Quality of life of type 2 diabetes mellitus patients attending a tertiary care hospital of Northern India: A cross sectional study

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ABSTRACT

Introduction: Diabetes mellitus is a chronic and progressive metabolic disorder. According to the World Health Organization (WHO) there is "an apparent epidemic of diabetes, which is strongly related to lifestyle and economic change." Objective of the study was to assess the quality of life of people living with type 2 diabetes mellitus and factors associated with quality of life. Methods: A hospital-based cross-sectional study was conducted on 215 patients with diabetes mellitus. Quality of life was assessed using a generic instrument SF 36. The data was analyzed using SPSS, version 24.0. An independent t test and analysis of variance (ANOVA) were used to compare the means of each domain of quality of life within groups of various independent variables. Results: The mean age of respondents was 52.5 ± 11.0 years. The majority (87.4%) of the patients were married, Hindu by religion (88.8%), and belonged to upper socioeconomic class (28.8%). The mean duration since diagnosis of diabetes was 7.82 ± 6.0 years, and 80.4 percent of patients were on oral hypoglycemic agents. Hypertension was found to be the most common (24.6%) comorbidity. Age, education, socioeconomic status, duration of diabetes, type of treatment, complication of diabetes, comorbidities, and body mass index (BMI) were found to be significantly associated with various domains of SF-36. Conclusions: Diabetes has an adverse effect on quality of life of patients with diabetes. The most affected domain in male and female patients was vitality domain followed by general health domain of quality of life.

Keywords: Diabetes mellitus, quality of life, SF 36

Introduction

Diabetes is a common chronic metabolic disorder affecting lives and well-being of individuals, families, and societies worldwide. Once “a disease of the affluent,” now has become increasingly common among the poor.[1] Globally, an estimated 463 million adults (20–79 years) were living with diabetes mellitus in the year 2019, and by 2045 this is expected to rise to 700 million.[2]

India is the second largest country with number of adults living with diabetes worldwide after China.[3] In 2019, India had 77 million people living with diabetes and was the largest contributor to the regional mortality, with nearly one million estimated deaths attributable to diabetes.[3] Prevalence of high (>140 mg/dL) and very high (>160 mg/dL) blood sugar among

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Diabetes is a common threat that occurs irrespective of areas or social class. The dynamics of diabetes epidemic are changing rapidly. The progression of disease, especially poor glycemic control, leads to numerous potentially life threatening complications. The World Health Organization has defined Quality of Life 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.”

Quality of life (QOL) is an important health outcome, and considerations of QOL are gaining increasing importance in evaluation of health policy and medical intervention. With advances in health care technology, we have been successful in prolonging the lives of people living with chronic noncommunicable diseases. However, considering the debilitating complications, nothing much is being done to improve the quality of the prolonged life of diabetes patients.

There is very limited literature and research material available pertaining to the present study. Very few studies have been conducted in India to assess the QOL in type 2 diabetes mellitus patients, with most of the studies conducted in Southern India, while the Northern region remained largely understudied. With this background in view, the present study was undertaken with an objective to assess the QOL of people living with type 2 diabetes mellitus and factors associated with quality of life.

**Materials and Method**

The present study was a cross-sectional study conducted on patients with type 2 diabetes mellitus attending a tertiary care center in Lucknow. The patients were enrolled from the Medicine OPD, which has a Diabetes Clinic that is attended by more than 100 patients every week. The sample size was calculated using the following formula: \[ n = \left( \frac{Z_{\alpha/2} \cdot \sigma}{d} \right)^2 \] where \( Z_{\alpha/2} \) is the value of two tailed alpha error at 95% confidence interval, SD is the standard deviation, and \( d \) is the acceptable deviation which was taken to be 2.5. Taking the SD to be 18.70 from a previous study where the mean value of QOL score was observed to be 59.47 ± 18.70, the minimum sample size was calculated to be 215.

