ORIGINAL ARTICLE

Quality of Life (QoL) among patients with diabetes mellitus: A hospital based study

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Abstract

Background: India has second-highest diabetes mellitus cases worldwide. Diabetes affects a person's physical, social, and psychological well-being, so managing diabetes requires a holistic strategy to enhance the overall Quality of Life (QoL). *Aim and Objectives:* This study aimed to identify factors influencing the QoL among individuals with diabetes mellitus. *Material and Methods:* A hospital based cross-sectional study was conducted among individuals visiting medical college hospital in costal Karnataka. A sample size of 403 was derived using appropriate sample size formula. The QoL of diabetic patients was assessed using a validated, revised version of DQoL questionnaire. The satisfaction domain score ranged from 6-30, impact score 4-20, worry score 3-15 and total QoL score 13-65. The data were analyzed using the Jamovi software version 2.3.28. *Results:* Mean scores for QoL in the satisfaction domain was the highest among all domains, with a score of 35.7 ± 6.80, followed by the impact domain 30.9 ± 8.12 and the worry domain 29.9 ± 9.84. Socio- demographic factors such as age, type of diabetes, gender, marital status and duration since diagnosis of diabetes were found to be influencing diabetes QoL ($p < 0.05$). *Conclusion:* Diabetes adversely affects the QoL of patients with diabetes mellitus. This study highlights the need of health programs which would help older patients, women and people with type-1 diabetes to improve their QoL.

Keywords: Quality of Life, RV-DQOL13, Metabolic Disorder, Diabetes

Introduction

Diabetes is a long-term condition caused by increased blood glucose levels. Overtime, this causes major complications to the cardiovascular system, visual organs, kidneys, and nervous system [1]. India is the country with the second-highest global incidence of diabetes. By 2030, it is estimated that, there will be more than 578 million individuals with diabetes mellitus in India. India's growing diabetes patient population is a major concern, as it adds to the nation's enormous healthcare burden [2].

World Health Organization says the prevalence of diabetes is growing most rapidly in developing countries [3]. In India, among individuals aged above 20, the overall prevalence of pre-diabetes and diabetes was found to be 15.3% and 11.4%, respectively. Despite a high burden of diabetes and pre-diabetes among adults in India, knowledge, treatment, and disease control are considerably low [4-5]. The burden of diabetes was higher in urban areas (11.2%) compared to rural areas (5.2%). The prevalence of pre-diabetes ranged from 5.8% to 14.7% in rural settings and from 7.2% to 16.2% in urban populations [6]. Over the years, DALYs due to communicable, maternal, neonatal, and nutritional diseases have dropped to 33%, with a corresponding increase to 55% for non-communicable diseases and 12% for injuries [7].

In this context, Quality Of Life (QoL) becomes a reliable indicator of important clinical outcomes, including morbidity and hospital admissions [8]. The surge in diabetes cases is primarily attributed to urbanisation, an older population, sedentary lifestyles, and higher incidences of overweight and obesity. Individuals with diabetes must modify lifestyle like having balanced diet, physical activity, medicines, regular glucose monitoring etc. to manage diabetes mellitus [9]. Monitoring blood glucose regularly has proven effective in controlling type 1 diabetes among patients [10]. Diabetes leads to macro-vascular complications and micro-vascular complications [11-12]. QoL is always compromised in individuals with diabetes and becomes even worse when it is associated with other co-morbidities [13]. This study aimed to identify factors influencing the QoL among individuals with diabetes mellitus.

Material and Methods

CTRI registration: This study was registered in CTRI portal before data collection (CTRI registration no: CTRI/2024/06/068423).

Institutional Ethics Approval: Ethical clearance was obtained from Institutional Ethics Committee, with reference number REG.NO: EC/NEW/INST/2022/KA/0174.

This hospital based cross-sectional study was conducted among individuals visiting tertiary care hospital for diabetes treatment in Mangalore. The sample size of 363 for this study was derived using the formula, $n = (Z^2_{1-\alpha/2} * p * q)/d^2$) where, the proportion (p) was estimated at 38%, with 95% confidence interval (Z_α), 5% absolute precision (d) and 10% non-response rate [14]. Adding 10% non-response rate the final estimated sample size was 403. The data was collected between June and July 2024 using Epicollect-5 software.

