

## Research Article

# A cross sectional study on prevalence and factors influencing anxiety and depression among patients with type II diabetes mellitus

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### ABSTRACT

**Background:** Numerous study findings documented higher risk of depression and anxiety that diabetic population. Anxiety and depression in turn are proven to have strong negative influence on glycemic control, complications and quality of life in diabetic patients. Major portion of evidence linking DM, depression and anxiety comes from developed countries, and there is scarcity of research in this regard in developing and low-income countries. Aim of the study was to assess the prevalence of depression and anxiety and factors associated with them in type II diabetes mellitus patients.

**Methods:** The study was a descriptive cross sectional study, conducted in a tertiary care teaching hospital. The study included 135 sequentially recruited type II diabetic patients. Hamilton Depression Rating Scale (HAM-D) and Hamilton Anxiety Rating Scale (HAM-A) were used to assess the severity of depression/anxiety.

**Results:** A total of 135 participants were included in the study. More than half (59.3%) of the study subjects have reported history of perceived stress. The proportions of subjects, reporting either anxiety or depression were 64.4%. Depression alone was present in 60.7% of the subjects and anxiety alone was present in 44.4% of the subjects. New onset of diabetes mellitus (Odds ratio 3.51, 95% CI 1.3 to 5.38), presence of diabetic neuropathy (Odds ratio 1.64, 95% CI 1.28 to 3.57), presence of diabetic retinopathy (Odds ratio 2.70, 95% CI 1.63 to 6.78) and history of perceived stress (Odds ratio 40.32, 95% CI 10.95 to 148.32), were associated with anxiety and depression.

**Conclusions:** Prevalence of depression and anxiety was very high in diabetic population; hence evaluation and management should be part of routine care. Special focus should be given to patients with new onset diabetes, suffering from neuropathy or nephropathy and patients with history of stressors.

**Keywords:** Diabetes mellitus, Anxiety, Depression

### INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder affecting millions of individuals worldwide characterized by increased insulin resistance and impaired insulin secretion.

As per the global trends, there are about 422 million diabetics in 2014 when compared to 108 million in 1980.<sup>1</sup> Apart from the common co-morbid conditions like

obesity, sleep disorders, hyperlipidemia, depression and anxiety have been found to be more commonly associated with DM.

Since recent past, considerable research focus has been laid upon to study the relationship of DM with anxiety and depression. Numerous study findings in this regard show that diabetic population has been found to be more at risk for depression and anxiety.<sup>2,4</sup> The proportion of that risk is about twice as high as compared to the general

population.<sup>5,6</sup> Such psychological events have found to be influencing the insulin secretion there by contributing to imbalance in diabetic control. Current research indicates the influence of depression and anxiety on DM is bi-directional.<sup>4</sup>

Depression increasing the risk of diabetes has been found to be common among females than males however, the role of anxiety is yet to be fully explained.<sup>2</sup> The gender inequality can partly be explained by the gender influence on the biologic and behavioral aspects of such disorders.<sup>7</sup> Depressive and anxiety symptoms in turn seem to influence the glycemic control among such patients. Tajfard et al, reported that correlation between depression or anxiety with fasting blood glucose concentrations among diabetics was positive and significantly linear.<sup>2</sup>

Significant number of diabetic patients could miss out being diagnosed with the early signs/symptoms of depression or anxiety.

This may be due to the clinical practitioner not adequately emphasizing the importance and need to identify and report symptoms of depression and anxiety and sometimes even overlooking them. Major portion of evidence linking DM, depression and anxiety comes from developed countries, and there is scarcity of research in this regard in developing and low-income countries.

Hence, the present study intends to assess the implications of depression and anxiety in glycemic control of diabetic patients of vice versa in a group of diabetic patients in India. Main objectives of the study were to assess the prevalence of depression and anxiety in type II diabetes mellitus patients and to assess the factors associated with depression and anxiety in patients with type II diabetes mellitus.

## **METHODS**

It was a Hospital based descriptive cross sectional study; the study was undertaken in the department of internal medicine and psychiatry of a tertiary care teaching hospital in Telangana, South India from July 2015 to January 2015. The study included patients of type II diabetes mellitus who were attending the outpatient department of psychiatry and internal medicine in the study setting.

### ***Inclusion and exclusion criteria***

Persons above age 18, of either sex, diagnosed with type II DM were included. Patients presenting with acute complications of diabetes mellitus, patients with known history of severe or long term psychiatric illness were excluded from the study.

A total of 135 subjects were recruited sequentially in to the study after screening for compliance with inclusion and exclusion criteria, hence no sampling was done.

### ***Ethical issues***

Approval of the institute Human Ethics Committee was obtained. Informed written consent was obtained from all the participants, after explaining the objectives of the study, risks and benefits involved. The personal details of the patients were kept confidential throughout the study.

Each participant, who has signed the informed written consent, was interviewed using a structured case report form (CRF) to collect information regarding the socio demographic variables like age, gender, and education, socio economic and marital status of the individual. Disease related parameters like duration of illness, medication being used and symptoms/signs suggestive of diabetes related complications were also documented by thorough history and clinical examination. History of presence and type of stressors has also been elicited.