A total of 215 patients were enrolled in the study, and a systematic random sampling method was used to select the patients for the study. A target of 8 to 10 patients was set per day and every tenth patient registered at Diabetes Clinic was included in the study. If the selected patient did not fulfill the inclusion criteria, then next registered patient was included. Patients with type 2 diabetes mellitus who were on treatment for 6 months and aged ≥18 years were included while other type of diabetes, pregnant patients, and uncooperative patients were excluded from the study.

A predesigned and pretested semi-structured interviewer administered schedule was used for data collection after taking informed consent from the participants. The ethical clearance was obtained from the Institutional Ethics Committee of King Georges Medical University before commencing the study.

Information on socio demographic characteristics, clinical history of disease, and QOL was collected. QOL was assessed using a Short Form (SF-36) scale. It is a generic instrument that assesses the health-related quality of life outcomes. The survey form consists of 36 items that measures 8 health domains namely physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH). A separate question about health transition (rating their health in general) is also included in this questionnaire.

The eight domains were scored on a scale of 0–100, “0” indicating the worst and “100” the best possible status. Ware et al. scoring manual was used for calculating scores. After data entry, items and scales were scored in three steps:

1. Item recoding, for the 10 items that require recoding.
2. Computing scale scores by summing across items in the raw scale.
3. Raw scale scores were transformed to a 0–100 scale (transformed scale scores).

Data were analyzed using the IBM SPSS, version 24.0. Descriptive statistics such as mean (SD) for continuous variables and frequency along with their percentage for categorical variables were determined. An independent t test and an analysis of variance (ANOVA) were used to compare the means of each domain of quality of life within groups of various independent variables. The level of significance was considered at \( P \) value less than 0.05.

**Results**

The mean age of all patients was observed to be 52.5 ± 11.0 years. The majority (87.4%) of the patients were married and Hindu by religion (88.8%). More than one third (37.2%) of the total patients were graduate and above followed by illiterates (17.2%). Half (50.2%) of the study patients were employed and more than two third (71.6%) belonged to an urban area [Table 1].

About 73.1 percent of patients were obese followed by 17.2 percent patients who were overweight. Normal range of body mass index (BMI) was observed in 8.8 percent of patients. A maximum of the males (68.5%) and females (79.1%) were obese followed by overweight [Figure 1].

The mean duration since diagnosis of diabetes was 7.82 ± 6.0 years. Out of the total study patients, 80.5 percent of patients were on oral hypoglycemic agents and along with lifestyle modification. Most (91.6%) of the patients did not have any complication. Among patients, hypertension was found to be the most common (24.6%) co-morbidity [Table 2].
The mean score of QOL of the patients was lowest in vitality domain (47.46 ± 15.63), whereas highest score was attained for social functioning domain (86.04 ± 22.28), followed by bodily pain (78.54 ± 18.01), physical functioning domain (74.39 ± 21.35), mental health domain (66.77 ± 12.99), role physical domain (62.67 ± 21.46), role emotional domain (59.84 ± 24.4), and general health domain (50.27 ± 17.08) of QOL. Most commonly affected domain in both male and female patients was vitality domain while social functioning domain was least affected among both male and female patients. About 64.7 percent of patients in the study perceived that their health is fair, followed by 19.4 percent who thought their health to be good, while only 15.8 percent of the patients perceived their health to be poor.

Age was significantly associated with all the domains of QOL except for role limitation and role emotion domain of QOL. Male patients perceived a better QOL as compared to females, and there was a statistically significant difference in the mean scores of males and females for the bodily pain, role emotion, and mental health domains of quality of life. Married patients had better scores as compared to widowed patients in the physical functioning, vitality, and social functioning domain of quality of life, and this was found to be statistically significant. Patients with more years of schooling had better scores in general health, vitality, role emotional, and mental health domains of quality of life except in role physical domain where patients up to primary education had better scores than patients with higher education.

