

THE ASSOCIATION BETWEEN TRADITIONAL AND
COMPLEMENTARY MEDICINE (T&CM) USE WITH
SOCIODEMOGRAPHIC FACTORS AND HBA1C LEVEL
AMONG TYPE 2 DIABETES MELLITUS OUTPATIENTS
IN HOSPITAL PAKAR UNIVERSITI SAINS MALAYSIA

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UNIVERSITI SAINS MALAYSIA

2026

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by

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Dissertation submitted in partial fulfillment
of the requirements for the degree
of Bachelor of Dietetics (Honours)

June 2026

ABSTRACT

Diabetes Mellitus (DM) is a major global health concern with an alarming increasing trend in Malaysia. This chronic nature, coupled with the fear of long-term complications, contributes significantly to the increased tendency among patients to seek Traditional and Complementary Medicine (T&CM) as an alternative or adjunct to conventional treatment. A cross-sectional study was conducted at Hospital Pakar Universiti Sains Malaysia (HPUSM), Kelantan involving 141 adult patients with Type 2 Diabetes Mellitus (T2DM) attending outpatient clinics. Participants were interviewed by using a validated questionnaire, while clinical data including the latest HbA1c results were obtained from medical records. A moderate prevalence of T&CM use (33.6%, n=47) was observed among the 140 respondents, approximately one in three T2DM outpatients in HPUSM, Kelantan were found to be using T&CM, with most users being female, aged 63 years and above, Malay, retirees, having secondary education, and from the B40 income group. However, no sociodemographic factors were significantly associated with T&CM use ($p>0.05$). Malay T&CM was the most commonly practiced modality (74.5%), mainly used as an additional treatment for diabetes and influenced by friends and advertisements. Although T&CM users recorded a slightly higher mean HbA1c level ($8.41 \pm 2.18\%$) compared to non-TCM users ($8.12 \pm 1.50\%$), no significant association was found between T&CM use and glycemic control or achievement of HbA1c targets ($p>0.05$). A key strength of this study was the use of objective laboratory-verified HbA1c data retrieved from medical records, reducing recall bias and improving the reliability of glycemic assessment. However, the use of convenience sampling and the single-centre study setting may limit the generalizability of the findings. Future studies are recommended to employ longitudinal or prospective study designs to better evaluate the long-term effects of T&CM use on glycemic outcomes and diabetes-related complications. Additionally, qualitative studies exploring patients' beliefs, motivations, and perceptions regarding T&CM use may provide deeper insights into factors influencing healthcare decisions among individuals with T2DM.

Keywords: Traditional and Complementary Medicine (T&CM), Type 2 Diabetes Mellitus (T2DM), HbA1c, Sociodemographic Factors, Cross-Sectional Study.

ABSTRAK

Diabetes Mellitus (DM) merupakan masalah kesihatan utama global yang menunjukkan trend peningkatan yang membimbangkan di Malaysia. Sifat penyakit yang kronik ini, disertai dengan kebimbangan terhadap komplikasi jangka panjang, telah menyumbang kepada peningkatan kecenderungan pesakit untuk mendapatkan Rawatan Tradisional dan Komplementari (T&CM) sebagai alternatif atau rawatan tambahan kepada rawatan konvensional. Satu kajian keratan rentas telah dijalankan di Hospital Pakar Universiti Sains Malaysia (HPUSM), Kelantan melibatkan 141 pesakit dewasa dengan Diabetes Mellitus Jenis 2 (T2DM) yang menghadiri klinik pesakit luar. Data mengenai penggunaan T&CM dikumpulkan menggunakan soal selidik yang telah disahkan, manakala data klinikal termasuk keputusan terkini HbA1c diperoleh daripada rekod perubatan. Kajian ini menunjukkan prevalens penggunaan T&CM yang sederhana (33.6%, n=47), iaitu kira-kira satu daripada tiga pesakit luar T2DM di HPUSM, Kelantan menggunakan T&CM. Majoriti pengguna terdiri daripada wanita, berumur 63 tahun ke atas, berbangsa Melayu, pesara, mempunyai pendidikan menengah, dan tergolong dalam kumpulan pendapatan B40. Walau bagaimanapun, tiada faktor sosiodemografi yang menunjukkan hubungan signifikan dengan penggunaan T&CM ($p>0.05$). Rawatan T&CM Melayu merupakan kaedah yang paling kerap digunakan (74.5%), terutamanya sebagai rawatan tambahan untuk diabetes dan dipengaruhi oleh rakan serta iklan. Walaupun pengguna T&CM mencatatkan purata HbA1c yang sedikit lebih tinggi ($8.41 \pm 2.18\%$) berbanding bukan pengguna T&CM ($8.12 \pm 1.50\%$), tiada hubungan signifikan ditemui antara penggunaan T&CM dan kawalan glisemik atau pencapaian sasaran HbA1c ($p>0.05$). Kekuatan utama kajian ini ialah penggunaan data HbA1c yang objektif dan disahkan melalui rekod perubatan, sekali gus mengurangkan bias ingatan dan meningkatkan kebolehpercayaan penilaian kawalan glisemik. Namun, penggunaan pensampelan mudah dan kajian di satu pusat kajian mungkin mengehadkan kebolehgunaan dapatan kepada populasi yang lebih luas. Kajian masa hadapan disarankan menggunakan reka bentuk longitudinal atau prospektif bagi menilai kesan jangka panjang penggunaan T&CM terhadap kawalan glisemik dan komplikasi diabetes. Selain itu, kajian kualitatif boleh dijalankan untuk memahami dengan lebih mendalam kepercayaan, motivasi, dan persepsi pesakit terhadap penggunaan T&CM dalam pengurusan T2DM.

