in shaping these attitudes. When patients are well-informed about the causes, warning signs, and risks associated with DFUs, they are more likely to adopt proactive measures to prevent them, such as daily foot inspections and appropriate footwear use (Awwad & Abu-khader, 2022)

The perception of severity and susceptibility to DFUs also influences patient attitudes. Those who understand the seriousness of DFUs and believe they are at risk are generally more motivated to engage in preventive practices. When patients perceive DFUs as a severe complication with potentially life-altering consequences, they are more inclined to adhere to recommended foot care routines. This perception acts as a driving force, encouraging patients to stay vigilant and consistent with their self-care practices (Awwad & Abu-khader, 2022).

2.7 Foot Care Practices among Type 2 Diabetic Patients

According to the Oxford Learner Dictionaries (2023), "practice" refers to actions that are usually or regularly performed, often as a habit, tradition, or custom. In this research, "practice" pertains to assessing how often patients engage in foot care activities such as keeping their feet clean and moisturized, wash the feet at least once daily, dry the feet after washing, avoiding walking barefoot, wearing suitable footwear, and seeking medical attention at the first sign of injury. Adhering to these practices is crucial for preventing ulcers, as they help alleviate pressure on vulnerable areas of the feet, reduce the risk of injury, and promote early detection of any issues.

Despite the critical importance of foot care, many diabetic patients do not consistently adopt these preventive behaviours. The study by Muhammad-Lutfi et al. (2014) revealed that a significant number of diabetic patients fail to follow essential foot care practices regularly. One of the most neglected habits was applying talcum powder between the toes, with few patients recognizing its significance or incorporating it into their routines. Additionally, practices such as using warm water for washing, checking the water temperature beforehand, and avoiding lotion application between the toes were frequently overlooked. While patients demonstrated relatively good knowledge about changing socks daily, their actual practice in this area remained inadequate. This suggests a gap between knowledge and behaviour, even though patients possess some understanding of proper foot care, they do not consistently put that knowledge into practice, which may increase their risk of foot complications.

Effective interventions, such as structured educational programs, personalized foot care plans, and regular follow-ups, have proven to enhance foot care practices among diabetic patients (Muhammad-Lutfi et al., 2014). These initiatives aim to raise awareness about the importance of foot care, teach patients how to conduct proper foot

inspections, and stress the necessity of suitable footwear. Improving foot care practices is essential to reducing the incidence of DFUs and related complications, thereby lowering the risk of amputations and enhancing the quality of life for individuals living with diabetes.

2.8 Association between Knowledge, Attitude and Practices related to Diabetic Foot Care

The association between knowledge, attitude, and practice (KAP) related to diabetic foot care is crucial for effective management. Higher knowledge about diabetic foot care often leads to more positive attitudes towards preventive measures. Positive attitudes, in turn, promote better foot care practices. Patients who understand the importance of prevention and management are more likely to adopt regular foot inspection and hygiene practices, thus reducing the risk of diabetic foot ulcers.

A study from Metwally et al. (2023) indicated that most participants held a positive view towards diabetic foot care and agreeing on the importance of seeking medical assistance for foot infections. However, despite this positive attitude, the actual practices reported were concerning of participants only sought foot check-ups when symptoms appeared, indicating a gap between knowledge, attitude and practice

2.9 Association between Selected Socio-demographic Factors and Level of Foot Care Practices

Socio-demographic factors have a significant impact on patients' practice towards diabetic foot care. Numerous studies have explored how demographic characteristics such as age, gender, education level, and duration of diabetes are linked to foot care

practices among individuals with Type 2 diabetes. The following discussion will examine each of these factors in detail, supported by relevant statistical evidence from previous research

2.9.1 Genders

The study reported that 62.31% of the respondents were women, and 71.54% exhibited good foot care behaviour. However, the analysis indicated that gender did not significantly affect foot care behavior (p-value > 0.05), suggesting that both men and women responded similarly to foot care recommendations from healthcare providers (Rondhianto et al., 2023). Other study from Rossaneis et al. (2016) in Brazil, showed that men had a significantly higher prevalence of foot self-care deficits compared to women. Specifically, men were less likely to regularly check their feet and dry between their toes. Women demonstrated better foot hygiene practices, such as regularly trimming nails and avoiding walking barefoot, which are critical for preventing diabetic foot complications. Both studies acknowledge the existence of gender differences in foot care practices.

