

**THE RELATIONSHIP BETWEEN THE WAIST-HIP RATIO
AND DIABETES RELATED DISTRESS WITH QUALITY OF
LIFE AMONG TYPE 2 DIABETES MELLITUS PATIENTS IN
HOSPITAL PAKAR UNIVERSITI SAINS MALAYSIA
(HPUSM)**

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**SCHOOL OF HEALTH SCIENCES
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(HPUSM)**

By

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**Dissertation submitted in partial fulfilment of the requirements
for the degree of
Bachelor of Health Science (Honors) (Dietetics)**

JUNE 2025

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.



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Siti Nursafiyah Binti Abdul Hammed

Date: 30th June 2025

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**HUBUNGAN ANTARA NISBAH PINGGANG-PINGGUL DAN STRES
BERKAITAN DIABETES DENGAN KUALITI HIDUP DALAM
KALANGAN PESAKIT DIABETES JENIS 2 DI HOSPITAL PAKAR
UNIVERSITI SAINS MALAYSIA (HPUSM).**

ABSTRAK

Kajian ini mengkaji hubungan antara nisbah pinggang-pinggul dan stres berkaitan diabetes dengan kualiti hidup dalam kalangan pesakit diabetes jenis 2 di Hospital Pakar Universiti Sains Malaysia (HPUSM). Kajian keratan rentas ini telah dilaksanakan dalam kalangan 191 pesakit yang berumur 18 tahun ke atas. Kajian ini dijalankan dengan menggunakan dua soal selidik daripada item Skala Kesusahan Diabetes Melayu 17 (MDDS-17) untuk mengukur kesusahan berkaitan diabetes dalam kalangan pesakit T2DM dan juga Kualiti Hidup Diabetes Versi Semakan 13 item (RVDQoL-13). Dapatan kajian ini mendapati bahawa lelaki mempunyai nisbah pinggang pinggul yang lebih tinggi berbanding wanita ($p < 0.001$). Terdapat juga perkaitan yang signifikan antara stress berkaitan diabetes dan kualiti hidup diabetes dimana tahap kesusahan sederhana hingga teruk adalah lebih tinggi daripada tahap kesusahan minimum hingga tiada ($p = 0.02$). Walau bagaimanapun, tiada hubungan yang signifikan secara statistik ditemui antara stres berkaitan diabetes, kualiti hidup diabetes dan antara nisbah pinggang pinggul dan kualiti hidup diabetes. Penyelidikan akan datang mesti meneroka kajian intervensi untuk mengkaji faktor yang mempengaruhi kualiti hidup dalam kalangan pesakit diabetes.

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ABSTRACT

This study examined the relationship between waist-hip ratio and diabetes-related stress with quality of life among type 2 diabetes patients at the Hospital Pakar Universiti Sains Malaysia (HPUSM). This cross-sectional study was conducted among 191 patients aged 18 years and above. This study was conducted using two questionnaires from the Malay Diabetes Distress Scale 17 (MDDS-17) to measure diabetes-related distress among T2DM patients and the Revised Diabetes Quality of Life 13-items (RVDQoL-13). The findings of this study found that men had higher waist-hip ratio than women ($p < 0.001$). There was also a significant association between diabetes-related stress and diabetes quality of life where moderate to severe distress was higher than minimal to no distress ($p = 0.02$). However, no statistically significant relationship was found between diabetes-related stress, diabetes quality of life and between waist-hip ratio and diabetes quality of life. Future research must explore intervention studies to examine factors that influence quality of life among diabetes patients.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Diabetes mellitus is one of the most vital global public health issues, weighing significantly on global burden both public health and socioeconomic development in most countries, including Malaysia (Akhtar et al., 2022). The International Diabetes Federation (IDF) reported that 10.5% of approximately 537 million of adults are living with diabetes in the worldwide in 2021. The figure is anticipated to increase up to 643 million adults predicted to have diabetes by 2030 and 783 million by 2045 if effective preventative strategies are not applied (Institute Diabetes of Federation, 2022). Meanwhile, in recent decades, diabetes prevalence has increased its number especially in type 2 diabetes mellitus among adults where is in Malaysia, the National Health and Morbidity Survey (NHMS) in 2023 revealed that more than half a million persons suffered from four noncommunicable diseases: diabetes, hypertension, high cholesterol, and obesity. Unfortunately, heart disease and stroke provide the greatest risk of these four NCDs. Furthermore, 15.6%, or one in every six persons in Malaysia aged 18 to more than 60, had diabetes (Institute for Public Health, 2024). Diabetes trends revealed that the condition becomes more prevalent as people age. However, 84% of young adults aged 18 to 29 who have diabetes are unaware that they have it, thus it is proven that diabetes is one of the leading causes of death in Malaysia.