Kata kunci: Rawatan Tradisional dan Komplementari (T&CM), Diabetes Mellitus Jenis 2 (T2DM), Hemoglobin terglikasi (HbA1c), faktor sosiodemografi, kajian keratan rentas.

ACKNOWLEDGEMENTS

In the name of Allah, the Most Gracious and the Most Merciful. All praises be to Allah SWT for granting us the strength, patience, and opportunity to successfully complete this research project.

I would like to express my sincere gratitude to my supervisor, Dr. Wan Faizah binti Wan Yusoff for her invaluable guidance, continuous support, constructive comments, and encouragement throughout the completion of this study. Her expertise and dedication have greatly contributed to the success of this research.

I would also like to extend my heartfelt appreciation to our family and friends for their unwavering support, understanding, and motivation throughout this journey. Their encouragement has been a constant source of strength during the completion of this project.

Special thanks are also extended to Dr. Mohd Al-Baqlish bin Mohd Firdaus and Dr. Nurain for their previous research work, which served as valuable references in the development of this study. Their contributions, particularly in the development of the research framework and questionnaire, have been instrumental in supporting this research.

We would also like to extend our sincere gratitude to Profesor Dato' Dr. Ab Rahman Izaini Ghani @ Ab Ghani, Director of Hospital Pakar Universiti Sains Malaysia, as well as the staff of the Klinik Rawatan Keluarga (Outpatient Clinic Service) at Hospital Pakar Universiti Sains Malaysia for their warm welcome, assistance, and utmost cooperation throughout the data collection process. Their support and commitment were invaluable in facilitating the successful completion of this research. I deeply appreciate their contributions and kindness. May Allah SWT reward all those involved with His blessings and grant them Jannah for their efforts.

Finally, I would like to thank all respondents and individuals who were directly or indirectly involved in this study. Their cooperation and contributions are greatly appreciated. May Allah SWT bless and reward everyone who has contributed to this research. Ameen.

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LIST OF ABBREVIATIONS

B40: Bottom 40% (Low-income household group in Malaysia)
CAM: Complementary and Alternative Medicine
CI: Confidence Interval
CM: Complementary Medicine
CPG: Clinical Practice Guidelines
Df / df: Degrees of freedom
DM: Diabetes Mellitus
DOSM: Department of Statistics Malaysia
G*Power: Sample size calculation software
HbA1c: Glycated hemoglobin / Glycosylated hemoglobin
HPUSM: Hospital Pakar Universiti Sains Malaysia
HTAA: Hospital Tengku Ampuan Afzan
IBM Corp: International Business Machines Corporation
JEPeM-USM: Human Research Ethics Committee of Universiti Sains Malaysia
KPP: Klinik Pakar Perubatan (Medical Specialist Clinic)
KRK: Klinik Rawatan Keluarga (Family Care Clinic)
M40: Middle 40% (Middle-income household group in Malaysia)
MAL: Ministry of Health product registration number prefix
MNT: Medical Nutrition Therapy
MOH: Ministry of Health
NHMS: National Health and Morbidity Survey
SD: Standard deviations
SPSS: Statistical Package for the Social Sciences (IBM SPSS Statistics)
T2DM: Type 2 Diabetes Mellitus
T20: Top 20% (High-income household group in Malaysia)
T&CM: Traditional and Complementary Medicine
TM: Traditional Medicine
USM: Universiti Sains Malaysia
WHO: World Health Organization

1. INTRODUCTION

1.1 BACKGROUND

Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia and long-term complications. In Malaysia, the prevalence of Type 2 Diabetes Mellitus (T2DM) has shown a worrying upward trend. According to the National Health and Morbidity Survey 2023 (NHMS 2023), diabetes remains a major public health concern, placing a substantial burden on the national healthcare system. Due to its chronic and currently incurable nature, many patients tend to seek alternative ways to manage their health, leading to a high tendency of seeking Traditional and Complementary Medicine (T&CM).

The World Health Organization (2013) defines Traditional Medicine (TM) as the sum total of knowledge, skills, and practices based on theories and beliefs indigenous to different cultures, used in the maintenance of health and the treatment of physical and mental illness. On the other hand, Complementary Medicine (CM) refers to a broad set of healthcare practices that are not part of a country's own tradition or conventional medicine. In Malaysia, T&CM is officially recognized and regulated under the Traditional and Complementary Medicine Act 2016 [Act 775], which includes practices such as traditional Malay, Chinese, and Indian medicine, as well as homeopathy and complementary therapies (Laws of Malaysia, 2016).

1.2 PROBLEM STATEMENT

Managing T2DM requires strict adherence to pharmacological treatment and lifestyle modifications. However, many diabetic patients at Hospital Pakar Universiti Sains Malaysia (HPUSM) incorporate T&CM into their management plan, often perceived as a "natural" and "safe" approach. This reflects the multicultural background of Kelantan, where cultural traditions and traditional healing methods are highly valued (Roslinda et al., 2020). Despite its widespread use, there is a significant gap in clinical evidence regarding how T&CM utilization affects glycemic control among outpatients at HPUSM. There are concerns that unregulated T&CM use may lead to potential herb-drug interactions or non-adherence to conventional therapy. Currently, it remains unclear whether T&CM users are achieving the clinical target of HbA1c < 7.0% as stipulated by the Clinical Practice Guidelines (CPG) for the Management of T2DM (6th Edition). Without localized empirical data, healthcare providers, including dietitians, face challenges in providing accurate counseling to patients regarding the safety and efficacy of these practices.