After that 5 ml of venous blood was drawn to check the relevant laboratory parameters like HbA1C, FBS/RBS, blood urea nitrogen (BUN) and creatinine. Each patient was evaluated for micro albuminuria and also for CAD using standard 12 lead ECG. Fundoscopy was carried out to evaluate for diabetic retinopathy.

Depression and anxiety was assessed by Hamilton Depression rating scale (HAM-D) and Hamilton anxiety rating scale (HAM-A).<sup>8,9</sup> The following cut-off scores were considered to classify depression and anxiety.

HAM D Score: 0-7 = Normal; 8-13 = Mild Depression  
14-18 = Moderate depression; 19-22 = Severe depression;  
≥23 = Very severe depression

HAM-A score: 14-17 = Mild Anxiety 18-24 = Moderate Anxiety 25-30 = Severe Anxiety

### ***Statistical analysis***

Presence or absence of depression or anxiety was the primary outcome variables variable. Various sociodemographic, disease related parameters and presence of stressors were considered as explanatory variables.

Descriptive analysis of the data was done by using frequency and percentage for categorical variables, mean and standard deviation for quantitative variables.

The association between the explanatory and outcome variables was assessed by calculating the odds ratio and 95% CI. Chi square test was used to test the statistical significance of the association.

Univariate logistic regression analysis was used to assess the association between various explanatory parameters and sleep pattern, factors showing significant association were included in the multivariate logistic regression analysis. P value 0.05 was considered as statistically

significant. IBM SPSS version 21 was used for statistical analysis.

## RESULTS

A total of 135 participants were included in the study. Majority (56.3%) of the participants belonged to 41 to 60 year age group.

Males constituted 71.1% of study subjects and majority of them were educated up to secondary (57%) and primary (24.4%) schooling. Urban population constituted 68.1% of the subjects, with 20% rural and 11.9% semi urban population. Currently married population was 85.2% and the remaining subjects were either unmarried, widowed or separated (Table 1).

The proportion of subjects with new onset of diabetes, i.e. duration less than 1 year was 29.6% and subjects with duration between 1 to 5 years, 5 to 10 years and > 10 years was 37%, 21.5% and 11.9% respectively.

Glycemic control was good in 68.9% of the subjects and the remaining 31.1% had poor glycemic control. Neuropathy and retinopathy were the most common complications, seen in 63% and 40% of the subjects respectively (Table 2).

**Table 1: Baseline characteristics of study population (n=135).**

Category	Frequency	Percentage
<b>Age group</b>		
21 to 40	8	5.9
41 to 60	76	56.3
61 and above	51	37.8
<b>Sex</b>		
Female	96	71.1
Male	39	28.9
<b>Education</b>		
Illiterate	19	14.1
Primary	33	24.4
High school	77	57.0
Diploma and above	6	4.4
<b>Locality</b>		
Urban	92	68.1
Rural	27	20.0
Semi urban	16	11.9
<b>Marital status</b>		
Currently Married	115	85.2
Single/Widow/widower & divorced	20	14.8

**Table 2: Disease related parameters in study population (N=135).**

Parameters	Category	Frequency	Percentage
Duration of illness	Up to 1 year	40	29.6
	1-5 years	50	37.0
	5-10 years	29	21.5
	More than 10 years	16	11.9
Glycemic control	Good control	93	68.9
	Poor control	42	31.1
Complications	Neuropathy	85	63.0
	Retinopathy	54	40.0
	Nephropathy	5	3.7
	Diabetic foot	4	3.0
	CAD	2	1.5

More than half (59.3%) of the study subjects have reported history of perceived stress. Financial stress, followed by health related stress and marital discord were the common types of stressors reported among 38.5%, 31.9% and 8.1% of subjects respectively (Table 3).

The proportions of subjects, reporting either anxiety or depression were 64.4%, 60.7% of the subjects had depression alone and 44.4% of the subjects had anxiety alone. The proportion of subjects, with mild, moderate, severe and very severe depression was 205, 24.4%, 11.9% and 4.4% respectively. The proportions with mild,

moderate and severe anxiety were 10.4%, 23.0% and 11.1% respectively (Table 4).

All the factors, which had statistically significant association in univariate analysis were included in multivariate analysis. During multivariate analysis it was found that factors associated statistically significant association with anxiety and depression were New onset of diabetes mellitus (Odds ratio 3.51, 95% CI 1.3 to 5.38), presence of diabetic neuropathy (Odds ratio 1.64, 95% CI 1.28 to 3.57), presence of diabetic retinopathy (Odds ratio 2.70, 95% CI 1.63 to 6.78) and history of

perceived stress (Odds ratio 40.32, 95% CI 10.95 to 148.32).

