Original Article

Health-Related Quality of Life and Associated Factors Among Adults with Type-2 Diabetes Mellitus: A Community-Based Cross-Sectional Study in Rural Kerala, India

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Abstract

Background: India is the second-largest country in the world with an estimated 77 million people living with diabetes. Persons with diabetes reported lower quality of life when compared to non-diabetes persons. There are significant associations between poor health-related quality of life (HRQoL) and adverse health outcomes among diabetes people. However, evidence documenting the same in India is scarce. **Aims:** To assess the health-related quality of life and its determinants among diabetic patients in rural Kerala, India. **Methods:** We conducted a community-based cross-sectional study among 425 adults type-2 diabetic patients from rural Kerala. The World Health Organization Quality of Life questionnaire was used to measure HRQoL. Multiple logistic regression analysis was used to study the association between HRQoL and independent variables. **Results:** More than half of the respondents were men (52%), and 45% were older adults (≥60 years). Poor quality of life was reported by 38% of the respondents. Medium [Odds ratio (OR):4.70, 95%CI: 2.61-8.46] and low socio-economic status (SES) group (OR: 4.59, CI: 2.43-8.66) had poorer HRQoL compared to the higher SES group. Those with multi-morbidity (OR: 2.91, CI: 1.63-5.19), unemployed (OR: 2.54, CI: 1.46-4.42), and less educated (OR: 2.28, CI: 1.34-3.88) and older adults (OR: 2.11, CI: 1.28-3.45) were more likely to have poor HRQoL compared to their counterparts. **Conclusion:** More than one-third of the diabetes patients in rural Kerala reported poor HRQoL. The study also identified age, socio-economic status, education, and occupation as the important predictors of HRQoL among diabetes patients. The findings highlighted the need for assessing HRQoL as part of the routine management of diabetes care in similar settings.

Keywords: India, Kerala, quality of life, type-2 diabetes mellitus, WHOQOL-BREF

Background

Diabetes is reported as the strongest metabolic risk factor for death and cardiovascular diseases following hypertension.[1] Asian countries contribute to more than 60% of the global burden of diabetes mellitus.[2] India is deemed the diabetic capital of the world. It has the second largest number of people with diabetes (74.2 million) in the world following China (140.9 million). The number of people with diabetes in the country has been estimated to rise to 124.9 million in 2045.[3] The annual number of deaths from diabetes in India is 0.6 million.

The existing literature has extensively documented the physical and psychological complications associated with diabetes.[4-6] While studying these complications is indispensable, it is equally important to consider that management of type 2 diabetes mellitus (T2DM) requires never-ending care along with lifestyle adjustments that have bearing on an individual's quality of life (QoL) and subsequently on the overall wellbeing. Recent guidelines of the American Diabetic Association emphasize the need for a 'patient-centered' approach to the management of

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T2DM which includes improving health-related quality of life (HRQoL), preventing diabetic complications, and achieving the glycemic targets.[7] Recognizing HRQoL as one of the markers of the effect of diabetes management,[8] an increasing number of studies have started documenting the same all around the world.

Studies across the globe, though limited, have shown that when compared to non-diabetes persons, individuals with T2DM, especially in the presence of complications, experience lower quality of life.[9,10] The inverse association of QoL with disease conditions is evidenced by different studies. Patients with better QoL may have fewer hospital visits and hospitalization and hence could have a better sense of well-being.[11] Also, those with poor QoL have reported adverse outcomes including poor response to therapy, disease progression, and even mortality.[12]

Despite the significant association between HRQoL and diabetes management, only a few studies have attempted to document HRQoL and its determinants. A scoping review found that the studies conducted among persons with diabetes in India observed poor QoL among persons with diabetes than non-diabetic patients with women reporting poorer QoL than men. However, these studies used different measurement instruments and had methodological flaws which constrain the validity and generalizability of the findings.[13,14] Furthermore, most of the studies are restricted to hospitals/clinics. These studies could be crippled with selection bias which may occur when the study respondents are systematically different in characteristics compared with other eligible respondents who are excluded from the study.[15] Hence, there is a possibility that the selected respondents may not represent the population of persons with diabetes which in turn can challenge the generalizability of the findings. This could be resolved by selecting respondents from the community. A scoping review of the quality of life and diabetes in India studied 41 related studies, among which only one study was based in the community setting.[13] The study was based on 138 diabetic patients from Karnataka state.[16] We could also trace a recent community-based study from Chandigarh, India that explored QoL among diabetic patients.[17] The study found a significant association between age, comorbidities, complications, duration of illness, and sedentary lifestyle with poor quality of life among diabetes patients