1.3 RESEARCH QUESTIONS

1. What is the prevalence of Traditional and Complementary Medicine (T&CM) use among type 2 diabetes mellitus outpatients in HPUSM?
2. What is the association between sociodemographic factors and T&CM use among type 2 diabetes mellitus outpatients in HPUSM?
3. What is the mean HbA1c level between T&CM users and non-T&CM users among type 2 diabetes mellitus outpatients in HPUSM?
4. What is the association between HbA1c level and T&CM use among type 2 diabetes mellitus outpatients in HPUSM?

1.4 RESEARCH OBJECTIVE

General Objective

To determine the prevalence of Traditional and Complementary Medicine (T&CM) use among type 2 diabetes mellitus (T2DM) outpatients and its association with sociodemographic factors and HbA1c level in Hospital Pakar Universiti Sains Malaysia (HPUSM).

Specific Objective

1. To assess the prevalence of T&CM use among T2DM outpatients in HPUSM.
2. To determine the association between sociodemographic factors and T&CM use among T2DM outpatients in HPUSM.
3. To compare the mean HbA1c level between T&CM users and non-T&CM users among T2DM outpatients in HPUSM.
4. To determine the association between HbA1c level and T&CM use among T2DM outpatients in HPUSM.

1.5 RESEARCH HYPOTHESIS

Null Hypothesis (H₀)

- There is no association between T&CM use with sociodemographic factors among T2DM outpatients in HPUSM.
- There is no association between T&CM use with HbA1c level among T2DM outpatients in HPUSM

Alternative Hypothesis (H_A)

- There is association between T&CM use with sociodemographic factors among T2DM outpatients in HPUSM
- There is association between T&CM use with HbA1c level among T2DM outpatients in HPUSM.

1.6 SIGNIFICANCE OF THE STUDY

This study holds significant value in addressing the gap in knowledge regarding the prevalence and factors associated with T&CM use among T2DM outpatients at HPUSM. By identifying the prevalence of T&CM use and its associated sociodemographic factors, the findings will provide essential insights for healthcare providers, educators, and policymakers.

Moreover, understanding the potential impact of T&CM use on HbA1c level will help clinicians monitor patients more effectively and provide appropriate guidance on combining conventional treatment with T&CM practices. This may also prevent potential drug-herb interactions and improve overall patient outcomes. Finally, this study contributes to the broader body of research on T&CM use among T2DM outpatients, offering a foundation for future studies and health programs not only at HPUSM but also in other hospital and community settings regionally or nationally.

2 LITERATURE REVIEW

2.1 DEFINITION OF TRADITIONAL AND COMPLEMENTARY MEDICINE

The World Health Organization (WHO) defines Traditional Medicine (TM) as the sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement, or treatment of physical and mental illness. In contrast, Complementary Medicine (CM) refers to a broad set of healthcare practices that are not part of that country's own tradition or conventional medicine and are not fully integrated into the dominant healthcare system (World Health Organization, 2013). Globally, the term Complementary and Alternative Medicine (CAM) is often used interchangeably with T&CM.

In the Malaysian context, the Ministry of Health (MOH) Malaysia defines T&CM as a range of health-related practices used to prevent, treat, or manage diseases and to maintain mental and physical well-being. These practices are officially recognized and regulated under the Traditional and Complementary Medicine Act 2016 [Act 775]. According to the Act, T&CM includes various modalities such as traditional Malay medicine, traditional Chinese medicine, traditional Indian medicine, homeopathy, and complementary therapies. However, it explicitly excludes medical and dental practices performed by registered medical and dental practitioners (Laws of Malaysia, 2016). For the purpose of this study, T&CM utilization refers to the use of any of these recognized modalities by patients with T2DM as an adjunct to their conventional clinical management.

2.2 GLOBAL PREVALENCE OF T&CM USE

According to WHO (2019), around 88% of its member states have reported the use of some form of T&CM. The global trend reflects increasing public trust and acceptance of traditional remedies, particularly in Asia, Africa, and the Middle East, where such practices are deeply rooted in cultural traditions. Recent study has shown that the prevalence of T&CM use among diabetic patients remains high, although it varies between regions. Prevalence studies on chronic diseases show high rates of T&CM utilization; for instance, Kifle et al. (2021) reported that up to 73.7% of diabetic patients utilize complementary and alternative therapies alongside their conventional treatments. The variation is often influenced by cultural beliefs, healthcare access, socioeconomic factors, and government policies regulating complementary practices. The prevalence reported by Aljulifi et al. (2022) in a tertiary hospital setting in Riyadh, Saudi Arabia, where 26.0% of adult diabetic patients utilized CAM therapies. The lower to moderate utilization rate in hospital settings compared to broader community surveys may reflect greater patient reliance on specialist-led conventional care at tertiary institutions, alongside the attenuation effect of structured medical management

In high-income countries, T&CM is often used as a complementary therapy to promote overall well-being or manage diabetes-related complications. Meanwhile, in developing countries, the use of T&CM is more common due to its affordability and accessibility compared to modern healthcare services (Kifle, 2021; World Health Organization, 2019). Likewise, Peter et al. (2019) highlighted that preparations of bitter melon (*Momordica charantia*) are widely used as complementary therapy to improve glycaemic control among Type 2 diabetes patients. Similarly, Kifle (2021) and Yusoff et al. (2019) reported that the belief in fewer side effects and recommendations from family members are primary motivators for T&CM adoption among chronic disease patients

