Journal for Re Attach Therapy and Developmental Diversities
eISSN: 2589-7799
2024 February; 7(2): 119-128

Sociodemographic Predictors Of Quality Of Life Among Type 2 Diabetes Mellitus (T2DM) Patients In Kota Kinabalu, Sabah

Jarreau Chong[1], Nicholas Tze Ping Pang[1]*, Mohammad Yusuf Ibrahim[1], Mohammad Saffree bin Jeffree[1], & Walton Wider[2]

[1]Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Malaysia
[2]Faculty of Business and Communications, INTI International University, Nilai 71800, Negeri Sembilan, Malaysia

***Corresponding Author:** Nicholas Tze Ping Pang
*****Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Malaysia

Abstract

Introduction: Quality of life (QOL) is a multidimensional concept encompassing subjective evaluations of both positive and negative aspects of life. Diabetes adversely affects a patient's psychological and physical well-being, as well as their social functioning. As a result, the disease often leads to a deterioration in the quality of life (QoL) of patients. The World Health Organization (WHO) has warned that diabetes is reaching epidemic proportions, with expectations that cases will surpass 300 million by 2025. According to the National Morbidity Survey conducted in 2019, the prevalence of diabetes among the population aged 18 and above stands at 9.4%, which equates to about 3.9 million people. Research concerning QOL in Sabah and its associated factors remains limited. This study aims to determine the QOL associated with T2DM in Kota Kinabalu, Sabah.
Methods: A cross-sectional study was carried out on Type 2 diabetes mellitus (T2DM) patients at a government health clinic in Kota Kinabalu, Sabah, with a sample size of 313. All these patients were actively registered under the National Diabetes Registry Malaysia (NDR) and were receiving treatment at the government clinic. Data, encompassing demographic details and ADDQOL scores, were analyzed using SPSS 28. A significant association was identified between Type 2 diabetes mellitus and quality of life.
Results: The average age of the diabetic patients was 54 years, with a range spanning from 21 to 88 years. The majority of the sample comprised females (55%), those who were married (90.7%), unemployed (37.7%), and had a household income exceeding RM2000 (34.8%). The majority had completed high school (51.8%). The mean (standard deviation, SD) ADDQol-19 average weighted impact score was -4.67(0.13). All 19 domains reflected a negative impact, with living conditions, working life, and family life being particularly affected. Multiple linear regression analysis indicated that age (adjusted B = 0.03, p = 0.005), out-of-pocket expenses (adjusted B = -0.98, p = 0.003), and occupation (adjusted B = 0.58, p = 0.036) were predictors of quality of life.
Conclusion: T2DM exerts a negative influence on the quality of life of patients across various aspects of their lives. The data suggest that older patients have a better QOL, likely due to adaptation over time. The importance of employment for an enhanced QOL was also underscored in this study.

Keywords: Quality of life; Diabetes mellitus; social functioning

1. Introduction

The concept of quality of life (QOL) is multifaceted, incorporating subjective evaluations of both positive and negative aspects of life (Ayub et al., 2023). The World Health Organization defines Quality of Life as an individual's perception of their position in life concerning their goals, expectations, standards, and concerns, as well as the cultural and value systems in which they live (Nematolahi, 2021). Quality of life reflects the extent to which an individual feels healthy, comfortable, and able to participate in or enjoy life events. This term is inherently subjective, as it can pertain to personal life experiences and external living conditions. Therefore, while one person might define quality of life in terms of wealth or life satisfaction, another might see it in terms of capabilities, such as emotional and physical well-being. For instance, a person with a disability might report a high quality of life, while a healthy individual who recently became unemployed might not. In healthcare, quality of life is understood as a comprehensive concept, encapsulating emotional, physical, material, and social well-being (Haraldstad et al., 2019).

Diabetes mellitus poses a significant public health concern, affecting numerous individuals both physically and mentally. Patients with diabetes complications grapple with a myriad of challenges, including nephropathy, vision loss, cardiac issues, erectile dysfunction, and peripheral neuropathies, all influencing QoL (Prajapati et al., 2018). Given the chronic nature of diabetes, it's crucial to regularly assess patients' quality of life. Diabetes complications, which cause the majority

of the disease's morbidity and mortality, adversely affect various organ systems (Power, 2008). Several studies have illuminated the profound impact of diabetes and its complications on QoL (Donald et al., 2013; Garg & Duggal, 2022; Peyrot & Rubin, 1997; Sayyed Kassem & Aron, 2020; Verma et al., 2010; Wexler et al., 2006).

Many researchers have identified diabetic complications as a primary determinant of QoL (Anderson et al., 1997; Glasgow et al., 1997; Jacobson et al., 1994; Polonsky et al., 2017; Rubin & Peyrot, 1999; Trief et al., 1998). Diabetes complications can be broadly categorized into microvascular and macrovascular issues, with the former encompassing conditions like retinopathy, nephropathy, and neuropathy, and the latter involving ailments such as coronary heart disease and stroke. Various studies have elaborated on the prevalence and impact of these complications on QoL (Prajapati et al., 2018; Wändell, 2005).

