



ASSESSMENT OF THE HEALTH-RELATED QUALITY OF LIFE AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS AT A TERTIARY CARE HOSPITAL IN MAKKAH CITY, SAUDI ARABIA IN 2021

Yousef Abdulhai Siddiq^{1*}, Mohammed Ali Hassan Alghamdi², Omar Badr Bawazir³,
Amira Hassan Alammari⁴, Azza Abdulrahim Islam Baw⁵, Maha Suleiman Alharbi⁶,
Rahmah Abdulrahman M Al Luhaybi⁷, Mahir Mugbil Alsaedi⁸

Abstract:

Background: The alarming increase in type 2 diabetes mellitus (T2DM) in Saudi Arabia is aggravated by increasing obesity, sedentary lifestyle, and population aging. Over 19.4 million adults aged 20–79 years globally are affected by Type 2 diabetes mellitus. The Kingdom of Saudi Arabia (KSA) has declared a new vision for 2030, which includes an aim to improve the quality of healthcare in the Kingdom while maintaining the efficacy of spending. The health impact profile Type 2 diabetes mellitus (T2DM) is a quality of life instrument that helps evaluate health status. Type 2 diabetes mellitus (T2DM) and its treatment impact patients' physical health as well as emotional and social wellbeing.

This study aimed: To assessment of the Health-related quality of life among patients with type 2 diabetes mellitus in, Makkah City, Saudi Arabia at a tertiary care hospital, was conducted on August 1, 2021. Method: A cross-sectional study was conducted among patients with type 2 diabetes who attended a tertiary care hospital in Makkah at Saudi Arabia in 2021. Participants were interviewed and their medical records were reviewed. Our total participants were (300).

Results: most of the participants (44.0%) were in the age group 25-50 years follow by the (38.0%) were in the age

>50 years, the majority of them were males (66.0%) while female (34.0%), also regarding level of education the majority of participant are Intermediate level were (42.0%), while Secondary were (29.0%). Regarding the economic level the majority of participant high economic levels were (38.0%). While Smoked most of participants (52.0%) not smoking while yes smoked were (48.0%), distribution the of the patient's with satisfaction and have a significant relation between the satisfaction and frequency while P-value <0.001 and X^2 170.820, participant toward Satisfaction study results show the majority of participant had Satisfied were (74.0%) while Non satisfied were (26.0%) but total (100%)

Conclusion: Overall, patients with T2DM had lower HRQoL than the general population, which was attributed to being older age, longer duration of diabetes, insulin use, obesity, inadequate glycemic control, and diabetes-related complications. The patient's good knowledge of T2DM disease was not reflected in the patient's attitude and practice towards T2DM. Therefore, the local health authorities need to implement health education and awareness of clinical.

Keywords: Assessment, Health-related quality, patients, type 2 diabetes mellitus, tertiary, hospital, Makkah.

^{1*}Family medicine doctor Al Etibiya Health Center Makkah.

²Namerah General Hospital Specialist Nersnig Makkah

³Family medicine doctor Al Etibiya health center Makkah

⁴Nursing King Fahd general hospital Jeddah

⁵Public Health Specialist General Directorate of Health Affairs in the Makkah

⁶Nursing technician Agyad Emergency Hospital Makkah

⁷Nursing Specialist Al Noor Specialist Hospital Makkah

⁸Nursing technician AL Etibiya Health Center Makkah

*Corresponding Author: Yousef Abdulhai Siddiq

*Family medicine doctor Al Etibiya Health Center Makkah.

DOI: 10.53555/ecb/2022.11.11.167

Introduction:

Type 2 diabetes mellitus (T2DM) is a clinical syndrome of disordered carbohydrates, fat, and protein metabolism. This condition results from an absolute or relative deficiency of insulin and a defect in insulin action known as insulin resistance (IR).[1]

One in every two appointments in primary care with a physician is attributed to long-term conditions (e.g. hypertension, diabetes, arthritis, etc.) [2]. It has been estimated that 70% of the total health and social care expenditure is spent on the treatment of patients with long-term conditions [3]

Diabetes mellitus (DM) is defined as a group of metabolic diseases characterized by hyperglycemia that results from defects in insulin secretion, insulin action, or both [4]. According to the International Diabetes Federation, 285 million people are affected by diabetes globally, and the number is expected to increase to 438 million by the year 2030, with two-thirds of all cases of DM occurring in developing countries. The number of adults with impaired glucose tolerance is expected to rise from 344 million in 2010 to 472 million by 2030, which reflects the increase in predisposing risk factors, such as obesity or overweight [5].

T2DM is characterized by chronic hyperglycemia and dyslipidemia, and it contributes to developing microvascular complications, cardiovascular disease (CVD), and renal disease.² The Middle East has a high prevalence of T2DM due to the development and changes in diet patterns and rapid economic expansion.³ In Saudi Arabia (SA), the Ministry of Health (MOH) stated that T2DM prevalence is about 2.5 million, and the rate is increasing.[6]

