ORIGINAL ARTICLE

Quality of life and its associated factors of Type-2 Diabetes Mellitus patients attending tertiary care hospital, Yavatmal, Central India: A hospital-based cross-sectional study

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ABSTRACT

Background: Type-2 diabetes mellitus (T2DM) is a long-term, incurable disease affecting negatively on quality of life (QoL). **Aim & Objectives:** To assess the Quality of life of Type-2 Diabetes Mellitus patients attending tertiary care hospital and its associated factors. **Methodology**: This cross-sectional study was carried out from Dec 2022 to Feb 2023 among 297 T2DM patients attending tertiary care hospital. The data was collected by first author using a 26-item WHOQoL-BREF questionnaire. The Institutional Ethics Committee approved the study. Statistical analysis was done using JASP version 0.18.3 for mean, standard deviation, t-test, ANOVA test, and multiple linear regression (MLR). **Results**: Mean age of participants was 55.18±11.09 years. Out of total, 57.9% were males, 85.5% of participants were satisfied with their QoL. The mean score of WHOQoL-BREF domains was highest for social relationships (58.78±15.49), while lowest for physical domain (51.83±12.31). The individual perception of overall QoL and health scored 59.59±19.39 and 55.38±18.73 respectively. ANOVA test showed statistical significance between education & socio-economic status with all domains of QoL ($P<0.05$). MLR reported that socio-economic class II was independently correlated with all domains of QoL. **Conclusion**: Overall QoL was above average. Education and socioeconomic status of the participants were significantly associated with QoL.

KEYWORDS

Cross-Sectional Study; Quality of Life; Type 2 Diabetes Mellitus; WHOQoL-BREF; Yavatmal

INTRODUCTION

India represents the largest number of diabetes cases and entitled as 'Diabetes Capital' of the world(1). International Diabetes Federation (IDF) 2023 data states, that currently there are 540 million cases of diabetes in the world which are estimated to increase to 640 million till 2030(2). Study of the Indian Council of Medical Research-India Diabetes (ICMR INDIAB) in 2023 has stated the current cases of diabetes in India is 101 million with a prevalence of 9.6% which can rise to 10.4% in 2030 and 10.8% in 2045(2,3). In Maharashtra, the prevalence of diabetes is 8.4% and pre-diabetes is 12.8%(4).

Type 2 Diabetes Mellitus (T2DM) is a chronic condition that demands prevention of complications and improving the quality of life (QoL) of patients along with blood sugar level management(5). T2DM patients need to undergo many lifestyle changes which can pose challenges(6). Because of that so many individuals feel overwhelmed and hence the life experiences can be termed as 'Diabetes Overwhelmus'(7).

According to WHO, the person's view of their place in life within the culture and value system in which they live, as well as their objectives, standards, expectations, and concerns, is referred to as their QoL(8). QoL is a crucial performance indicator for

managing chronic illnesses(9). Several studies have shown its significant association with factors such as the age, sex, educational level, occupation, marital status, socioeconomic status, residence, physical activity, body mass index, duration, type of treatment, and presence of diabetes-related complications(1,5,7,10-14).

As per our knowledge, no study has been conducted regarding QoL of T2DM patients particularly in Yavatmal city. So, the current study was planned with following objectives.

Aim & Objectives(s):

1. To assess the Quality of life of Type-2 Diabetes Mellitus patients attending tertiary care hospital.
2. To assess the factors affecting the Quality of life of Type-2 Diabetes Mellitus patients attending tertiary care hospital.

MATERIAL & METHODS

Study type & study design: Cross-sectional study.

Study setting: Outpatient department (OPD) of a tertiary care hospital, Yavatmal.

Study population: Type 2 Diabetes Mellitus patients

Study duration: From December 2022 to February 2023.

Sample size calculation: Using OpenEpi software (version 3.0) and taking reference of the recently published study by Pattankar T et al(6) using the mean ± standard deviation of the environmental domain of QoL (50.0±8.80). The total sample size was 297.

Inclusion criteria: Diagnosed cases of T2DM more than or equal to one year. Above 18 years of age.