Like other chronic diseases, T2DM is linked to numerous personal, familial, societal, and economic challenges, as well as a heightened mortality rate. Issues confronting individuals with DM include elevated blood sugar levels, dietary and activity restrictions, regular insulin injections, musculoskeletal problems, physical limitations, sexual dysfunction, and vascular abnormalities (Abedini et al., 2020; Blonde et al., 2022; Colberg et al., 2016). Additionally, these patients often face challenges like job loss, frequent hospitalizations, increased medical care demands, early mortality-induced indirect costs, diminished social and family interactions, and a deteriorated lifestyle (Cuddapah et al., 2022). Several factors can influence the QoL of these patients, ranging from the type of diabetes and insulin usage to their understanding of the disease and the support they receive (Kiadaliri et al., 2013). It's crucial to assess QoL routinely in clinical practice to enhance communication between healthcare providers and their patients, facilitating early identification of complications and ensuring long-term care, ultimately improving patient health status (Prajapati et al., 2018).
The ADDQoL (Bradley et al, 1999) is a 19-item questionnaire, complemented by two summary items evaluating current QoL and the impact of diabetes on QoL. While several instruments claim to gauge the influence of diabetes on QoL, the ADDQoL, influenced by the personalized SEIQoL interview technique (McGee et al., 1991), offers distinct advantages. It allows patients to highlight life aspects relevant to them, gauge diabetes' impact on that facet, whether positive or negative, and denote the importance they attribute to each QoL facet.

2. Objectives

The aim of this study is to analyze the association between various sociodemographic factors and quality of life in Malaysian patients with diabetes mellitus. By understanding the factors directly impacting QoL, interventions can be tailored to address specific risk factors that diminish QoL. Adopting a wellness-centric perspective, rather than a solely disease-focused approach, will provide a more holistic understanding of diabetes and its implications on quality of life.

3. Methods

Study Design and Location
Our cross-sectional study was meticulously designed to evaluate the quality of life among type 2 diabetes mellitus patients. The research focused on a representative sample from seven health clinics situated within a 30 km radius of Kota Kinabalu, Sabah. This geographical choice ensured both a diverse set of participants and a cohesive regional focus.

Participant Selection
The participants were chosen based on strict inclusion criteria. Only active patients, defined as those both registered with government health clinics and currently listed in the National Diabetes Registry (NDR) in Malaysia, were considered. Further criteria include age (over 18), Malaysian citizenship, any ethnicity in Malaysia including Malay, Chinese, Indian, Sabah Native and other races in Malaysia. The demographic profile of the participants is presented in the Results section. In considering marital status, employment, income and education status. Must be proficient in Bahasa Malaysia language. Exclusions were made for individuals with active psychiatric disorders and those unwilling to participate.

Ethical Considerations
Ensuring ethical standards are met is paramount in any research. Our study was supported by ethical clearances from the National Medical Research Registry (NMRR) with the ID number: NMRR-19-2780-48613 and the ethics board of a local university.

Data Collection Tools
Data was collected via two primary tools. The first was a demographic and clinical questionnaire that outlined each participant's socio-economic and clinical background. Parameters such as education status, occupation, and HbA1c levels provided insight into potential patterns linked with diabetes. The second tool was the Audit Dependent Diabetes Quality

of Life (ADDQoL) Questionnaire. This comprehensive instrument aimed to measure diverse facets of a patient's life quality among patient with diabetes, from leisure activities, life with family, social life, sexual life, physical appearance, confident, self-motivation, dependency on others and financial conditions. The questionnaire consists of 19 question that measure the impact of diabetes on specific aspects of life and the importance of these aspects of life for QOL. Being individualised measure is not assumed that all item are applicable to everyone which working life have preliminary "Yes/No" option.

Data Analysis

Statistical analysis was conducted using the SPSS 28 software. Initially, descriptive statistics were performed; frequencies or percentages were used to describe the sociodemographic parameters. The mean (with standard deviation) was employed to describe the 19 items within the ADDQoL-19. Before proceeding further, the internal consistency of the ADDQoL-19 was verified using Cronbach's alpha. The Cronbach's alpha for the Bahasa Malaysia version of the ADDQoL in this study was 0.943. Subsequent analyses utilized the Chi-square tests to investigate the differences in QOL based on gender and the year of diabetes diagnosis. T-tests were then applied to examine the differences in QOL based on age, and the relationship between diabetes and QOL scores.

4. Results

Respondent Profiles

According to Table 1, which profiles the respondents, the average age is 54 years with a standard deviation of 12.603. A significant majority of the patients are married (90.7%). The most common educational attainment is secondary school, with 51.8% of respondents having this level of education. A large proportion work in the private sector (33.9%), followed closely by those who are unemployed (37.7%). Additionally, the majority of households have a monthly income exceeding RM2000 (34.8%).

