



Original Article

Fatigue and Quality of Life in Adults with Diabetes Mellitus with and without Depression at a Tertiary Care Centre in Bikaner

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ABSTRACT

Background: Depression may increase the burden of fatigue and impaired quality of life in people with diabetes mellitus. Assessing these outcomes alongside glycaemic measures may help identify unmet care needs.

Objective: To compare fatigue and quality of life among adults with diabetes with and without depression and controls without diabetes, and to examine the correlations of fatigue with clinical measures and depressive symptom severity.

Methods: This comparative cross-sectional study included 90 participants in three groups of 30: diabetes with depression, diabetes without depression and controls without diabetes. Depression was diagnosed using ICD-10 criteria, and participants were assessed using the Beck Depression Inventory-II, Fatigue Severity Scale and WHOQOL-BREF. Fasting blood glucose, glycated haemoglobin and body mass index were also measured.

Results: Fatigue was observed in 35/60 (58.3%) participants with diabetes and 4/30 (13.3%) controls. Severe fatigue occurred in 23/30 (76.7%) participants with diabetes and depression, 3/30 (10.0%) with diabetes without depression and no controls. Mean scores in all four WHOQOL-BREF domains were lowest in the group with diabetes and depression and highest in controls; omnibus comparisons were significant (all $p < 0.001$). Fatigue scores correlated positively with fasting blood glucose ($r = 0.318$), glycated haemoglobin ($r = 0.364$) and depressive symptom scores ($r = 0.719$).

Conclusion: Coexisting depression was associated with greater fatigue and lower quality-of-life scores among participants with diabetes. These findings support assessing mood, fatigue and daily functioning alongside glycaemic measures. The cross-sectional design precludes causal inference.

Keywords: Diabetes mellitus; Depression; Fatigue; Quality of life; Glycated haemoglobin.

INTRODUCTION

Diabetes mellitus creates a substantial burden of illness in India, extending beyond glycaemic abnormalities to daily functioning, psychological health and long-term treatment demands.^[1] Clinical assessment that focuses only on glucose control may overlook symptoms that matter to patients. Depression, fatigue and impaired quality of life are particularly relevant because they can occur together and complicate self-management.

A meta-analysis found that depression was more common in adults with diabetes than in those without diabetes.^[2] Depressive symptoms have been associated with poorer adherence, functional impairment and greater healthcare costs.^[3] Other studies have linked depression with diabetes complications, poorer glycaemic control and mortality.^[4-6] These associations do not establish a single causal pathway, but they support evaluating psychological symptoms during diabetes care.

Fatigue can interfere with routine activities and participation in treatment. It is a nonspecific symptom with physiological, psychological and behavioural contributors.^[7] Jain et al. examined fatigue and depression among industrial workers with

type 2 diabetes,^[8] while Goedendorp et al. investigated chronic fatigue in type 1 diabetes.^[9] Work demands and the perceived burden of diabetes may also contribute.^[10] Consequently, a single glucose measurement may not adequately explain fatigue severity.

Quality of life is similarly influenced by several aspects of diabetes. Evidence from adults with type 1 diabetes indicates that depression and selected complications are associated with reduced health-related quality of life.^[11] In type 2 diabetes, Wexler et al. identified depression and comorbidity as relevant correlates.^[12] However, differences in study populations and instruments limit direct comparison across reports. Examining fatigue and quality of life together may clarify how depressive symptoms accompany the clinical burden of diabetes in a local care setting.

The present study aimed to compare fatigue severity and quality-of-life domain scores among adults with diabetes and depression, diabetes without depression and controls without diabetes at a tertiary care centre in Bikaner. The relationships of fatigue with glycaemic measures, body mass index and depressive symptom severity were also examined.

MATERIALS AND METHODS

Study design and setting: This comparative cross-sectional study was conducted in the Department of Psychiatry in collaboration with the diabetic clinic at the Diabetes Care and Research Centre, PBM Hospital, Bikaner, from February to June 2016. Ninety participants were enrolled, with 30 in each study group.

Eligibility: Patients aged 20–60 years with type 1 or type 2 diabetes who could complete the assessments and provide written informed consent were eligible for the diabetes groups. Controls had no history of diabetes. Individuals unable to understand the assessment language, unwilling to participate, or with intellectual disability, psychotic disorders, substance abuse, neurological disease, other endocrine disorders or other chronic medical illness were excluded.

Recruitment and grouping: The purpose and procedures of the study were explained to potential participants, and written informed consent was obtained before enrolment. Depression was diagnosed according to ICD-10 criteria.^[13] Group I comprised 30 patients with diabetes and depression (DMD), and group II comprised 30 patients with diabetes without depression (DMWD). Group III comprised 30 accompanying spouses, relatives or neighbours without a history of diabetes.

