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Sociodemographic and clinical determinants of health-related quality of life among patients with type 2 diabetes mellitus: a cross-sectional analysis using the WHOQOL-BREF in a South Indian tertiary care setting

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Article

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Abstract

Background

Type 2 diabetes mellitus (T2DM) diminishes health-related quality of life (QOL), but the sociodemographic and clinical factors that shape QOL are incompletely characterised in South Indian tertiary care populations. We examined the determinants of QOL across the four WHOQOL-BREF domains among adults with T2DM in Mysuru, India.

Methods

This cross-sectional analysis used baseline data from 360 adults with T2DM attending the diabetic clinic of a tertiary care teaching hospital. QOL was assessed with the validated WHOQOL-BREF instrument (physical, psychological, social relationships, and environmental domains, each transformed to a 0–100 scale). Associations with sociodemographic and clinical characteristics were examined using the Kruskal–Wallis and Mann–Whitney U tests and Spearman correlation, followed by multivariable linear regression for each domain (predictors: age, sex, residence, education, socioeconomic status, and duration of diabetes). A p value < 0.05 was considered significant, and all analyses were independently verified against the raw dataset.

Results

Median (IQR) domain scores were 56 (44–63) for physical, 56 (44–63) for psychological, 50 (44–56) for social, and 50 (44–63) for environmental. Longer duration of diabetes was independently associated with lower QOL across all four domains (β per year: physical − 0.70, psychological − 0.73, social − 1.15, environmental − 0.62; all $p < 0.01$). Higher educational attainment was independently associated with higher QOL in the physical (β = 1.68, $p < 0.001$), social (β = 1.89, $p = 0.003$), and environmental (β = 1.70, $p = 0.006$) domains. Older age and rural residence were associated with lower QOL in univariate analysis. Sex, body mass index, and glycaemic-monitoring frequency were not significantly associated with QOL.

Conclusions

Among South Indian adults with T2DM, longer disease duration and lower educational attainment were the most consistent determinants of poorer quality of life. These groups should be prioritised for targeted psychosocial and self-management support within diabetes care.

Background

Type 2 diabetes mellitus (T2DM) is a leading global non-communicable disease, and India carries the second-largest national burden, with an estimated 101 million adults affected [1, 2]. Beyond its effects

on glycaemic control and the risk of complications, T2DM substantially reduces health-related quality of life (QOL) across physical, psychological, social, and environmental dimensions [3, 4]. As diabetes care increasingly recognises patient-reported outcomes as central to management success, understanding which patients experience the greatest reduction in QOL—and why—is essential for targeting supportive interventions.

The World Health Organization Quality of Life – BREF (WHOQOL-BREF) instrument is a validated, cross-culturally applicable measure widely used to quantify QOL in chronic disease [5]. Systematic reviews indicate that QOL in T2DM is shaped by a range of sociodemographic and clinical factors, including age, education, socioeconomic status, disease duration, treatment complexity, and complications, though the relative importance of these determinants varies across populations [3]. Evidence from South Indian tertiary care settings, where sociodemographic gradients and disease patterns differ from Western cohorts, remains limited.

Prior work from the Mysuru clinical context has shown that structured, technology-enabled interventions can improve QOL among T2DM patients [6, 7]. However, effective targeting of such interventions requires first identifying the patient subgroups at greatest risk of poor QOL. We therefore analysed the sociodemographic and clinical determinants of QOL, across all four WHOQOL-BREF domains, among adults with T2DM attending a tertiary care hospital in Mysuru, South India.

Methods

Study design and setting

This was a cross-sectional analysis of baseline data collected from adults with T2DM attending the diabetic clinic of the Department of Community Medicine and General Medicine, JSS Medical College and Hospital, Mysuru, a tertiary care teaching hospital in South India. The reporting follows the STROBE guidance for cross-sectional studies.

Participants

Adults aged more than 18 years with a diagnosis of T2DM of at least one year's duration, willing to participate, were included. Patients who were bedridden, had neuropsychiatric disorders, had gestational diabetes mellitus, or had severe complications were excluded. A total of 360 participants were enrolled through purposive sampling until the required sample size was reached.

Measurements

QOL was assessed using the validated WHOQOL-BREF instrument, comprising 26 items across four domains—physical, psychological, social relationships, and environmental—plus two general items; domain scores were transformed to a 0–100 scale, with higher scores indicating better QOL. A semi-

structured questionnaire captured sociodemographic characteristics (age, sex, residence, education, occupation, family structure, marital status, and socioeconomic status by the updated B.G. Prasad classification) and clinical characteristics (body mass index [BMI], duration of diabetes, current treatment, family history, and frequency of blood glucose monitoring).