2.3 PREVALENCE OF T&CM USE AMONG MALAYSIANS

In Malaysia, T&CM continues to be a significant component of healthcare practices, particularly among individuals with chronic diseases such as diabetes mellitus. This reflects Malaysia's multicultural background and strong cultural traditions that value traditional healing methods. According to the National Health and Morbidity Survey (NHMS 2015), nearly 30% of Malaysian adults reported using some form of T&CM in the previous 12 months, with herbal-based therapies, massage, and acupuncture being among the most common. The survey also highlighted that T&CM use was higher among individuals with chronic illnesses compared to the general population.

More focused studies on diabetic patients have reported even higher prevalence rates. In a cross-sectional study conducted across public health clinics in Negeri Sembilan, Baharom et al. (2016) reported a high overall prevalence of CAM usage (58.5%) among Type 2 Diabetes Mellitus patients, comprising 40.6% who used CAM specifically for diabetes management and 17.9% for general health purposes. Similarly, Roslinda et al. (2020) reported that more than 43% of diabetic patients in Kelantan used at least one type of T&CM, most commonly herbal remedies and spiritual-based therapies. These findings suggest that T&CM is widely accepted among Malaysian patients as a complementary approach to conventional medical treatment. The high prevalence of T&CM use in Malaysia is influenced by several factors, including, accessibility, affordability, and perceptions of fewer side effects compared to modern medications (Yusoff et al., 2019). On a regional level, a local study by Nurain et al. (2021) at Hospital Tengku Ampuan Afzan (HTAA), Kuantan, reported a T&CM prevalence rate of 16.9% among adult patients with T2DM. Their findings also highlighted that retirees formed the largest group of T&CM users in the hospital setting. Documenting this baseline data from a neighboring East Coast state is important to help evaluate regional variations and shifts in T&CM patterns over time.

Moreover, Malaysia's Ministry of Health continues to support the integration of T&CM into the healthcare system through the Traditional and Complementary Medicine Blueprint 2018–2027 (Ministry of Health Malaysia, 2018). Overall, the prevalence of T&CM use among Malaysians, particularly those with diabetes, remains high and is expected to continue increasing. This pattern of T&CM use may vary according to several factors such as gender, age, education, race, marital status, work status, and household income.

2.4 FACTORS ASSOCIATED WITH T&CM USE

Several factors have been identified as influencing the use of T&CM among T2DM outpatients. These factors include demographic characteristics such as gender, age, education level, race, marital status, work status, and household income, as well as sociocultural beliefs and health-seeking behaviors. Understanding these determinants is crucial for healthcare professionals to provide culturally appropriate guidance, ensure patient safety, and support effective diabetes management (Kifle et al. 2021).

2.4.1 GENDER AND T&CM USE

Gender is an important sociodemographic factor that may influence the use of T&CM among T2DM outpatients. Numerous studies have consistently reported that female patients are more likely than males to utilize T&CM for the management of chronic diseases. This pattern has been observed in both local and international research, suggesting that women may be more health-conscious, proactive in seeking healthcare, and receptive to alternative treatment approaches (Wan et al., 2025; Kifle et al., 2021).

In Malaysia, Wong et al. (2021) found that female patients with T2DM were significantly more likely to use T&CM than their male counterparts. The authors suggested that women tend to exhibit stronger health-seeking behaviors, are generally more open to natural and complementary therapies, and are often influenced by social networks such as family members and friends. This finding aligns with the study by Wan et al. (2025), conducted in a rural region of Malaysia, which similarly reported a high prevalence of herbal and dietary supplement (HDS) use among female patients with Type 2 Diabetes Mellitus (T2DM), at 63.16%.

Supporting these findings, an institutional study conducted by Nurain et al. (2021) at HTAA, Kuantan, reported that 60.9% of T2DM patients who used T&CM were female, whereas 39.1% were male. Although a higher proportion of T&CM use was observed among women, statistical analysis revealed no significant association between gender and T&CM utilization. This finding suggests that, despite the descriptive predominance of female users, the likelihood of adopting T&CM within this particular clinical population was relatively similar between males and females. Consequently, gender alone may not be a sufficient predictor of T&CM use, and other sociodemographic, cultural, and health-related factors should also be considered.

Evidence from international studies further supports the tendency for women to utilize T&CM more frequently. Similarly, studies on diabetic populations reported that female patients demonstrated higher rates of T&CM use, often motivated by beliefs regarding the safety and natural effectiveness of herbal remedies (Kifle, 2021). Likewise, evidence from recent studies shows that women are often more inclined to adopt complementary therapies, driven by greater concerns regarding the side effects of conventional medications and a desire for greater personal autonomy in healthcare decision-making (Kifle, 2021; Yusoff et al., 2019).

Overall, gender differences in T&CM use may be influenced by both biological and sociocultural factors. Women tend to engage more actively in preventive health measures and are more receptive to alternative approaches that align with emotional and spiritual well-being.

2.4.2 AGE AND T&CM USE

Age is an important factor that may influence the utilization of T&CM among T2DM outpatients. In general, middle-aged and older adults tend to report higher rates of T&CM use than younger individuals. This trend may be attributed to the greater prevalence of chronic health conditions, longer disease duration, and increased exposure to traditional health practices among older populations (Roslinda et al., 2020; Wong et al., 2021).