Kerala has emerged as the 'Diabetic Capital' of India with the prevalence of diabetes at 19.2%.[18] However, only a couple of studies have attempted to document HRQoL among persons with diabetes in Kerala.[19,20] These studies were based on clinical settings. We could not locate any community-based study on HRQoL among T2DM patients in Kerala. Recognizing HRQoL as an important indicator of the effectiveness of diabetes management, and considering the urgency for high-quality assessment studies on QoL with representative sample sizes,[13] the current study assessed the HRQoL and its determinants among T2DM patients in a rural community in Kerala, India.

Methods

Study design and data collection

A community-based, cross-sectional study was conducted between January to March 2020 in the Thiruvananthapuram district of Kerala. Based on the reported prevalence of QoL among T2DM patients (38%) from the state,[19] and by considering a precision of seven along with a design effect of two, the sample size was estimated to be 370, which was rounded off to 400. We employed a multi-stage cluster sampling technique to select the respondents. Among the six *taluks* (administrative sub-divisions of the district), one *taluk* was randomly selected. Out of the eleven *grama panchayats* (lowest administrative division in rural areas) in the selected taluk, we randomly selected two *grama panchayats*. From each of the selected gram panchayat, four *wards* (the smallest geographic unit of the *gram panchayat*) were randomly selected. From each selected *ward*, 50 diabetic patients were identified (the selection of individuals was guided by the guidelines of the World Health Organization's expanded program on immunization cluster sampling technique).[21] A central location in the selected *ward* was identified to start the survey. After identifying the first household we moved in a clockwise direction and visited all households till 50 adults (>=18 years) with diabetes were surveyed. All the study respondents were asked about the presence of diabetes along with the treatment details. All those who reported diabetes treatment were asked for valid medical prescriptions and only those who were under treatment were included in this study. We excluded individuals with debilitating illnesses, and pregnant and lactating mothers. All those who had approached the study were willing to participate in the study and gave consent. Finally, we collected details from 425 respondents.

A pre-tested interview schedule was employed to collect details on socio-demographic characteristics and the presence of other chronic diseases. Health-related quality of life has been recognized as a multidimensional construct because of its embeddedness in the cultural, social, and environmental context.[22] Hence, several scales have been designed to capture its multi-dimensional nature with the World Health Organization Quality of Life (WHOQoL-BREF) being one among them. We have utilized the validated *Malayalam* version of the WHOQoL-BREF scale to assess HRQoL among T2DM patients.[23,24] The questionnaire has four HRQoL domains, one question on the perceived quality of life, and another on general health satisfaction. The four domain scores denote an individual's perception of HRQoL under the following domains – physical, psychological, social relationships, and environment.[25] In all the domains, scores are scaled in a positive direction, with higher scores representing a higher quality of life. The following items are covered under each domain: Physical health (activities of daily living, dependence on medicinal substances and medical aids, energy, and fatigue, mobility, pain and discomfort, sleep and rest, work capacity); Psychological domain (bodily image and appearance, negative feelings, positive feelings, self-esteem,

spirituality/religion/personal beliefs, thinking, learning, memory and concentration); Social relationships (personal relationships, social support, sexual activity); Environmental domain [financial resources; freedom, physical safety, and security; health and social care: accessibility and quality; home environment, opportunities for acquiring new information and skills; participation in and opportunities for recreation/leisure activities, physical environment (pollution/noise/traffic/climate) and transport].

Definitions and explanations of variables

We defined a diabetic patient as an individual diagnosed with diabetes by a physician for more than six months and under treatment for the disease. Socioeconomic status (SES) was assessed based on the color of the *ration card*, an official document given by the state government, and the color of the card is based on the SES. We classified pink or yellow cardholders as low SES, middle SES for blue, and high SES for white cardholders. Multi-morbidity was defined as the co-existence of at least one co-morbidity with diabetes.