Exclusion criteria: Patients having severe complications such as cardiovascular, renal, neurological diseases or diabetic foot ulcers, pregnant women, and patients with gestational diabetes mellitus.

Strategy for data collection: The data was collected using the WHOQoL-BREF questionnaire (English+Marathi version)(8) to assess QoL. It contains a total of 26 questions, 2 questions related to the perception of overall QoL and general health of the participant, and 24 questions are further divided into four domains i.e. physical, psychological, social, and environmental. The physical domain includes questions related to pain, energy, sleep, work, and activities. Questions on the psychological domain include positive feelings, negative feelings, and body image. The social domain includes questions on personal relationships and support. The environmental domain includes home and work environment and satisfaction regarding facilities such as transport, health, living, and financial arrangements(15). The responses from the participants were noted on the 5-point Likert scale scoring from 1 to 5. We have assessed various sociodemographic factors that affect the QoL of T2DM patients such as age of the patient, sex, residence, marital status, religion, education, occupation, type of family, and socioeconomic status according to Modified Kuppuswamy socioeconomic classification(16). History of diabetes and duration was noted.

Ethical issues & informed consent: This study was approved by the Institutional Ethics Committee (o/w no. 204/2022). Prior to data collection an informed consent was obtained from each participant. Complete confidentiality of the data was maintained.

Data analysis – software: The data was collected by first author with face-to-face interviews using cluster sampling during OPD hours and tabulated in Microsoft Excel. The data was analyzed by using statistical software JASP(17) version 0.18.3 for frequency, mean, standard deviation, percentages, t-test, ANOVA test, and multiple linear regression. The P-value was considered significant if it was less than 0.05. The reliability of WHOQoL-BREF domains was evaluated using Cronbach's Alpha, the value being acceptable ≥ 0.7.

Scoring of the WHOQoL-BREF

Taking the reference of the WHOQoL-BREF Field Trial Version(15), it is possible to derive four domain scores. The first two questions were examined separately i.e. question 1 is about an individual's overall perception of their QoL and question 2 is about an individual's overall perception of their health. The four domain scores denote an individual's perception of quality of life in each particular domain. An individual's Domain scores were scaled in a positive direction (i.e. highest score denotes a higher quality of life). The domain score was calculated by taking the mean score of the items within each domain. Mean scores were multiplied by 4 to make domain scores comparable with the scores used in the WHOQoL-100. It converts raw scores into transformed scores. Individuals having a total mean score of 50% or above were considered as having high QoL, whereas those scoring less than 50% as having lower QoL.

RESULTS

A total of 297 participants with T2DM were included in the study. The mean age of the study participants was 55.18±11.09 years (Range 30-90 years). In this study majority of the study population were males 172(57.9%). About 88.9% of the study population were living with a spouse. Among the study population 83.5% belonged to the Hindu religion, and the remaining belonged to

Buddhist and Muslim 9.8%, and 6.7% respectively. Most of the study participants 85.2% were literate. The 61.3% of participants were employed, 61.6% had nuclear families and 41.1% belonged to the Upper Middle (class II) of the Modified Kuppuswamy socioeconomic classification (Table 1).

Table 1: Frequency distribution of socio-demographic characters.

Variables	Frequency (n=297)	Percentage (100%)
Age groups(years)		
≤50	108	36.4
51-70	176	59.3
71-90	13	4.4
Sex		
Male	172	57.9
Female	125	42.1
Residence		
Urban	159	53.5
Rural	138	46.5
Marital status		
Living with spouse	264	88.9
Living without spouse	33	11.1
Religion		
Hindu	248	83.5
Muslim	20	6.7
Buddhist	29	9.8
Education		
Literate	253	85.2
Illiterate	44	14.8
Occupation		
Employed	182	61.3
Unemployed	115	38.7
Type of family		
Nuclear	183	61.6
Joint	114	38.4
Socioeconomic class		
Upper - I	5	1.7
Upper Middle - II	122	41.1
Lower Middle - III	93	31.3
Upper Lower - IV	72	24.2
Lower - V	5	1.7

In the WHOQQoL-BREF questionnaire, the first two questions are related to the perception of overall QoL and general health of the participants. The mean scores for these questions were 59.59±19.39 and 55.38±18.73 respectively. For the first question, 85.52% of participants rated as having higher overall QoL and 14.47% as having lower QoL. Regarding satisfaction with general health, 81.14% of participants were satisfied and the remaining 18.85% of participants were dissatisfied with their health.

