Quality of Life and its Determinants in Patients with Diabetes Mellitus from Two Health Institutions of Sub-himalayan Region of India

Jyoti Gupta, Dheeraj Kapoor[1], Vivek Sood[1]

Department of Psychiatry, All India Institute of Medical Sciences, Bilaspur, Himachal Pradesh, [1]Department of Medicine, Dr. Rajendra Prasad Government Medical College, Himachal Pradesh, India

Abstract

Background: Diabetes mellitus (DM) causes serious deterioration in general quality of life (QoL) mainly affecting the health-related quality of life (HRQOL). Routine assessment of QoL improves communication with the patient, helps to predict treatment response, and supports clinical decision-making. QoL can predict an individual's capacity to manage the disease and maintain long-term health and wellbeing. **Aims:** To find out the QoL and its socio-demographic, anthropometric, and clinical determinants among DM patients attending health institutions from sub-Himalayan region, catering rural population. **Settings and Design:** This cross-sectional study was conducted in two hospitals mostly catering rural population from 2014 to 2018. Purposive sampling technique was used. **Materials and Methods:** Socio-demographic, anthropometric, and clinical data of DM patients (N = 300) were collected. They were administeredHindi translation of QoL Instrument for Indian Diabetes Patients (QOLID) and Patient Health Questionnaire-9 (PHQ-9). All statistical analyses were carried out using Statistical Package for Social Sciences (SSPS) (Version 17.0, USA). **Results:** About 10% had very poor, 13% poor, 11% average, 16% good, and 50% very good QoL on QOLID. General health (GH) and treatment satisfaction (TS) were the most affected domains. Fatigue was the most common symptom (79%) reported in QOLID. Age more than 55 years, rural background, and PHQ-9 score of more than 7 were predictors of poorer QoL. **Conclusion:** There is a need for a holistic and collaborative care of DM patients, to maintain a good HRQoL. Screening of depression, fatigue, and regular assessment of QoL should be emphasized.

Keywords: Diabetes mellitus, QOLID, Quality of life

BACKGROUND

Noncommunicable diseases, like diabetes mellitus (DM), are one of the most important public health problems worldwide.[1] In 2019, according to the International Diabetes Federation (IDF), 463 million people had diabetes in the world[2] of which 77 million belong to India.[3]

Patients with DM have to undergo lifestyle adjustments such as timing and type of food, regular exercise, daily medications, blood glucose monitoring etc., this places unique demands on individual as well as on the family,[4] which affects their QoL. The QoL has been recognized as an important health outcome, representing the ultimate goal of health for all interventions[5]

The WHO defines QoL as "an individual's perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards, and concerns."[6] DM causes serious deterioration in general QoL mainly affecting the HRQOL,[7]; especially in the presence of complications.[8] The recent guidelines from the American Diabetes Association emphasize the need for "patientcentered" approach to the management of type-2 DM patients in terms of QoL, prevention of diabetic complications, and achievement of glycemic targets.[9]

Address for correspondence: Dr. Jyoti Gupta, Assistant Professor, Department of Psychiatry, All India Institute of Medical Sciences, Bilaspur, Himachal Pradesh, India. Email: drjyotigupta2017@gmail.com

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Routine assessment of QoL has the potential to improve communication with the patient and identify frequently overlooked problems.[10] The studies on QoL can help a clinician's ability to predict treatment response, comparing the impact of different treatment regimens on a patient's wellbeing and satisfaction, taking both biomedical and psychosocial aspects into consideration.[10] Also, QoL is a powerful tool to predict an individual's capacity to manage the disease.[10] Improved health-related quality of life (HRQOL) may lead to fewer hospital visits and hospitalizations and hence reduce health care costs.[11]

There are various factors affecting QoL negatively or positively in DM management.[12] Age, gender, marital status, rural lifestyle, family type, occupation, retirement, low socio-economic status, lower educational status; adherence to proper glycemic management and strictly advised diet, exercise routine; type of DM, use of insulin, microvascular and macrovascular complications, longer duration of illness, comorbidities, blood glucose level, glycated hemoglobin (HbA1C), and type of treatment[13,14] have been found to be independent risk factors for poor QoL. Body mass index (BMI),[15] presence of depression[7,16-26] and other psychological factors, ethnicity, knowledge about the disease, type of assistance which they received from others may interfere in the QoL for the patients.[15]