Table 1 *Description of sociodemographic profiles (N=313)*

Variables	Frequency (%)	Mean (±SD)
Age		54.59 (±12.603)
Gender		
Male	141 (45%)	
Female	172 (55%)	
Marital Status		
Married	284 (90.7%)	
Divorce	5 (1.6%)	
Single	24 (7.7%)	
Education level		
No formal education	26 (8.3%)	
Primary school	63 (20.1%)	
Secondary school	162 (51.8%)	
Higher education	62 (19.8%)	
Occupation		
government servant	52 (16.6%)	
Private sector employee	106 (33.9%)	
Self employed	37 (11.8%)	
Not working	118 (37.7%)	
Household income		
<RM500	19 (6.1%)	
RM501 - RM1000	35 (11.2%)	
RM1001 - RM1500	85 (27.2%)	
RM1501 - RM2000	65 (20.8%)	
> RM2000	109 (34.8%)	

Table 2 shows that a significant portion of participants (57.2%) reported being diagnosed within the past 0-5 years. This suggests that a considerable number of study participants were relatively newly diagnosed. It's essential to offer appropriate education, support, and resources to assist these individuals in adjusting to their condition and encourage effective self-management strategies. The participants' HbA1c levels reflect overall glycemic control. Notably, about 61.4% of the participants had an HbA1c level above the recommended target of 6.5%. This underlines the need to enhance

efforts for better glycemic control and the importance of effective treatment approaches and patient education on diabetes management.

Concerning the type of treatment, the majority of participants (76.0%) relied on tablet medication as their primary treatment method. This is consistent with common treatment practices for type 2 diabetes, where oral medications are typically the first line of treatment. However, regularly assessing treatment efficacy and contemplating adjustments or additional treatments, like insulin therapy, is crucial, especially for those needing more rigorous management to meet glycemic targets.

The frequency of clinic visits suggests that most participants (69.6%) had appointments every 4 months. This might be a reflection of the standard healthcare system practice for routine diabetes check-ups. Yet, individualized care tailored to patients, especially those with complications or inconsistent glycemic control, might necessitate more regular monitoring and follow-ups.

The study's focus on complications revealed that a large segment of participants (66.1%) reported no diabetes-related complications. It's essential to acknowledge the considerable influence complications can have on one's well-being and quality of life. The reported prevalence of issues such as eye problems (20.8%), heart disease (3.8%), kidney disease (5.1%), sexual problems (1.3%), and amputations (1.6%) emphasizes the importance of holistic diabetes management, encompassing both glycemic control and the prevention and early detection of complications.

The data on hospitalization history indicates that a relatively small percentage of participants (8.3%) had been hospitalized due to their diabetes. Even if this figure seems low, it's vital to understand the specific reasons for hospitalization and the gravity of cases. Exploring factors leading to hospitalization and strategies to decrease such incidents among diabetes patients could enhance outcomes and cut healthcare expenses.

As for out-of-pocket expenses for diabetes check-ups, a notable number of participants (61.3%) spent RM1-RM50, pointing to relatively low costs for routine diabetes care. While this is positive, suggesting that diabetes check-ups are largely affordable for most participants, it's crucial to factor in the wider economic implications of diabetes management, including medication and other associated costs, which may differ from one individual to another.

Lastly, the minimal percentage of participants (1%) who were members of a diabetes association signifies potential for more extensive engagement through such organizations. Diabetes associations can offer invaluable resources, education, and support networks for those with diabetes. Increasing awareness and promoting participation in these associations could be fruitful. In conclusion, this study illuminates various aspects of diabetes management and its repercussions on the quality of life among patients with type 2 diabetes. The insights highlight the importance of early diagnosis, optimizing glycemic control, managing and preventing complications, and individualized treatment.

Table 2 *Description of diabetes profiles (N=313)*

Variables	Frequency (%)	Mean (±SD)
Duration of diabetes		
0-5 years	179 (57.2%)	
6-10 years	58 (18.5%)	
11-15 years	41 (13.1%)	
16-20 years	28 (8.9%)	
>20 years	7 (2.2%)	
HbA1c level		
<6.5%	49 (15.7%)	
6.6-7.0%	72 (23.0%)	
7.1-8.0%	96 (30.7%)	
>8.0%	96 (30.7%)	
Type of treatment		
Insulin	68 (21.7%)	
Tablet medication	238 (76.0%)	
Diet	7 (2.2%)	
Clinic visit		
Every month	41 (13.1%)	
Every 3 monthly	25 (8.0%)	
Every 4 monthly	218 (69.6%)	
Every 6 monthly	29 (9.3%)	
Duration to clinic (Hour)		0.5 (±0.31)
Type of Complication		
No	207 (66.1%)	
Eye problem	65 (20.8%)	
Heart disease	12 (3.8%)	