Statistical analysis

Data were analysed using SPSS version 30 and independently re-verified using Python (pandas, SciPy, statsmodels). Domain scores were summarised as median and interquartile range (IQR), as they were not normally distributed. Bivariate associations between QOL domains and categorical characteristics were tested using the Mann–Whitney U and Kruskal–Wallis tests, and associations with continuous variables (age, BMI, duration) using Spearman correlation. To identify independent determinants, multivariable linear regression was fitted for each domain, with age, sex, residence (rural vs urban), educational level, socioeconomic level, and duration of diabetes as predictors. A p value < 0.05 was considered statistically significant.

Ethics

The study was approved by the Institutional Ethical Committee, JSS Medical College (JSS/MC/PG/23–24/2023-24), and written informed consent was obtained from all participants.

Results

A total of 360 adults with T2DM were analysed, with an equal number of men and women (180 each). The baseline sociodemographic and clinical characteristics are summarised in Table 1. Grade I obesity was prevalent (73.3%), most participants had a family history of diabetes (70.3%), and the majority were on oral antidiabetic drugs (59.4%).

Table 1
Baseline characteristics and WHOQOL-BREF domain scores (N = 360).

Characteristic	Value
Age, mean (SD), years	58.6 (10.2)
Male / Female, n	180 / 180
Residence: urban / rural, n	196 / 164
Education ≤ primary, n (%)	112 (31.1)
Family history of diabetes, n (%)	253 (70.3)
Duration of diabetes, median (IQR), years	6 (3–10)
On oral drugs / insulin / both / none, n	214 / 79 / 44 / 23
Grade I obesity, n (%)	264 (73.3)
WHOQOL-BREF physical, median (IQR)	56 (44–63)
WHOQOL-BREF psychological, median (IQR)	56 (44–63)
WHOQOL-BREF social, median (IQR)	50 (44–56)
WHOQOL-BREF environmental, median (IQR)	50 (44–63)

Quality of life scores

Median (IQR) WHOQOL-BREF domain scores were 56 (44–63) for the physical domain, 56 (44–63) for the psychological domain, 50 (44–56) for the social relationships domain, and 50 (44–63) for the environmental domain (Table 1). The social relationships domain had the lowest median score.

Bivariate determinants

QOL varied significantly by several sociodemographic characteristics (Table 2). Higher educational attainment was associated with higher scores across all four domains (physical $p < 0.001$, psychological $p = 0.002$, social $p < 0.001$, environmental $p < 0.001$), as was higher socioeconomic status (all four domains, $p \leq 0.004$). Older age was associated with lower QOL in all domains (physical $p = 0.002$, psychological $p < 0.001$, social $p < 0.001$, environmental $p = 0.009$), and rural residence with lower QOL in the physical ($p < 0.001$), psychological ($p = 0.002$), and environmental ($p = 0.004$) domains. Longer duration of diabetes correlated negatively with all four domains (Spearman r: physical − 0.30, psychological − 0.29, social − 0.37, environmental − 0.25; all $p < 0.001$) (Fig. 1). Sex, BMI category, and frequency of blood glucose monitoring were not significantly associated with QOL in any domain.

Table 2
WHOQOL-BREF domain scores by education, residence, and age (median [IQR]).

Group	Physical	Psychological	Social	Environmental	p*
Education: ≤ primary	56 (44–56)	50 (44–56)	50 (44–56)	50 (44–63)	< 0.001
Education: middle/high	56 (44–63)	50 (44–63)	50 (31–56)	50 (44–63)	
Education: ≥ higher secondary	56 (50–69)	56 (50–69)	56 (44–69)	63 (50–75)	
Residence: urban	56 (50–63)	56 (48–69)	50 (44–69)	56 (50–69)	≤ 0.004†
Residence: rural	56 (44–56)	50 (44–63)	50 (44–56)	50 (44–63)	
Age ≤ 50 years	56 (50–69)	60 (50–74)	56 (44–69)	63 (46–69)	≤ 0.009‡
Age 51–70 years	56 (44–63)	53 (44–63)	50 (37–56)	50 (44–63)	
Age > 70 years	50 (44–56)	44 (44–56)	50 (41–50)	50 (44–56)	

**Kruskal–Wallis test across education tiers (all four domains p < 0.001). †Residence: physical p < 0.001, psychological p = 0.002, environmental p = 0.004; social p = 0.059 (not significant). ‡Age category: physical p = 0.002, psychological p < 0.001, social p < 0.001, environmental p = 0.009.*