Besides, the NHMS in 2023 stated that overweight and obesity may be contributing to the rise in diabetes, particularly type 2 diabetes mellitus. Overweight and obesity trends suggest a rise in the condition based on body mass index (BMI) greater than 25 kg/m² grew to 44.5% and 54.4% in 2011 and 2023, respectively. Meanwhile, the prevalence of abdominal

obesity among men over 90 cm and women over 80 cm has risen from 45.4% to 54.5% in 2011 and 2023, respectively (Institute for Public Health, 2024). Diabetes mellitus that also known as heterogeneous metabolic disorder characterized by hyperglycemia which is high blood glucose, carbohydrate, fat and protein metabolism disturbance and defects in either insulin secretion or action or both (Akhtar et al., 2022). People with diabetes live a longer life and more sensitive to microvascular and macrovascular problems, making it a major public health issue with high morbidity and mortality rates, as well as considerable economic consequences (Ismail et al., 2024).

Next, having diabetes can lead to severe psychological influence on both emotional and mental well-being, a condition known as diabetes distress. It can be defined as a poor emotional or affective experience that results from the difficulties of living with diabetes (Skinner et al., 2020). Moreover, physical complications such as cardiovascular diseases, neuropathy, diabetic foot, stroke and also psychological complications like emotional distress and depression will be exposed to individuals with diabetes (Palamenghi et al., 2020). Thus, diabetes distress is a complex concept that includes various facets of diabetes treatment and based on the day-to-day experience of living with diabetes. According to a study, the prevalence of diabetes distress varies substantially among different diabetic populations. A meta-analysis of diabetic distress in patients with type 2 diabetes found significant links between increased distress and among female gender (Skinner et al., 2020). However, it is best to note that diabetes distress differs from depression, as it is connected with decreased levels of self-care, overall emotional well-being, and potentially metabolic consequences of diabetes treatment (Skinner et al., 2020).

Diabetes related distress will also directly affect various social dimensions which are common in daily living such as glycemic control and changes in food habits and lifestyles (Palamenghi et al., 2020). According to Skinner et al (2020), found in their study that type 2 diabetes patients had poor communication, poorer metabolic outcomes and lower levels of self-management, which are the components that associated with diabetes distress that they have experienced. In other words, diabetes distress can have a substantial influence on an individual's quality of life. As reported by Palamenghi et al., (2020) the influence of the disease and treatment on all chronic patients' QOL and lifestyle is a major issue for both patients and physicians. Diabetes patients experience a physical, psychological, and social burden that affects their self-care, disease management, therapeutic adherence, and QOL. The World Health Organization emphasizes on the psychological impact of illness and treatment on physical, social, and mental well-being when assessing QOL. A person's capacity to be engaged in their own care and their surrounding environment are some of the factors towards their quality of life. Therefore, quality of life does not rely on just only the presence or absence of impairments caused by a certain medical condition (Palamenghi et al., 2020).