Kidney disease	16 (5.1%)
Sexual problem	4 (1.3%)
Amputation	5 (1.6%)
Others	4 (1.3%)
Number of complications	
No	206 (65.8%)
1 complication	61 (19.5%)
2 or more complication	46 (14.7%)
Hospitalization history	
No	287 (91.7%)
Yes	26 (8.3%)
Out of pocket on diabetes check up	
RM1 -RM50	192 (61.3%)
RM51 - RM100	59 (18.8%)
RM101 - RM150	31 (9.9%)
RM151 - RM200	23 (7.3%)
> RM200	8 (2.6%)
Diabetes association	
No	310 (99%)
Yes	3 (1%)

Evaluation of Diabetes-Dependent Quality of Life (ADDQoL) Outcomes

Based on Table 3, the ADDQoL-18 AWI scores for all participants in this study were negative. The mean ADDQoL-19 AWI score was -4.67 (SD ±0.13). The mean weighted impact ratings for the 18 condition-specific domains of life in the ADDQoL-19 ranged between -2.84 (SD 3.82) and -5.88 (SD 3.07). Notably, the three most negatively affected domains of life were living conditions, working life, and family life.

Table 3 *General distribution of ADDQoL responses by impact, importance rating and weighted impact score*

Domains	Impact ratings	Importance ratings	N/A	Weighted impact score	Rank
Leisure activities	-1.96 (0.97)	2.31 (0.64)		-4.89 (3.03)	9
Working life	**-2.17 (0.95)**	**2.54 (0.57)**	**31.6%**	**-5.79 (3.06)**	**2**
Journeys	-1.70 (1.09)	2.27 (0.63)		-4.19 (3.27)	14
Holidays	-1.95 (0.86)	2.23 (0.63)	10.5%	-4.64 (2.72)	12
Physical health	-2.01 (0.90)	2.43 (0.58)	0.96%	-5.14 (2.88)	6
Family life	**-2.03 (1.01)**	**2.58 (0.56)**		**-5.46 (3.16)**	**3**
Friendship & social life	-1.86 (1.03)	2.35 (0.58)		-4.64 (3.08)	11
Personal relationship	-1.94 (0.96)	2.37 (0.61)	11.8%	-4.92 (3.00)	8
Sex life	-1.95 (0.89)	2.35 (0.60)	17.9%	-4.84 (2.83)	10
Physical appearance	-1.55 (1.13)	2.24 (0.57)		-3.81 (3.26)	18
Self-confidence	-1.67 (1.09)	2.31 (0.58)		-4.23 (3.25)	13
Motivation	-1.67 (1.04)	2.27 (0.58)		-4.14 (3.12)	16
People's reaction	-1.57 (1.09)	2.17 (0.67)		-3.83 (3.16)	17
Feelings about future	-2.11 (0.95)	2.38 (0.61)		-5.37 (3.08)	4
Financial situation	-1.93 (1.04)	2.49 (0.57)		-5.12 (3.24)	7
Living conditions	**-2.21 (0.91)**	**2.47 (0.59)**		**-5.81 (3.09)**	**1**
Dependence on others	-2.02 (1.02)	2.38 (0.61)		-5.17 (3.20)	5
Freedom to eat	-1.70 (1.04)	2.16 (0.72)		-4.19 (3.20)	15
Freedom to drink	-1.55 (1.07)	2.09 (0.73)		-3.77 (3.15)	19

N/A = Not applicable

Statistically significant gender disparities were noted in certain life domains. Based on Table 4, working life surfaced as an area of marked divergence between males and females. While it ranked second most impacted for males, it was the topmost for females ($p = 0.001$). Another domain presenting a significant gender difference was holidays ($p = 0.001$), with it ranking notably higher in importance for females (3rd) than males (14th). Differences in journeys ($p = 0.031$) and sex life ($p = 0.015$) were also of statistical note, underscoring that gender nuances do play a role in certain arenas of life with regards to the impact of diabetes. Lastly, freedom to eat emerged as a significant domain ($p = 0.022$) but was ranked differently, 13th for males and 18th for females. However, a multitude of domains, including leisure activities, physical

health, family life, and personal relationships, showed no statistically significant gender-based differences in their impact ratings. This indicates that diabetes exerts a uniformly consistent impact on certain facets of life irrespective of gender.
Among the most pronounced domains affected by diabetes, irrespective of gender, were working life, family life, and living conditions. For males, living conditions was the most negatively affected domain, followed by working life, while for females, it was the inverse. Family life also manifested differently, being the third most impacted for males but much less so for females, ranking 16th. Conversely, some domains retained consistency across genders. Physical appearance, for instance, consistently ranked the least impactful (19th) for both males and females. Likewise, the financial situation stood as the fifth most impacted domain for both genders, indicative of the universal strain diabetes might exert on economic well-being.