A consecutive sampling method was used to recruit the individuals visiting outpatient and inpatient departments of general medicine and endocrinology for treating diabetes condition. Ensuring privacy, trained personnel interviewed each subject after outlining the study's purpose and importance.

Study tool

A revised Diabetes Quality of Life (RV-DQoL) scale developed in 2018 by DCCT research group was used for data collection. The questionnaire had 13 items to measure health-related QoL among individuals with diabetes. The satisfaction domain had 6 items, the impact domain had 4 items, and the worry domain had 3 items. Responses were recorded using a 5-point Likert scale. Satisfaction was measured from 1 (very satisfied) to 5 (very dissatisfied), while impact and worry were assessed on a scale from 1 (never impacted/worried) to 5 (always impacted/worried). The reliability for the satisfaction domain was 0.922, the impact was 0.781, and the worry was 0.794. The satisfaction domain score ranged from 6-30, the impact score 4-20, the worry scores 3-15, and the total QoL score between 13-65. The scores were transformed to percentages by using the formulas S/30*100 for the satisfaction domain, I/20*100 for the impact domain, W/15*100 for the worry domain and Total/65*100 for overall diabetes QoL. A higher score signified diminished QoL [15].

Analysis of statistical data

Qualitative variables were summarized as frequencies and percentages, while quantitative were summarised as mean ± Standard Deviation (SD). Differences in QoL scores across various domains and socio-demographic factors were analysed

using independent samples t-tests and one-way ANOVA. JAMOVI software version 2.3.28 was used for statistical analysis.

Results

This study included 403 individuals with diabetes visiting hospital. The mean age of the participants was 49.4 ±13.7 years. Most of the participants enrolled into the study were above 40 years (76.1%), males (61.3%), married (95.8%), and having primary level education (36.3%). Majority of the participants were residing in rural area (85.4%), and had monthly income up to 15,000 (70%). The respondents' latest mean HbA1c level and fasting blood sugar level was found to be 6.60 ± 2.50 and 219 ± 84.2 mg/dl respectively. Most of the respondents were with type 2 diabetes (87.1%), More than half (54.3%) of the participants were on Oral Hypoglycaemic Agents (OHA) while others were on insulin. Majority of the participants duration since diagnosis of diabetes was found to be, 1- 5 years (70.2%) (Table 1). A moderate level of satisfaction (74.5%) was reported by most participants regarding the time required to manage their diabetes, while 20% expressed being very satisfied. Only a few (5.5%) were neither satisfied nor dissatisfied. Most respondents (55.6%) sometimes felt pain associated with their diabetes treatment, while 42.9% never felt pain. Most respondents (58.8%) sometimes felt physically ill due to their diabetes, while 35.5% never felt physically ill. Nearly half of the respondents (48.4%) never worried about being unconscious due to diabetes, while a similar proportion (47.1%) sometimes worried about it (Table 2). Among all the domains the highest mean was in satisfaction domain 35.7± 6.80 and the lowest score was in worry domain 29.9 ± 9.84 and in impact domain it was 30.9 ± 8.12 (Table 3). Age was associated with all the QoL domains i.e., satisfaction, impact and worry domain of DQoL. Individuals aged 18-28 years had better QoL compared to the individuals aged ≥ 40 years. Factors such as age and type of diabetes were associated with satisfaction domain. Age, gender, and marital status were associated with the impact domain. Similarly, age, marital status and duration since diagnosis of diabetes were associated with worry domain ($p < 0.05$) (Table 4).