1.2 Problem Statement

Lifestyle changes and food intake patterns especially those related with sugar and fats are the main problems in the increased of diabetes cases mainly in type 2 diabetes mellitus (Ismail et al., 2021). This problem has to be addressed accordingly to prevent further life-threatening complications via optimal diabetes management care. Without a proper management, these issues will continue to burden the country as managing diabetes requires ongoing medical care and medications. In this study, the effectiveness of managing diabetes and the prevention of all complications are the concern that will be explored via assessing their diabetes distress followed by quality of life.

According to Janoo et al (2019), patients who have been suffered from type 2 diabetes mellitus had struggles with adhering to their treatment plan as suggested by physicians. In the meantime, it is obviously related with various of feelings such as frustration, loneliness, in denial and more where it could contribute to obstruction of self-care and poor glycaemic control (Janoo et al., 2019). These behaviours will increase risk of evolving diabetes specific distress and lead to psychological distress. Due to potential long-term problems and their significant impact on the current state of diabetes, many patients are concerned and preoccupied with the worry of the resulting serious complications such as affecting macrovascular and microvascular (Janoo et al., 2019).

Therefore, due to macrovascular and microvascular complications that they have been suffered and continuous demanding task of being type 2 diabetes mellitus patients, their quality of life will be affected, and they might have issues in understanding and completing health information that has eventually made them difficult to appraise the information (Shibraumalisi et al., 2020).

1.3 Research Questions

At the end of the study, the following questions are expected to be addressed:

- i) What is the mean waist-hip ratio among type 2 diabetes mellitus patients in Hospital Pakar Universiti Sains Malaysia (HPUSM)?
- ii) What is the level diabetes related distress experienced by type 2 diabetes mellitus patients in Hospital Pakar Universiti Sains Malaysia (HPUSM)?
- iii) How is the quality of life among type 2 diabetes mellitus patients in Hospital Pakar Universiti Sains Malaysia (HPUSM)?
- iv) Is there any relationship between waist-hip ratio and quality of life among type 2 diabetes mellitus patients in Hospital Pakar Universiti Sains Malaysia (HPUSM)?
- v) Is there a mean difference in quality of life between T2DM individual with different severity of diabetes related distress in Hospital Pakar Universiti Sains Malaysia (HPUSM)?

1.4 Research Objectives

General Objective: To determine the relationship between the waist-hip ratio and diabetes related distress with quality of life among type 2 diabetes mellitus patients in Hospital Pakar Universiti Sains Malaysia (HPUSM).

Specific Objectives

- i) To determine the mean waist-hip ratio among type 2 diabetes mellitus patients in Hospital Pakar Universiti Sains Malaysia (HPUSM).
- ii) To determine the level of diabetes related distress level among type 2 diabetes mellitus patients in Hospital Pakar Universiti Sains Malaysia (HPUSM).

- iii) To determine the quality of life among type 2 diabetes mellitus patients in Hospital Pakar Universiti Sains Malaysia (HPUSM).
- iv) To assess the relationship between waist-hip ratio and quality of life among type 2 diabetes mellitus patients in Hospital Pakar Universiti Sains Malaysia (HPUSM).
- v) To compare the quality of life in T2DM individual with different levels of diabetes related distress in HPUSM.

1.5 Research Hypothesis

Null Hypotheses, H_0

- i) There is no relationship between waist-hip ratio and quality of life among type 2 diabetes mellitus patients in Hospital Pakar Universiti Sains Malaysia (HPUSM).
- ii) There is no mean difference in the quality of life in T2DM individual with difference levels of diabetes related distress in Hospital Pakar Universiti Sains Malaysia (HPUSM).

Alternative Hypotheses, H_a

- i) There is a relationship between waist-hip ratio and quality of life among type 2 diabetes mellitus patients in Hospital Pakar Universiti Sains Malaysia (HUSM)
- ii) There is a mean difference in the quality of life in T2DM individual with difference levels of diabetes related distress in Hospital Pakar Universiti Sains Malaysia (HPUSM).

