Original Article

Prevalence of Depression in Patients with Type II Diabetes Mellitus and its Impact on Quality of Life

Ranjan Das[1], Omprakash Singh[1,2], Rajarshi Guha Thakurta[1], M. R. Khandakar[3], S. N. Ali[1], Asim Kumar Mallick[1], Paromita Roy[1], Amit K. Bhattacharrya[1]

ABSTRACT

Background: Diabetes mellitus (DM) is a frequently encountered chronic metabolic disease with various complications throughout its course, which causes severe restriction and disability in an individual's life. It has been well documented that the incidence of depression is higher in diabetic patients and co-morbid depression causes further deterioration in the quality of life in diabetic patients. **Aims:** To study the prevalence of depression and its impact on quality of life in patients with type II DM. **Settings and Design:** Single centre, cross-sectional, single interview. **Materials and Methods:** Total 195 type II DM patients are included in this study. To diagnose Depressive Episode Structured Clinical Interview for DSM IV Axis-1 Disorders, Research Version patient edition was applied. All patients were evaluated with a semi-structured socio-demographic proforma to assess socio-demographic characteristics, Hamilton Rating Scale for Depression (HAM-D) and Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES–Q) SF (Short Form) to measure the quality of life. **Results:** Among them, 46.15% (*N*=90; males: 41, females: 49) met the DSM-IV diagnostic criteria for major depressive episodes. Among the depressed group, majority were (36.7%) moderately depressed. QLESQ-SF total and each item scores were significantly lower in the depressed group than in the non-depressed group. Both the HAM-D scores and HbA1c level have significant negative correlations with QLESQ-SF total scores. **Conclusion:** Our study demonstrates that the presence of depression in type II DM further deteriorates the quality of life of the patients. Therefore, treating depression would have a beneficial effect on the quality of life.

Key words: *Depression, diabetes mellitus, quality of life*

INTRODUCTION

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia.[1] It is a chronic disease that causes short- and long-term complications. It is a major health problem in the world. It is well documented that the prevalence of depression among patient with diabetes is higher than among the general population.[2] A recent meta analysis of 42 studies concluded that the presence of diabetes doubled the odds of co-morbid depressive disorder.[2] Depression may have special clinical relevance in diabetes since the two illnesses may affect each other. The major hypotheses that currently exist explains the linking pathway between diabetes and depression.

The first hypothesis asserts that depression precedes type II diabetes.

Chronic stress associated with depression leads to hypercortisolemia and it may cause centripetal obesity

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[1]Departments of Psychiatry, Burdwan Medical College and Hospital, Burdwan, [2]Nil Ratan Sarkar Medical College, [3]Medicine, SMMCH, Kolkata, West Bengal, India

Address for correspondence: Dr. Om Prakash Singh
Department of Psychiatry, Nil Ratan Sarkar Medical College, Kolkata - 700 014, West Bengal, India. E-mail: hodpsybmc@gmail.com

and metabolic syndrome. Depression is associated with increased levels of glucocorticoids, catecholamines, and growth hormone; changes in glucose transport function; and secretion of inflammatory cytokines, which could lead to insulin resistance and, ultimately, be causal factors in the development of diabetes as well as complications of diabetes. The second hypothesis is that depression in patients with both type 1 and type II diabetes results from chronic psychosocial stressors of having a chronic medical condition[3] as well as psychosocial demands imposed by diabetes.

Quality of life (QoL) refers to the ways in which health, illness, and medical treatment influence an individual's perception of functioning and well-being (Coons and Kaplan, 1992; Guyatt *et al*., 1993). QoL assessment has been increasingly employed to evaluate outcomes among patients with chronic medical conditions. DM is a chronic medical illness that places serious constraints on the life of the patient. Several studies have shown that QoL in diabetes is decreased as compared to individuals without diabetes.[4-6] Furthermore, the presence of diabetic complications has an additional negative impact on QoL.[4-7] Depressive symptoms are known to have a considerable impact on QoL as well.[5] The co-occurrence of depressive symptoms and diabetes may further decrease QoL. Depressive symptoms may thus be an important determinant of QoL in diabetes.