Table 1: Socio-demographic characteristics of the study participants (N=403)

Characteristics	Number (Percentage)	
Age (in years)	**18 - 28**	22 (5.5 %)
	29 - 39	74 (18.4%)
	≥ 40	307 (76.1%)
Gender	**Female**	155 (38.5%)
	Male	247 (61.3%)
	Trans woman	1 (0.2%)
Marital status	**Married**	386 (95.8%)
	Single	17 (4.2%)

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Education	**No formal education**	29 (7.2%)
	Primary school certificate	146 (36.3%)
	Middle school certificate	66 (16.4%)
	High school certificate	77 (19.1%)
	Intermediate or diploma	77 (19.1%)
	Graduate	7 (1.7%)
	Post graduate	1 (0.2%)
Domicile	**Urban**	59 (14.6%)
	Rural	344 (85.4%)
Monthly income (in rupees)	**Up to 15,000**	282 (70.0%)
	15,000 - 30,000	115 (28.5%)
	30,000 - 45,000	6 (1.5%)
Type of diabetes	**Type 1**	52 (12.9%)
	Type 2	351 (87.1%)
Treatment for diabetes	**Oral medicine**	219 (54.3%)
	Insulin	184 (45.7%)
Duration since diagnosis of diabetes (in years)	**< 1**	21 (5.2%)
	1 - 5	283 (70.2%)
	5 - 10	73 (18.1%)
	>10	26 (6.5%)
HbA1c level[#] (in percentage)	**Not tested**	44 (10.9 %)
	< 5.7	4 (1.0%)
	5.7 - 6.4	70 (17.4%)
	6.5 or higher	285 (70.7%)
Fasting blood sugar level[#] (in mg/dl)	**Not tested**	11 (2.7%)
	70 - 100	8 (2.0%)
	101 - 125	47 (11.7%)
	126 or higher	337 (83.6%)

standardized estimate was used to categorise fasting blood sugar level and ADA standardized estimate was used to categorise HbA1c level

Table 2: Quality of life assessment - satisfaction, impact, and worry domains (n=403)

Diabetes Quality of Life Domains		Very Satisfied n (%)	Moderately satisfied n (%)	Neither satisfied nor dissatisfied n (%)	Moderately dissatisfied n (%)	Very dissatisfied n (%)
Satisfaction Domain	Time it takes to manage diabetes	81 (20.0)	300 (74.5)	21 (5.3)	0 (0.0)	1 (0.2)
	Time you spend getting check-ups	142 (35.3)	241 (59.8)	19 (4.7)	1 (0.2)	0 (0.0)
	Time it takes to determine the sugar level	98 (24.3)	273 (67.8)	32 (7.9)	0 (0.0)	0 (0.0)
	Current treatment	139 (34.5)	246 (61.1)	17 (4.2)	1 (0.2)	0 (0.0)
	Knowledge about diabetes	94 (23.3)	280 (69.5)	24 (6.0)	3 (0.7)	2 (0.5)
	Life in general	117 (29.0)	270 (67.0)	16 (4.0)	0 (0.0)	0 (0.0)
		Never n (%)	Sometimes n (%)	Often n (%)	Frequently n (%)	Always n (%)
Impact Domain	Feel pain associated with the treatment	173 (42.9)	224 (55.6)	6 (1.5)	0 (0.0)	0 (0.0)
	Feel physically ill	143 (35.5)	237 (58.8)	21 (5.2)	2 (0.5)	0 (0.0)
	Interfere with the family life	227 (56.3)	167 (41.4)	9 (2.3)	0 (0.0)	0 (0.0)
	Limiting social relationships and friendships	237 (58.8)	159 (39.5)	6 (1.5)	1 (0.2)	0 (0.0)
Worry domain	Pass out	195 (48.4)	190 (47.1)	18 (4.5)	0 (0.0)	0 (0.0)
	Body looks differently	248 (61.6)	143 (35.5)	11 (2.7)	0 (0.0)	1 (0.2)
	Get complications	216 (53.6)	173 (42.9)	14 (3.5)	0 (0.0)	0 (0.0)

Table 3: Descriptive statistics on diabetes quality of life (N=403)

Domains of quality of life	Mean ± SD	Minimum	Maximum
Satisfaction	35.67 ± 6.80	20.00	56.67
Impact	30.92 ± 8.12	20.00	70.00
Worry	29.86 ± 9.84	20.00	66.67
Total	32.87 ± 6.33	20.00	60.00