The association between employment status and QOL revealed

Figure 1: Body Mass Index of Type 2 Diabetes Mellitus Patients

Table 1: Distribution of type 2 diabetes mellitus patients by their socio-demographic characteristics

| Socio-demographic variables | Males (n=124) | Females (n=91) | Total (n=215) |
|----------------------------|--------------|---------------|--------------|
| Age of participants (years) |              |               |              |
| 30 - <40                   | 12 (9.7)     | 14 (15.4)     | 26 (12.1)    |
| 40 - <50                   | 20 (16.1)    | 28 (30.7)     | 48 (22.4)    |
| 50 - <60                   | 46 (37.1)    | 30 (33.0)     | 76 (35.3)    |
| ≥60                        | 46 (37.1)    | 19 (20.9)     | 65 (30.2)    |
| Mean Age±SD                | 54.9±10.7    | 49.3±10.7     | 52.5±11.0    |
| Marital Status             |              |               |              |
| Married                    | 108 (87.1)   | 80 (87.9)     | 188 (87.4)   |
| Widowed/Widower            | 16 (12.9)    | 11 (12.1)     | 27 (12.6)    |
| Religion                   |              |               |              |
| Hindu                      | 112 (90.3)   | 79 (86.8)     | 191 (88.8)   |
| Muslim                     | 12 (9.7)     | 12 (13.2)     | 24 (11.2)    |
| Category                   |              |               |              |
| SC/ST                      | 12 (9.7)     | 12 (13.2)     | 24 (11.2)    |
| Other Backward Class       | 46 (37.1)    | 12 (13.2)     | 58 (27.0)    |
| Unreserved                 | 66 (53.2)    | 67 (73.6)     | 133 (61.8)   |
| Education                  |              |               |              |
| Upto Primary               | 24 (19.4)    | 45 (49.5)     | 69 (32.1)    |
| Upto Senior Secondary      | 44 (35.5)    | 22 (24.2)     | 66 (30.7)    |
| Graduate and above         | 56 (45.2)    | 24 (26.4)     | 80 (37.2)    |
| Employment Status          |              |               |              |
| Employed                   | 91 (73.4)    | 17 (18.7)     | 108 (50.2)   |
| Homemaker                  | 0 (0)        | 67 (73.6)     | 67 (31.2)    |
| Unemployed/Retired         | 33 (26.6)    | 7 (7.7)       | 40 (18.6)    |
| Place of residence         |              |               |              |
| Rural                      | 34 (27.4)    | 27 (29.7)     | 61 (28.4)    |
| Urban                      | 90 (72.6)    | 64 (70.3)     | 154 (71.6)   |
| Socioeconomic Status*      |              |               |              |
| Class I                    | 44 (35.5)    | 18 (19.8)     | 62 (28.8)    |
| Class II and III           | 50 (40.3)    | 32 (35.2)     | 82 (38.1)    |
| Class IV and V             | 30 (24.2)    | 41 (45.1)     | 71 (33.0)    |

*Modified BG Prasad Scale
that there were significant differences in physical functioning, role physical, vitality, and mental health domains of quality of life. QOL was better in all domains in patients who belonged to upper class, and this was significant for general health, vitality, and mental health domains of quality of life [Table 3].

Physical functioning and social functioning domain of QOL was significantly associated with duration since diagnosis. The mean scores of all the domains of QOL was better in patients who were on oral hypoglycemic agents in comparison to those who were on insulin only or oral hypoglycemic agents and insulin both. This was found to be statistically significant for all domains of QOL except for role physical and role emotional domains of QOL. Patients with diabetic complications had lower scores in general health, role emotional, and mental health domains of QOL compared to those who did not report any complications, and this was found to be statistically significant. Moreover, patients with comorbidities showed significantly lower scores in the role physical and vitality domains of quality of life. The mean scores of different domains of quality of life of patients within normal range of BMI was better than those who were overweight and obese. This was found to be significantly associated with physical functioning and bodily pain domains of quality of life of diabetes patients [Table 4].