Clinical assessment: Sociodemographic characteristics, family history of diabetes and body mass index were recorded. Fasting blood glucose (FBG) and glycated haemoglobin (HbA1c) were measured. For participants with diabetes, additional information was collected on diabetes type, illness duration, treatment duration, treatment modality and complications.

Depressive symptoms: Depressive symptom severity was assessed using the Beck Depression Inventory-II (BDI-II). This 21-item self-report instrument assesses symptoms over the preceding two weeks and yields a total score of 0–63.^[14] Group allocation was based on the ICD-10 clinical diagnosis, while symptom severity was assessed using the BDI-II.

Fatigue: Fatigue was assessed using the nine-item Fatigue Severity Scale (FSS), which measures the effect of fatigue on daily activities.^[15] The mean item score was calculated. Scores <4 indicated no fatigue, scores from 4 to <5 indicated moderate fatigue and scores ≥ 5 indicated severe fatigue.

Quality of life: Quality of life was assessed using WHOQOL-BREF, a 26-item instrument comprising two general items and 24 items covering physical health, psychological health, social relationships and environment.^[16] Domain scores were expressed on the 4–20 scale, with higher scores indicating better quality of life.

Statistical analysis: Data were entered in Microsoft Excel 2007 and analysed using SPSS version 22.0. Continuous variables were summarised as means and standard deviations, and categorical variables as counts and percentages. Categorical variables were compared using chi-square tests. Independent-samples t tests were used to compare the diabetes groups, and one-way analysis of variance (ANOVA) was used to compare quality-of-life domain scores across the three groups. Associations between fatigue scores and clinical measures were examined using correlation analyses.

Ethics: Ethical committee approval and permission from the Medical Superintendent of PBM Hospital, Sardar Patel Medical College, Bikaner, were obtained. All participants provided written informed consent.

RESULTS

The study included 90 participants, with 30 in each group. The sample included 62 men (68.9%) and 28 women (31.1%), with a mean age of 41.03 ± 8.28 years. Seventy-six participants (84.4%) were married, and 14 (15.6%) were unmarried, widowed or divorced. Farming was the most frequent occupation (37; 41.1%), followed by homemaking (25; 27.8%). Thirty-five participants (38.9%) were illiterate, 44 (48.9%) lived in joint families, 56 (62.2%) identified as Hindu and 60 (66.7%) lived in rural areas. Table 1 presents the group-specific characteristics.

Among the 60 participants with diabetes, 40 (66.7%) had type 2 and 20 (33.3%) had type 1 diabetes. Nineteen participants (31.7%) had complications or comorbidities: neuropathy in 11, hypertension in five and coronary artery disease in three. Mean illness duration was 6.98 ± 4.66 years in DMD and 4.76 ± 4.70 years in DMWD; the corresponding treatment durations were 6.65 ± 4.03 and 4.49 ± 4.60 years. Table 2 presents the clinical comparisons.

No fatigue, moderate fatigue and severe fatigue were observed in 4, 3 and 23 DMD participants; 21, 6 and 3 DMWD participants; and 26, 4 and 0 controls, respectively. Thus, fatigue was present in 26/30 DMD participants (86.7%), 9/30 DMWD participants (30.0%) and 4/30 controls (13.3%). Across the diabetes groups, 35/60 participants (58.3%) had fatigue (Figure 1). FSS scores correlated positively with FBG ($r=0.318$), HbA1c ($r=0.364$) and depressive symptom scores ($r=0.719$). Table 3 presents the correlation coefficients and p values.

Mean scores in all four WHOQOL-BREF domains were lowest in DMD, intermediate in DMWD and highest in controls (Table 4). The omnibus ANOVA showed significant differences among groups for every domain (all $p < 0.001$).