Table 4 *Gender-specific distribution of ADDQoL responses by impact, importance rating and weighted impact score*

Domains	Impact ratings		Importance ratings		Weighted impact score				*P* value
	Male	Female	Male	Female	Male	Rank	Female	Rank	
Leisure activities	-1.99(0.97)	-1.92(0.96)	2.35(0.61)	2.27(0.67)	-5.00(3.08)	11	-4.80(3.00)	13	0.577
Working life	-2.13(1.00)	-2.22(0.90)	2.55(0.56)	2.53(0.57)	-5.69(3.16)	2	-5.88(2.96)	1	**0.001**
Journeys	-1.79(1.11)	-1.62(1.07)	2.36(0.61)	2.19(0.65)	-4.62(3.40)	12	-3.83(3.12)	14	**0.031**
Holidays	-1.85(0.93)	-2.04(0.77)	2.17(0.65)	2.29(0.60)	-4.37(2.81)	14	-4.89(2.62)	3	**0.001**
Physical health	-2.04(0.93)	-1.99(0.87)	2.42(0.57)	2.44(0.59)	-5.18(2.97)	9	-5.11(2.81)	11	0.296
Family life	-2.07(1.01)	-2.00(1.01)	2.60(0.53)	2.57(0.59)	-5.60(3.14)	3	-5.34(3.18)	16	0.889
Friendship & social life	-1.96(1.04)	-1.78(1.02)	2.48(0.52)	2.26(0.60)	-5.09(3.15)	10	-4.27(2.98)	17	0.108
Personal relationship	-2.06(0.97)	-1.84(0.95)	2.46(0.58)	2.28(0.62)	-5.42(3.11)	6	-4.51(2.86)	4	0.688
Sex life	-2.08(0.84)	-1.84(0.93)	2.42(0.58)	2.28(0.60)	-5.27(2.83)	8	-4.47(2.78)	10	**0.015**
Physical appearance	-1.56(1.14)	-1.54(1.12)	2.24(0.58)	2.23(0.56)	-3.81(3.29)	19	-3.81(3.25)	19	0.760
Self-confidence	-1.72(1.09)	-1.63(1.10)	2.33(0.56)	2.29(0.60)	-4.34(3.27)	15	-4.13(3.24)	8	0.630
Motivation	-1.73(1.05)	-1.62(1.04)	2.30(0.60)	2.24(0.57)	-4.33(3.19)	16	-3.99(3.06)	2	0.321
People's reaction	-1.65(1.10)	-1.50(1.07)	2.21(0.67)	2.13(0.66)	-4.06(3.27)	17	-3.64(3.06)	6	0.771
Feelings about future	-2.12(.98)	-2.10(0.94)	2.40(0.59)	2.37(0.63)	-5.40(3.18)	7	-5.35(3.01)	12	0.191
Financial situation	-2.06(1.02)	-1.83(1.04)	2.54(0.52)	2.44(0.61)	-5.50(3.22)	5	-4.82(3.24)	5	0.782
Living conditions	-2.23(0.91)	-2.19(0.92)	2.47(0.56)	2.48(0.62)	-5.78(3.07)	1	-5.84(3.11)	9	0.909
Dependence on others	-2.13(0.99)	-1.92(1.03)	2.41(0.59)	2.35(0.62)	-5.51(3.15)	4	-4.90(3.23)	7	0.831
Freedom to eat	-1.79(1.05)	-1.63(1.02)	2.17(0.80)	2.16(0.66)	-4.45(3.35)	13	-3.98(3.07)	18	**0.022**
Freedom to drink	-1.65(1.11)	-1.48(1.02)	2.10(0.80)	2.08(0.67)	-4.04(3.34)	18	-3.55(2.98)	15	0.080

Socio-Demographic Factors and Quality of Life

Table 5 presents the findings related to socio-demographic factors and their impact on quality of life. The relationship between diabetes profiles and quality of life yielded several significant insights. Age positively correlated with quality of life ($\beta = 0.224$, SE = 0.01, 95% CI [0.022, 0.062], $p < 0.001$), suggesting an enhancement in the quality of life as individuals with diabetes age. Marital status, specifically being divorced or single, negatively affected quality of life ($\beta = -0.170$, SE = 0.454, 95% CI [-2.277, -0.488], $p = 0.003$). Furthermore, being employed was linked to a positive impact on quality of life ($\beta = 0.187$, SE = 0.271, 95% CI [0.376, 1.443], $p < 0.001$). Regular clinic visits, within intervals of less than 3 months, were associated with better quality of life ($\beta = 0.164$, SE = 0.323, 95% CI [0.313, 1.586], $p = 0.004$). Lastly, those who spent over RM100 on diabetes check-ups experienced a notable decrease in quality of life ($\beta = -1.199$, SE = 0.329, 95% CI [-1.826, -0.532], $p < 0.001$).

Contrarily, several variables did not display a statistically significant influence on the quality of life. Gender, educational level, household income, the duration of diabetes, number of complications, hospitalization history, duration of clinic visits, type of treatment, and membership in a diabetes association were all variables that didn't show a significant impact on the quality of life of individuals with diabetes.