Increased prevalence of depression in diabetic patients points to the fact that evaluating the effects of co-morbid depression on QoL in diabetes will have relevant clinical outcomes. If we show that depression has a negative influence on QoL, we will be able to improve the QoL in patients by early detection and treatment of depression.

MATERIALS AND METHODS

The present study was a single-centre, cross-sectional, single interview that was approved by the institutional ethics board. Consecutive type II DM patients newly diagnosed or followed-up by the Diabetic Clinic of Burdwan Medical College and Hospital who were willing to provide valid and informed consent to participate in the study were recruited. Patients aged 18-60 years and with adequate cognitive functions to perform the interview and without schizophrenia any other psychotic disorders or substance-related disorders were included in the study. Presence of any other concomitant disorders that could affect the function of nervous system or taking drugs (except for the drugs used for the management of diabetes), which is known to cause depression, were excluded from the study. Total study sample consisted of 195 patients (Male:81, Female:114) and was conducted during the period from February 2011 to January 2012.

The diagnosis of depression was established by Structured Clinical Interview for DSM IV Axis-1 Disorders, Research Version patient edition (SCID-I/P). Patients were classified into two groups as having a depressive episode or not having a depressive episode (depressive and non-depressive).

Overall, 90 patients had a depressive episode and 105 patients did not have a depressive episode. To investigate the patients' socio-demographic characteristics, semi-structured socio-demographic proforma was used. To objectively assess the clinical states of the patients, HbA1c levels that showed long-term blood glucose control were measured on the day of interview. All patients in both the groups were assessed by the Hamilton Rating Scale for Depression (HAM-D) and Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES –Q) SF (Short Form) to measure QoL. HAM-D is a widely used, 17-item, clinician-rated scale designed to assess the severity of depression (Hamilton, 1967).

Statistical analysis

SPSS version 20 (SPSS Inc., Chicago, USA) statistical package was used for statistical analysis. For comparisons between the groups, *t*-test was used for continuous variables and X^2 test was used for categorical variables. The relationship between HAM-D, (Q-LES –Q) SF, and other clinical characteristics (duration of DM and HbA1c levels) was assessed by Pearson's correlation analysis. Significance was determined at $P<0.05$.

RESULTS

Among the study participants, 90 patients (males:41, females:49) met the DSM-IV diagnostic criteria for major depressive episodes, whereas 105 patients (males: 40, females: 65) did not have a major depressive episode in the past month. Among the depressed group, 32.2% were mildly depressed ($N=29$), 36.7% were moderately depressed ($N=33$), 14.4% had severe depression ($N=13$), and 16.7% had very severe depression ($N=15$) according to the HAM-D scale.

Mean age of the depressed group was 44.21±6.4 years and that of the non-depressed group was 45.68±6.2 years (t=1.62, $P>0.05$). The difference in the age of both groups was not statistically significant. Among the depressed group, 47 patients were Hindu and 43 were Muslim and, among the non-depressed group, 47 patients were Hindu and 58 were Muslim ($\chi^2=1.08$, $P=0.3$). Among the depressed group, 69 patients belonged to a nuclear family and 21 belonged to a

joint family) and, among the non-depressed group, 87 patients belong to a nuclear family and 18 belonged to a joint family (χ^2=1.61, *P*=0.28). There were no statistically significant differences between the family type and religion among depressive and non-depressive groups. Table 1a shows the socio-demographic characteristics of both groups and Table 1b, shows the severity of depression among the sexes of study population also represented in Figure 1.