Table 4: Domain wise QoL scores based on socio-demographic characteristics

Characteristics (n= 403)		Satisfaction domain (Mean ± SD)	Impact domain (Mean ± SD)	Worry domain (Mean ± SD)
Age (in years)	**18 - 28**	35.5 ± 7.46	28.2 ± 7.70	24.5 ± 7.53
	29 - 39	33.4 ± 7.38	29.5 ± 8.05	29.1 ± 9.59
	≥ 40	36.2 ± 6.51	31.5 ± 8.10	30.4 ± 9.95
	p	0.016*	0.048*	0.004*
Gender	**Female**	35.2 ± 6.56	31.1 ± 7.80	31.5 ± 10.09
	Male	36.0 ± 6.95	30.8 ± 8.35	28.8 ± 9.58
	p	0.275	0.008*	0.727
Marital status	**Married**	35.7 ± 6.75	31.1 ± 8.11	30.1 ± 9.87
	Single	36.1 ± 8.10	27.1 ± 7.51	24.3 ± 7.43
	p	0.803	0.045*	0.017*
Education	**No formal education**	36.0 ± 7.56	32.8 ± 8.30	31.5 ± 12.33
	Up to class 10	35.9 ± 6.47	31.2 ± 8.15	30.2 ± 9.81
	Above class 10	34.9 ± 7.59	29.4 ± 7.85	28.1 ± 8.90
	p	0.545	0.095	0.121
Domicile	**Rural**	35.5 ± 6.60	31.2 ± 8.11	30.2 ± 9.78
	Urban	36.8 ± 7.85	29.4 ± 8.10	28.0 ± 10.12
	p	0.177	0.122	0.121
Monthly income (in rupees)	**Up to 15,000**	35.5 ± 6.62	31.0 ± 7.99	30.3 ± 9.80
	15,000 - 30,000	36.0 ± 7.40	30.8 ± 8.51	28.6 ± 10.06
	30,000 - 45,000	35.6 ± 1.72	27.5 ± 6.89	32.2 ± 5.02
	p	0.847	0.498	0.199

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Characteristics (n= 403)		Satisfaction domain (Mean ± SD)	Impact domain (Mean ± SD)	Worry domain (Mean ± SD)
Type of diabetes	**Type 1**	32.7 ± 8.37	37.4 ± 7.86	31.8 ± 12.84
	Type 2	30.7 ± 8.06	35.4 ± 6.61	29.6 ± 9.31
	p	0.045*	0.091	0.129
Treatment for diabetes	**Insulin**	35.9 (6.16)	31.2 ± 8.16	30.4 ± 9.80
	Oral medicine	35.5 (7.31)	30.7 ± 8.10	29.4 ± 9.88
	p	0.564	0.571	0.283
Duration since diagnosis of diabetes	**< 1 years**	31.6 ± 7.72	27.9 ± 6.63	25.4 ± 7.49
	1-5 years	35.8 ± 6.57	30.7 ± 7.63	29.5 ± 9.32
	5 - 10 years	36.3 ± 7.05	32.1 ± 8.93	31.2 ± 10.65
	> 10 years	35.9 ± 7.14	32.5 ± 11.16	33.6 ± 12.9
	p	0.103	0.122	0.021
HbA1c level (%)	**Not measured**	34.5 ± 6.54	30.8 ± 9.88	30.0 ± 8.35
	< 5.7	29.2 ± 8.50	28.3 ± 10.0	26.3 ± 9.46
	5.7 - 6.4	36.0 ± 6.97	28.8 ± 9.47	31.1 ± 7.84
	6.5 and above	35.8 ± 6.70	30.0 ± 9.95	31.1 ± 8.15
	p	0.420	0.427	0.724
Fasting blood sugar level (mg/dl)	**Not measured**	34.5 ± 6.54	31.4 ± 15.02	28.5 ± 14.33
	70 - 100	29.2 ± 8.50	29.4 ± 10.50	32.5 ± 15.34
	101 - 125	36.0 ± 6.97	30.9 ± 7.54	28.4 ± 8.84
	126 and above	35.8 ± 6.70	30.9 ± 7.88	30.0 ± 9.68
	p	0.210	0.980	0.647