Table 5 *Diabetes profiles factors and quality of life*

Variables	β	Standard Error	95% Confidence Interval	P Value
Age	**0.224**	**0.01**	**0.022, 0.062**	**< 0.001**
Gender				
Male	-0.09	0.268	-0.955, 0.098	0.111
Female				
Marital Status	**-0.170**	**0.454**	**-2.277, -0.488**	**0.003**
Married				
Divorce/Single				
Educational Level	-0.097	0.334	-1.232, 0.082	0.086
Lower Education				
Higher Education				
Occupation	**0.187**	**0.271**	**0.376, 1.443**	**<0.001**
Employed				
Not Employed				
Household Income	-0.01	0.281	-0.600, 0.504	0.864

<RM2,000				
>RM2,000				
Duration of Diabetes (Year)	0.039	0.270	-0.347, 0.716	0.981
More than 5 years				
Less than 5 years				
No of Complications	-0.001	0.378	-0.752, 0,734	0.981
2 or more				
1				
Hospitalization History	-0.096	0.482	-1.771, 0.127	0.089
Yes				
No				
Duration of Clinic (Hours)	-0.061	0.427	-1.303, 0.377	0.279
> 6.6%				
< 6.5%				
Clinic Visit	**0.164**	**0.323**	**0.313, 1.586**	**0.004**
< 3 Months				
> 3 Months				
Out of pocket on Diabetis check-up (RM)	**-1.199**	**0.329**	**-1.826, -0.532**	**< 0.001**
< RM100				
> RM100				
Type of Treatment	0.103	0.323	-0.043, 1.226	0.068
Insulin				
Oral Med/diet				
Member of Diabetis Association	-0.022	1.372	-3.234, 2.165	0.697
No				
Yes				

5. Discussion

The study on the quality of life among type 2 diabetes patients offers insightful revelations about the nuances of diabetes management and its individual repercussions. One salient finding was the diagnosis duration: 57.2% of participants were diagnosed within the recent 0-5 years, hinting at a sizable population in the early stages of their diabetic journey. This underscores the need for robust education and resources tailored for these newly diagnosed individuals, aiding them in assimilating to their condition and promoting sound self-management strategies. The HbA1c levels, acting as a proxy for glycemic control, indicated that an alarming 61.4% surpassed the advised 6.5% threshold, accentuating the urgency for more rigorous glycemic control strategies and patient-oriented diabetes education. In terms of treatment, the predominance of oral medication (76.0% of participants) corroborates with conventional type 2 diabetes treatments. Nevertheless, periodic reassessment of this modality's efficacy is imperative, with potential shifts towards additional treatments like insulin for better glycemic control. The majority's clinic visit frequency (69.6% every 4 months) possibly mirrors standardized healthcare protocols, yet the call for a personalized approach, especially for those with added complications, remains pressing.

A significant 66.1% of participants were devoid of diabetes-related complications, emphasizing the profound effects complications can induce on individual well-being and quality of life. The incidence rates of eye issues (20.8%), heart disease (3.8%), kidney anomalies (5.1%), sexual dysfunctions (1.3%), and amputations (1.6%) underline the dire necessity for a holistic diabetes management strategy pivoting on both glycemic control and timely complication detection. Hospitalization data revealed that only 8.3% had diabetes-induced admissions, which, despite being seemingly low, warrants a deeper dive into the underlying causes and potential mitigation measures. The out-of-pocket expenditures showed 61.3% spending between RM1-RM50, suggesting affordable access to routine diabetes care. Yet, one must also weigh in the holistic financial toll, inclusive of medicines and assorted expenses. Finally, the mere 1% affiliation to a diabetes association signals a chance for bolstered involvement, given these associations' potential in furnishing critical resources and support. To encapsulate, this study elucidates various dimensions of diabetes management and its ripple effects on type 2 diabetes patients' quality of life, underscoring the pivotal role of early detection, glycemic control optimization, complication foresight, and personalized treatments.

The relationship between QOL and sociodemographic shows that there is a significant relationship between QoL and age, marital status, education level and occupation. O'Reilly et al. (2011) found that QoL scores increased with age, which could be attributable to societal differences in economic and social conditions.

Ageing has been established as a risk factor for T2DM (Alneami, 2016) and poor HRQoL (Al-Aboudi, 2015). As a result, a negative relationship between age and HRQoL in diabetic patients is expected. (Chung, 2013) discovered that the link

between insulin usage and lower ADDQoL scores is age-dependent, with insulin use being independently linked to lower ADDQoL scores in the younger groups. In the patients who did not have depressive symptoms, the interaction with age stratum was also statistically significant. As a result, our findings imply that the influence of insulin use on QoL in type 2 diabetes patients varies with age. Patients with T2DM who are female and single had a lower average weighted effect score than those who are married (Levterova, 2018). Study by (Trikkalinou, 2017) found that Women and the elderly had lower HRQoL than men, while marital status was positively related to HRQoL.
Patients with a greater degree of education have a better QoL score (Abedini, 2020). It could be owing to a better understanding of the disease and timely efforts to improve disease control and treatment (Solli, 2010). Similar to a study according to Glasgow et al. (1997), those with diabetes who had a college education had a better quality of life than those who had only a high school education. According to another study by (Mikailiukstiene, 2013) finds that, male gender and higher education lead to improved life quality evaluations in all areas.