The ICMR- INDIAB study has shown that there is a maximum prevalence of type-2 DM in North Indian center among the studied four centers. Also, there is a steep urban-rural gradient as regards to awareness about DM in northern India as compared to the Southern part. Many myths and superstitions about DM hinder treatment-seeking and practicing a healthy lifestyle in rural north India. Also, because of the urban concentration of health facilities, people in rural areas seek treatment from quacks and unqualified personnel.[27] All these factors may hinder QoL in these patients, thus making an assessment of QoL important in rural north Indian settings. However, such data is limited. So, this study was conducted to find out the QoL and its socio-demographic, anthropometric, and clinical determinants among DM patients attending health institutions from sub-Himalayan region, catering to the rural population, so that a holistic and individualized care can be provided to them.

MATERIAL AND METHODS

This was a cross-sectional study conducted from 2014 to 2018 after taking approval from Institute's Ethics Committee. Patients were enrolled from the diabetic clinic (n = 217) and medicine department (OPD and IPD; n = 83) from two health centers of Northern India respectively, using a purposive sampling technique. The data collected during the study by the authors[28] was further analyzed to find out the determinants of QoL in patients with DM. As a part of the aforesaid study, patients fulfilling the American diabetes association (ADA), 2014 criteria for diagnosis of DM and capable of independent communication were recruited after an informed consent [n = 300]. Those patients with any other diagnosed comorbid chronic severe physical illnesses (except hypertension and macro and microvascular complications of DM) or individuals under treatment for psychiatric illness and substance dependence (except tobacco) were excluded from the study. All information of the patients was recorded in an ethically approved predesigned proforma. The patient's demographic profile and anthropometric variables [i.e. height, body weight, waist circumference, and body mass index (BMI) (kg/m^2)] were assessed. Latest laboratory investigation reports related to DM i.e. HbA1c (within last 1 month) or fasting blood sugar (FBS) within the past 1 week (if HbA1c not available or done) were reviewed, and brief clinical history as per variables included in the proforma was taken (duration of diabetes, family history, current diabetic treatment, number of pills or injections, complications/comorbidities, blood pressure, the monthly cost of treatment, whether taking medicine from the hospital, tobacco use, etc.)

A 34-item scale Quality of Life Instrument for Indian Diabetes Patients (QOLID) developed and validated by Nagpal *et al.*[29] was used to assess QoL of the patients. It is a sensitive tool for the assessment of health-related and diabetes-specific QoL in patients with type -2 DM in India. It consists of eight domains covering all aspects of QoL, namely, role limitations due to physical health (RL) physical endurance (PE), general health (GH), treatment satisfaction (TS), symptom botherness (SB), financial worries (FW), mental and emotional health (EMH), and diet advice tolerance (DAT). It uses a standard Likert scale across all questions. It was translated in Hindi to be used in the study.

For the assessment of depression, Hindi version of Patient Health Questionnaire-9 (PHQ-9)[30] was used. A PHQ-9 score of more than 7 with one of the two cardinal symptoms (either depressed mood or anhedonia) was defined as clinical depression. Both these questionnaires were administered by the author.

Socio-demographic and clinical data were reported as the mean ± SD/median or percentages. Differences in characteristics between variables were found using independent sample *t*-test for continuous variables and Chi-square test for categorical variables. Bivariate correlations with QoL total and domain-wise scores was analyzed using Pearson's product-moment correlation. Binary logistic regression was used for multivariate analysis, where a median of the total score of QoL was used as cutoff for recoding as a dichotomous variable and entered as a dependent variable. Various socio-demographic and clinical variables were entered as independent variables after dichotomous coding. All statistical analyses were carried out using Statistical Package for Social Sciences (SSPS) (Version 17.0, USA).