### Discussion

In this study, the association of socio demographic and diabetes-related variables with quality of life of patients with type 2 diabetes attending a tertiary care hospital was investigated. Among all the eight domains of QOL, the least affected domain was social functioning domain (86.04 ± 22.28) while the most affected domain was vitality domain (47.46 ± 15.63). The highest mean score in social domain was also reported in a study conducted among type 2 diabetes mellitus cases in West Ethiopia by Reba K et al. (2018). Similarly, in a study by Svedbo Engström M et al. (2019), vitality domain was found to be highly affected.

Socio-demographic status plays an important role in the QOL outcome. In the present study, age was significantly associated with all the domains of QOL except for role physical and role emotional domains of QOL. These findings are consistent with the results of the study performed by Zurita-Cruz JN (2018) in which a significant association between age and domains of QOL was observed.

In view of gender, male patients perceived a better quality of life as compared to females and there was a statistically significant difference in the bodily pain, role emotion, and mental health domains of quality of life. Shaheen F et al. (2013) in their study observed that there was a statistically significant difference in the physical functioning, vitality, bodily pain, mental health, and general health domains of QOL, and this result is in accordance with the result of present study.

Patients with more years of schooling had better scores of QOL in general health, vitality, role emotion, and mental health domains except in role physical domain where patients up to primary education had better scores than patients with higher education. Similar findings were observed by Altinok A et al. (2016) in their study that patients with more years of schooling had statistically significantly better QOL of life in all domains except for social functioning domain of SF 36.

When the QOL scores according to the occupation of the patients enrolled in our study were examined, it was observed...
In the present study, patients with less than 2 years of diabetes had better scores in physical functioning domain than those of patients with more years of duration of diabetes, and this difference was found to be statistically significant. Previous studies conducted by Kumar SA et al. (2016)[18] and Javanbakht M et al. (2016)[17] in their study showed that there was a statistically significant association between age and physical functioning and vitality domain of SF 36, which is in accordance with the result of the present study.

Patients who were on oral hypoglycemic agents had better QOL and this was found to be significant in all domains except for bodily pain, however, contrast results were reported by Gautam Y et al. (2009)[9] in which there was no significant relation between treatment types and different domains of QOL.

With respect to complications, patients with complications had lower scores in general health, role emotional, and mental health domains of QOL in comparison to those without any complications, and this was found to be statistically significant.

### Table 3: Association of all the domains of Quality of Life of Type 2 Diabetes Mellitus patients with Socio-Demographic Variables