Statistical analysis

The data were analyzed using SPSS version 21.0 (IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp). Pearson's correlation coefficient was used to measure the association between the four HRQoL domain scales. Bivariate and multivariate analyses were done to study the association of HRQoL with independent variables. Association between categorical variables was studied using the Chi-square test whereas for continuous variables t-test was used. Multivariate logistic regression analysis was used to find the associated factors of poor quality of life of diabetic patients. In all cases, the *P* value ≤0.05 was considered statistically significant.

Based on the mean value, we divided all four domains of QoL into two categories: poor (less than the mean value) and good (greater than or equal to the mean value). The association of background characteristics with quality of life was analyzed in each domain. The sum of all four domains was calculated and the average values were considered for overall HRQoL. Based on the earlier literature HRQoL was categorized into three: poor (<=45), moderate (46-65), and high (>65).[26,27] In our data, the high HRQoL was reported by only 35 respondents. So, for getting a meaningful interpretation and analyzing the associations, we combine moderate and high together and considered it a "good" HRQoL.

Ethics approval

The study was approved by the Institutional Ethics Committee of the host institution (AHRI/EC/119/July/2019 dated 17th July 2019). Written informed consent was obtained from all respondents before the survey. Around 4% of the study respondents had no formal education. However, all of them were literate. The process of consent for these participants was obtained with a witness (not related to the participant or related to the current research), who could read and understand the participant information sheet and consent form.

Results

The basic characteristics of the study respondents are presented in Table 1. The mean age of the respondents was 58 years (±SD: 11), ranging from 29 to 93. Of the 425 respondents 45% were aged 60 years or more, 52% were men and 34% had ten or more years of schooling. More than half (56%) were employed at the time of the survey, and 47% reported a family history of diabetes. More than three fourth (78%) of the respondents were on oral medication. Exclusive use of oral medication was reported by 59%. Nearly 34% had health insurance and 74% had multi-morbidity. Around 73% sought treatment for diabetes from Government hospitals. Around 44% of the respondents perceived their QoL as poor, 17% perceived it as good whereas 39% had no opinion on this. Around 45% of respondents were dissatisfied, 9% were satisfied and 46% had no opinion about their health condition.

All four domains of HRQoL were significantly correlated with each other with the highest association among physical and psychological domains (correlation coefficient: 0.697). The mean values of different domains and overall quality of life scores are presented in Table 2. The mean overall quality of life was 48.5 ranging from 5.7 to 88.3. Overall

Table 1: Background characteristics of the study respondents (*n*=425)

Variables	*n* (%)
Age group (in years)	
<40	12 (2.8)
40-49	90 (21.2)
50-59	134 (31.5)
≥60	189 (44.5)
Sex	
Women	205 (48.2)
Men	220 (51.8)
Education	
<10 years of schooling	279 (65.6)
≥10 years of schooling	146 (34.4)
Employment Status	
Employed	236 (55.5)
Un-employed	189 (44.5)
Socio-economic status	
Low	144 (33.9)
Medium	108 (25.4)
High	173 (40.7)
Duration of Diabetes	
<10 years	249 (58.6)
≥10 years	176 (41.4)
Diabetes Medication	
Oral medication only	249 (58.6)
Insulin and/or oral medication	176 (41.1)
Health seeking for diabetes	
Private hospital	113 (26.6)
Government hospital	312 (73.4)
Family history of diabetes	200 (47.1)
Had health insurance	145 (34.1)
Multi-morbidity present	316 (74.4)

poor quality of life (score <=45) was reported by 38% of the respondents. The proportion of poor quality of life was highest in the environmental domain followed by the psychological domain [Table 2].

Bivariate results of the association of basic characteristics with poor quality of life in different domains are presented in Table 3. Age was significantly associated with all four domains with older adults (60 years or above) having poorer QoL compared to their younger counterparts. Women had significantly poorer QoL in the physical, psychological, and social relationships domain compared to men. Low educational status was significantly associated with poor quality of life in physical, psychological, and environmental domains. Unemployed respondents had poorer QoL as compared to others in all domains except the environmental domain. The lower socio-economic status was significantly associated with poor quality of life in all domains. Increased duration of diabetes was significantly associated with a poor physical domain. Those with multi-morbidity had poorer QoL in physical, psychological, and social relationship domains.