Being male was a factor that significantly affected the domains of ‘close personal relationship’ and ‘sex life’ (Wang, 2012). Study on sexual dysfunction (erectile dysfunction) negatively affect QOL. The Exploratory Comprehensive Evaluation of Erectile Dysfunction study reported that among patients in the general population presenting to a urologist, ED negatively affected both general QOL and HRQOL. The largest negative impact of T2DM observed in the present study was on “freedom to eat” (Bradley, C, 1999 and Papazafiropoulou, 2015). (Krzeminka, 2020) T2DM had the most severe impact on the “freedom to eat” domain, suggesting that patients are most bothered by dietary restrictions or the need to use special nutrition. Similar to earlier study by (bradley, 2002 & Speight, 2013) the highest negative weighted impact of T2DM was found to be 'freedom to eat,' which is consistent with earlier research.

For the relationship between type 2 diabetes mellitus and quality of life, one seminal previous finding was Trikkalinou (2017) suggesting that patients with diabetes, especially long term complications, were found to have lower health-related QoL (HRQOL) scores. However, there is also research from other countries that indicated that the HRQOL of diabetic patients was not significantly different from that of nondiabetic individuals (Venkataraman, 2013 & Olvia, 2012), hence for the overall picture of diabetes the literature may be still be equivocal. Nevertheless, this does not take into account the far lower quality of life that patients with long term complications suffer. The literature indicates that diabetic problems such as nephropathy or retinopathy have been linked to a considerable decrease in social functioning and emotional role dimensions (Pham, 2020). Levterova, 2018 also suggest that there are particular illness related risk factors: patients with a longer history of diabetes (>5 years), those with microvascular problems, and those on insulin regimens all had significantly poorer diabetes-related QoL scores.

Hba1c levels are also linked with poore QoL scores, with an inverse connection between diabetes duration and QoL. (Trikkalinou, 2017). The negative results indicate the overall negative impact of diabetes mellitus across all 19 evaluated categories, with the ones most affected being 'freedom to eat,' 'family life,' and 'physically can do,' according to (Levterova, 2018) study.

Conclusion, Limitations, and Future Recommendations

There are some limitations to this study. First, because the study was limited to an outpatient clinic in Kota Kinabalu, the findings may not be indicative of all diabetic patients in the city. Second, because our study was cross-sectional in nature, the causal nature of the relationships could not be determined. Despite these limitations, our findings could be useful in determining the factors that influence QoL in type 2 diabetic patients.
In conclusion, the study sheds light on various aspects of diabetes management and its impact on the quality of life among type 2 diabetes patients. These findings suggest that different techniques concentrating on QoL may be required in the management of T2DM patients. However, because our study was cross-sectional, additional prospective investigations are required to corroborate our findings. At the same time, the findings emphasize the importance of early diagnosis, optimizing glycemic control, preventing and managing complications, and individualized treatment. T2DM has a negative impact on these patients' QoL in all aspects of their lives. In conclusion, our findings suggest that T2D has a significant impact on patients' QoL, most notably affecting working life, travel, holidays, sex life, and freedom to eat. In the current study, the only factors of QoL were age, out-of-pocket money for diabetes check-ups, and occupation.

Conflict of interest

The authors declare that there is no conflict of interest.