Table 1: Sociodemographic characteristics by study group

Variable/category	DMD (n=30)	DMWD (n=30)	Control (n=30)	χ^2	p value
Age, years (mean)	41.33	41.53	40.23	—	—
Sex: Male	19 (63.3)	21 (70.0)	22 (73.3)	0.726	0.696
Female	11 (36.7)	9 (30.0)	8 (26.7)	0.726	0.696
Marital status: Married	26 (86.7)	24 (80.0)	26 (86.7)	3.391	0.758
Unmarried	2 (6.7)	2 (6.7)	3 (10.0)	3.391	0.758
Widowed	2 (6.7)	3 (10.0)	1 (3.3)	3.391	0.758
Divorced	0 (0.0)	1 (3.3)	0 (0.0)	3.391	0.758
Occupation: Unemployed	3 (10.0)	3 (10.0)	5 (16.7)	8.47	0.583
Homemaker	10 (33.3)	9 (30.0)	6 (20.0)	8.47	0.583
Student	1 (3.3)	2 (6.7)	0 (0.0)	8.47	0.583
Professional	5 (16.7)	2 (6.7)	6 (20.0)	8.47	0.583
Skilled/semiskilled worker	1 (3.3)	0 (0.0)	0 (0.0)	8.47	0.583
Farmer	10 (33.3)	14 (46.7)	13 (43.3)	8.47	0.583
Education: Illiterate	13 (43.3)	13 (43.3)	9 (30.0)	4.96	0.549
Up to middle school	10 (33.3)	13 (43.3)	10 (33.3)	4.96	0.549
Middle-secondary	6 (20.0)	3 (10.0)	9 (30.0)	4.96	0.549
Graduate/postgraduate	1 (3.3)	1 (3.3)	2 (6.7)	4.96	0.549
Type of family: Nuclear	3 (10.0)	1 (3.3)	5 (16.7)	4.156	0.385
Nuclear extended	13 (43.3)	11 (36.7)	13 (43.3)	4.156	0.385
Joint	14 (46.7)	18 (60.0)	12 (40.0)	4.156	0.385
Religion: Hindu	16 (53.3)	22 (73.3)	18 (60.0)	3.85	0.427
Muslim	9 (30.0)	7 (23.3)	8 (26.7)	3.85	0.427
Sikh	5 (16.7)	1 (3.3)	4 (13.3)	3.85	0.427
Locality: Urban	12 (40.0)	7 (23.3)	11 (36.7)	2.100	0.350
Rural	18 (60.0)	23 (76.7)	19 (63.3)	2.100	0.350

Values are n (%) within each group unless indicated.

DMD, diabetes with depression; DMWD, diabetes without depression.

The χ^2 and p values apply to each variable as a whole. Group-specific age values are means.

Table 2: Clinical measures in participants with diabetes

Parameter	DMD Mean±SD	DMWD Mean±SD	t value	p value
HbA1c (%)	10.19±3.57	9.22±3.00	1.141	0.258
BMI (kg/m ²)	24.11±5.43	23.34±3.65	0.650	0.518
FBG (mg/dL)	197.10±109.67	164.26±63.95	1.417	0.162
Illness duration (years)	6.98±4.66	4.76±4.70	1.837	0.071
Treatment duration (years)	6.65±4.03	4.49±4.60	1.927	0.104

n=30 per group.

BMI, body mass index; FBG, fasting blood glucose; HbA1c, glycated haemoglobin; SD, standard deviation.

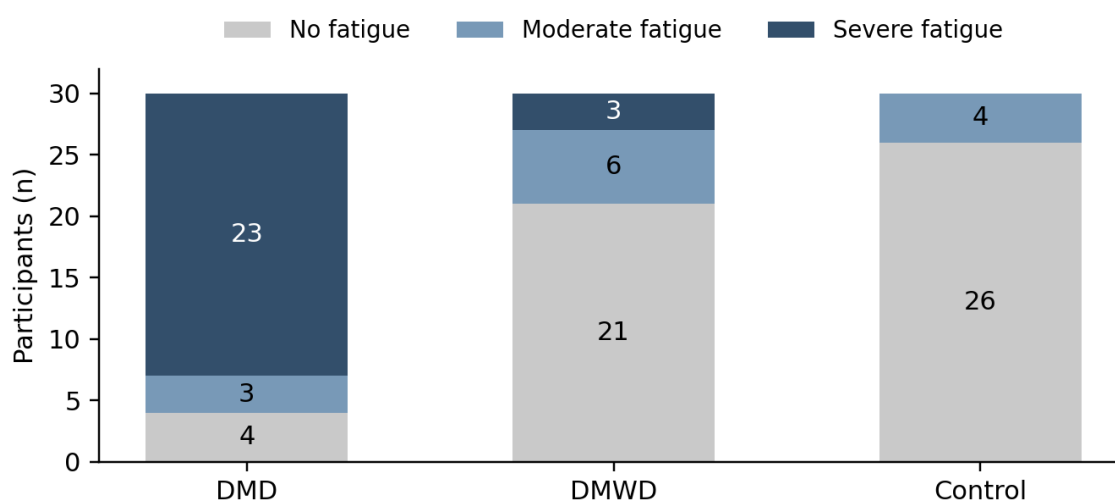


Figure 1: Fatigue severity by study group (Each group included 30 participants. Counts are shown within bars. FSS categories were <4, no fatigue; 4 to <5, moderate fatigue; and ≥5, severe fatigue.)

Table 3: Correlations of fatigue scores with clinical measures

Measure	r	p value
FBG	0.318	0.001
HbA1c	0.364	<0.001
BMI	-0.67	0.267
Depressive symptom score	0.719	<0.001

FSS, Fatigue Severity Scale; FBG, fasting blood glucose; HbA1c, glycated haemoglobin; BMI, body mass index; *r*, correlation coefficient.