Since patients with long-term conditions are living longer and receiving treatment for an extended period, quality of life (QoL) has become an important outcome measure to assess the effectiveness of any disease management plan. This is perhaps because poor QoL has been associated with poor therapeutic response, disease progression, and development of disease-related complications [7]. Type 2 diabetes mellitus (T2DM) is a growing public health challenge associated with significant health, social, and economic burden on patients, families, and healthcare systems [8,2]. The number of people with diabetes exceeds 2.57 million (5.2%), making it one of the highest prevalence countries in Sub-Saharan Africa [1, 9]. The global epidemic of diabetes is linked to an increasing rate of an aging population, urbanization, unhealthy eating habits, sedentary lifestyle as well as lack of physical activities [10]. HRQoL is a

patient-reported outcome measure that evaluates the extent to how diseases, disability, and treatment affects the health status of patients [11]. It encompasses physical, functional, psychosocial, and emotional functioning domains of quality of life [12]. It can provide information about a person's overall health status because it considers both physical and mental health, and their respective impact on HRQoL [13]. Thus, healthcare providers and researchers use self-reported HRQoL measures to evaluate the burden of disease and its treatments in addition to clinical outcomes in patients with diabetes [14]. Moreover, HRQoL is a relevant input to conduct economic evaluations and identify cost-effective interventions that lead to efficient utilization of scarce resources [15]. Diabetes might have an adverse effect on the patients' health in general and on their quality of life (QoL) [16]

Literature Review

Eghbali T, et al.(2019) A meta-analysis that investigated quality of life of Iranian patients showed that patients with type-2 DM have a moderate quality of life [17]

In Bahraini study, it was reported an average knowledge of teachers (24). In a study from Turkey about knowledge and attitude of teachers toward DM complications, it was found that the teachers had adequate knowledge of DM complications [18]

Mehdizadeh et al, 2019 report that the results showed the patients who were older than 40 years had lower scores in all HRQoL scales, compared with those who were forty years old or less. These findings are consistent with other studies which found that age is negatively correlated with HRQoL [19]. The findings could be interpreted accordingly, such that diabetes complications are prevalent among older diabetics, and they are determinants of poor HRQoL [20]

Another study was Tabuk University showed that 55% of the students were unaware of diabetes risk factors. This study included 200 subjects; among them, 103 were males and 97 were females. Their ages ranged from 18 to 24 years, and 16.5% of them were diabetic patients [21]

Many recent studies have shown that improving the KAP of T2DM among patients is directly associated with their improvement in self-management of T2DM and leads to better control of the disease.[22-23] In addition, American Diabetes Association (ADA) has also emphasized the importance of enhancing self-management to improve T2DM practice, compliance and reduce chronic complications.[24] In general, participants of this study showed a high

percentage of knowledge T2DM, which was similar to studies conducted in KSA.[24,25]. This suggests that patients with T2DM in Saudi society have good Knowledge of T2DM, and the health authorities may not face significant obstacles during the application of further prevention and awareness plans[26].

Another study was carried out in Oman among more than 500 students. It illustrated that knowledge of DM among high school students is suboptimal. In most cases, their knowledge deficiency was particularly in HRQoL[27]

Also a study conducted most diabetes mellitus patients found had low to moderate knowledge scores in Riyadh, Jeddah, Al Hasa, Al-Khobar, and Mecca. Also unexpectedly, health professionals in Saudi Arabia also had low knowledge scores about QoL [28]

Murad et al [29] performed a case-control study in Jeddah to investigate the risk factors of T2DM. They found that smoking, hypertension, increased weight/obesity and age (above 40 years) were significant risk factors for Type 2 diabetes mellitus among the studied population. Alfadhli et al [30] found that older maternal age, high BMI, high blood pressure, previous gestational diabetes (GDM), history of delivering a malformed child and family history of diabetes were the main risk factors for GDM.

Another study was carried out in KSA found There may be a gap between knowledge of diabetes and perceptions of diabetes among young adults in Saudi Arabia, including secondary school students.[31]

Al Hayek, et al. (2014) In Saudi Arabia, a cross-sectional study on type-2 DM patients revealed moderate HRQOL among patients attending tertiary care hospitals in the capital city Riyadh [32]

Rationale:

Health-related quality of life among patients with type 2 diabetes mellitus at a tertiary care hospital in Makkah City, Saudi Arabia indicators are solid predictors of an individual's competence to maintain long-term health, well-being and productivity. Improved quality of life has been regarded as a key goal of all healthcare interventions including diabetes mellitus management programs. Reported that diabetes mellitus and its complications drain a substantial portion of the national healthcare budget in Saudi Arabia, hence, it is important to know the level of health-related quality of life (HRQoL) of diabetes patients against the huge spending from the national budget. To the best of our knowledge, this is the first study addressing the

effects of health-related quality of life among patients with type 2 diabetes mellitus, the researcher is interested in level of health-related quality of life (HRQoL) of diabetes patients because it is a common problem among all age and the researcher has a family history of diabetes mellitus.

Aim of the study:

To assessment of the Health-related quality of life among patients with type 2 diabetes mellitus in, Makkah City, Saudi Arabia on August 1, 2021

Objectives

To assess health-related quality of life among patients with Type 2 diabetes also to examine factors associated with health-related quality of life in Makkah City, Saudi Arabia on August , 2021

Methodology:

Study design:

A cross-sectional study was conducted among quality of life in the patients with type 2 diabetes who Visiting the Outpatient Clinics at Tertiary Hospital Makkah City, Saudi Arabia in 2021. Participants were interviewed and their medical records were reviewed. Our total participants were (300).

Study Area:

The study has been carried out in the city of Makkah Al-Mokarramah Makkah is the holiest spot on Earth. It is the birthplace of the Prophet Mohammad and the principal place of the pilgrims to perform Umrah and Hajj. It is located in the western area in Kingdom of Saudi Arabia and called the Holy Capital. Contains a population around 2 million. Makkah has many hospitals in addition to King Abdullah Medical city which is tertiary center this study was conducted in a tertiary care hospital in Makkah, Saudi Arabia. During the August , 2021 to October, 2021, and participants from a tertiary care hospital in Makkah, and it reflects a diversified demographic profile with a considerable portion of the population comes from rural descent, while others come from an urban one. This difference translates into biological, socioeconomic and lifestyle differences in the Makkah population.