Table 4 shows the results of both bivariate and multivariate analyses of overall poor QoL. Socioeconomic status emerged as the most significant predictor of poor HRQoL. Medium (OR: 4.70, 95% CI: 2.61-8.46) and low SES group (OR: 4.59, CI: 2.43-8.66) had poorer HRQoL compared to the higher SES group. Those with multi-morbidity (OR: 2.91, CI: 1.63-5.19), unemployed (OR: 2.54, CI 1.46-4.42), less educated (OR 2.28, CI: 1.34-3.88) and older adults (OR: 2.11, CI: 1.28-3.45) were more likely to have poor HRQoL compared to their counterparts.

Table 2: Mean values of overall and different domains of quality of life

Domains	Mean±SD	Minimum-Maximum	Poor quality of life†
Physical health	45.5±17.5	0.0-78.5	190 (44.7)
Psychological	40.0±16.7	4.1-83.3	201 (47.3)
Social relationship	63.4±16.1	0.0-100.0	169 (39.8)
Environmental	45.2±14.6	0.0-100.0	224 (52.7)
Overall	48.5±12.8	5.7-88.3	163 (38.4)

†Scored below the mean value. SD: Standard Deviation

Discussion

This study assessed the HRQoL and its determinants among T2DM patients in rural Kerala. We found that more than a third (38%) of respondents had a poor overall quality of life. This is in confirmation of the findings of the clinic-based study in Kerala which reported a poor overall QoL of 38%.[19] Age, education, socio-economic status, employment, and multi-morbidity had a significant association with the poor overall quality of life as reported in other studies.

The mean overall quality of life score in our study was 48.5 which was lower than that reported among diabetes women in Iran (58.0)[28] and diabetes patients in Ethiopia (51.5)[27] using the WHO-BREF tool. Except for the social domain, the mean scores of all other three domains: physical, psychological, and environmental, in our study were lower than that reported in

Table 3: Bivariate analysis results of poor quality of life in different domains by background characteristics

Variables	Poor quality of life			
	Physical	Psychological	Social relationship	Environmental
Age	<0.001	<0.001	0.013	0.050
<60	70 (33.5)	91 (38.6)	81 (34.3)	114 (48.3)
>=60	111 (58.7)	110 (58.2)	88 (46.6)	110 (58.2)
Sex	0.019	0.004	<0.001	0.561
Men	86 (39.1)	89 (40.5)	68 (30.9)	119 (54.1)
Women	104 (50.7)	112 (54.6)	101 (49.3)	105 (51.2)
Education	<0.001	<0.001	0.096	<0.001
No formal education/ <10 years of schooling	143 (51.3)	161 (57.7)	119 (42.7)	173 (62.0)
≥10 years of schooling	47 (32.2)	40 (27.4)	50 (34.2)	51 (34.9)
Employment Status	0.001	0.002	0.022	0.287
Employed	88 (37.3)	96 (40.7)	82 (34.7)	130 (55.1)
Un-employed	102 (54.0)	105 (55.6)	87 (46.0)	94 (49.7)
Socio-economic status	0.007	<0.001	<0.001	<0.001
Low	78 (54.2)	83 (57.6)	74 (51.4)	104 (72.2)
Medium	49 (45.4)	66 (61.1)	44 (40.7)	75 (69.4)
High	63 (36.4)	52 (30.1)	51 (29.5)	45 (26.0)
Duration of Diabetes	0.002	0.139	0.317	0.922
<10 years	95 (38.2)	110 (44.2)	94 (37.8)	132 (53.0)
≥10 years	95 (54.0)	91 (51.7)	75 (42.6)	92 (52.3)
Multi-morbidity	0.002	<0.001	0.012	0.119
Present	158 (50.0)	167 (52.8)	137 (43.4)	174 (55.1)
Absent	32 (29.4)	34 (31.2)	32 (29.4)	50 (45.9)

Table 4: Bivariate and multivariate analysis results of poor OVERALL quality of life by background characteristics