Scores of the four QoL domains (at a scale of 100) were compared with different sociodemographic characteristics of the participants. Among the age category of the study participants, QoL scores were found to be statistically significant in physical (P=0.010) and psychological (P=0.010) domains and the scores were significantly lower for the age group 71-90 years in the psychological domain as compared to other age groups. Approximately similar distribution of scores was observed between male and female participants. All domain scores were similar for the residence of the participants. It was found that residence was significantly associated with psychological (P=0.011), social relationship (P=0.008), and environmental (P=0.028) domains of QoL. All domain scores were low in illiterate participants as compared to literate ones. It showed a statistically significant association of QoL with a graded increase in the educational level of participants i.e. physical domain (P= 0.030), psychological domain (P= 0.005), social relationship domain (P= 0.032), and environmental domain (P= 0.041). Unemployed participants had significantly lower QoL scores in all domains except in the

environmental domain as compared to participants engaged in some kind of employment. QoL in occupation showed a significant association with the physical domain (P= 0.007), psychological domain (P=0.023), and social relationship domain (P=0.012). Study participants living in a nuclear family had better QoL as compared to those living in a joint family and this shows a statistically significant association with the physical domain (P=0.021). Regarding the socioeconomic status of the study participants, almost all domain scores were high and showed statistically significant association with QoL i.e. physical domain (P<0.001), psychological domain (P<0.001), social relationship domain (P=0.001), and environmental domain (P=0.001). It was observed that the QoL of study participants increases in association with their socioeconomic status (Table 2).

Table 2: Four Quality of Life Domain scores across different characteristics of participants.

Variables	Physical domain	Psychological domain	Social domain	Environmental domain
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Age groups(years)				
<50	54.43±11.01	54.93±11.46	61.11±14.54	57.34±12.76
51-70	50.66±12.75	53.10±13.19	57.52±15.95	56.74±14.30
71-90	46.15±12.99	43.58±15.17	56.41±15.64	51.68±13.95
	(P=0.010)	(P=0.010)	(P=0.142)	(P=0.375)
Sex				
Male	52.40±12.38	54.43±13.23	59.78±16.08	57.32±13.71
Female	51.05±12.21	51.86±12.17	57.40±14.59	55.95±13.81
	(P=0.351)	(P=0.089)	(P=0.190)	(P=0.397)
Residence				
Urban	53.05±11.96	55.11±12.92	61.00±15.32	58.37±14.27
Rural	50.44±12.59	51.32±12.49	56.21±15.33	54.86±12.91
	(P=0.068)	(P=0.011)	(P=0.008)	(P=0.028)
Marital status				
Living with spouse	52.12±12.41	53.86±12.53	59.15±1569	57.09±13.76
Living without spouse	49.56±11.35	49.24±14.63	55.80±13.57	53.97±13.53
	(P=0.261)	(P=0.051)	(P=0.243)	(P=0.221)
Religion				
Hindu	51.64±12.44	53.17±12.65	58.63±15.50	56.85±13.88
Muslim	52.14±11.37	52.50±16.13	58.75±17.41	55.62±13.54
Buddhist	53.32±12.07	55.45±12.25	60.05±14.49	56.57±13.10
	(P=0.781)	(P=0.634)	(P=0.897)	(P=0.927)
Education				
Literate	52.48±12.28	54.21±12.21	59.58±14.90	57.42±13.68
Illiterate	48.13±11.91	48.39±15.22	54.16±18.01	52.84±13.64
	(P=0.030)	(P=0.005)	(P=0.032)	(P=0.041)
Occupation				
Employed	53.37±11.87	54.69±12.91	60.57±15.17	57.36±13.44
Unemployed	49.40±12.64	51.23±12.49	55.94±15.63	55.76±14.22
	(P=0.007)	(P=0.023)	(P=0.012)	(P=0.328)
Type of family				
Nuclear	53.14±11.83	54.18±12.00	58.28±14.94	57.06±13.36
Joint	49.74±12.81	52.01±14.03	59.57±16.37	56.22±14.38
	(P=0.021)	(P=0.155)	(P=0.487)	(P=0.606)
Socioeconomic class				
Upper - I	60.71±11.00	61.66±6.18	66.66±24.29	63.75±9.52
Upper Middle - II	55.26±11.25	56.83±12.58	62.63±13.56	60.34±13.21
Lower Middle - III	48.46±11.40	49.77±11.74	54.21±16.00	52.82±12.51
Upper Lower - IV	49.85±13.88	51.85±13.17	57.87±15.81	55.33±14.97
Lower - V	50.71±7.31	48.33±17.33	55.00±15.13	55.00±1336
	(P<0.001)	(P<0.001)	(P=0.001)	(P=0.001)