| Socio-demographic variables | PF | RP | BP | GH | VT | SF | RE | MH |
|-----------------------------|----|----|----|----|----|----|----|----|
| Age | | | | | | | | |
| ≤39 | 79.2±16.8 | | | 54.8±14.0 | 48.8±14.3 | | 65.2±11.9 | |
| 40-49 | 85.3±13.7 | | | 54.6±13.6 | 53.3±12.6 | | 65.9±11.3 | |
| 50-59 | 72.7±26.0 | | | 48.1±18.8 | 45.0±17.4 | | 64.6±15.1 | |
| ≥60 | 67.2±20.0 | | | 47.6±17.6 | 44.8±14.5 | | 65.2±11.9 | |
| p-value | <0.001 | 0.53 | 0.01 | 0.049 | 0.009 | 0.006 | 0.32 | 0.032 |
| Gender | | | | | | | | |
| Male | 75.4±22.9 | 60.4±23.1 | 81.4±18.1 | 51.7±17.3 | 48.8±14.3 | 85.2±22.9 | 62.9±23.7 | 68.8±11.5 |
| Female | 73.1±18.1 | 63.6±18.2 | 76.3±17.6 | 48.3±16.6 | 45.5±17.0 | 87.1±21.4 | 55.6±24.8 | 63.9±14.2 |
| p-value | 0.42 | 0.06 | 0.04 | 0.14 | 0.12 | 0.55 | 0.032 | 0.008 |
| Marital Status | | | | | | | | |
| Married | 75.5±21.4 | 62.1±21.8 | 78.8±18.2 | 50.8±17.1 | 48.2±15.9 | 89.0±19.4 | 60.1±24.3 | 67.3±13.1 |
| Widowed | 66.4±19.5 | 66.6±18.3 | 77.0±16.6 | 46.4±16.4 | 42.0±11.6 | 64.8±29.2 | 58.0±25.4 | 62.7±11.4 |
| p-value | 0.032 | 0.30 | 0.64 | 0.20 | 0.018 | <0.001 | 0.68 | 0.008 |
| Education Status | | | | | | | | |
| Upto V | 75.0±18.3 | 69.2±19.2 | 82.8±17.4 | 48.1±16.2 | 46.1±13.9 | 84.8±24.3 | 52.6±23.1 | 63.5±13.7 |
| VI to XII | 76.3±17.2 | 52.2±23.9 | 76.4±18.9 | 47.3±16.3 | 41.8±14.3 | 82.8±20.8 | 58.1±25.0 | 64.2±13.3 |
| Above XII | 72.2±26.3 | 65.6±17.9 | 76.5±17.3 | 54.6±17.7 | 53.2±16.2 | 90.3±21.1 | 67.5±23.1 | 71.6±10.6 |
| p-value | 0.49 | <0.001 | 0.05 | 0.015 | <0.001 | 0.07 | 0.001 | <0.001 |
| Employment Status | | | | | | | | |
| Employed | 78.3±22.8 | 64.9±20.2 | 78.7±17.8 | 52.4±16.9 | 50.6±13.4 | 86.5±22.8 | 61.7±24.8 | 69.3±10.8 |
| Homemaker | 73.2±17.1 | 64.9±18.9 | 81.3±17.8 | 46.4±16.5 | 43.3±17.1 | 85.4±20.9 | 57.7±21.3 | 63.1±14.5 |
| Unemployed/Retired | 65.7±21.9 | 53.7±26.8 | 73.3±17.9 | 50.9±17.5 | 45.7±17.1 | 85.2±23.4 | 58.3±27.9 | 65.9±14.2 |
| p-value | 0.005 | 0.014 | 0.08 | 0.07 | 0.008 | 0.94 | 0.52 | 0.007 |
| Socio economic status | | | | | | | | |
| Class I | 77.2±20.3 | 64.1±18.4 | 81.3±16.5 | 54.3±17.1 | 50.8±13.5 | 65.1±22.9 | 87.1±20.3 | 71.2±12.0 |
| Class II & III | 72.1±23.4 | 60.9±22.2 | 76.8±18.6 | 49.9±17.3 | 48.9±6.9 | 59.3±25.7 | 88.4±21.9 | 68.1±11.9 |
| Class IV & V | 74.4±19.5 | 63.4±23.0 | 78.1±18.5 | 47.1±16.2 | 42.8±14.8 | 55.9±23.7 | 82.4±25.0 | 61.3±13.3 |
| p-value | 0.37 | 0.65 | 0.33 | 0.048 | <0.001 | 0.09 | 0.22 | 0.001 |

PF=Physical functioning; RP=Role Physical, BP=bodily pain, GH=General Health, VT=Vitality, SF=Social functioning, RE=Role emotional, MH=Mental Health
Diabetes mellitus being a chronic disease with lifelong implications, the QOL of the patients is bound to get affected. It is of utmost importance to understand the effect of diabetes on QOL for clinical management and also for health policy makers in order to improve the QOL and health outcomes of those with diabetes. Physicians starting from primary to tertiary levels should always take into account the QOL of the patients while initiating or modifying the treatment to get a better adherence and compliance to the prescribed therapy.

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Conflicts of interest
There are no conflicts of interest.

Conclusion
To conclude, this study has shown that diabetes mellitus has an adverse effect on QOL. Most affected domain in male and female patients was vitality domain followed by general health domain of QOL. It was observed that socio-demographic factors were significantly associated with QOL in patients with type 2 diabetes mellitus such as age, gender, education level, marital status, and employment status in various SF-36 domains. Clinical variables such as duration of illness and type of treatment were significantly associated with QOL of type 2 diabetes mellitus patients. The presence of diabetes complications and comorbidities had an adverse effect on QOL of the type 2 diabetes patients.

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