Table 4: WHOQOL-BREF domain scores by study group

Domain	DMD Mean±SD	DMWD Mean±SD	Control Mean±SD	F value	p value
Physical health	10.30±2.03	12.76±1.01	14.38±1.83	45.60	<0.001
Psychological health	10.24±2.08	12.53±1.36	14.84±1.91	48.117	<0.001
Social relationships	10.04±3.02	12.40±1.83	14.97±2.26	31.03	<0.001
Environment	9.50±2.37	12.60±1.01	14.41±1.60	58.33	<0.001

n=30 per group.

Scores are presented on the 4–20 scale; higher scores indicate better quality of life. *F* values are from omnibus ANOVA comparisons across the three groups.

DISCUSSION

In the present study, participants with diabetes and depression experienced a greater burden of fatigue and had lower quality-of-life scores than those with diabetes without depression or controls. Severe fatigue was observed in 76.7% of the DMD group, compared with 10.0% of the DMWD group. The consistent pattern across fatigue severity and quality-of-life domains highlights the additional symptom burden associated with coexisting depression.

These findings are consistent with the association between fatigue and depressive symptoms described by Jain et al.^[8] Their industrial-worker sample differed from the present clinic-based population, which may affect the applicability of direct comparisons. Fritschi and Quinn describe several physiological, psychological and behavioural contributors to fatigue in diabetes,^[7] while Weijman et al. emphasise work-related and diabetes-related burden.^[10] Together, these observations support assessing mood and medical contributors when a patient with diabetes presents with fatigue. Not all of these potential contributors were evaluated in the present study.

Fatigue correlated positively with FBG and HbA1c. However, findings across diabetes populations are not uniform. Goedendorp et al. found that chronic fatigue in type 1 diabetes was not explained by hyperglycaemia or glucose variability.^[9] Differences in diabetes type, fatigue assessment and participant selection may partly explain this variation. The cross-sectional measurements cannot establish whether glycaemic fluctuations preceded fatigue, and continuous glucose-monitoring data were not collected.

Fatigue correlated more strongly with depressive symptom severity than with glycaemic measures. Mean scores in all four quality-of-life domains followed the same pattern, with the lowest scores in DMD and the highest in controls. Peasgood et al. found an association between depression and lower health-related quality of life in adults with type 1 diabetes,^[11] and Wexler et al. identified depression as a relevant correlate in type 2 diabetes.^[12] Although their populations and outcome measures differed from those of the present study, these findings support considering psychological health when evaluating the burden of diabetes. The present findings demonstrate a consistent pattern across physical health, psychological health, social relationships and environment.

No statistically significant differences were observed between the diabetes groups in the clinical measures shown in Table 2. This finding does not establish equivalence or exclude confounding, particularly given the modest group sizes. Diabetes type, complications, medication use, illness duration and socioeconomic circumstances may influence fatigue and quality of life. The observed group differences therefore cannot be attributed independently to depression.

Previous studies have associated depression with impaired adherence and functioning,^[3] diabetes complications,^[4] poor glycaemic control^[5] and mortality.^[6] These outcomes were not prospectively evaluated in the present study. The present findings nevertheless support including fatigue, mood and daily functioning in the clinical assessment of people with diabetes. Persistent fatigue should prompt evaluation of psychological and medical contributors, and patients with depressive symptoms should undergo an appropriate diagnostic assessment.

Limitations: The study was limited by its small sample and single-centre design. Type 1 and type 2 diabetes were analysed together. Controls were accompanying relatives or neighbours and may have shared environmental or familial factors with patients, limiting their representativeness. The effects of treatment, sleep, other causes of fatigue and overlap between depressive and fatigue symptoms were not fully assessed. The equal-sized groups were selected by diabetes and depression status, so the sample cannot be used to estimate the prevalence of depression in the clinic population. Finally, the cross-sectional design precludes conclusions about causality, and the omnibus ANOVA results do not establish the significance of individual pairwise comparisons.

CONCLUSION

Adults with diabetes and depression had more severe fatigue and lower mean quality-of-life scores than those with diabetes without depression and controls. These findings support assessing mood, fatigue and daily functioning alongside glycaemic measures in diabetes care. Larger prospective studies are needed to clarify the direction of these associations and the effects of addressing coexisting depressive symptoms.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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No external funding was received.

ABBREVIATIONS

ANOVA, analysis of variance; *BDI-II*, Beck Depression Inventory-II; *BMI*, body mass index; *DMD*, diabetes mellitus with depression; *DMWD*, diabetes mellitus without depression; *FBG*, fasting blood glucose; *FSS*, Fatigue Severity Scale; *HbA1c*, glycated haemoglobin; *ICD-10*, International Classification of Diseases, tenth revision; *QOL*, quality of life; *SD*, standard deviation; *WHOQOL-BREF*, World Health Organization Quality of Life brief questionnaire.

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