The mean duration of DM in the depressed and non-depressed groups was 44.83±42.65 months and 35.40±35.69 months, respectively. The difference in the duration of diabetes between groups was statistically insignificant (t=−1.68, *P*=0.09). Mean HbA1c levels were 8.28±1.44 and 6.7±1.4 in the depressed and non-depressed groups, respectively, and the difference between groups was very significant (t=−7.74, *P*<0.001).

Duration of DM and mean HbA1c levels in both groups is presented in Table 2.

To study the QoL, raw scores on QLESQ-SF were converted to percentage maximum scores (QLESPER). The evaluation of QLESQ-SF life quality scale showed that all items and total score of the scale were significantly lower in the depressed group. QLESQ-SF life quality item scores of both the groups are presented in Table 3.

The relationships between QLESQ-SF total scores and percentage maximum scores, clinical features, and HAM-D scores were investigated. There were significant negative correlations between HAM-D scores and QLESQ-SF percentage maximum scores (r=−0.864, *P*<0.01). HbA1c level was also negatively correlated with QLESQ-SF percentage maximum scores (r=−0.405, *P*<0.01), and it was statistically significant. Table 4 shows correlation matrix between variable, and Figure 2 is the graphic presentation of the relationship between HAM-D and QLESQ-SF scores.

DISCUSSION

The present study aimed to assess the prevalence of major depressive disorder (MDD) and to evaluate its impact on QoL.

The result from the present study shows the rate of MDD to be 46.15% in DM patient. Among the depressed group, majority are (36.7%) moderately depressed. Age, gender, religion, and family type are not the contributing factors for the development of depression in diabetic patient. Whereas HbA1c level, which is an indicator of long-term glucose control has a strong influence for the development of depression in diabetic patient. Mean HbA1c level is significantly high in depressed group as compared

Table 1a: The sociodemographic data of the depressed and non-depressed groups

Charecterestics	Depressed (*N*=90)	Non-depressed (*N*=105)	*P* value
Age (years)	44.21±6.39	45.68±6.2	*t*=1.62, *P*>0.05
Gender			χ^2=1.1 *P*=0.29
Male (*N*=81)	41	40	
Female (*N*=114)	49	65	
Religion			χ^2=1.08 *P*=0.3
Hindu (*N*=94)	47	47	
Muslim (*N*=101)	43	58	
Family type			χ^2=1.61 *P*=0.28
Nuclear (*N*=156)	69	87	
Joint (*N*=39)	21	18	

Table 1b: The severity of depression

Severity of depression	Count	Percentage
Mild	29	32.2
Moderate	33	36.7
Severe	13	14.4
Very severe	15	16.7

Table 2: Comparison of duration of diabetes, Hba1c and Ham-D scores between depressed and non depressed group

	Depressed (*N*=90)	Non-depressed (*N*=105)	*P* value
Duration of diabetes (months)	44.83±42.65	35.40±35.69	*t*=−1.68 *P*=0.09
HbA1c	8.28±1.44	6.7±1.4	*t*=−7.74 *P*=0.000