In Malaysia, Roslinda et al. (2020) found that T&CM use was most prevalent among patients with T2DM aged above 45 years. This finding may reflect a greater interest among middle-aged adults in managing chronic diseases through a combination of conventional and complementary approaches. Similarly, Wong et al. (2021) reported higher rates of T&CM utilization among older age groups, suggesting that age-related health challenges and familiarity with traditional healing practices may contribute to greater reliance on alternative therapies.

Evidence from a local cross-sectional study conducted by Nurain et al. (2021) at HTAA, Kuantan, further supports the tendency for T&CM users to be older adults. The study reported that the mean age of T&CM users was 58.09 years. However, despite the relatively older age profile observed among users, inferential analysis revealed that age was not significantly associated with T&CM utilization. This finding suggests that, within the study population, the use of T&CM was not restricted to a particular age group but was relatively common across different age categories.

International studies have reported similar trends. Kifle et al. (2021) found that middle-aged patients with T2DM were the most frequent users of herbal remedies and complementary therapies, whereas younger individuals were less likely to adopt T&CM.

Overall, the relationship between age and T&CM utilization appears to be influenced by a combination of health-related, cultural, and experiential factors. Older adults often have a longer history of living with diabetes, a greater burden of comorbidities, and stronger exposure to traditional health beliefs, which may encourage the use of T&CM as a complementary strategy for managing their condition. Nevertheless, findings from local studies indicate that age alone may not be a definitive predictor of T&CM use, suggesting that other sociodemographic and cultural factors also contribute to patients' decisions to adopt complementary therapies.

2.4.3 EDUCATION LEVEL AND T&CM USE

Studies have reported mixed findings regarding the association between educational attainment and the use T&CM, with both higher and lower levels of education being linked to T&CM utilization depending on the sociocultural and demographic context of the population studied.

In Malaysia, Roslinda et al. (2020) reported that T&CM use was most prevalent among patients with secondary and tertiary education, suggesting that individuals with higher educational attainment may possess greater health awareness and be more receptive to exploring alternative healthcare options. Roslinda et al. (2020) observed that individuals with lower educational levels were also frequent users of T&CM, particularly among those whose health practices were strongly influenced by traditional beliefs and recommendations from family members or the local community. These findings suggest that education alone may not be a direct determinant of T&CM use but rather interacts with cultural, social, and economic factors that shape health-seeking behaviors.

Evidence from a local institutional study conducted by Nurain et al. (2021) at HTAA, Kuantan, further supports this complexity. Among diabetic patients who reported using T&CM, the majority had received formal education, with 73.9% possessing a secondary school educational background. This finding indicates that T&CM use may be common among individuals with moderate levels of education, who may combine knowledge acquired through formal education with culturally embedded health beliefs.

At the regional level, Ching et al. (2013) observed that educational attainment significantly influences diabetes management, where individuals with formal education are more likely to seek information on herbal and traditional therapies to complement their care. This suggests that education plays a key role in health literacy, self-efficacy, and confidence in navigating chronic disease management. Likewise, evidence from recent studies indicates that higher educational attainment and health literacy are often associated with increased T&CM use, as educated individuals tend to actively seek complementary approaches to maintain health, improve well-being, and prevent disease-related complications (Kifle et al., 2021; Yusoff et al., 2019).

Overall, the relationship between educational level and T&CM use appears to be multifaceted and context-dependent. While higher education may facilitate greater access to health information and increase awareness of complementary therapies, lower educational attainment may also be associated with T&CM use through the influence of traditional beliefs, cultural practices, and community networks. Therefore, education level may influence not only the likelihood of T&CM utilization but also the motivations, perceptions, and types of therapies adopted by individuals with T2DM.

2.4.4 ETHNICITY AND T&CM USE

In multicultural countries such as Malaysia, different ethnic groups possess distinct traditional healing practices, cultural beliefs, and health-related perspectives that may influence their preferences for T&CM.

According to Roslinda et al. (2020), ethnic background is an important factor influencing both the choice and frequency of T&CM use, as cultural familiarity, accessibility, and beliefs regarding natural healing differ across communities. This diversity highlights the importance of adopting culturally sensitive approaches when addressing T&CM practices among Malaysian patients. Roslinda et al. (2020) reported that Malay patients demonstrated the highest prevalence of T&CM use compared to other ethnic groups. This pattern may be attributed to the strong cultural heritage of traditional Malay medicine, which remains widely practiced and socially accepted within the Malay community. Similarly, Wong et al. (2021) found that Malays were more likely to utilize T&CM, particularly herbal and spiritually based therapies, whereas Chinese patients showed a greater preference for traditional Chinese medicine and acupuncture. Indian respondents, on the other hand, were more likely to use Ayurvedic therapies, reflecting the rich cultural diversity of T&CM practices in Malaysia. Supporting these findings, a local institutional study conducted by Nurain et al. (2021) at HTAA, Kuantan, revealed that among diabetic patients who used T&CM, 91.3% were Malay, while Chinese and Indian patients each accounted for 4.3% of users.

Evidence from other studies has demonstrated similar patterns. Yusoff et al. (2019) reported that cultural background, traditions, and ethnicity are strong predictors of T&CM practices across Malaysian and Southeast Asian populations. Individuals from ethnic groups with deeply rooted traditional health beliefs were more likely to integrate traditional therapies with conventional diabetes treatment. Overall, racial and cultural factors play a vital role in shaping T&CM use. Understanding these differences will help healthcare professionals design culturally appropriate diabetes education and counselling that respect patients' beliefs while ensuring safety and evidence-based care.