RESULTS

A total of 216 (72%) patients were hailing from a rural area. The mean age of patients in years was 55.52 ± 9.94. Overall, the mean education of the patients was 9.09 ± 4.84 years (Median 10 years). Males were more educated (11.28 ± 4.05 years) than females (7.61 ± 4.77 years), ($\chi^2 = 68$; $P < 0.001$). The mean duration of diabetes was 8.02 ± 6.72 years (median 6). The mean monthly cost of the treatment was 1266.12 ± 1000 INR (Median 1000 INR). Most patients i.e. 213 (71%), were on oral hypoglycemic agents (OHA), 59 (19.7%) were on only insulin, 5 (1.6%) on both insulin and OHA, and 13 (4.3%) were using lifestyle modification for diabetic control. Comorbid hypertension was found in 43% of the patients. A positive family history of DM was given by 37% of the patients. The mean PHQ-9 score was 5.22 ± 6.16 (Median 3). The scores were higher (t = 3.85, $P < 0.001$) in females (6.32 ± 6.31) than in males (3.60 ± 5.56).

More females (12.8%vs 6.6% males) were poorly compliant to the treatment ($P < .001$). Abdominal obesity (waist circumference >90 cm in males and >80 cm in females) was present in 74.7% of the females and 54.5% males, the difference was statistically significant at $P < 0.001$. Rates of depression (PHQ-9 > 7) were higher in females (32.9%, females a 14.8% males; $P < .05$).

Table 1, shows a difference in domain-wise and total QOLID score, between males and females.

Table 2, show the frequency of responses to questions asked under individual domains of QOLID. An average of responses of all the domains was added to find out the average of total QoL on the Likert scale, which were reported as very poor, poor, average, good, and very good. About 10% had very poor, 13% had poor, 11% had average, 16% had good, and 50% had very good QoL on QOLID.

In the RL domain, the most affected was the work efficiency (more than 50%) In the PE domain, around 75% of the patients reported at least some decrease in endurance for vigorous activities; the least affected was endurance for activities of daily living. GH and TS were the most affected domains. In around 79%, fatigue was reported sometimes to always. Fatigue was the most common symptom reported on PHQ-9 (75%). In addition to all patients with PHQ-9 > 7, 66.4% of those without depression also reported fatigue.

Around ¾ th of the patients were having no or least SB, dry mouth, hunger, and frequent urination at the time of assessment. A total of 42% of the patients had very much, much, or some FW. On an average, more than 2/3rd of the patients were very satisfied with their emotional health. A total of 28% of the patients were discouraged by their health problems. On average, 50% of thepatients tolerated diet advice very well.

Table 3 shows the relationship of QoL (total and domain wise) with socio-demographic, anthropometric, and clinical variables.

Table 1: Comparison of domain-wise and total QOLID scores, among males and females

	Mean±SD or percentage (overall)	male	female
Role limitation	24.47±5.56	25.13±5.90	24.02±5.83
Physical endurance	24.29±5.75	26.07±5.00**	23.09±5.93**
General health	8.98±2.82	9.98±2.60**	8.31±2.76**
Treatment satisfaction	16.02±3.92	17.18±3.40**	15.23±4.06**
Symptom botherness	12.22±2.69	12.65±2.41*	11.92±2.83*
Financial worries	14.53±5.30	15.44±4.82*	13.92±5.53*
Emotional or mental health	20.91±4.64	22.43±3.28**	19.88±5.14**
Diet satisfaction	11.77±1.66	11.78±1.87	11.76±1.5
QoL (total)	133.04±24	140.88±21.30**	127.75±24.33**

** $P<0.001$, * $P<0.05$

Those diabetic patients hailing from rural areas had more FW ($P < .001$), RL, poorer PE, and GH, EMH, more SB, poor DAT, and total QoL ($P < .05$). The unemployed, retired, students, or home-makers had a better total QoL and DAT ($P < .05$). Employment correlated with domains of lesser RL, better GH, EMH ($P < 0.05$) and more PE ($P < 0.001$). DM patients with monthly family income more than 10,000 INR had lesser RL, more PE and TS and better GH, EMH, less FW, total score of QoL ($P < 0.001$); and lesser SB ($P < .05$) as compared to those with monthly family income less than 10000 INR. The monthly cost of treatment correlated negatively with FW ($P < 0.05$).