2.9.2 Age

From the study by Aljaouni et al. (2024), mention that age plays a key role, as younger individuals may have more access to educational resources but often neglect consistent foot care, possibly due to feeling less at risk for complications. On the other hand, older adults, while having more experience managing diabetes, may face challenges like physical limitations, vision problems, or cognitive decline, which can interfere with regular foot inspections and care routines. Otherwise, Older patients tend to have better foot care practices. This might be because they have more experience

managing their condition and are more aware of the risks associated with poor foot care. Meanwhile, in article Saurabh et al. (2014) state that 20.2% of participants exhibited good foot care practices, with older patients showing lower knowledge levels impacting their self-care behaviours.

2.9.3 Educational Level

Education level has a strong correlation with foot care practices. Patients with higher education, such as university degrees, tend to have better adhere more to foot care practices compared to those with lower educational backgrounds. For instance, 76.3% of university graduates had good knowledge of foot care, compared to only 44.4% among those with below secondary education (Al Amri et al., 2021). Other study found that patients with higher educational levels had significantly better foot care knowledge and practices. Specifically, those with tertiary education scored higher on foot care knowledge assessments compared to those with only primary or secondary education (Ong et al., 2022). Both studies reveal a clear correlation between higher educational levels and improved foot care practices among diabetic patients. Patients with more education tend to have better knowledge and engage in more effective self-care behaviours.

2.9.4 Duration of Diabetes

The duration of diabetes also matters. A study in Dar es Salaam, Tanzania, found that longer diabetes duration was associated with better foot care knowledge but not necessarily better practices. Patients with longer disease duration might have more exposure to foot care education, but other factors such as accessibility to healthcare and socioeconomic status could influence practice adherence (Chiwanga & Njelekela,

2015). On the other hand, research conducted at the University of Gondar in Ethiopia highlighted those patients who had diabetes for over five years were more likely to demonstrate inadequate foot care practices compared to those with a shorter duration. This suggests that while knowledge might improve over time, consistent practices might decline due to complications or fatigue in managing the disease (Mekonen & Gebeyehu Demssie, 2022). These findings underline the need for continuous reinforcement of foot care education and support throughout the duration of diabetes to ensure sustained adherence to preventive practices.

2.10 Theoretical and Conceptual Framework of the Study

The Health Belief Model (HBM) is a widely recognized theoretical framework used in health behaviour research. Developed by social psychologists in the 1950s, it seeks to understand why individuals often fail to adopt disease prevention strategies or participate in screening programs. The model emphasizes the impact of personal beliefs on health-related behaviours and decision-making (Rural Health Information Hub, 2024). It is particularly effective for examining how patients' beliefs about the risks and severity of DFUs, along with their understanding of preventive behaviours, influence their foot care practices. Figure below shows The Health Belief Model by Hochbaum, Rosenstock and Kegels.

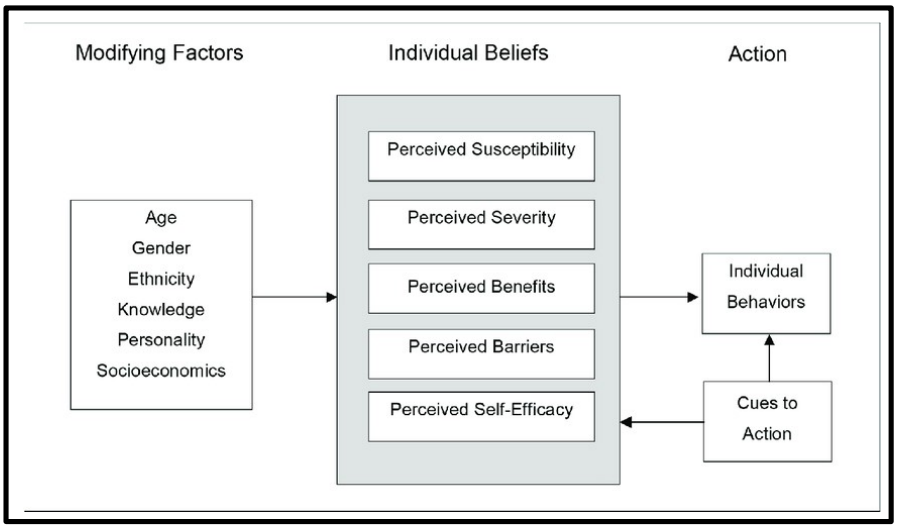

Figure 2.2 The Health Belief Model by Hochbaum, Rosenstock and Kegels (1950s)