Independent determinants

In multivariable linear regression (Table 3), longer duration of diabetes was independently associated with lower QOL in all four domains (β per year: physical − 0.70, 95% CI − 0.97 to − 0.42; psychological − 0.73, − 1.06 to − 0.40; social − 1.15, − 1.54 to − 0.77; environmental − 0.62, − 0.99 to − 0.25; all p < 0.01). Higher educational level was independently associated with higher QOL in the physical (β = 1.68, p < 0.001), social (β = 1.89, p = 0.003), and environmental (β = 1.70, p = 0.006) domains. After adjustment, age, sex, and residence were no longer independent predictors. The socioeconomic-status coefficient was negative in the adjusted models, in the opposite direction to its positive bivariate association; this reflects moderate collinearity between education and socioeconomic status (Spearman r = 0.48), with educational attainment emerging as the more robust socioeconomic determinant. The models explained 8–15% of the variance in domain scores (adjusted R^2: physical 0.154, social 0.152, psychological 0.124, environmental 0.082; all models p < 0.001).

Table 3
Multivariable linear regression: independent determinants of WHOQOL-BREF domain scores.

Predictor	Physical β (p)	Psychological β (p)	Social β (p)	Environmental β (p)
Duration of diabetes (per year)	−0.70 (< 0.001)	−0.73 (< 0.001)	−1.15 (< 0.001)	−0.62 (0.001)
Education level (per tier)	1.68 (< 0.001)	1.04 (0.062)	1.89 (0.003)	1.70 (0.006)
Age (per year)	−0.08 (0.246)	−0.15 (0.058)	−0.11 (0.243)	−0.07 (0.399)
Rural residence	−1.69 (0.239)	−2.18 (0.207)	−1.45 (0.470)	−1.22 (0.526)
Male sex	0.44 (0.718)	0.43 (0.770)	0.68 (0.686)	0.10 (0.952)
Socioeconomic level (per tier)	−1.55 (0.036)	−0.43 (0.634)	−2.90 (0.005)	−0.57 (0.564)
Adjusted R^2	0.154	0.124	0.152	0.082

Multivariable linear regression, N = 355. β = unstandardized coefficient; positive values indicate higher quality of life. All four models significant at p < 0.001. The negative adjusted socioeconomic coefficient reflects collinearity with education (Spearman r = 0.48); education is the more robust socioeconomic determinant.

Discussion

In this cross-sectional analysis of 360 South Indian adults with T2DM, longer duration of diabetes and lower educational attainment were the most consistent independent determinants of poorer quality of life. Duration was the only factor independently associated with lower QOL across all four WHOQOL-BREF domains, and education was independently protective in three. In contrast, sex, BMI, and frequency of glucose monitoring showed no meaningful association with QOL.

The strong, pervasive effect of disease duration is consistent with the cumulative burden of long-standing diabetes—accumulating complications, treatment fatigue, and psychosocial strain—and mirrors findings from systematic reviews linking longer duration to reduced QOL [3]. The independent protective effect of education aligns with the health-literacy pathway, whereby better-educated patients more effectively navigate self-management, health services, and coping resources. The lowest median score occurred in the social relationships domain, suggesting that the interpersonal impact of diabetes may be under-recognised in routine care.

These findings have practical implications for a resource-constrained setting. Because patients with long-standing diabetes and limited education are at greatest risk of poor QOL, they should be prioritised for targeted psychosocial support, simplified self-management education, and, where available,

technology-enabled interventions—which have improved QOL in this same population [6, 7]. Screening for QOL by duration and education could help clinics allocate scarce supportive resources efficiently.

Strengths and limitations

Strengths include a substantial sample of 360 participants with complete data, use of the validated WHOQOL-BREF instrument, an equal sex distribution, a balanced rural–urban composition, and independent re-verification of all statistics. Limitations include the cross-sectional design, which precludes causal inference; purposive sampling from a single tertiary care clinic, which may limit generalisability; the moderate proportion of variance explained by the models, indicating unmeasured determinants (e.g., complications, comorbidity, depression); and reliance on the self-reported WHOQOL-BREF. Longitudinal and multi-centre studies incorporating clinical complication data would strengthen these findings.

Conclusions

Among South Indian adults with T2DM, longer duration of diabetes and lower educational attainment were the most consistent determinants of poorer quality of life across the WHOQOL-BREF domains, while the social relationships domain scored lowest overall. Diabetes care in this setting should prioritise patients with long-standing disease and limited education for targeted psychosocial and self-management support.

Abbreviations

BMI
Body mass index
IQR
Interquartile range
QOL
Quality of life
T2DM
Type 2 diabetes mellitus
WHOQOL-BREF
World Health Organization Quality of Life – BREF instrument.