Treatment compliant patients had better GH, TS, better EMH, less SB, and higher QoL total score ($P < 0.05$). With an increase in the duration of DM, QoL deteriorated, total score correlated negatively with the duration ($P < 0.05$); RL and PE decreased ($P < 0.001$). Similarly, requirement of more pills or an injection to control DM correlated negatively with total QoL, had more RL and decreased PE ($P < 0.001$). Pill burden also correlated with less DAT ($P < 0.001$), whereas need for insulin injections correlated with more FW, poor GH ($P < 0.001$), and poor TS ($P < 0.05$). Indoor setting of treatment (N = 83) correlated with more financial worries score ($P < 0.05$). Good glycemic control (FBS $\leq$ 126 mg/dL; HbA1c $\leq$ 6.5 g/dL) correlated with lesser RL, better GH, less SB, better EMH, total QoL ($P < 0.05$), and more TS ($P < .001$). When analyzed separately as continuous variables, FBS correlated negatively with total QoL ($P < 0.001$), and all its domains. The relationship was statistically significant for all the domains except DAT at $P < 0.001$ for all domains of QoL other than FW where it was significant at $P < .05$. Similarly, a statistically significant

Table 2: Response to questions included in each domain of QOLID

a. Role limitation due to physical health (Social life, work, traveling)

S No.	Question	Always	frequently	Often	Sometimes	Never
1	How often miss the work because of diabetes/health	21 (7%)	18 (6%)	25 (8.3%)	48 (16%)	188 (62.7%)
2	How often does the requirement of regular medication and meals affect your work	3 (1%)	5 (1.7%)	10 (3.3%)	15 (5%)	267 (89%)
3	How often does diabetes/health affect your efficiency at work	53 (17.7%)	55 (18.3%)	45 (15%)	66 (22%)	81 (27%)
4	How often do you feel that diabetes/health is limiting your social life	15 (5%)	36 (12%)	22 (7.3%)	29 (9.7%)	198 (66%)
		A lot	**Highly**	**Little**	**Very little**	**Not at all**
5	To what extent do you avoid traveling (business tours, holiday, general tours) because of your diabetes/health	27 (9%)	60 (20%)	12 (4%)	22 (7.3%)	179 (59.7%)
6	Limitations of social activities (partying/ visiting friends) as compared with others of your age because of your diabetes	12 (4%)	32 (10.7%)	26 (8.7%)	35 (11.7%)	195 (65%)
	Average	44 (15%)	34 (11%)	23 (8%)	36 (12%)	168 (56%)

b. Physical endurance

S No.	Question	Always	frequently	Often	Sometimes	Never
1	How often in the last 3 months your health problems limited vigorous activities you can do	98 (32.7%)	42 (14%)	32 (10.7)	51 (17%)	77 (25.7%)
2	How often in the last 3 months your health problems limited moderate activities you can do	50 (16.7%)	27 (9%)	20 (6.7%)	49 (16.3%)	154 (51.3%)
3	How often in the last 3 months your health problems limited your walking uphill/climbing1-2 floors	42 (14%)	27 (9%)	39 (13%)	42 (14%)	150 (50%)
4	How often in the last 3 months your health problems limited you from walking 1-2 km at a stretch you can do	10 (3.3%)	9 (3%)	17 (5.7%)	33 (11%)	231 (77%)
5	How often in the last 3 months your health problems limited you from bending, squatting or turning	15 (5%)	15 (5%)	15 (5%)	26 (8.7%)	229 (76.3%)
6	How often in the last 3 months your health problems limited you from eating, dressing, bathing or using the toilet	2 (0.7%)	2 (0.7%)	8 (2.7%)	12 (4%)	276 (92%)
	Average	36 (12%)	20 (7%)	22 (7%)	36 (12%)	186 (62%)

c. General Health

S No.	Question	Poor	Fair	Good	Very good	Excellent
1	In general you say your health is	93 (31%)	176 (58.7%)	24 (8%)	4 (1.3%)	3 (1%)
		Not at all	**Little**	**Moderate**	**Very much**	**An extreme amount**
2	How well are you able to concentrate on everything like reading, working, driving etc	13 (4.3%)	33 (11%)	39 (13.0%)	59 (19.7%)	156 (52%)
		Always	**Frequently**	**Often**	**Sometimes**	**Never**
3	How many times in the past 3 months have you felt fatigued or tired	67 (22.3%)	42 (14%)	39 (13%)	89 (20.7%)	63 (21%)
	Average	58 (19%)	84 (28%)	34 (11%)	51 (17%)	74 (25%)

d. Treatment satisfaction

S No.	Question	Very dissatisfied	Moderately dissatisfied	Neither satisfied nor dissatisfied	Moderately satisfied	Very satisfied
1	Satisfaction with current diabetes treatment	18 (6%)	29 (9.7%)	43 (14.3%)	42 (14%)	168 (56%)

Table 2: Contd...