Study Population:

The study has been conducted among patients with type 2 diabetes who attended diabetes visiting the Outpatient Clinics at Tertiary Hospital Makkah City, Saudi Arabia in 2021. During the August , 2021 to October, 2021. Participants. Our

total participants were (300).

Selection criteria: Inclusion criteria

- All 35 years or more to >55 years age patients (males and females) visiting the Outpatient Clinics at Tertiary Hospital Makkah City, Saudi Arabia in 2021.
- Patients who can write and read in Arabic Language
- Patients who diagnosed with T2DM at least six months before data collection .

Exclusion criteria :

- No speaks Arabic fluently
- Patients who refuse to participate in the study
- Persons who have reported severe mental disabilities .
- We excluded patients with gestational diabetes.
- Type 1 diabetes mellitus.

Sample size

Patients who visiting the Outpatient Clinics at Tertiary Hospital Makkah City . The sample size has been calculated by applying Raosoft sample size calculator based on (The margin of error: 5%, Confidence level: 95%, and the response distribution was considered to be 20%) accordingly the Sample size is (300) of the patients with type 2 diabetes who visiting the Outpatient Clinics at Tertiary Hospital. and adding 10 more to decrease margin of error. After adding 5% oversampling, the minimum calculated sample has been 300. Computer generated simple random sampling technique was used to select the study participants.

Sampling technique:

Systematic random sampling technique is adopted. After that, by using random number generator, then simple random sampling technique has been applied to select the PHC. Also, convenience sampling technique will be utilized to select the participants in the study. By using systematic sampling random as dividing the total students by the required sample size; (300) .

Data collection tool

An Arabic version of the questionnaire was used after obtaining prior permission from the EuroQol Research Foundation (32). The questionnaire was distributed to the participants and their socio-demographic and clinical characteristics were obtained. The questionnaire was filled by the participants. Socio-demographic and clinical characteristics The data on participants' gender,

age, education status, monthly income, items are scored on a 5-point Likert scale and are of two general formats.

The second format asks about satisfaction with treatment and quality of life and is scored from 1 (very satisfied) to 5 (very dissatisfied). Higher scores on DQOL items and subscales are, therefore, negatively valence, indicating problem frequency or dissatisfaction. Participants completed a five item questionnaire assessing how frequently they engaged in the following self-care behaviors: 1) diet, 2) insulin, 3) exercise, 4) foot care, and 5) blood glucose monitoring (identified by the American Diabetes Association as critical for good metabolic control). Each behavior was scored on a Likert scale ranging from 1 (never) to 5 (always) and then averaged to create a total measure of self-care (higher = greater frequency of adherence to self-care guidelines). The instrument used in this study was based largely on instruments that have been widely used in diabetes research.(33) Overall treatment satisfaction. Respondents were asked to rate their overall "satisfaction with diabetes control" based on their current treatment. Responses were made on a Likert scale ranging from 1 (verysatisfied) to 5 (very unsatisfied).

Data Collection technique

The researcher has be used Arabic version of the questionnaire since the target population are Saudi middle age (35) . The questionnaire has be distributed to all patients attending primary health care center during the data collection period (which is 60 days initially). The questionnaire was distributed equally between male and female section because it is separate departments. The researcher has be train 2 nurses on how to fulfill the questionnaire in order to optimize the interpreter reliability. The researcher has be distribute the questionnaire in the waiting area in male while in female section, has be trained nurse was be distribute the questionnaire in female waiting area. After that, the researcher was being collected the paper daily from the nurse for data entry and analysis after thanking the participants for their precious time and effort. The services: the researcher has been providing the participants with a simple gift as an appreciation for their participation in the study, after collecting questionnaire from them.

Data entry and analysis

Statistical analysis has be performed using SPSS software program (Statistical Package for Social Sciences), version 24.0. descriptive using listing and frequency and analytic statistics using chi-

square test to analyses the association and the difference between two qualitative categorical variables or t test for two quantitative categorical variables or using other statistical tests if needed. Significance: P value less than 0.05 is considered statistically significant.

Pilot study/pretesting

A pilot study on 60 participants representing 20% of study sample size (out of study area) has been conducted to explore applicability, acceptance and obstacles and plan to overcome these problems.

Results

Table 1 Distribution of demographic data (age, gender, Level of education, economic level, smoking) in our study (n=400)

	N	%
Age		
<25 years	72	18
25-50 years	176	44
>50 years	152	38
Gender		
Female	136	34
Male	264	66
Level of education		
Intermediate	168	42
Secondary	116	29
University	116	29
Economic level		
Low	132	33
Medium	116	29
High	152	38
Smoked		
Yes	192	48
No	208	52

Table 1 shows that most of the participants (44.0%) were in the age group 25-50 years followed by the (38.0%) were in the age >50 years, the majority of them were males (66.0%) while female (34.0%), also regarding level of education the majority of participants are Intermediate level

Ethical consideration

- Permission from the Makkah joint program of family medicine has been obtained.
- Permission from the Directorate of Health Affairs of the Holy Capital Primary Health Care has been obtained.
- Permission from administration of public health in Makkah Al-Mukarramah has been obtained.
- Written consents from all participants have been obtained.
- All information will be confidential, and a result has been submitted to the department.