1.6 Justification of Study

This issue necessitates the development of public health strategies in order to lower the prevalence of prediabetes and diabetes as if the proportion of people living with diabetes will rise and consequently putting an enormous number of patients developing complications. The prevalence of type 2 diabetes mellitus among older people at the age of 60 years old and above are tenfold likely than those at the age of 20-29 to have type 2 diabetes mellitus due to fast-ageing Malaysian in the average age of 74.4 years old in 2017 as reported by Akhtar et al., (2022). Furthermore, Malaysian government has to develop a controlled programme throughout country as well as developing a comprehensive approach to improve diabetes awareness, control, prevention and treatment.

Besides, targeting intervention will be done by identifying the roots of this issue as it is vital to ensure the wellbeing of type 2 diabetes mellitus patients (Shibraumalisi et al., 2020). Moreover, a scale with recognized psychometric features is useful in identifying diabetes related distress and its impact on psychological adjustment (Jannoo et al., 2019). This will be beneficial to assess patients who is at risk lack of compliance and having low quality of life. This is an undeniably rigorous and difficult task in order to achieve and improving the patient's outcome, particularly their quality of life as it need extra attention.

1.7 Conceptual Framework

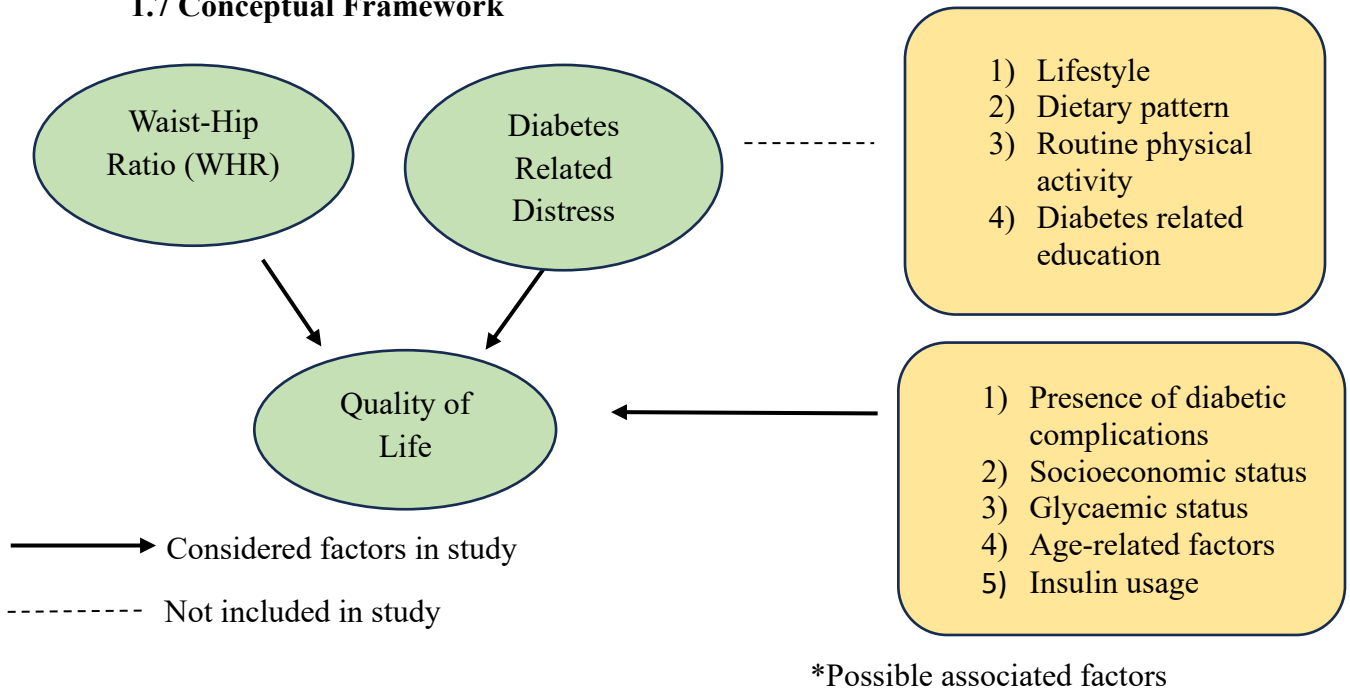


Figure 1. Conceptual framework of factors associated to waist hip ratio and diabetes related distress with quality of life among type 2 diabetes mellitus patients in Hospital Pakar Universiti Sains Malaysia (HPUSM).