S No.	Question	Very dissatisfied	Moderately dissatisfied	Neither satisfied nor dissatisfied	Moderately satisfied	Very satisfied
2	Satisfaction with amount of time it takes to manage diabetes	4 (1.3%)	19 (6.3%)	42 (14%)	33 (11%)	20.2 (67.3%)
3	Satisfaction with the amount of time spent getting check-ups (e.g. once in three months)	18 (6%)	46 (15.3%)	48 (16%)	30 (10%)	158 (52.7%)
4	Satisfaction with the time spent exercising	37 (12.3%)	44 (14.7%)	28 (9.3%)	42 (14%)	14.9 (49.7%)
	Average	19 (6%)	34 (12%)	40 (13%)	37 (12%)	90 (30%)

e. Symptom botherness

S No.	Question	Always	Frequently	Often	Sometimes	Never
1	How many times in the past three months you felt excessive thirst/dry mouth	17 (5.7%)	27 (9%)	34 (11.3%)	80 (47.3%)	142 (47.3%)
2	How many times in the past three months you felt excessive hunger	4 (1.3%)	22 (7.3%)	20 (6.7%)	37 (12.3%)	217 (72.3%)
3	How many times in the past three months you had frequent urination related to polydipsia or increased water intake	22 (7.3%)	33 (11%)	63 (21%)	61 (20. 3%)	121 (40.3%)
	Average	14 (5%)	27 (9%)	39 (13%)	59 (20%)	160 (53%)

f. Financial Worries

S No.	Question	Very expensive	Little expensive	reasonable	Not at all expensive	
1	What do you think about the cost involved in the management of diabetes	49 (16.3%)	58 (19.3%)	116 (38.7%)	77 (25.6%)	
		Alot	Highly	Little	Very little	Not at all
2	To what extent has your priority of expenditure shifted towards diabetes management	42 (14%)	45 (15%)	14 (4.7%)	19 (6.3%)	180 (47%)
3	To what extent your family budget affected by expenses related to diabetes management	32 (10.7%)	49 (16.3%)	16 (5.3%)	16 (5.3%)	187 (62.3%)
4	To what extent you diabetes has limited your expenditure on other aspects of life (movies, outings, parties)	24 (8%)	49 (16. 3%)	15 (5%)	18 (6%)	194 (64.7%)
	Average	36 (12%)	50 (17%)	40 (13%)	32 (11%)	187 (47%)

g. Emotional/Mental Health

S No.	Question	Very dissatisfied	Moderately dissatisfied	Neither satisfied nor dissatisfied	Moderately satisfied	Very satisfied
1	Satisfaction with your self	22 (7.3%)	37 (12.3%)	20 (6.7%)	24 (8%)	197 (65.7%)
2	Satisfaction with personal relationships (family, friends, relatives)	9 (3%)	7 (2.3%)	7 (2.3%)	10 (3.3%)	267 (89%)
3	Satisfaction with the emotional support you get from friends and family	9 (3%)	7 (2.3%)	7 (2.3%)	11 (3.7%)	266 (88.7%)
4	How often are you discouraged by your health problems	51 (17%)	33 (11%)	31 (10.7%)	87 (29%)	98 (32.7%)
5	To what extent do you feel that you are able to lead your life in a purposeful manner	21 (7%)	15 (5%)	53 (17.7%)	44 (14.7%)	167 (55.7%)
	Average	22 (7%)	20 (7%)	24 (8%)	35 (12%)	199 (66%)

S No.	Question	Always	Frequently	Often	Sometimes	Never
	h. Diet advice tolerance					
1	How often feel restrictions in choosing food when eating out	19 (6.3%)	36 (12%)	45 (15%)	155 (51.7%)	45 (15%)
2	How much choice you have in eating your meals/snacks away from home	34 (11.3%)	58 (19.3%)	58 (19. %)	95 (31.7%)	55 (18.3%)
3	How often you avoid eating out because of diabetes		3 (1%)	1 (3%)	18 (6%)	278 (92.7%)
	Average	18 (6%)	32 (11%)	35 (12%)	89 (30%)	126 (42%)
i	Total QoL - average	31 (10%)	38 (13%)	32 (11%)	47 (16%)	149 (50%)