Budget:

- The research has been self-budgeted

were (42.0%) while Secondary were (29.0%). Regarding the economic level the majority of participants high economic levels were (38.0%). While Smoked most of participants (52.0%) not smoking while yes smoked were (48.0%)

Table 2 Distribution of patient's behavioral characteristics

	N	%
Physical activity		
≥150 min/week	112	28
<150 min/week	288	72
Sitting time		
<10 hours per day	272	68
≥10 hours per day	128	32
Sources of information about DM		
Booklets and brochures	72	18
Mass media	52	13
Own personal experience	140	35

Educational films	176	44
Medical education in health centers and hospitals	184	46

Regarding the Physical activity the majority of participant <150 min/week were(72.0%), while \geq 150 min/week were (28.0), regarding Sitting time the majority of participant <10 hours per

day were(68.0%). Regarding the sources of information most of participants from Medical education in health centers and hospitals were (46.0%) Educational films were(44.0%).

Table 3 Distribution of the studied primary health care patients according to their overall satisfaction about treatment and behavioral of the health care providers.

	Satisfaction		% Of satisfaction	One Sample T-test (test value=2.5)	
	Mean	SD		t	P-value
Satisfaction with checkups time	3.3300	1.30398	66.6	12.730	<0.001*
Satisfaction with current treatment	3.6750	1.35424	73.5	17.353	<0.001*
Satisfaction with exercise time	3.5400	1.26784	70.8	16.406	<0.001*
Satisfaction with glucose maintenance time	3.7125	1.43002	74.25	16.958	<0.001*
Satisfaction with diabetes knowledge	3.7275	1.36304	74.55	18.011	<0.001*
Satisfaction with the amount of time it takes to manage your diabetes	3.5025	1.26253	70.05	15.881	<0.001*
Satisfaction with the time it takes to determine your sugar level	4.0500	1.22526	81	25.301	<0.001*
Satisfaction with the time you spend exercising	2.9925	1.41331	59.85	6.969	<0.001*
Satisfaction with your sex life	3.1425	1.27721	62.85	10.061	<0.001*
Satisfaction with time spent getting checkups for your diabetes	3.4350	1.36397	68.7	13.710	<0.001*
Satisfaction with your knowledge about your diabetes	3.5025	1.29777	70.05	15.450	<0.001*

regarding the satisfaction with checkups time a significant relation between checkups time and satisfaction while P-value= <0.001 and T (12.730) the Mean were 3.3300 and SD were 1.30398 while % Of satisfaction were 66.6%, regarding the satisfaction with Satisfaction with current treatment a significant relation between current treatment and satisfaction while P-value= <0.001 and T (17.333) the Mean were 3.6750 and SD were 1.35424 while % Of satisfaction were 73.5%. While Satisfaction with exercise time a significant relation between 10 exercise time and satisfaction while P-value= <0.001 and T (16.406) the Mean were 3.5400 and SD were 1.26784 while % Of satisfaction were 70.8%, regarding the Satisfaction with glucose maintenance time a significant relation between glucose maintenance time and satisfaction while P-value= <0.001 and T (16.958) the Mean were 3.7125 and SD were 1.43002 while % Of satisfaction were 74.25%, regarding Satisfaction with diabetes knowledge a significant relation between diabetes knowledge and satisfaction while P-value= <0.001 and T (18.011) the Mean were 3.7275 and SD were 1.36304 while % Of satisfaction were 74.55%. Regarding Satisfaction with the amount of time it takes to manage your diabetes a significant relation between amount of time it takes to

manage your diabetes and satisfaction while P-value= <0.001 and T (15.881) the Mean were 3.5025 and SD were 1.26253 while % Of satisfaction were 70.05%. Regarding Satisfaction with the time it takes to determine your sugar level a significant relation between Satisfaction with the time it takes to determine your sugar level and satisfaction while P-value= <0.001 and T (25.301) the Mean were 4.0500 and SD were 1.22526 while % Of satisfaction were 82.05%. Regarding Satisfaction with the time you spend exercising a significant relation between Satisfaction with the time you spend exercising and satisfaction while P-value= <0.001 and T (6.969) the Mean were 2.9925 and SD were 1.41331 while % Of satisfaction were 59.85%. Regarding Satisfaction with your sex life a significant relation between Satisfaction with your sex life and satisfaction while P-value= <0.001 and T (10.061) the Mean were 3.1425 and SD were 1.27721 while % Of satisfaction were 62.85%. Regarding Satisfaction with time spent getting checkups for your diabetes a significant relation between Satisfaction with time spent getting checkups for your diabetes and satisfaction while P-value= <0.001 and while T (13.710) the Mean were 3.4350 and SD were 1.36397 while % Of satisfaction were 68.7%. Regarding Satisfaction with your knowledge

about your diabetes a significant relation between Satisfaction with your knowledge about your diabetes and satisfaction while P-

value= <0.001 and while T (15.450) the Mean were 3.5025 and SD were 1.29777 while % Of satisfaction were 70.05.

Table 4 Distribution of the Frequency of the of patient's with Satisfaction.