One of the predictive indicators for abdominal fat accumulation is waist to hip ratio (WHR) which have been related with obesity-related health risks including diabetes. Multiple studies have found that a comprehensive view of health and accurately to categorize nutritional status is through WHR compared to body mass index (BMI). Even though BMI is significant indicators to evaluate and classify the nutritional body status yet still cannot provide accurate proportion of fat distribution in body. Moreover, highly associated of developing diabetes and other health complications like hypertension, cardiovascular disease and cancer are with an increase of waist circumference even BMI in the normal range (Thao et al., 2022). One of research finding by Thao et al (2022) found that a group that demonstrated a greater incidence of distress for about 27.9% is those with higher waist circumference ratio meanwhile on the other normal group of waist circumference ratio is about 25.8%.

Besides, without proper management of type 2 diabetes mellitus, patients could suffer from other diabetic complications and adversely affected to their quality of life especially to those who are unable to cope with the complications. This is clearly proven by prior research that diabetic patient's feeling will be increased regarding to the uncertainty of future consequences due to the existence of diabetic complications such as diabetic nephropathy and diabetic retinopathy. Thus, in turn patient reported quality of life were declined with the presence of diabetic complications (Bujang et al., 2017).

CHAPTER 2

LITERATURE REVIEW

2.1 Prevalence of Type 2 Diabetes Mellitus Patients

The World Health Organization (WHO) defines diabetes mellitus as a chronic metabolic condition which is defined by high blood glucose levels that eventually proceed to damage the heart, blood vessels, eyes, kidneys, and nerves. Most common type of diabetes cases globally is type 2 diabetes mellitus (T2DM) or also recognized as non-insulin-dependent diabetes mellitus (NIDDM) which affects 90-95% of diabetes patients compared with other types of diabetes such as type 1 diabetes mellitus (T1DM) and gestational diabetes mellitus (GDM) (World Health Organization, 2023). According to Ke et al (2022), there are two phases of insulin secretion that can be explained in the pathophysiology where the first phase of insulin release rises at 2-4 minutes after blood glucose level begins to rise and declines dramatically after 10-15 minutes. Meanwhile the second phase of insulin secretion occurs gradually and stabilizes at 2-3 hours following the initial increase in blood glucose levels.

T2DM characterized by insufficient insulin secretion by pancreatic islet β -cells, tissue insulin resistance, and insufficient insulin corrective secretory response (Galicía-García et al., 2020). This phenomenon occurred due to hyperglycemia or high blood glucose that derives from the progression of T2DM in situations where insulin secretion incapable to regulate the homeostasis of blood sugar level and lead to metabolic dysfunctions of carbohydrate, fat and protein where it progressed very slowly and asymptotically throughout years (Banday, Sameer & Nissar, 2020). Conversely, rising arterial glucose levels

in the liver and the declining of glucose utilization in muscle, liver and adipose tissue resulted from insulin resistance (Galicia-Garcia et al., 2020).