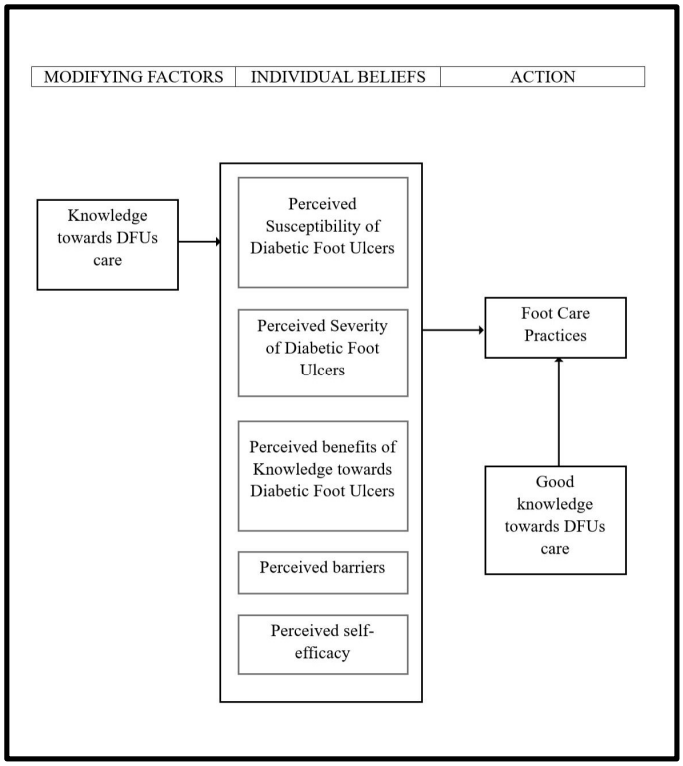

Figure 2.3 Foot care practice framework adapted from The Health Belief Model by Hochbaum, Rosenstock, and Kegels (1950s)

The framework above presented represents a model for understanding and improving diabetic foot care practices among patients. It is based on the Health Belief Model, highlighting the interaction between modifying factors, individual beliefs, and resulting actions regarding DFUs care. The framework demonstrates how patient knowledge about DFUs and individual perceptions influence foot care practices and subsequent outcomes. The model begins with the modifying factor, which is the knowledge patients have about DFUs and their care. Patients with a deeper understanding of DFUs, including the causes, risk factors, and preventive measures, are more likely to recognize the importance of maintaining good foot care habits. When patients are informed, they can comprehend their susceptibility to DFUs, understand the potential severity of complications, and be aware of strategies to mitigate their risks.

Individual beliefs are central to this framework and consist of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and perceived self-efficacy. Perceived susceptibility refers to how individuals evaluate their risk of developing DFUs. When patients perceive themselves as highly vulnerable to foot ulcers due to factors such as uncontrolled diabetes, poor circulation, or previous foot complications, they are more likely to engage in protective foot care behaviours. Perceived severity pertains to the seriousness of DFUs as understood by the patient. Patients who grasp the potential complications of DFUs, including infection, gangrene, and amputation, are motivated to adopt recommended preventive practices.

The perceived benefits focus on patients' beliefs about the positive outcomes associated with adhering to recommended foot care practices. When individuals believe that performing daily foot checks, wearing appropriate footwear, and managing their diabetes effectively will reduce their risk of complications, they are more likely to commit to these behaviours. However, perceived barriers can hinder patients'

willingness or ability to perform foot care practices. Barriers might include limited access to healthcare resources, financial difficulties, lack of awareness about effective care, or physical challenges. Perceived self-efficacy emphasizes the patient's confidence in their ability to take preventive measures and maintain good foot care practices. Patients who feel empowered and capable of managing their foot health are more likely to engage consistently in foot care routines, thereby reducing their risk of developing severe DFUs.

The last element of the framework is the resulting action of foot care practices. Good knowledge and strong individual beliefs lead to positive foot care behaviours, such as daily inspection of the feet, proper hygiene, wearing protective footwear, and seeking timely medical intervention when necessary. Overall, this framework underscores the importance of patient education, belief modification, and behavioural support in improving diabetic foot care practices. By increasing knowledge, addressing perceived barriers, and fostering self-efficacy, healthcare providers can empower patients to take control of their foot health, ultimately reducing the burden of DFUs and improving patient outcomes.