		Satisfaction	
		N	%
Non satisfied		104	26
Satisfied		296	74
Total		400	100
Chi-square	X ²	91.203	
	P-value	$<0.001^*$	

Table 4 Regarding distribution the of the patient's with satisfaction and have a significant relation between the satisfaction and frequency while P-value <0.001 and X² 170.820, participant toward

Satisfaction study results show the majority of participant had **Satisfied** were(74.0%) while **Non satisfied** were(26.0%) but total (100%)

Finger1 Distribution of the Frequency of the of patient's with Satisfaction

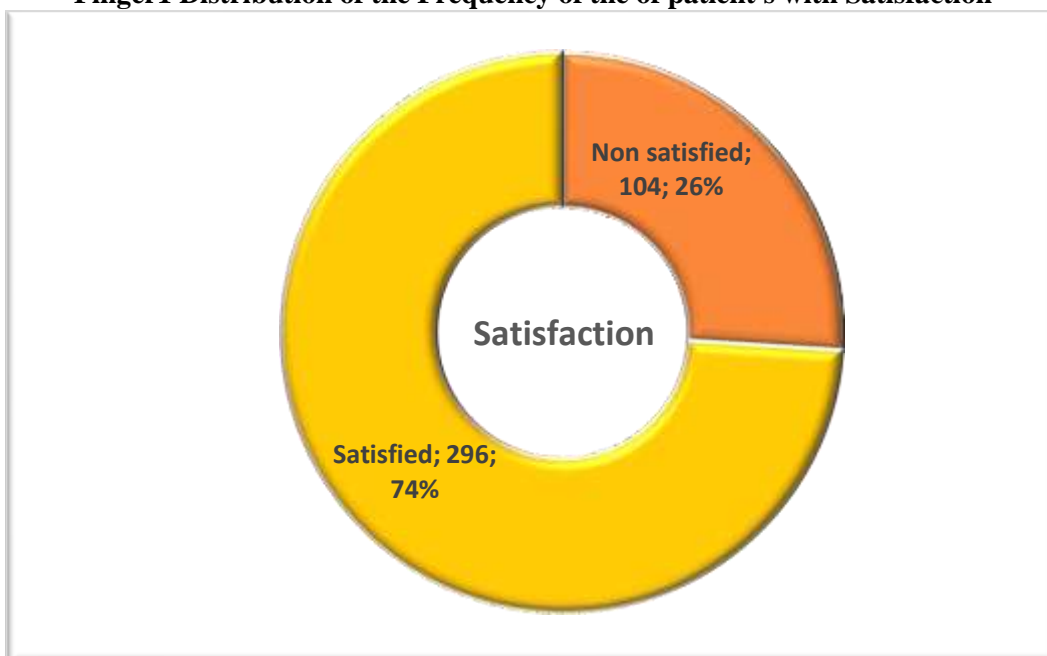


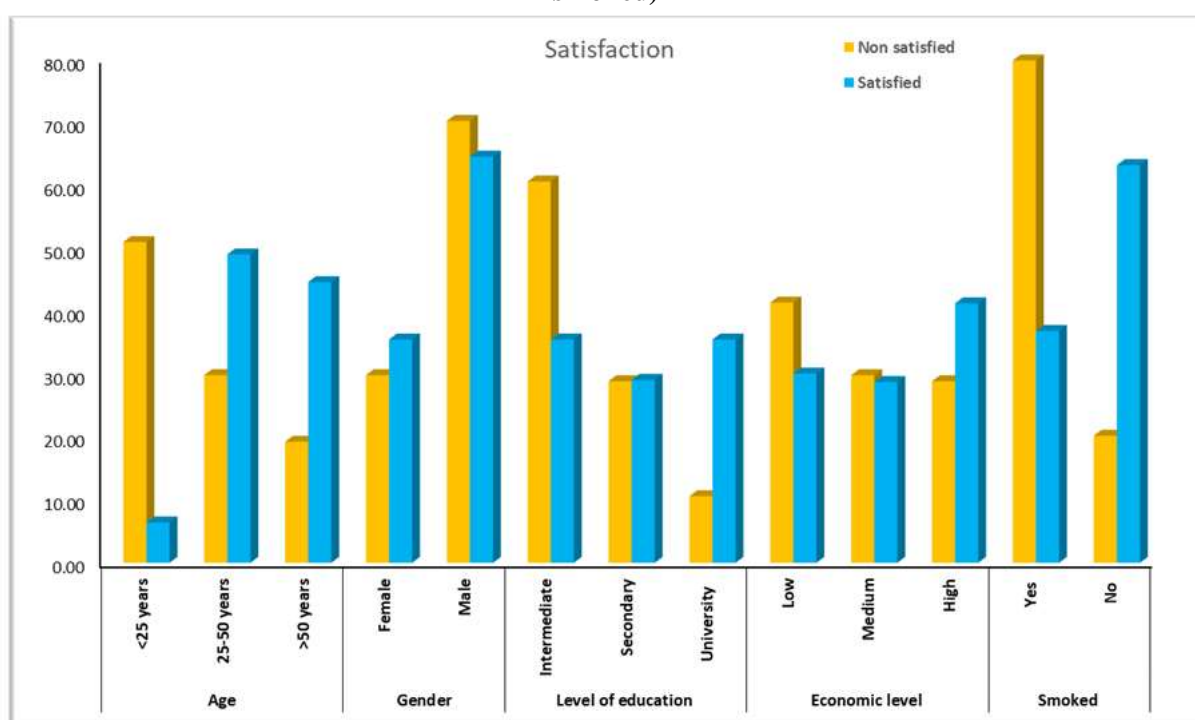
Table 5 Distribution of the relationship of satisfaction among a visiting the Outpatient tertiary care hospital patients and the demographic data (age, gender, Level of education, economic level and smoked)

		Non satisfied (n=104)		Satisfied (n=296)		Total		Chi-square	
		N	%	N	%	N	%	X ²	P-value
Age	<25 years	53	50.96	19	6.42	72	18	104.292	$<0.001^*$
	25-50 years	31	29.81	145	48.99	176	44		
	>50 years	20	19.23	132	44.59	152	38		
Gender	Female	31	29.81	105	35.47	136	34	0.863	0.353
	Male	73	70.19	191	64.53	264	66		
Level of education	Intermediate	63	60.58	105	35.47	168	42	27.998	$<0.001^*$
	Secondary	30	28.85	86	29.05	116	29		
	University	11	10.58	105	35.47	116	29		
Economic level	Low	43	41.35	89	30.07	132	33	6.097	0.047*
	Medium	31	29.81	85	28.72	116	29		
	High	30	28.85	122	41.22	152	38		
Smoked	Yes	83	79.81	109	36.82	192	48	55.258	$<0.001^*$
	No	21	20.19	187	63.18	208	52		