Diabetes mellitus is a major worldwide health issue throughout century which ranks in the top ten causes of death alongside other noncommunicable diseases (NCDs) such as cancer, cardiovascular disease and chronic respiratory disease. Based on WHO, 77% of NCDs deaths mostly are from low and middle-income countries. Since diabetes constantly rising its prevalence globally throughout centuries, T2DM cases worldwide have also increased, affecting human life, health expenditure and impacting public health which parallel to accelerated economic progress and urbanization especially in low and middle-income countries (Abdul Basith Khan et al., 2019). According to International Diabetes Federation (2022), the prevalence of people having diabetes worldwide is about 540 million where it was reported in 2021, the adult population having diabetes was about more than 10.5% at the age of 20 to 79 years old. Furthermore, IDF forecasts stated that the anticipated number of people who have diabetes will continuously increase in the 2030 and 2045 with 643 million and 783 million adults respectively. Research findings by Sun et al (2023) found out that the number of diabetes mellitus prevalence will steadily inclining for about 12.9% worldwide mostly from middle-income countries. In particular, among approximately 540 million people living with diabetes globally, greater than 90% are diagnosed with type 2 diabetes mellitus (International Diabetes Federation, 2024). Besides, an estimated 232 million people were undiagnosed where about 1 in 3 diabetetic people contribute to the true disease burden of type 2 diabetes mellitus (Galicia-Garcia et al., 2020). Globally, results found by Abdul Basith Khan et al (2019) showed that people that are affected by type 2 diabetes mellitus was about 6.28% of the global population and the occurrence rate of T2DM

was 6059 cases per 100,000 and shows no sign of declining. They have estimated the prevalence rate is expected to rise for about 7079 per 100,000 by 2030 and 7862 by 2040 (Abdul Basith Khan et al., 2019). A previous study by Nanda et al (2022) have provided epidemiological databases from Global Burden Disease (GBD) in 2019 including all aspects from incidence, prevalence, death and disability-adjusted years (DALYs) at global and national level to assess the development of T2DM. Based on the results reported in 2019, the highest prevalence of T2DM cases were in the Asian region, preceded by South Asia which were India and China with 81.8 million and 90 million people. Additionally, most significant growth was observed in North Africa and Middle East at 373.1% and subsequently in Andean Latin America at 341.5% between 1990 to 2019 (Nanda et al., 2022). There are factors that lead to the progression of T2DM in developing countries throughout years, especially rapid changes in industry, food, life, and urbanization. The alarming increase of prevalence rate changes over years may result from heavily processed food, sedentary lifestyle along with environmental pollution such as air and water pollution that declines stage of health (Junjun Ye et al., 2023).

Diabetes mellitus in Malaysia has experienced significant alarming raises throughout the year and creating a global burden on public health and socioeconomic development. The prevalence of diabetes mellitus in Malaysia has gradually increased in every four years which in 2011 at 7.2% followed by 8.3% at 2015 and 9.4% at 2019 among adults aged 18 years old and above has been reported in NHMS 2019 (Institute for Public Health, 2020). According to the latest key findings reported in the NHMS 2023, 15.6% approximately 1 in 6 people living with diabetes whereas 84% of young adults aged 18-29 years old were unconscious that they have diabetes (Institute for Public Health, 2024). On the other hand, type 2 diabetes

mellitus in Malaysia has extremely shown an alarming increase over years. According to Abdul Basith Khan et al (2019), the prevalence of T2DM in developing countries in Southeast Asia such as Indonesia, Thailand and Malaysia have been monitored and has escalated the ranks in the last two decades due to enhancement of socioeconomic status. One of the studies regarding prevalence of T2DM in Malaysia was reported by Akhtar et al (2022) was 14.39% of Malaysian population which shown highest prevalence rate compared to the other neighboring countries such as Indonesia at 6.2% (Ligita et al., 2019) and Singapore at 7.9% (Tan et al., 2022). The prevalence rate of T2DM was categorized into subpopulations according to age, ethical sub-groups and others by Akhtar et al (2022). Firstly, the prevalence of T2DM according to the age showed that the highest prevalence rate was among the adult population at the age of 60 years above with 33.45% meanwhile the lowest prevalence rate was among 20-29 years old with 3.16% (Akhtar et al., 2022). This is because the elderly population with low mortality rates will contribute to a higher proportion of people living with diabetes as well as elevating the risk of multiple complications due to diabetes (Tan, Dickens & Cook, 2020). Moreover, based on the ethnicity in Malaysia, Indians has highest prevalence rate, which was 25.10%, accompanied by Malays population (15.25%) followed by Chinese (12.87%), Bumiputera (8.62%) and others ethnicity (6.91%) (Akhtar et al., 2022).