References

1. Abedini, M. R., Bijari, B., Miri, Z., Shakhs Emampour, F., & Abbasi, A. (2020). The quality of life of the patients with diabetes type 2 using EQ-5D-5 L in Birjand. *Health and Quality of Life Outcomes*, *18*(1), 1-9.
2. Anderson, R. A., Cheng, N., Bryden, N. A., Polansky, M. M., Cheng, N., Chi, J., & Feng, J. (1997). Elevated intakes of supplemental chromium improve glucose and insulin variables in individuals with type 2 diabetes. *Diabetes*, *46*(11), 1786-1791.
3. Ayub, F., Khan, T. M., Baig, M. R., Amin, M. U., & Tahir, H. (2023). Quality of life and wellbeing among breast cancer patients in Lahore, Pakistan. *Frontiers in Oncology*, *13*, 1105411.
4. Blonde, L., Umpierrez, G. E., Reddy, S. S., McGill, J. B., Berga, S. L., Bush, M., ... & Weber, S. L. (2022). American Association of Clinical Endocrinology Clinical Practice Guideline: Developing a Diabetes Mellitus Comprehensive Care Plan—2022 Update. *Endocrine Practice*, *28*(10), 923-1049.
5. Bradley, C., Todd, C., Gorton, T., Symonds, E., Martin, A., & Plowright, R. (1999). The development of an individualized questionnaire measure of perceived impact of diabetes on quality of life: the ADDQoL. *Quality of Life Research*, *8*, 79-91.
6. Colberg, S. R., Sigal, R. J., Yardley, J. E., Riddell, M. C., Dunstan, D. W., Dempsey, P. C., ... & Tate, D. F. (2016). Physical activity/exercise and diabetes: a position statement of the American Diabetes Association. *Diabetes care*, *39*(11), 2065.
7. Cuddapah, G. V., Chennakesavulu, P. V., Pentapurthy, P., Vallakati, M., Kongara, A., Reddivari, P., ... & pragna Chandupatla, K. (2022). Complications in diabetes mellitus: Social determinants and trends. *Cureus*, *14*(4), e24415.
8. Donald, M., Dower, J., Coll, J. R., Baker, P., & Mukandi, B. (2013). Mental health issues decrease diabetes-specific quality of life independent of glycaemic control and complications: findings from Australia's living with diabetes cohort study. *Health and quality of life outcomes*, *11*(1), 1-8.
9. Garg, P., & Duggal, N. (2022). Type 2 diabetes mellitus, its impact on quality of life and how the disease can be managed-a review. *Obesity Medicine*, 100459.
10. Glasgow, R. E., Ruggiero, L., Eakin, E. G., Dryfoos, J., & Chobanian, L. (1997). Quality of life and associated characteristics in a large national sample of adults with diabetes. *Diabetes care*, *20*(4), 562-567.
11. Haraldstad, K., Wahl, A., Andenæs, R., Andersen, J. R., Andersen, M. H., Beisland, E., ... & LIVSFORSK network. (2019). A systematic review of quality of life research in medicine and health sciences. *Quality of life Research*, *28*, 2641-2650.
12. Jacobson, A. M., Hauser, S. T., Lavori, P., Willett, J. B., Cole, C. F., Wolfsdorf, J. I., ... & Wertlieb, D. (1994). Family environment and glycemic control: a four-year prospective study of children and adolescents with insulin-dependent diabetes mellitus. *Psychosomatic Medicine*, *56*(5), 401-409.
13. Kiadaliri, A. A., Najafi, B., & Mirmalek-Sani, M. (2013). Quality of life in people with diabetes: a systematic review of studies in Iran. *Journal of Diabetes & Metabolic Disorders*, *12*, 1-10.
14. McGee, H. M., O'Boyle, C. A., Hickey, A., O'Malley, K., & Joyce, C. R. B. (1991). Assessing the quality of life of the individual: the SEIQoL with a healthy and a gastroenterology unit population. *Psychological medicine*, *21*(3), 749-759.
15. Nematolahi, S. (2021). Effect of a quality of life education program on psychological well-being and adherence to treatment of diabetic patients. *Journal of Holistic Nursing And Midwifery*, *31*(1), 61-67.
16. Peyrot, M., & Rubin, R. R. (1997). Levels and risks of depression and anxiety symptomatology among diabetic adults. *Diabetes care*, *20*(4), 585-590.
17. Polonsky, W. H., Hessler, D., Ruedy, K. J., & Beck, R. W. (2017). The impact of continuous glucose monitoring on markers of quality of life in adults with type 1 diabetes: further findings from the DIAMOND randomized clinical trial. *Diabetes Care*, *40*(6), 736-741.
18. Power, A.C. (2008). Diabetes mellitus. In T.R. Harrison, A.S. Fauci, E. Braunwald, D.L. Kasper, S.L. Hauser, D.L. Longo, & J.L. Jameson (Eds.), *Harrison's: Principles of Internal Medicine* (17th ed., pp. 2275-2304). McGraw-Hill.
19. Prajapati, V. B., Blake, R., Acharya, L. D., & Seshadri, S. (2018). Assessment of quality of life in type II diabetic patients using the modified diabetes quality of life (MDQoL)-17 questionnaire. *Brazilian Journal of Pharmaceutical Sciences*, *53*(4), e17144.
20. Rubin, R. R., & Peyrot, M. (1999). Quality of life and diabetes. *Diabetes/metabolism research and reviews*, *15*(3), 205-218.
21. Sayyed Kassem, L., & Aron, D. C. (2020). The assessment and management of quality of life of older adults with diabetes mellitus. *Expert Review of Endocrinology & Metabolism*, *15*(2), 71-81.
22. Trief, P. M., Grant, W., Elbert, K., & Weinstock, R. S. (1998). Family environment, glycemic control, and the psychosocial adaptation of adults with diabetes. *Diabetes care*, *21*(2), 241-245.

23. Verma, S. K., Luo, N., Subramaniam, M., Sum, C. F., Stahl, D., Liow, P. H., & Chong, S. A. (2010). Impact of depression on health related quality of life in patients with diabetes. *Annals Academy of Medicine Singapore*, *39*(12), 913-919.
24. Wändell, P. E. (2005). Quality of life of patients with diabetes mellitus an overview of research in primary health care in the Nordic countries. *Scandinavian journal of primary health care*, *23*(2), 68-74.
25. Wexler, D. J., Grant, R. W., Wittenberg, E., Bosch, J. L., Cagliero, E., Delahanty, L., ... & Meigs, J. B. (2006). Correlates of health-related quality of life in type 2 diabetes. *Diabetologia*, *49*, 1489-1497.