Table (5) show that is a significant relation between satisfaction and demographic data regarding age increase in <25 years year in Non satisfied were 50.% follow by 25-50 age in satisfied were (48.99) P- value=<0.001, X² 104.292. Regarding gender in our study the majority of our participants were noticed in male more than female with Non satisfied were (70.19) with no significant relation between satisfaction and gender were and P-value=0.001. X² 0.863. Regarding Level of education show that a significant relation between satisfaction and

Level of education increase in Intermediate Non satisfied no significant were (60.58) and P-value=0.001 X² 27.998. Also regarding the economic level show that a significant relation between satisfaction and economic level increase in the high income participants in no significant were (41.35) and P-value=0.001 X² 6.097. Also regarding the Smoked show that a significant relation between satisfaction and Smoked increase in smoking in no significant were (79.81%) and P-value=0.001 X² 55.258.

Finger2 Distribution of the relationship of satisfaction among a visiting the Outpatient tertiary care hospital patients and the demographic data (age, gender, Level of education, economic level and smoked)



Discussion

Our study included 400 participants with age ranging from < 25 to > 50 years old. shows that most of the participants (44.0%) were in the age group 25-50 years, were in the age >50 years, the majority of them were males (66.0%), also regarding level of education the majority of participant are Intermediate level were (42.0%), Regarding the economic level the majority of participant high economic levels were (38.0%). While Smoked most of participants (52.0%) not smoking while yes smoked were (48.0%) (see Table 1.2 (

The burden of T2DM in Saudi Arabia is steadily increasing due to population growth, urbanization, lack of physical activity and unhealthy diet [33]. Which is far from what was found in another study conducted on participants

with type 2 diabetes mellitus in the region where 61% of participants were vaccinated [34] . Health-related quality of life among patients with type 2 diabetes in Primary Health Care is very important used to assessment the effect of management of diabetes mellitus diseases on health, and it reflects a patient's physical and psychosocial disease burden, previous studies support results of our study [35]

A study from Ghana[36] showed more prevalence of males those with age of 30-39 years old and 1-5 years of experience. Most of in Ghana study participants showed a moderate level of knowledge not similar to our results reported. In Bahraini study, it was reported an average knowledge and awareness of students. In a Jordanian study there was dominance in male and young age participants. A study from Turkey

showed that 50% of participant were males [37]. Out of 400 patients, had completed the tool of study patients' on the for the assessment of the treatment satisfaction ranged. Our study findings are similar to a number of previous study results that showed an inadequate level of satisfaction ranged of diabetes mellitus among the respondents in Saudi Arabia [36]. Alsous et al, 2019 [37] reported that 15% of the study participants in Riyadh had inadequate satisfaction ranged of treatment, while participant toward Satisfaction study results show the majority of participant had average were (66.3%) [37]. the respondents in Dammam were found to obtain low scores regarding knowledge and attitudes toward diabetes mellitus [38]. In another survey by Al Malki et al.

[39] in our study the of the patient's with satisfaction and have a significant relation between the satisfaction and frequency while P-value <0.001 and X² 170.820, participant toward Satisfaction study results show the majority of participant had Satisfied were (74.0%) while Non satisfied were (26.0%) but total (100%). (See Table 4). A study by Al-Maskari et al. among patients with diabetes mellitus reported that age, gender, Level of education, economic level were related to diabetes mellitus Practices, and observed a higher Practices score among males than females (p < 0.001). That study also found there was a significant difference between knowledge scores of postgraduate (19.67) and undergraduate (14.74) respondent (p < 0.001) [34]. Similarly, a study showed significant associations for all demographic variables (including diabetes mellitus status) with awareness scores [29].

Another study was carried out exclusively among secondary school students in Riyadh by Al-Mutairi et al [40]. Similar our study show that is a significant relation between satisfaction and demographic data regarding age increase in <25 years year in Non satisfied were 50.% follow by 25-50 age in satisfied were (48.99) P-value=<0.001, X² 104.292. Regarding gender in our study the majority of our participants were noticed in male more than female with Non satisfied were (70.19) with no significant relation between satisfaction and gender were and P-value=0.001. X² 0.863. Regarding Level of education show that a significant relation between satisfaction and Level of education increase in Intermediate Non satisfied no significant were (60.58) and P-value=0.001 X² 27.998. Also regarding the economic level show that a significant relation between satisfaction and economic level increase in the high income

participants in no significant were (41.35) and P-value=0.001 X²

6.097. Also regarding the Smoked show that a significant relation between satisfaction and Smoked increase in smoking in no significant were (79.81%) and P-value=0.001 X² 55.258. (See Table 5)

Conclusions

Our study showed that patients. Patients with T2DM frequently reported problems with pain/discomfort and mobility. Being older, a longer duration of diabetes, insulin use, obesity, inadequate glycemic control, and diabetes-related complications were significant negative predictors of Health-related quality of life. Hence, interventions to improve Health-related quality of life should focus on achieving adequate glycemic control, promoting exercise to reduce obesity, reducing pain/discomfort, and reducing diabetes related complications. The health preference-based utility value generated in this study could be used to monitor clinical outcomes and conduct economic evaluations of different healthcare interventions in patients with T2DM.