In the evaluation of QoL of the study participants with T2DM, it was observed that the WHOQoL-BREF domains with the highest score were social relationship (58.78±15.49) followed by environmental (56.74±13.75) and psychological (53.35±12.84), while the lowest scoring domain was physical (51.83±12.31). Also, we applied Cronbach's Alpha reliability to evaluate the internal consistency of the WHOQoL-BREF questionnaire and the four domains of it and the results revealed that the psychological domain (α=0.72) and environmental domain (α=0.81) were found reliable. Among the total study participants, 178 (59.93%), 182 (61.27%), 242 (81.48%), and 216 (72.72%) recorded high QoL scores (≥50) in physical, psychological, social relationship, and environmental domains respectively. This shows that the overall QoL of the study participant is better and above 50% (Table 3).

Table 3: Cronbach's reliability measures of WHOQoL-BREF domains.

QoL Domains	M ± SD	Min. /Max.	Cronbach's Alpha	No of participants (QoL Score)	
				High (≥50)	Low (<50)
Physical	51.83±12.31	10.71/92.86	0.68	178(59.93%)	119(40.04%)
Psychological	53.35±12.84	20.83/100.00	0.72	182(61.27%)	115(38.72%)
Social Relationship	58.78±15.49	8.33/100.00	0.65	242(81.48%)	55(18.51%)
Environmental	56.74±13.75	15.62/93.75	0.81	216(72.72%)	81(27.27%)

The Multiple Linear Regression (MLR) model was used to investigate the relation between QoL domains and the socio-demographic characteristics of participants. The dependent variables were the physical domain, psychological domain, social relationship domain, and environmental domain. The independent variables were age, sex (male-1 and female-0), residence (urban-1 and rural-0), marital status (living with spouse-1 and living without spouse-0), religion (Hindu, Buddhist and Muslim-2 dummy variables created), family type (nuclear-1 and joint-0), education (literate-1 and illiterate-0), occupation (employed-1 and unemployed-0) and socioeconomic status (SES) class (I, II, III, IV and V-4 dummy variables created). The dependent variable should be measured as a continuous variable i.e. physical domain in scores (Mean±SD) and the independent variables should be measured as a categorical variable, so the coding is created. Stepwise method was used. We prepared four models of MLR for each domain of QoL. The results showed that socioeconomic class II of the study participants was independently associated with all four domains of QoL (Table 4).

Table 4: Multiple linear regression for all four domains of QoL.

QoL Domains	Beta	t value	P-value	95% Confidence Interval	
				Upper Bound	Lower Bound
Physical					
II class SES	0.20	3.50	0.001	2.224	7.916
IV class SES	Ref.				
Age	-0.128	-2.207	0.28	-5.377	-0.308
Psychological					
II class SES	0.212	3.733	<0.05	2.612	8.436
V class SES	Ref.			3	
Residence					
Urban	0.12	2.146	0.033	0.260	6.005
Rural	Ref.				
Social Relationship					
II class SES	0.192	3.379	0.001	2.526	9.572
V class SES	Ref.				
Residence					
Urban	0.131	2.308	0.22	0.600	7.55
Environmental					
II class SES	0.219	3.859	<0.05	2.997	9.236
V class SES	Ref.				