**Table 3: Prevalence of various stressors in study population (N=135).**

Psychiatric morbidity	Frequency	Percent %
H/O perceived stress	80	59.3
Financial stress	52	38.5
Health related	43	31.9
Marital discord	11	8.1
Job related stress	8	5.9
Care giver burden stress	8	5.9
Other stress	19	14.1

None of the other factors like age, gender, marital status etc. have shown any association with anxiety and depression (Table 5).

**Table 4: Prevalence of depression and anxiety among study population (N=135).**

Psychiatric morbidity	Frequency	Percent %
Anxiety or depression	87	64.4
Depression alone	82	60.7
Anxiety alone	60	44.4
Severity of depression		
Normal	53	39.3
Mild	27	20.0
Moderate	33	24.4
Severe	16	11.9
Very severe	6	4.4
Severity of anxiety		
Normal	75	55.6
Mild	14	10.4
Moderate	31	23.0
Severe	15	11.1

**Table 5: Factors associated with Anxiety and depression among study population (N=135).**

Explanatory parameter	Adjusted odds ratio	P-value	95% C.I. for EXP(B)	
			Lower	Upper
Age in years	0.988	0.659	0.935	1.043
SEX (Baseline = female)	1.334	0.681	0.339	5.254
Marital status (baseline= married)	0.576	0.456	0.135	2.457
Duration of diabetes mellitus (baseline= >10 years)				
Duration <1 year	3.513	0.028	1.349	5.388
Duration 1 to 5 years	0.725	0.754	0.097	5.412
Duration 6 to 10 years	2.777	0.364	0.306	25.22
Diabetic neuropathy (baseline= No)	1.644	0.042	1.28	3.57
Diabetic retinopathy (baseline= No)	2.705	0.0048	1.63	6.78
History of perceived stress (baseline= No)	40.302	<0.001	10.951	148.32

## DISCUSSION

Depression and anxiety are some of the many co-morbid conditions, which have been consistently associated with, type 2 DM. The factors that influence such relationship can be external like gender, educational status and type of occupation or internal such as altered inflammatory status and level of serotonin.<sup>4</sup>

Evidence indicates that inflammation is independently linked to both pathogenesis and progression of type 2 DM and depression and also both these conditions might share a common inflammatory mechanism. The reduced brain size in hippocampus and amygdala observed in diabetics might indicate that type 2 DM provides a strong biological risk for depression.<sup>10</sup>

The present study findings reveal that majority of diabetics (64%) had either depression or anxiety with specific prevalence of 60% and 44% respectively. Similar higher proportion of prevalence of depression and/or anxiety prevalence has been reported by many studies. One cross-sectional study of (N=184) found 70% of diabetics having depression while 69% had anxiety.<sup>4</sup>

However, a Mexican study assessing larger sample (N=820) reported that the prevalence of anxiety (55%) higher than depression (48%).<sup>11</sup> Though, higher prevalence of anxiety as compared to depression among diabetics was found in a study by de Kort et al, their overall prevalence was considerably lower (27% and 19% respectively).<sup>12</sup> One systematic review that synthesized 48 studies reported an average depression prevalence of 37% (25%-45%).<sup>13</sup>

Contrary to common belief the factors that influence depression and anxiety seem to be somewhat unique and different. One study exploring such links reported that anxiety is commonly associated with occupation and complications in diabetics while glucose levels and complications in diabetics were linked to depression.<sup>11</sup>

Available literature suggests that consequent to the development of co-morbidities in DM such as depression and anxiety it also leads to enhanced disease severity, complications like poor glycemic control, work imbalance, decreased quality of life. Such added adversities further increase the need for medical services there by economically further burdening the patients.<sup>14,15</sup>

Present multivariate analysis showed that factors associated statistically significant association with anxiety and depression were new onset of diabetes mellitus (OR 3.5), presence of diabetic neuropathy (OR 1.64), presence of diabetic retinopathy (OR 2.70) and history of perceived stress (OR 40.32).

None of the other factors like age, gender, marital status etc have shown any association with anxiety and depression. Perceived stress and the resultant anxiety in diabetics have been linked to shared effects of functional disability, pain and inherent uncertainties of life with a chronic disease such as type 2 DM. This is further enhanced by ensuing debilitating complications like loss of vision, peripheral neuropathy, and nephropathy among others.<sup>16-19</sup> It is estimated that the diabetic population is going to grow by a whopping 9% in India, thanks to its booming economy, the middle and lower income class population is going to be the worst affected.<sup>13</sup>

The inherent problems of such demographic shifts are that the lower income group sufferers will not only have higher rates of depression and increased stress levels, they will be sufficiently lacking with respect to the diabetes knowledge and the need to seek appropriate care. One of the limitations of the study that strongly negates drawing causality is the cross sectional nature of the study and the relatively smaller sample size that limits the ability to generalize the study results to a larger population.

## CONCLUSION

To conclude, the findings of the study indicate that the prevalence of depression and anxiety are higher among diabetic patients and hence targeted interventions are essential to delay the complications, thereby preventing the occurrence of depression and anxiety. Also the clinicians need to appraise the patients about the potential signs and symptoms of any such psychological illnesses at the earliest and counseling them appropriately.

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