2.4.5 MARITAL STATUS AND T&CM USE

Research has shown that married individuals are more likely to use T&CM compared to unmarried or widowed individuals. This may be attributed to stronger social support systems, shared health-related decision-making, and encouragement from family members and spouses.

In Malaysia, Wong et al. (2021) reported that married patients with T2DM were more likely to utilize T&CM than those who were single or widowed. The authors suggested that family members and spouses often play an influential role in encouraging the use of traditional therapies as part of disease management.

Evidence from a local institutional study conducted by Nurain et al. (2021) at HTAA, Kuantan, supports these findings. The descriptive results showed that married individuals constituted the overwhelming majority of T&CM users, accounting for 95.7% (22 patients) of all users. This suggests that marital relationships may play a significant role in influencing decisions related to T&CM utilization.

Similar trends have been observed in other populations. Kifle et al. (2021) reported that married individuals were significantly more likely to use T&CM than unmarried patients, as they frequently relied on spouses and family members for encouragement, social support, and health-related advice. In Indonesia, Faridah et al. (2022) reported that the majority of T2DM patients utilizing traditional medicine drug were married (78.2%). However, marital status was not significantly associated with either patient perception of the medication combination or adherence to prescribed synthetic antidiabetic regimens.

Overall, marital status appears to influence T&CM use through family support, shared experiences, and interpersonal trust. Married patients may feel more confident using traditional therapies when encouraged by their partners or family members, while single individuals may rely more on healthcare professionals for treatment advice.

2.4.6 WORK STATUS AND T&CM USE

Employment conditions, income stability, and work-related stress may influence individuals' decisions regarding the use of T&CM for health management (Roslinda et al., 2020).

In Malaysia, Roslinda et al. (2020) reported that employed patients with T2DM were more likely to use T&CM compared to unemployed. The study suggested that employed individuals may possess greater financial resources to purchase T&CM products and services, as well as better access to information regarding alternative therapies.

Recent international evidence has further supported the association between employment status and T&CM utilization. Furthermore, regarding employment status, Kifle et al. (2021) observed that the prevalence of T&CM use was consistently high among both employed (73.9%) and unemployed individuals (73.5%), suggesting that the inclination toward complementary therapies spans across different occupational backgrounds.

A local institutional study conducted by Nurain et al. (2021) at HTAA, Kuantan, identified employment status as an important factor associated with T&CM use. The descriptive findings showed that retirees constituted the largest proportion of T&CM users (43.5%), followed by housewives (30.4%). These findings suggest that employment dynamics may significantly influence decisions to adopt T&CM. The higher prevalence of T&CM use among retirees may be attributed to greater availability of time, increased health concerns associated with ageing, and a preference for holistic approaches to health management.

Overall, the relationship between work status and T&CM use is multifaceted. While working individuals may have more financial capacity and exposure to T&CM, unemployed or retired individuals may depend on traditional remedies for their cultural and economic convenience.

2.4.7 HOUSEHOLD INCOME AND T&CM USE

Household income was classified according to the 2024 monthly gross household income categories by household group and state in Malaysia, as reported by the Department of Statistics Malaysia (DOSM). For Kelantan, the income categories were defined as B40 (household income below RM3,250), M40 (RM3,250 to RM7,000), and T20 (RM7,000 and above). Variations in financial capacity may influence access to, preferences for, and motivations behind the use of different types of traditional and complementary therapies (Wong et al., 2021).

In Malaysia, Roslinda et al. (2020) reported that T&CM use was prevalent among both low- and middle-income populations. Individuals from lower-income households were more likely to rely on traditional home remedies because of their affordability, cultural familiarity, and ease of access. In contrast, those with higher incomes were more inclined to purchase commercially prepared herbal products or seek services from registered T&CM practitioners. Similarly, Wong et al. (2021) found that T&CM users represented a broad range of income groups, suggesting that income alone may not determine whether individuals use T&CM, but rather may influence the type and quality of therapies selected. A local study conducted by Nurain et al. (2021) at HTAA, Kuantan, revealed that T&CM use was predominantly observed among lower-income patients, with 69.6% of users reporting a monthly income of less than RM1,000.

Within the Southeast Asian region, Yusoff et al. (2019) observed that socioeconomic status and income levels significantly influence individuals' willingness to purchase herbal and alternative therapies, particularly in settings where treatment costs and healthcare affordability are important considerations. Globally, contrasting patterns of T&CM use have been documented. In developed countries, individuals with higher incomes often utilize T&CM for wellness promotion and disease prevention, whereas in developing countries, lower-income populations rely more heavily on traditional remedies due to their affordability and strong cultural acceptance (Kifle et al, 2021).

Overall, the relationship between household income and T&CM use appears complex and context-dependent. While affordability often drives greater reliance on T&CM among lower-income groups, health awareness and lifestyle preferences may encourage T&CM use among middle- and high-income populations. Therefore, income may influence not only the likelihood of T&CM use and approach chosen by individuals. (Wong et al., 2021).

2.5 REASONS TO USE T&CM

T2DM outpatients frequently use T&CM for a variety of reasons, including cultural beliefs, dissatisfaction with conventional medical treatment, and the perception that natural therapies are safer or more effective. Previous studies have identified both individual and social determinants influencing T&CM utilization, reflecting the complexity of patients' health-seeking behaviors (Kifle et al., 2021; Yusoff et al., 2019).