DISCUSSION

The current study was conducted to assess the QoL and its associated factors among 297 T2DM patients at tertiary care hospitals. We found the total mean score of QoL as 55.17±13.59. In the study carried out by Mani C and Kumar L(18), it was observed that the total mean score of QoL as 58.3±17.4. Another study carried out by Manjunath K et al(13) showed similar findings i.e. 58.03±18.29. These findings were similar to our study because the previous studies were conducted among the same population and study setting as compared to our study, and the study tools used in these studies were similar to our study.

In the present study among all the four domains of the WHOQoL-BREF questionnaire, the highest score was found in the social relationship domain 58.78±15.49, which shows that the study participants had relatively more satisfaction in their personal relationships and sexual life along with social support. A study carried out by Gholami A et al(10)found the highest score for the social relationship domain with a mean of 12.66±2.94. These findings were similar to the current study because in both studies the factors influencing social domains i.e. marital status, and education level had a similar distribution. Another study carried out by Puspasari S and Farera D(19) observed that the social relationship domain has the highest score among T2DM patients than the other three WHOQoL-BREF domains. In contrast to the present study findings, Pattankar T and Patil S(6) observed that in their study physical domain had the highest score (50.5±11.5) and the lowest score for the social relationship domain (45.8±16.1). The reason for these contrasting findings might be the difference in the study settings in which they were carried out.

We found out that the lowest score was present in the physical domain of QoL with a mean score of 51.83±12.31, indicating difficulty in activities of daily living, more dependence on medicinal support and medical aids, reduced energy and early fatigue, mobility pain and discomfort in sleep and rest work capacity. In a study carried out by Kumar P et al(20), they observed that the physical domain (58.84±18.43) of QoL among diabetics was significantly affected and showed the lowest score and the social relationship domain (63.20±20.89) had the highest score. These findings were similar to the present study because both the studies were hospital-based studies carried out using the same study tool i.e. WHOQoL-BREF questionnaire, also the mean age of the study participants was similar in both studies which significantly affects the physical domain. Similar findings were present in the studies carried out by Latif F et al(21) and Yeole U et al(7), where they observed a minimum score in the physical domain of QoL. This could be due to, there is a higher rate of complications that can limit the physical functions i.e. vision difficulty, peripheral neuropathy, and other comorbidities, which negatively affects the QoL of T2DM patients.

In our study, age of the study participants was found to be significantly associated with physical and psychological domains of QoL. Similar findings were present in the study carried out by Gholami A et al(10) where they found that age was associated with the physical and psychological domains of QoL, Puspasari S and Farera D(19) also found that age was associated with the physical domain only. As the increase in age is related to a decrease in body functions, also age is closely related to impaired glucose tolerance which negatively affects physical functions and QoL.

In the present study, the residence of the participants was found to be significantly associated with the psychological, social, and environmental domains of QoL, and participants living in urban areas had higher scores of QoL. Because the people living in urban areas had a better quality of living and early as well as better access to medical facilities. The study carried out by Abedini M et al(11) among T2DM patients using the EQ-5D-5L scale found a significant association of residence with self-care, usual activities, and anxiety/depression variables. On the contrary, the studies conducted by John R et al(12) and Raghav S et al(5) did not find an association between residence and domains of QoL.

In our study, it was found that marital status was significantly associated with the psychological domain of QoL and the participants living with a spouse showed better QoL. Similar findings were present in the study carried out by Gautam Y et al(1), Manjunath K et al(13), Mani C and Kumar L(18). Marital status was significantly associated with all four domains of QoL in the study carried out by Gholami A et al(10). On the contrary, a study carried out by Raghav S et al(5) observed no significant association between marital status and QoL. Married participants get more psychological support from their spouse to deal with the disease as well as its management.