References

1. Iverson, E., Kaler, L., Agostino, E. L., Song, D., Duncan, G. A., & Scull, M. A. (2020). Leveraging 3D model systems to understand viral interactions with the respiratory mucosa. *Viruses*, 12(12), 1425.
2. Ellingson, M. K., Dudley, M. Z., Limaye, R. J., Salmon, D. A., O'Leary, S. T., & Omer, S. B. (2019). Enhancing uptake of influenza maternal vaccine. *Expert review of vaccines*, 18(2), 191-204.
3. Mackie, S., & Darvill, A. (2016). Factors enabling implementation of integrated health and social care: a systematic review. *British journal of community nursing*, 21(2), 82-87.
4. Zheng, Y., Ley, S. H., & Hu, F. B. (2018). Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. *Nature reviews endocrinology*, 14(2), 88-98.
5. Alshayban, D., & Joseph, R. (2020). Health-related quality of life among patients with type 2 diabetes mellitus in Eastern Province, Saudi Arabia: A cross-sectional study. *PloSone*, 15(1), e0227573.
6. Alotaibi, A., Perry, L., Gholizadeh, L., & Al-Ganmi, A. (2017). Incidence and prevalence rates of diabetes mellitus in Saudi Arabia: An overview. *Journal of epidemiology and global health*, 7(4), 211-218.

7. Sheen, Y. J., Hsu, C. C., Jiang, Y. D., Huang, C. N., Liu, J. S., & Sheu, W. H. H. (2019). Trends in prevalence and incidence of diabetes mellitus from 2005 to 2014 in Taiwan. *Journal of the Formosan Medical Association, 118*, S66-S73.
8. Shams, M. R., & Epstein, T. E. (2019). Controlling Triggers for Asthma in Older Adults: Environmental Allergens, Indoor and Outdoor Air Pollutants, and Infection. In *Treatment of Asthma in Older Adults* (pp. 119-134). Springer, Cham.
9. Cho, N., Shaw, J. E., Karuranga, S., Huang, Y., da Rocha Fernandes, J. D., Ohlrogge, A. W., & Malanda, B. (2018). IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. *Diabetes research and clinical practice, 138*, 271-281.
10. Haridi, H. K., Salman, K. A., Basaif, E. A., & Al-Skaibi, D. K. (2017). Influenza vaccine uptake, determinants, motivators, and barriers of the vaccine receipt among healthcare workers in a tertiary care hospital in Saudi Arabia. *Journal of Hospital Infection, 96*(3), 268- 275.
11. East, M., & Africa, N. (2017). IDF diabetes atlas. *diabetes, 20*, 79.
12. Knight, M. J., Lyrtzis, E., & Baune, B. T. (2020). The association of cognitive deficits with mental and physical Quality of Life in Major Depressive Disorder. *Comprehensive Psychiatry, 97*, 152147.
13. Della Corte, L., Di Filippo, C., Gabrielli, O., Reppuccia, S., La Rosa, V. L., Ragusa, R., ... & Giampaolino, P. (2020). The burden of endometriosis on women's lifespan: a narrative overview on quality of life and psychosocial wellbeing. *International journal of environmental research and public health, 17*(13), 4683.
14. Zhang, L., Cai, P., & Zhu, W. (2020). Depression has an impact on disease activity and health-related quality of life in rheumatoid arthritis: a systematic review and meta- analysis. *International Journal of Rheumatic Diseases, 23*(3), 285-293.
15. Araya, L. T., Fenta, T. G., Sander, B., Gebremariam, G. T., & Gebretekla, G. B. (2020). Health-related quality of life and associated factors among cervical cancer patients at Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia. *Health and quality of life outcomes, 18*(1), 1-9.
16. Mahmoud, S. S., Mahdy, M. H. E., Mahfouz, M. S., Nada, I. S., Aqeeli, A. A., Darbi, M. A. A., & Ahmed, A. E. (2018). Effects of a psychoeducational program on hemoglobin A1c level and health-related quality of life in patients with type 2 diabetes mellitus, Jazan, Saudi Arabia. *BioMed research international, 2018*.
17. Pashaki, M. S., Eghbali, T., Niksima, S. H., Albatineh, A. N., & Gheshlagh, R. G. (2019). Health literacy among Iranian patients with type 2 diabetes: A systematic review and meta- analysis. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 13*(2), 1341-1345.
18. Almeahmad, R. M., Qadir, S. A. B., Taweel, K. M., Marouf, M. A., Algarni, A. H., & Qadah, B. M. (2018). Awareness of school teachers about diabetes Mellitus. *The Egyptian Journal of Hospital Medicine (January 2018), 70*(7), 1230-1233.
19. Mehdizadeh, M., Martinez-Martin, P., Habibi, S. A., Fereshtehnejad, S. M., Abasi, A., Niazi Khatoon, J., ... & Taghizadeh, G. (2019). Reliability and validity of Fall Efficacy Scale- International in people with Parkinson's disease during on-and off-drug phases. *Parkinson's Disease, 2019*.
20. Almogbel, E. (2020). Assessment of health-related quality of life among Saudi patients with type 2 diabetes mellitus in Qassim region—Saudi Arabia. *Age, 234*(106), 68-8.
21. Alenazi, M. A., Alenezi, S. H., Alhablani, M. N., Alanazi, M. A. M., Alenazi, W. H., AlQahtani, M. S., ... & Mahzari, Q. A. (2020). Knowledge and awareness of diabetes mellitus disease among high school students in King Abdulaziz Military City, Tabuk, Saudi Arabia. *Open Access Macedonian Journal of Medical Sciences, 8*(E), 91-97.
22. Zibran, M. A., & Mohammadnezhad, M. (2019). Determinants of knowledge, attitude and practice in patients with both type 2 diabetes and chronic kidney disease in Fiji. *F1000Research, 8*.
23. Sami, W., Ansari, T., Butt, N. S., & Ab Hamid, M. R. (2017). Effect of diet on type 2 diabetes mellitus: A review. *International journal of health sciences, 11*(2), 65.
24. Sagor, K. H., & AlAteeq, M. A. (2018). Beliefs, attitudes and barriers associated with the uptake of the seasonal influenza vaccine among patients visiting primary healthcare clinics. *Saudi medical journal, 39*(7), 690.
25. Alnaheelah, I. M., Awadalla, N. J., Al-Musa, K. M., Alsabaani, A. A., & Mahfouz, A. A. (2018). Influenza vaccination in type 2