Table 2: Contd...

negative correlation was seen with higher HbA1c levels with total QoL, GH, TS, and SB at $P < 0.001$ and DAT and EMH at $P < 0.05$. Diastolic BP correlated negatively with total QoL, TS, DAT ($P < 0.05$) and more RL (0.001). Presence of diabetic complications (microvascular or macrovascular) other than hypertension correlated negatively with total QoL, RL, PE, and GH scores ($P < 0.001$), as well as with TS, DAT, and FW domain scores ($P < .05$). Abdominal obesity correlated negatively with TS ($P < .05$).

All the domains of QoL as well as its total score showed a negative correlation with the presence of depression.

In multivariate analysis, [Table 4] age more than 55 years, rural background ($P < .05$), and presence of depression had significant ($P < .001$) negative association with total QoL score (>137; median value).

Discussion

A variety of instruments have been used to study QoL in DM patients. Few studies have also used the Quality of Life Instrument for Indian Diabetes Patients (QOLID)[16,23,31-33] Among all the domains of QOLID, the GH domain was most affected by DM in our study similar to the study by John *et al.*[16] Fatigue was the most frequent symptom reported in QOLID (subhead of GH domain). It has been reported to be prevalent in patients with DM, is multi-dimensional, and has been found to be negatively related to the quality of life and functional status.[34] It often precipitates depression in type 2 DM patients and vice versa.[35,36]

In a study by Mathew *et al.*,[23] about 42% of the patients reported good and very good QoL on QOLID. This is in contrast to our study where 66% of the patients have good or very QoL on QOLID. This may be because of the fact that our study had a lower percentage of people 60 years or more. Old age has been found to be associated with poor HRQoL in diabetics,[10,20,25,26,37,38] especially in physical health.[5,39] This explains our finding of age correlating negatively with the PE domain. Age more than 55 years has been found to be a risk factor for poor QoL in our study. This replicates the finding of another study using QOLID.[33]

In another study by Parashar *et al.*,[32] the average score of RL, FW, EMH, and SB score was reported as good or very good by the lesser percentage of patients than in the current study. This may be because in that study higher proportion of patients had SB, suggestive of poorly controlled DM. Total QoL scores and domain wise score, except for GH, were also higher in our study than another study using QOLID by Chaturvedi *et al.*[31] This may be because of the reason that mean duration of DM since diagnosis was more (10.96 ± 5.99 years) than that in the current study (8.02 ± 6.72 years). Also, complications like vision problems (9.5%), neuropathic pain (9%) were lesser in our study, (4.3% and 4.7%, respectively).

Females had poorer QoL, similar to findings in the literature.[10,19,23,25,37,40-42] This may be due to a social disfavor of females in rural areas of north India. Female patients are usually the victims of under-reporting, leaving treatment and follow up, and absence of family and social support. Besides, females observe religious fasts more frequently as compared to males and remain indoors most of the time, with little or no access to recreational physical activity. These factors hinder their diabetic control, thereby hampering QoL.[27]

Being single,[16] separated, divorced,[25,37,38] or widow[37,38] correlating with poorer QoL has also been found in previous studies. Poor QoL in rural areas[43] may be due to poor awareness about illness and access to health care facilities or having financial constraints because of lesser job opportunities. A study from South India has also observed poor QoL in such patients.[40] Employed[24] diabetics had better scores in most of the domains except DAT which was better in retired, students, unemployed, and home-makers. Literature supports the findings that low socio-economic patients had poorer QoL[4] and higher-income groups had better QoL.[11,25] An educated[16,19,43] patient has better QoL is similar to the previous findings. Educated patients are able to understand the information and comply with the advice regarding self-management of the illness in a better way. Abdominal obesity correlated with poor TS in the current study. Weight gain or high body mass index (BMI) has also been found to be associated with poor TS in previous studies.[24,37,38] Findings of correlation with increasing duration of diabetes with poor QoL have been replicated in the current study.[10,19,23,25,37] Need for