In our study, educational level was found to be significantly associated with all four domains of QoL, literate participants showed better QoL. Similar findings were present in the studies carried out by Gholami A et al(10), Amin M et al(14), Gautam Y et al(1), and John R et al(12). Well educated diabetic patients have higher self-esteem and are more knowledgeable about the condition as well as the management of the disease which helps them to improve their QoL.

We found that the occupation of the participants was significantly associated with all the domains of QoL except the environmental domain. The earning individuals had better QoL. Similar findings were present in the study carried out by Amin M et al(14) where they found a significant association between employment and monthly income of participants with the QoL. Employed individuals can spend as well as access treatment resources as compared to unemployed individuals who have to depend on others which can negatively affect their QoL.

In our study, we observed that the type of family of participants showed a significant association with the physical domain of QoL, and participants living in nuclear families showed better QoL. In contrast, the study carried out by Pandey S et al(9) observed no significant association between the type of family and QoL. The type of family influences the QoL of diabetic patients as in nuclear families there are fewer members in the family so better living conditions are present.

In the present study, we have found that the socioeconomic class of study participants was significantly associated with all four domains of QoL. Similar findings were present in the study carried out by Mani C and Kumar L(18), it showed that lower socioeconomic status was significantly associated with poor QoL. Another study carried out by Manjunath K et al(13) concluded that those belonging to lower socioeconomic status have a higher risk of poor QoL. In contrast to our findings, a study conducted by Raghav S et al(5)observed that there is no significant association between socioeconomic status and QoL of study participants. Lower socioeconomic status is associated with lower QoL as the management of diabetes and its complications can impose an economic burden on the lower socioeconomic class.

In the current study, after using multiple linear regression (as shown in Table 4) it was observed that socioeconomic class II was independently associated with all four domains of the WHOQoL-BREF questionnaire (P <0.001). Similar findings were present in the study of Gholami A et al(10) where they found that monthly household income was significantly associated with all four domains of QoL. Another study carried out by Pandey S(9) et al showed similar findings and observed that socioeconomic status was significantly associated with the environmental domain of QoL using backward multiple linear regression.

The study concludes that, the overall QoL among T2DM patients was above average. The education and socioeconomic status of the study participants were significantly associated with all the four domains of QoL. The WHOQoL-BREF domain with highest score was social relationships which shows that patients having stronger social support tend to report higher QoL, whereas the lowest scoring was physical domain. Socioeconomic class II of the study participants was independently associated with all four domains of QoL.

The study contributes understanding of QoL among T2DM patients, highlighting education and socioeconomic status as key determinants and emphasizing the need for interventions addressing the physical and psychological domains of QoL in this population.

The study's generalizability might be limited to tertiary care patients. The study did not include detailed information on the severity of diabetes, which could influence QoL. However, addressing the identified limitations in future research would further strengthen the findings and their generalizability.

RECOMMENDATION

The assessment of QoL of patients should be made as a part of diabetes treatment modality. This study helps policymakers to consider the QoL of patients while planning a health program. Improving literacy will improve the quality of life for T2DM patients. Patients will benefit from health education and increased understanding about the disease in terms of lifestyle adjustment, treatment compliance, blood sugar monitoring, and early detection of complications. Socioeconomic status of the participants can be improved by providing patient specific job opportunities which will help in increasing the QoL of patients

AUTHORS CONTRIBUTION

RAA: Concepts, design, definition of intellectual concepts, literature search, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript editing, manuscript review, guarantor. **DVK:** Concepts, design, definition of intellectual concepts, literature search, data analysis, statistical analysis, manuscript preparation, manuscript editing, manuscript review. **KPM:** Design, definition of intellectual concepts, literature search, data analysis, manuscript preparation, manuscript editing, manuscript review. **TSS:** Design, definition of intellectual concepts, literature search, data analysis, manuscript preparation, manuscript editing, manuscript review.

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CONFLICT OF INTEREST

There are no conflicts of interest.

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DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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