Variables	Poor quality of life *n* (%)	OR (95% CI)	*P**
Age			
<60	65 (27.5)	Reference	0.003
>=60	98 (51.9)	2.11 (1.28-3.45)	
Sex			
Men	72 (32.7)	Reference	0.700
Women	91 (44.4)	1.10 (0.66-1.83)	
Education			
≥10 years of schooling	29 (19.9)	Reference	0.002
No formal education/< 10 years of schooling	134 (48.0)	2.28 (1.34-3.88)	
Socio-economic status			
High	37 (21.4)	Reference	<0.001
Medium	51 (47.2)	4.70 (2.61-8.46)	
Low	75 (52.1)	4.59 (2.43-8.66)	
Employment status			
Employed	71 (30.1)	Reference	<0.001
Unemployed	92 (48.7)	2.54 (1.46-4.42)	
Multi-morbidity			
Absent	21 (19.3)	Reference	<0.001
Present	142 (44.9)	2.91 (1.63-5.19)	

* Significance level in multivariate analysis, OR: Odds Ratio, CI: Confidence Interval

the above two studies. The mean score of social domains in our study was 63.4, which was similar to that reported among Iranian women diabetes patients.[28] This could be due to the higher health care access in the state of Kerala and other supports from the individual and community level. A similar trend is seen among diabetes patients in Ethiopia.[27]

The findings from a study in Bihar state reported that quality of life was poor among diabetes patients compared to non-diabetes patients.[29] We found that 38% of our study respondents had poor quality of life. Similar to that reported among diabetes patients in the Karnataka state of India,[30] our study reported that poor quality of life was highest in the environmental domain. In this study, only a small fraction of people had a good quality of life is a point that needs to be highlighted.

Quality of life is shaped by a myriad number of factors such as age, gender, socio-economic status, educational status, presence/absence of co-morbidities, gender, employment status, and local cultural factors.[31-33] We found an inverse association of age with overall as well as all the domains of quality of life. This is also reported in studies conducted across the globe.[27,28,34-36] One of the possible reasons for this association could be the drop in physiological function as one ages.[37] Like other studies, we also found an association between medium or low socioeconomic status, lower educational status, and unemployment status with poor HRQoL.[25,38,39] The significant association of higher QoL in the high socio-economic groups was reflected in all domains of physical, psychological, social, and environmental. Interestingly, we could not find a significant association between gender and poor QoL. This is in contrast to the existing evidence that associates the role of gender with QoL. Studies conducted across the globe including in India have reported poorer QoL among women with diabetes as compared to men.[10,16,40-42] Our contradictory finding needs further exploration.

The presence of co-morbidity was associated with poor QoL. The possible justification could be that the presence of co-morbidity would have increased the number of medicines they are supposed to take which also means spending more to buy these medicines, and need to consider the amount of time for treatment and hospital admission. There is a possibility that these various drugs may interact to produce side effects which in turn have the potential to hamper QoL.[43] As reported earlier, older adults, women, and those using insulin and/or oral medication were more likely to have multi-morbidity compared to their counterparts.[44]

Comparable data on quality of life are often hampered by different study measurements, samples, and geographics, although the increasing use of the WHO-BREF has been reported. We found only two community-based studies on QoL and diabetes in India.[16,17] The major strength of the present study is that we selected respondents from a rural community using a representative sampling technique and measured HRQoL using an internationally validated tool.[23,45] Our study also attempted to present the HRQoL with a more comprehensible interpretation by dividing the overall QoL into 'poor' and 'good'. One limitation of the study is that we didn't consider the severity of the disease. The level of glycemic control in diabetes patients was not determined. The interrelationship of the independent categorical variables might have influenced the results of the multivariate analysis, however, multicollinearity might not be a problem. There is also the limitation of self-reporting including the possibility of recall bias.

Conclusion

The study found that more than a third of the diabetes patients in rural Kerala reported poor HRQoL. The main determinants of poor HRQoL found in the study were older age, low socioeconomic status, unemployment, less educated, and the presence of other morbidities. While the quality of life was relatively better for the social domain, it was poorer for the environmental, psychological, and physical domains. Hence, programs targeting the quality of life of diabetic patients should concentrate more on environmental, psychological, and physical health domains. There is a call for assessing HRQoL as part of the routine management of diabetes care in the state. The findings of the study could be utilized by the decision-makers and planners in developing interventions for improving the quality of life of diabetes patients in similar settings.

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Conflicts of interest

There are no conflicts of interest.

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