In Malaysia, Roslinda et al. (2020) reported that a common reason for T&CM use among individuals with diabetes was the belief that herbal remedies could assist in controlling blood glucose levels and enhancing overall well-being. Cultural and religious influences were also found to be significant, particularly among Malay communities where traditional healing practices have been preserved and passed down through generations.

In addition, dissatisfaction with modern healthcare services and prolonged waiting times have motivated some individuals to seek alternative treatment options. An institutional study conducted by Nurain et al. (2021) at HTAA, Kuantan, identified several reasons why diabetic patients chose to use alternative therapies. The findings showed that the most frequently reported motivation was the belief that T&CM was effective for maintaining general health and could serve as a complementary approach alongside conventional diabetes treatment. Furthermore, a considerable proportion of patients reported using T&CM following recommendations from family members and friends, underscoring the strong influence of social networks and community trust in traditional remedies. Other contributing factors included the perceived safety of natural products, fewer side effects compared with conventional medications, and the ease of obtaining these therapies (Yusoff et al. 2019).

Overall, these findings indicate that T&CM use among T2DM outpatients is influenced by a combination of cultural, psychological, social, and practical factors. Understanding these motivations is essential for healthcare professionals to communicate effectively with patients and to promote the safe and appropriate integration of T&CM with conventional diabetes management.

Conceptual Framework

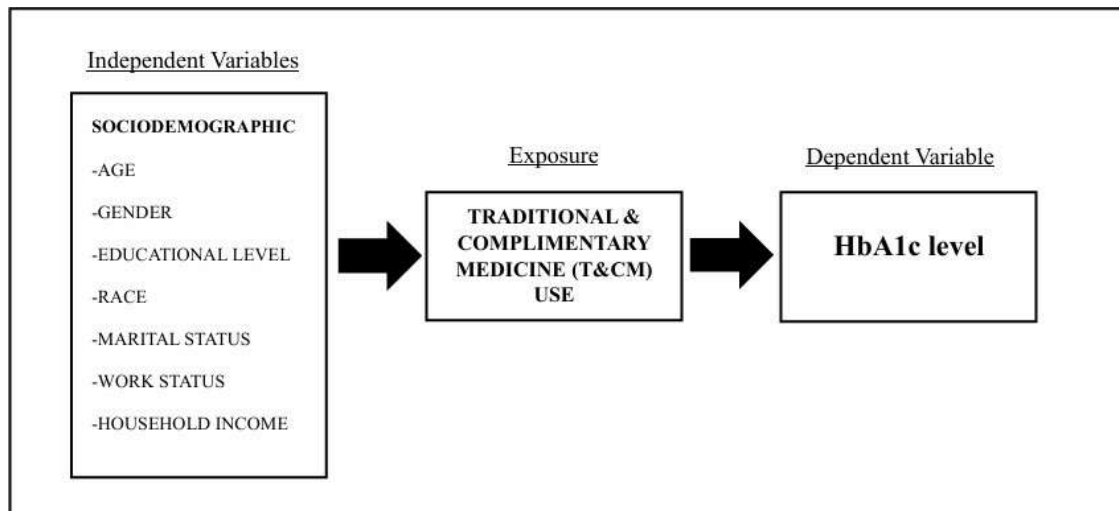


Figure 2.5

Source: Nurain et al. (2021)

This study examined several sociodemographic variables, including age, gender, race, marital status, work status, and household income, as independent factors that might have influenced T&CM use among T2DM outpatients. T&CM use acted as the main exposure variable, while the outcome of interest was glycemic control, measured using the latest HbA1c level. This framework showed how patient background factors might have affected their use of T&CM, which could then have been related to their overall glycemic control. In addition, a cultural framework was applied to understand how cultural beliefs, traditions, and social norms influenced health behaviors, including the use of T&CM. In the context of this study, the cultural framework helped explain why certain ethnic groups or individuals with specific sociocultural backgrounds preferred traditional or complementary therapies over conventional medicine. It considered factors such as trust in traditional healing, family influence, and perceived safety or effectiveness of natural treatments. By integrating a cultural perspective, this study was able to better interpret patterns of T&CM use among Malaysian T2DM patients and provide insights for culturally sensitive healthcare interventions.

3 METHODOLOGY

3.1 STUDY DESIGN

A cross-sectional study was conducted at Hospital Pakar Universiti Sains Malaysia (HPUSM), Kota Bharu, Kelantan, and involved T2DM patients from outpatient settings.

3.2 STUDY LOCATION

The study was conducted at Hospital Pakar Universiti Sains Malaysia (HPUSM), Kota Bharu, Kelantan. Outpatients were recruited from the Klinik Dietetik Luar, Klinik Rawatan Keluarga (KRG), and Klinik Pakar Perubatan (KPP).



Figure 3.2: Location of Hospital Pakar Universiti Sains Malaysia, Kubang Kerian Kelantan

3.2.1 STUDY POPULATION

The study population comprised patients with Type 2 Diabetes Mellitus (T2DM) at Hospital Pakar Universiti Sains Malaysia (HPUSM) aged 18 to 75 years. Eligible participants were identified based on the inclusion and exclusion criteria, and recruitment was conducted within the relevant hospital clinics.