- diabetes patients: coverage status and its determinants in southwestern Saudi Arabia. *International Journal of Environmental Research and Public Health*, 15(7), 1381.
26. Al Busaidi, N., Shanmugam, P., & Manoharan, D. (2019). Diabetes in the Middle East: government health care policies and strategies that address the growing diabetes prevalence in the Middle East. *Current diabetes reports*, 19(2), 1-10.
 27. Al-Saedi, A. H. S., Alghamdi, Y. I., Qurashi, B. H. A., Alharbi, R. A., Algiyari, G. M. G., Al-Qarni, S. M. S., ... & Albotthi, W. I. (2019). Cross-Sectional Study about Assessment of the Diabetes Mellitus Awareness and Knowledge among Diabetic Type 2 in Secondary School Students in Makkah at Saudi Arabia. *Annals of the Romanian Society for Cell Biology*, 57-78.
 28. Baatiah, N. Y., Alhazmi, R. B., Albathi, F. A., Albogami, E. G., Mohammedkhalil, A. K., & Alsaywid, B. S. (2020). Urolithiasis: Prevalence, risk factors, and public awareness regarding dietary and lifestyle habits in Jeddah, Saudi Arabia in 2017. *Urology annals*, 12(1), 57.
 29. Murad, M. A., Abdulmageed, S. S., Iftikhar, R., & Sagga, B. K. (2014). Assessment of the common risk factors associated with type 2 diabetes mellitus in Jeddah. *International journal of endocrinology*, 2014
 30. Alfadhli, E. M., Osman, E. N., Basri, T. H., Mansuri, N. S., Youssef, M. H., Assaaedi, S. A., & Aljohani, B. A. (2015). Gestational diabetes among Saudi women: prevalence, risk factors and pregnancy outcomes. *Annals of Saudi medicine*, 35(3), 222-230.
 31. Gazzaz, Z. J. (2020). Knowledge, attitudes, and practices regarding diabetes mellitus among university students in Jeddah, Saudi Arabia. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, 13, 5071.
 32. Al Hayek, A. A., Robert, A. A., Al Saeed, A., Alzaid, A. A., & Al Sabaan, F. S. (2014). Factors associated with health-related quality of life among Saudi patients with type 2 diabetes mellitus: a cross-sectional survey. *Diabetes & metabolism journal*, 38(3), 220-229.
 33. Alshayban, D., & Joseph, R. (2020). Health-related quality of life among patients with type 2 diabetes mellitus in Eastern Province, Saudi Arabia: A cross-sectional study. *PloSone*, 15(1), e0227573.
 34. Alnaheelah, I. M., Awadalla, N. J., Al-Musa, K. M., Alsabaani, A. A., & Mahfouz, A. A. (2018). Influenza vaccination in type 2 diabetes patients: coverage status and its determinants in southwestern Saudi Arabia. *International Journal of Environmental Research and Public Health*, 15(7), 1381.
 35. Chew, B. H., Mohd-Sidik, S., & Shariff-Ghazali, S. (2015). Negative effects of diabetes-related distress on health-related quality of life: an evaluation among the adult patients with type 2 diabetes mellitus in three primary healthcare clinics in Malaysia. *Health and quality of life outcomes*, 13(1), 1-16.
 36. Amissah, I., Barnes, N. A., Craymah, J. P., & Eliason, S. (2017). Knowledge of diabetes mellitus and management practices among senior high school teachers in Ghana. *International Journal of Science and Research*, 6(1), 1090-1095.
 37. Alsous, M., Abdel Jalil, M., Odeh, M., Al Kurdi, R., & Alnan, M. (2019). Public knowledge, attitudes and practices toward diabetes mellitus: a cross-sectional study from Jordan. *PloS one*, 14(3), e0214479.
 38. Haridi, H. K., Salman, K. A., Basaif, E. A., & Al-Skaibi, D. K. (2017). Influenza vaccine uptake, determinants, motivators, and barriers of the vaccine receipt among healthcare workers in a tertiary care hospital in Saudi Arabia. *Journal of Hospital Infection*, 96(3), 268-275.
 39. Almalki, T. M., Almalki, N. R., Balbaid, K., & Alswat, K. (2018). Assessment of diabetes knowledge using the Michigan brief diabetes knowledge test among patients with type 2 diabetes mellitus. *Journal of Endocrinology and Metabolism*, 7(6), 185-189.
 40. Al-Mutairi, R. L., Bawazir, A. A., Ahmed, A. E., & Jradi, H. (2015). Health beliefs related to diabetes mellitus prevention among adolescents in Saudi Arabia. *Sultan Qaboos University Medical Journal*, 15(3), e398.