Table 3: Relationship of QoL (total and domain wise) with sociodemographic, anthropometric and clinical variables

	Role limitation	Physical endurance	General health	Treatment satisfaction	Symptom botherness	Financial worries	Emotional/ mental health	Dietary satisfaction	QoL
Age	-0.110	-0.202**	0.017	0.074	-0.044	0.080	0.018	-0.019	-0.049
Education	0.257**	0.369**	0.394**	0.252**	0.251**	0.346**	0.263**	0.037	0.401**
Sex	0.093	0.255**	0.292**	0.244**	0.134*	0.141*	0.269**	0.005	0.269**
Family type	-0.032	-0.099	-0.077	0.013	-0.084	-0.081	0.031	-0.011	-0.055
Marital Status	0.142*	0.206**	0.155*	0.127*	0.241**	0.282**	0.189*	0.106	0.254**
Locality	-0.155*	-0.133*	-0.151*	-0.065	-0.154*	-210**	-150*	-0.128*	-0.197*
Compliance	0.091	0.111	0.115*	0.139*	0.146*	0.094	0.121*	0.084	0.150*
Occupation	-0.127*	-0.224**	-0.143*	-0.063	-0.068	-0.074	-0.122*	0.142*	-0.161*
Monthly income	0.209**	0.181*	0.290**	0.239**	0.145*	0.431**	0.223**	-0.025	0.323**
Monthly cost of treatment	-0.102	-0.047	0.006	0.093	0.089	-0.127*	-0.082	0.086	-0.032
Duration of DM	-0.262**	-0.182**	-0.109	0.061	0.052	-0.109	-0.049	-0.023	-0.142*
Pill burden	-0.198**	-0.201**	-0.113	0.067	0.051	-0.098	-0.069	-0.170**	-0.150**
Injection	-0.246**	-0.175**	-0.152**	-0.137*	0.003	-0.236**	-0.082	-0.097	-0.215**
Diabetic control	0.156*	0.060	0.183*	0.202**	0.195*	-0.013	0.126*	-0.005	0.148*
FBS (N = 190)	-0.283**	-0.216**	-0.350**	-0.429**	-0.313**	-0.145*	-0.240**	-0.125	-0.351**
HbA1c (N = 122)	-0.125	0.143	-0.355**	-0.390**	-0.306**	-0.136	-0.232*	-0.222*	-0.285**
Treatment setting (N = 83)	-0.714	-0.816	-0.494	-1.273	-1.126	-2.387*	0.265	-0.784	-1.291
Hypertension	-0.048	0.060	0.020	-0.013	-0.038	0.014	-0.013	-0.084	-0.024
Other Complications	-0.307**	-0.202**	-0.204**	-171*	0.033	-0.195*	-0.096	-0.152*	-204**
Systolic BP	-0.086	-0.106	-0.008	-0.060	-0.023	0.035	0.021	-0.109	-0.047
Diastolic BP	-0.154**	-0.122*	-0.080	-0.132*	-0.079	0.038	-0.070	-0.145*	-121*
Obesity	-0.042	-0.096	-0.029	-0.105	-0.074	-0.034	0.103	-0.019	-0.101
Abdominal obesity	0.047	-0.109	-0.047	-0.146*	-0.076	0.003	-0.026	0.024	-0.052
PHQ-9 > 7	-0.696**	-0.655**	-0.578**	-0.481**	-0.391**	-0.356**	-0.739**	-0.260**	-0.779**

$* P < 0.05$, $** P \leq 0.001$

insulin[24,44] was related to less TS and poor GH of the patient; and pill burden was associated with poor QoL. This replicates the finding that of a study using QOLID.[31] DAT was also less in those with more medicines. It is likely that those not complying on dietary restrictions may need more medications to control blood sugar. Treatment compliance means resultant adequate glycemic control and lesser complications and thus more TS and better QoL. Those with good glycemic control had better QoL,[5,10,19,25,45-48] and good TS has been found in the previous studies.[47,48] Indoor setting was associated with more FW, this may be because of poorly controlled DM being admitted, with an increased cost of treatment and resultant FW. Studies report that patients with poorer control have a greater negative appraisal of diabetes, significant worries, and uncertainty with an increased sense of burden and lower sense of well-being.[44,49]

The literature supports the finding of the study of various macrovascular and microvascular complications correlating with poorer QoL.[8,10,24,26,34,41,44] DM and hypertension coexist in approximately 40%–60% of the patients (43% in our study).[31] Diastolic blood pressure correlating with poor QoL scores as has also been found in the literature,[7,16] but in the current study, no correlation was found with the presence of hypertension and systolic blood pressure, which was studied as a continuous variable.