2.2 Risk Factors of Type 2 Diabetes Mellitus Patients

T2DM is a multifactorial disease featuring age, low socioeconomic status, family history, unhealthy lifestyle, metabolic syndrome, increased waist size, ethnicity and plethora of modifiable and non-modifiable risk factors (Oo et al., 2020). The relationship by blood highlights non-modifiable risk factors and it has been proven in a research study by Al Amiri et al (2015) where the findings showed the rate of abnormal glucose testing among students

with a family history of diabetes was 1.9 times higher, particularly among first-degree relatives. The risk of developing T2DM is highest among the United Arab Emirates population compared to the other countries as they practice cousin marriages (Al-Amiri et al., 2015). Individuals with a first-degree relative with a family history of T2DM have two to three-fold higher chance of getting the condition compared to those without disease (Rautio et al., 2012). Individuals with family history of disease internalize the significance differently depending on the disease by understanding the facts of surrounding disease and its relation to an individual which could result in favorable changes. Moreover, study research among African American community found out that only 11 out of 20 which over half percent were able to identify family history as growing risk factors for T2DM while most of the responses only could be identified modifiable risk factors including obesity and sedentary lifestyle changes (Ard, Tettey & Feresu, 2020). These findings correlate with recent research, indicating that diabetes programs prioritize awareness of modifiable risk factors over family history during diabetes prevention programs and lead to decreased recognition of non-modifiable risk factors within the community (Geiss et al., 2017). In addition, according to Ard et al (2020) mentioned, the awareness campaign regarding family history should be emphasized as the topic of family history able to spark discussions about healthcare concerns beyond T2DM.

Another study conducted for the Malaysian population explained that chances of getting T2DM among relatives are higher as they are sharing similar diets, lifestyles and genetics (Reed, Bain & Kanamalapurdi, 2021). This aligns with the fact that T2DM is heritable which implies that genetic variation passed down via generations and contributes to disease risk (Noraidatulakma et al., 2018). Moreover, heritability is a significant factor in

the development of type 2 diabetes, accounting for 20-80% of cases whereas individuals with single diabetic parents contribute about 40% whereas individuals having both parents with T2DM elevates up to 70% risk of developing T2DM. This refers to the hereditary ability to change gene activities including various mechanisms such as DNA methylation, histone acetylation, and non-coding RNA, regulate gene expression without altering the arrangement of nucleotide sequences and can also be influenced by environmental factors (Cuschieri, 2019).

Besides, age is also one of the non-modifiable risk factors of type 2 diabetes and more common as people get older. The prevalence of aging population can be showed as increasing trend in Malaysia from the age of 20-29 years old (3.16%) followed by the age of 30-45 years old (13.71%), 46-59 years age group (25.66%) and the highest at the age of 60 years old and above (33.45%) (Akhtar et al., 2022). The reasons behind a greater rise of T2DM among elderly could be unawareness of diabetes symptoms at early stages and overcrowding of patients in government healthcare centers that make it harder to assess diabetes screening (Hasimah et al., 2016). Furthermore, elderly diabetic individuals aged 60 years and above were more likely to develop hypertension, experiencing macro- and microvascular problems including stroke, retinopathy, nephropathy and more as well as having a greater mortality rate compared to younger diabetic patients (Chew et al., 2013). According to Shih & Tseng (2009), every decade in age, fasting and postprandial blood glucose levels range increase from 1 to 2 mg/dL and up to 15 mg/dL, respectively and they explained further age-related glucose intolerance can be caused by three mechanisms which were decreasing insulin sensitivity, decreased β -cell function, and changing dietary habits, among other factors include drug used and stressful conditions.