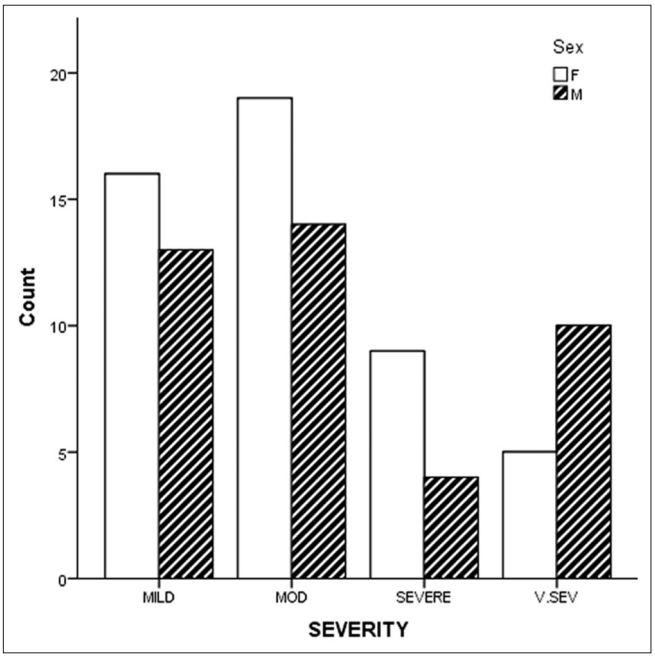

Figure 1: Severity of depression among sexes in study population

Table 3: QLESQ-SF item scores of the depressed and non-depressed groups

QLESQ-SF questionnaire	Depressed (*N*=90)	Non-depressed *N*=105	*t*	*P*
Q1 Physical health	2.47±0.62	3.43±0.55	11.44	0.000
Q2 Mood	1.98±0.3	3.57±0.68	20.65	0.000
Q3 Work	2.38±0.59	3.50±0.62	12.78	0.000
Q4 Household activity	2.39±0.54	3.82±0.64	15.98	0.000
Q5 Social relationship	3.79±0.6	4.56±0.5	9.75	0.000
Q6 Family relationship	3.6±0.73	4.45±0.69	8.3	0.000
Q7 Leisure time activity	2.67±0.56	3.54±0.59	10.59	0.000
Q8 Ability to function daily life	2.24±0.56	3.4±0.69	12.67	0.000
Q9 Sexual drive, interest, and/or interest	1.79±1.01	3.53±0.99	12.14	0.000
Q10 Economic status	2.31±0.61	3.1±0.8	7.63	0.000
Q11 Living/housing situation	2.36±0.6	3.07±0.78	6.98	0.000
Q12 Ability to get around physically without feeling dizzy	2.71±0.46	3.3±0.54	8.12	0.000
Q13 Your vision in terms of ability to do work/hobbies?	2.43±0.5	3.47±0.65	12.28	0.000
Q14 Overall sense of well being/	2.38±0.49	3.78±0.62	17.36	0.000
QLESQPER	38.37±6.85	65.11±10.14	21.11	0.000

Table 4: Correlation matrix between the variable

	Age (year)	Duration (month)	HAMD	QLESQ-SF	QLESQPER	HbAIc
QLESQSF						
Pearson correlation	0.129	−0.137	−0.864**	1	1.000**	−0.405**
Sig. (2-tailed)	0.072	0.055	0.000	–	0.000	0.000
N	195	195	195	195	195	195
QLESQPER						
Pearson correlation	0.128	−0.136	−0.864**	1.000*	1	−0.403**
Sig. (2-tailed)	0.075	0.058	0.000	0.000	–	0.000
N	195	195	195	195	195	195

*Correlation is significant at the 0.05 level (2-tailed), **Correlation is significant at the 0.01 level (2-tailed)

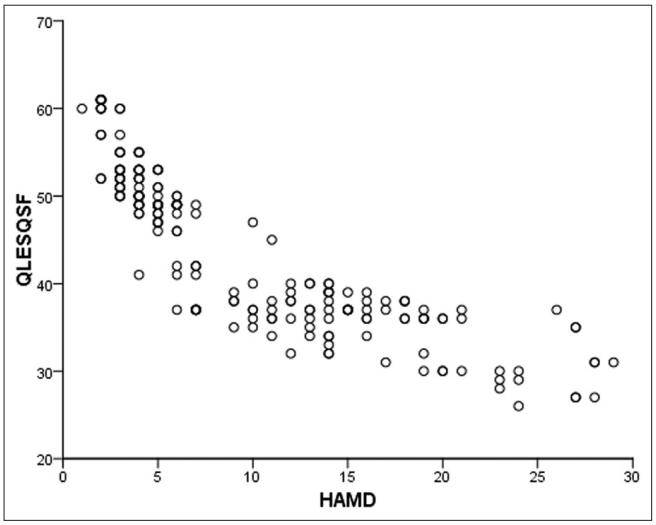

Figure 2: Relationship between Ham-D and QLESQ-SF scores

to the non-depressed group. This high level of HbA1c supports the view that poor glycemic control is one of contributing factors for depression. This study indicates that the prevalence of depression is high compared to that reported in most of the previous studies.