Declarations

Ethics approval and consent to participate

The study was approved by the Institutional Ethical Committee of JSS Medical College, JSS Academy of Higher Education & Research, Mysuru (approval number JSS/MC/PG/23–24/2023-24). Written informed consent was obtained from all participants prior to enrolment. All methods were carried out in accordance with the Declaration of Helsinki and relevant institutional guidelines and regulations.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Author Contribution

K.M. and S.K.D. conceived and designed the study. K.M. collected the data. A.G. performed and verified the statistical analysis and prepared Fig. 1. K.M. and S.K.D. drafted the main manuscript text. A.G. and L.S.A. critically revised the manuscript for important intellectual content. S.K.D. supervised the study as corresponding author. All authors reviewed and approved the final manuscript.

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Data Availability

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

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Figures

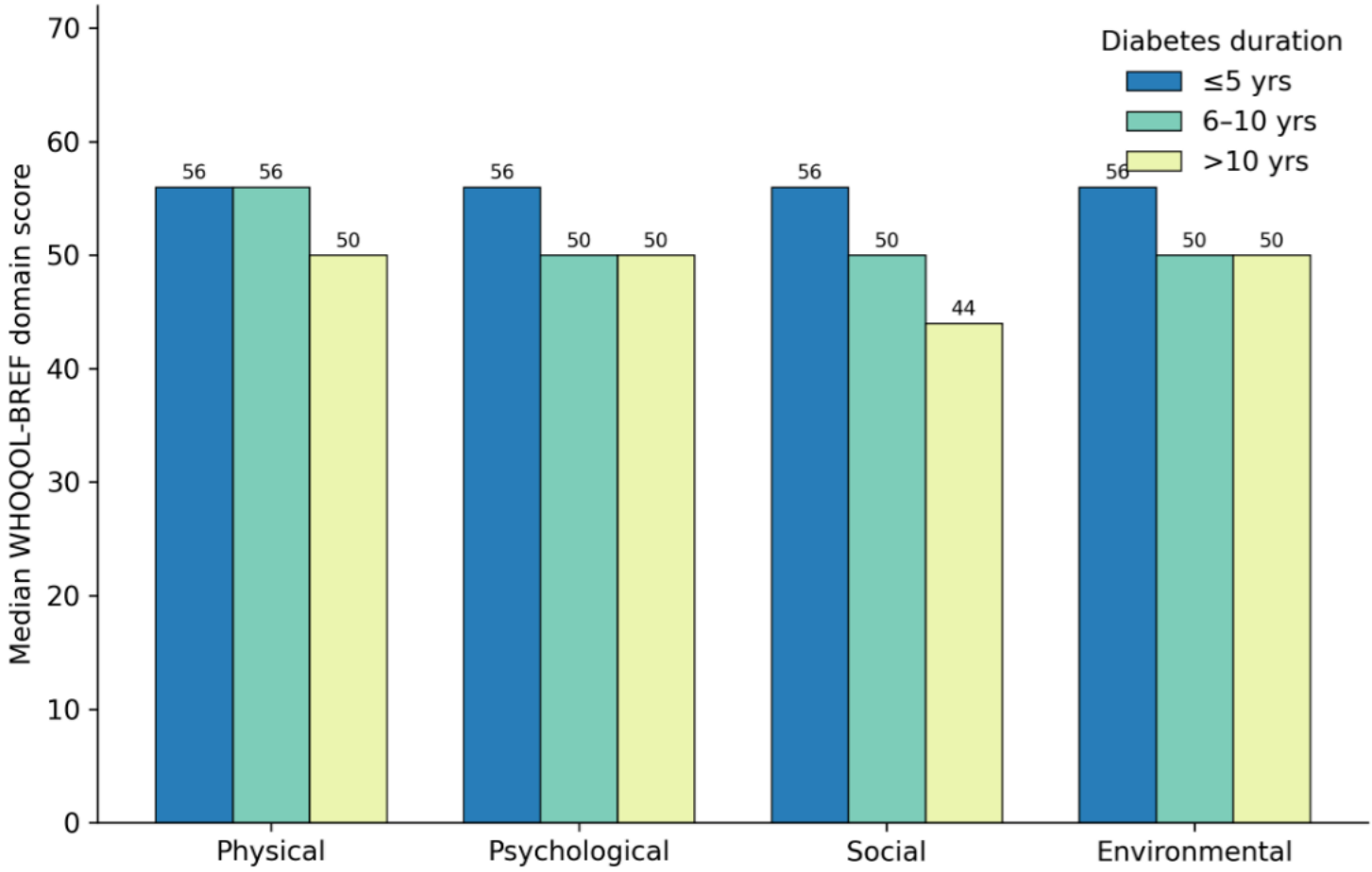


Figure 1

Median WHOQOL-BREF domain scores by duration of diabetes (≤5, 6–10, and >10 years). Longer duration was associated with progressively lower quality of life across all four domains, most markedly in the social relationships domain.

Supplementary Files

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