Co-occurring depression in diabetes has been found to be associated with decreased QoL in various studies.[7,11,24-26,38,41,42,45] DM with depressive symptoms had significantly worse HRQOL in studies using SF-36,[25,46] (WHO-QOL-BREF),[11] Diabetes distress scale.[7] Depression severity was associated with poorer QoL in a study using QOLI.[50] Similarly, in a study, DM and its complications affected negatively all of the domains of the WHOQOL-BREF; with the strongest effects for the physical health and psychological domains.[7] The presence of depression is associated with less TS similar to previous studies.[7,24] A prospective cohort survey of elderly patients with type 2 DM found that impairments in daily activities and lower HRQOL were predictors of depressive symptomatology.[49] Thus, in the current study, the QOLID domains GH, RL, and EMH in DM can be explained with these findings from the various studies.

An educated and well-informed DM patient had better QoL is in keeping with findings of previous studies.[16,19,40,43] Educated patients are able to understand the information and comply with the advice given regarding the medicines, lifestyle, and dietary modifications in a better way. This may prevent

Table 4: Binary logistic regression analysis showing risk factors associated with poor QoL in patient with DM

Variable	Odds ratio (95% CI)	Sig. (*P*)
Age more than 55 years	0.417 (.193-899)	0.014*
Female Sex	0.554 (.203-1.517)	0.251
Locality (urban)	2.400 (1.121-5.16)	0.024*
Education more than 3 years	1. 345 (.428-4.289)	0.606
Employment (ever employed vs student/ unemployed/housewife)	1.432 (.544-770)	0.467
Monthly income more than 10,000 INR	2.122 (.999-4.507)	0.050
Staying with spouse	1.139 (.417-3.113)	0.799
Family (non-nuclear vs nuclear)	1.019 (.533-1.948)	0.954
Duration of DM more than 6 years	0.940 (.478-1.847)	0.857
Poor compliance to treatment	0.810 (.269-2.44)	0.709
Poor glycaemic Control	0.666 (.346-1.282)	0.223
CAD	0.807 (.161-4.052)	0.794
Nephropathy	0.298 (.009-10.422)	0.505
Hypertension	1.005 (.514-1.962)	0.989
Complication other than hypertension	1.448 (.587-3.574)	0.422
Neuropathy	0.678 (.016-28.753)	0.839
Retinopathy	0.111 (.006-1.895)	0.129
Central Obesity (WC >90 cm in males and 80 cm in females)	0.918 (.435-1.935)	0.822
BMI more than 24.9 kg/m^2	0.754 (.227-2.510)	0.646
Pill Burden (> 4)	1.180 (.587-2. 372)	0.642
Insulin use	0.951 (.416-2.171)	0.904
Monthly cost of treatment (more than 1000 INR)	0.680 (.0329-1.404)	0.297
PHQ-9 more than 7	0.028 (.009-.092)	0.000**

deterioration in their glycemic control, seeking early medical advice, and with early detection and management of psychiatric symptomatology and maintaining a better QoL.

Conclusion

There is a need for a holistic care of DM patients, and a collaborative approach for management between the internist/endocrinologist, a psychiatrist, and/or a psychologist. Education about the need for adequate glycemic control and treatment compliance as well as regular exercise to maintain desired body measurement parameters should be provided to the patient and his primary caregivers. Treatment should be individualized keeping in view the patient's will, psychological, and social factors. Multiple and complex drug regimens should be avoided as far as possible. Patients in the 6th decade and above should be thoroughly assessed and educated keeping in view their state of physical endurance and any comorbidity. Primary care physicians should be sensitized regarding the role of screening for depression and fatigue; and

a regular assessment of QoL in patients with DM. However, our study has few limitations of being a hospital-based cross-sectional study. The Hindi translation of the QOLID has not been validated.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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