**p value < 0.05 is considered as statistically significant*

**The Trans woman category was excluded from the analysis as there was only one respondent*

Discussion

This study determined QoL and association of various socio-demographic factors, among individuals with diabetes mellitus visiting medical college hospital in Mangalore. The QoL was determined across three domains using RV-DQoL questionnaire. The mean QoL score in the satisfaction domain (35.7 ± 6.80) was the highest among all three domains followed by impact domain (30.9 ± 8.12) and worry domain (29.9 ± 9.84) respectively. In this study diabetes QoL was associated with certain socio-demographic factors, type of diabetes and duration since diagnosis of diabetes ($p < 0.05$).

In this study, an overall diabetes QoL score was found to be (32.9 ± 6.33). Similarly, a study conducted in Benin, West Africa, reported a mean score of (38.1 ± 4.1) [16]. In contrast, studies conducted in Delhi (59.47 ± 18.70) and Himachal Pradesh (133.04 ± 24) had better DQoL compared to current study [17-18]. Conversely, studies conducted in Ethiopia (64.79 ± 9.09) and Iran (41.8 ± 6.2) revealed that the QoL was poorer compared to the current study. This discrepancy may be due to differences in healthcare access, socioeconomic factors, and disease management [19-20].

The current study reveals that the mean DQoL score in the satisfaction domain is (35.7 ± 6.80), which is comparatively lower than the study conducted in Iran (55.2 ± 2.7) [20]. In contrast, a study conducted in Saudi Arabia (13.14 ± 4.84) and Pune, India (13.75 ± 3.44) reported a higher life satisfaction compared to this study [21-22]. It may be because of its extensive public health initiatives and comprehensive diabetes education programs. The socio-demographic factors such as age and type of diabetes were found to be influencing satisfaction domain of DQoL ($p < 0.05$). Younger patients (18 - 28 yrs.) with type 2 diabetes had higher satisfaction compared to their counter parts. Despite using varying measurement tools, studies from Ethiopia and Chennai, India, corroborated these results [19, 22-24].

The study shows the QoL score in the impact domain was 30.9 ± 8.12. In contrast, studies conducted in South Benin (19.9 ± 1.4), Delhi (59.98 ± 23.36) and in Saudi Arabia (9.20 ± 3.37) reported that the QoL among diabetes patients was higher than in the current study [16-17, 21]. However, a study conducted in Iran reported a score of (57.7 ± 3.9), suggesting that the QoL for diabetes patients there was poorer compared to the current study [20]. Age, gender and marital status was found to be influencing impact domain of DQoL. Present study showed, diabetes had greater impact on men than on women, showing the necessity for sex-specific approaches in diabetes management. These findings align with Malaysian study, highlighting interventions need to address gender differences in the QoL among individuals with diabetes [25].

In present study, the score in the worry domain was (29.9 ± 9.84). In contrast, studies conducted in Delhi (58.71 ± 18.33) and Tamil Nadu (62.21 ± 21.31) reported better psychological health compared to current study which may be due to more robust mental health support systems [17, 26]. This study showed that age, marital status and duration since diagnosis of diabetes were found to be influencing worry domain of DQoL, and these findings were similar to the study conducted in Delhi [17].

Strengths and limitations

The RV-DQoL13 questionnaire, a modified tool for assessing diabetes-related QoL, was used for this

study. It is a validated tool that measures DQoL and enhances the credibility of the results. The sample size was efficiently calculated and sufficiently large, further strengthening the study's validity and reliability. However, this study is a hospital-based study, with respondents recruited consecutively, which limits its generalizability.

Conclusion

This study shows that the satisfaction towards diabetes related factors was the most affected domain among the patients. Socio-demographic factors such as male, unmarried, respondents with type 2 diabetes, shorter duration since diagnosis (< 1 year) and younger individuals aged (18 - 28 years) had better QoL than their counterparts. This study highlights the need of health programs which would help older patients, women and people with type 1 diabetes to improve their QoL.

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