Inclusion Criteria:

- T2DM patients who continue undergoing treatment at HPUSM
- Malaysian
- Able to understand and communicate in Malay or English
- Aged 18 to 75 years

Exclusion Criteria:

- Pregnant women
- Patients unable to complete the data collection form (e.g., incomplete form)

3.3 SAMPLE SIZE AND SAMPLING METHOD

3.3.1 SAMPLE SIZE

3.3.1.1 Sample size for first specific objective

First specific objective is to assess the prevalence of Traditional and Complementary Medicine (T&CM) use among T2DM outpatients. Considering the prevalence of T&CM use among T2DM patients of 23% for inpatient (Koren et al., 2015) and 49% for outpatient (Hasan, Loon, Ahmadi, Ahmed, & Bukhari, 2011) with confidence interval (CI) of 95%, the estimated sample size was 120. A priori power analysis was conducted using G*Power 3.1.9.7 (Faul, Erdfelder, Lang, & Buchner, 2007) to determine required sample size for a comparison of two independent proportions. The analysis used Fisher's exact test (two-tailed) with proportions of $p_1 = 0.23$ and $p_2 = 0.49$, significance level $\alpha = 0.05$, allocation ratio $N_2/N_1 = 1$, and desired power $(1 - \beta) = 0.80$. This yielded a required sample size of $n_1 = n_2 = 60$ (total $N = 120$). The corresponding Cohen's h effect size is $h \approx 0.55$. The analysis returned an actual power of ~ 0.80 .

Proportion in population 1 :0.23

Proportion in population 2: 0.49

Significance level $\alpha = 0.05$

Ratio of sample sizes (n_1/n_2):1

Confidence level: 0.95

Desired Power: 0.80

Sample size ($n_1=n_2$): 60

Total sample size (N): 120

Considering the non- response rate of 10%, the estimated sample size was 132 participants.

3.3.1.2 Sample size for second specific objective

Second specific objective is to determine the association between sociodemographic factors and T&CM use. A priori power analysis was conducted using G*Power 3.1.9.7 to determine the required sample size for a Chi-square test of independence (Contingency tables). The analysis used a medium effect size (Cohen's $w = 0.30$), a significance level $\alpha = 0.05$, and desired power $(1 - \beta) = 0.80$. The degrees of freedom (df) were set at 1, which is conservative and acceptable for most 2 times 2 x 2 or 2 x 3 sociodemographic comparisons. This analysis yielded a required minimum total sample size of $N = 88$ participants. The analysis returned an actual power of approximately 0.8035.

Cohen's $w = 0.30$

Significance level $\alpha = 0.05$

Desired power $(1 - \beta) = 0.80$

Degrees of freedom (Df) = 1

Sample size of $N = 88$ participants

Considering a non-response rate of 10%, the estimated sample size was 98 participants.

3.3.1.3 Sample size for third specific objective

Third specific objective is to compare the mean glycemic control (HbA1c) between T&CM users and non-T&CM users. A priori power analysis was conducted using G*Power 3.1.9.7 to determine the required sample size for a t-test for the difference between two independent means (two groups). Since standard deviation (SD) was not provided, a standardized medium effect size (Cohen's $d = 0.5$) was used, as recommended to be realistic and avoid excessively large samples. The analysis specified a two-tailed test, a significance level $\alpha = 0.05$, an allocation ratio $N_2/N_1 = 1$, and a desired power $(1 - \beta) = 0.80$. This yielded a required sample size of $n_1 = n_2 = 64$ per group, for a total sample size of $N=128$ participants. The analysis returned an actual power of approximately 0.8015.

Cohen's $d = 0.5$

Significance level $\alpha : 0.05$

Allocation ratio $N_2/N_1: 1$

Desired power $(1 - \beta): 0.80$

Sample size ($n_1 = n_2$): 64

Total sample size (N) = 128 participants

Considering a 10% dropout rate, the estimated sample size was 140 participants.

3.3.1.4 Sample size for fourth specific objective

Fourth specific objective is to determine the association between T&CM use and glycemic control among Type 2 diabetes mellitus patients. A priori power analysis was conducted using G*Power 3.1.9.7 to determine the required sample size for a z-test for the difference between two independent proportions. The analysis specified a two-tailed test with proportions of $p_1 = 0.22$ and $p_2 = 0.78$, a Significance level $\alpha = 0.05$, an Allocation ratio $N_2/N_1 = 1$, and a desired power $(1 - \beta) = 0.80$. This yielded a required sample size of $n_1 = n_2 = 12$ per group, for a total sample size of $N = 24$ participants. The analysis returned an actual power of approximately 0.8278

Proportion in population 1: 0.22

Proportion in population 2: 0.78

Significance level α : 0.05

Allocation ratio N_2/N_1 ; 1

Desired power $(1 - \beta)$: 0.80

Sample size ($n_1 = n_2$): 12

Total sample size (N) = 24 participants

Considering a 10% dropout rate, the estimated sample size was 26 participants.

3.3.1.5 Final sample size of the study

The final sample size selected of the study is 140 participants.

Sample size ($n_1 = n_2$): 64

Total sample size (N) = 128 participants

Considering a 10% dropout rate, the estimated sample size was **140 participants**.

3.3.2 SAMPLING STRATEGY

Convenience sampling was used because it was the most practical and feasible method in a hospital setting where patient attendance varied daily. This approach allowed the researcher to recruit eligible patients who were available during data collection without disrupting clinical services. It was also suitable for studies requiring face-to-face interviews and access to medical records. Participation was voluntary, and patients meeting the inclusion criteria were approached directly. This approach ensured practicality and feasibility while minimizing bias.