However, worldwide estimates of depression prevalence among individuals with diabetes appear to vary by diabetes type and among developed and developing nations. Li *et al*., found that among the U.S. adults aged ±18 years, the age adjusted rate of depression was 8.3% (95% CI 7.3-9.3), ranging from 2.0% to 28.8% among the 50 states.[8] Asghar *et al*., found evidence of depressive symptoms in 29% of males and 30.5% of females with newly diagnosed diabetes in rural Bangladesh.[9] Similarly, Sotiropoulos *et al*., found 33.4% of a cohort of Greek adults with type 2 diabetes.[10] Zahid *et al*., found a more modest depression prevalence (14.7%) among patients with diabetes in a rural area in Pakistan.[11] However, Khamseh *et al*., found major depression in 71.8% of a sample of 206 Iranian patients with type 1 and type II diabetes,[12] which is higher than in this study. Our findings is comparable with that of Mier *et al*., who found that the rate of depression among hispanic patients was 40.5% in northeastern Mexico.[13]

According to Tattersall *et al*., diabetes can have considerable consequences on the quality of everyday life, with possible limitations in physical activity, social life, family relations, and leisure activities.[14] It is being increasingly recognized that the impact of chronic illnesses must be assessed in terms of their influence on QoL in addition to more traditional

measures of medical outcome. QoL in people with diabetes is generally accepted as an important aspect of the outcome of treatment. In this study, taking into account overall QoL, depressive patients had significantly lower QLESQ-SF, total and each item score. These findings are consistent with that in other studies that indicate that depression may affect the QoL in patients with chronic diseases.[15] Patients with depression and DM rate themselves lower on all domains than those with DM alone.[16] This study indicates effect of depression appears to be pervasive; all items of QLESQ-SF significantly correlated with the presence and severity of depression, with the QoL being adversely affected by the presence of depression.

Depression affects the highest order capacities of the human organism, including motivation, energy, concentration, and self-confidence. Depressed patients have a worse QoL than general medical patients within the same clinics with common diseases such as hypertension, arthritis, diabetes, and heart disease[17] according to Egede *et al*., Taken together, these studies and our findings provide strong evidence that presence of co-morbid depression has an additional functional impairment. In addition Unützer *et al*., showed that patients with co-morbid depression with chronic medical illnesses had additive decrements in quality adjusted life years.[18]

According to Iliffe *et al*.,[19] Jaffe *et al*.,[20] and Laukkanen *et al*.,[21] the degree of deterioration in QoL is proportional to the severity of depressive symptoms. This study also shows that there were negative correlations between HAM-D and QLESQ-SF scores.

In this study, there were negative correlations between HbA1c, an indicator of metabolic control, and QoL scores. This supports the view that patients with poor control of blood glucose level have worse QoL. Patients with elevated HbA1c demonstrate worse clinic course and with a much higher complication rate. It is a well established fact that symptoms and complications of diabetes negatively affect QoL of patients.

CONCLUSION

Diabetes is one of the most complex chronic medical conditions that places serious constraints on patients' activities. This study shows that the presence of depression in DM has a negative effect on the QoL of the patient, independent of the impact of the physical illness itself. This finding and the increased prevalence of depression in diabetes suggest that it may be useful to examine the relative effects of disease severity and co-morbid depression on QoL in patients with diabetes. The foremost goals of therapy are to normalize metabolic parameters and the QoL. Treating depression increases QoL. Diagnosing and treating depression may be essential to improve the QoL in type II DM population. Clinicians must be aware of the fact that early detection and treatment of depression have a positive effect on the a patient's QoL.

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