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Original Research Article

A study to assess utility of diabetes anxiety depression scale in diabetic patients and to correlate its scores with glycaemic control

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ABSTRACT

Background: According to the International Diabetes Federation "diabetes is one of the largest global health emergencies of the 21st century". Depression and anxiety have been identified as frequent co-morbid condition in Type 2 diabetes, which is itself associated with worse outcomes including increased mortality. People with diabetes are 2 to 3 times more likely to have depression than people without diabetes. Only 25% to 50% of people with diabetes who have depression get diagnosed and treated. The diabetes anxiety depression scale (DADS) is a potentially useful instrument in screening for anxious depression in people with type 2 diabetes in clinical practice.
Methods: The study was a prospective observational study done on 100 Diabetic patients in a tertiary care hospital in Bangalore during the period of 2 months from November 2022 to December 2022.
Results: Among the subjects studied,57% were Male and 43% were female. The maximum number of subjects i.e., 31% were in the age group of 51-60 years. Then mean duration of Type 2 DM in the study subjects was 12.34 years. 53% were found to have poor glycaemic control which is a HbA1C value of more than equal to 8%. 31% of them scored 18-39. Score of 18-39 was suggestive of major anxious depression.
Conclusions: Anxious depression was prevalent across all categories of glycemic variability. There was no statistically significant difference among glycemic variability across the anxious depression spectrum. DADS score had a positive correlation with increasing age. Male diabetic patients had more anxious depression than female patients. Female diabetic patients had poorer diabetic control over prolonged periods of time. The present study findings have potential clinical implications but also have certain limitations in terms of sample size.

Key words: Diabetes, Anxiety, Depression, DADS score, Glycemic variability

INTRODUCTION

Diabetes mellitus is a chronic, progressive, metabolic illness and is rapidly spearheading a pandemic of non-communicable diseases in the Indian Subcontinent.[1] Depression has been identified as a frequent co-morbid condition in Type 2 diabetes, which itself has been associated with worse outcomes including increased mortality.[2] With the taboo associated with psychological illnesses, it becomes hard to appropriately treat the symptoms of depression. When associated with a metabolic condition which relies on rigorous life style changes to accomplish good control, debilitating conditions of depression might impede good control of diabetes. Untreated mental health issues can make diabetes worse, and problems with diabetes can make mental health issues worse. People with diabetes are 2 to 3 times more likely to have depression than people without diabetes. Only 25% to 50% of people with diabetes who have depression get diagnosed and treated.[3] As it is defined by

the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders (DSM-5), diabetes is a mood disorder that reunites several symptoms that alter the functionality of an individual. Depression disturbs emotions, cognition, and behaviors.[4,5] There is evidence that the prevalence of depression is moderately increased in prediabetic patients and in undiagnosed diabetic patients, and markedly increased in the previously diagnosed diabetic patients compared to normal glucose metabolism individuals.[6,7] Different environmental factors (epigenetic factors) may activate common pathways that promote DM2 and depression in the end.[8] One of the important factors are low socioeconomic status, poor sleep, lack of physical exercises and diet. Taking into consideration these factors, a key candidate for a common pathway could be the activation and disturbance of the stress system. The ICD-10 was the first to introduce the diagnosis of "mixed anxiety-depression" in 1992 in response to mounting evidence that co-morbid anxiety and depression were prevalent in patients who did not meet full criteria for either disorder. Their level of disability was comparable to that of patients with full syndromal depression and anxiety. The evidence from dimensional studies suggests that anxiety accompanies depression at higher rates than expected, worsens depression outcome, and increases risk of suicide, all of which have important implications for clinical care.

Chronic stress activates the hypothalamus pituitary adrenal axis (HPA-axis) and the sympathetic nervous system (SNS), increasing the production of cortisol in the adrenal cortex and the production of adrenalin and noradrenalin in the adrenal medulla. Chronic hypercortisolemia and prolonged SNS activation promote insulin resistance, visceral obesity and lead to metabolic syndrome and DM2. On the other hand, chronic stress has behavioral consequences: noradrenalin, cortisol and other hormones activate the fear system determining anxiety, anorexia or hyperphagia; the same mediators cause tachyphylaxis of the reward system, which produces depression and cravings for food, other substances or stress.[8,9] Depression has a synergistic effect in patients with DM1 and DM2, increasing the risk for complications of both micro- and macro-vascular nature, increased hyperglycemia, predicting greater mortality.[10] The diabetes anxiety depression scale (DADS) is a potentially useful instrument in screening for anxious depression in people with type 2 diabetes in clinical practice.[10] Type 2 diabetes participants from the observational community-based Fremantle Diabetes Study Phase II underwent assessment of lifetime depression using the brief lifetime depression scale, the patient health questionnaire 9-item version (PHQ-9) for current depression symptoms, and the Generalized Anxiety Disorder Scale that was specifically developed and validated for this study. The main outcome measure was classes of patients with a specific syndromal profile of depression and anxiety symptoms based on LCA identified four classes that were interpreted as "major anxious depression", "minor anxious depression", "subclinical anxiety", and "no anxious depression" In the present study, a DADS cut-off score of 18 correctly identified all participants with LCA-derived major anxious depression and was significantly associated with incident coronary heart disease and cardiovascular mortality, while only 6.8% with LCA-derived minor anxious depression were misclassified as having major anxious depression. Similarly, a DADS score greater than seven identified the vast majority of participants with minor depression.[11]

Aim and objectives

Aim of the study was to study prevalence of anxious depression in diabetic patients and to correlate glycaemic control and duration of diabetes with it. Objectives of current study were to assess the presence of anxious depression in diabetic patients by diabetes anxiety depression scale and to correlate glycemic control and duration of diabetes with diabetes anxiety depression Scale scores.

METHODS

Study design, location, duration and population

Prospective observational study was carried out in the department of internal medicine in Apollo hospital, Sheshadripuram, Bangalore for duration of 2 months from November 2022- December 2022. Adult patients admitted in the hospital with pre-existing diabetes were considered for the study

Inclusion criteria

Inclusion criteria for current study were; Adults >18 years, Inpatients admitted in the hospital during the course of the study, Pre-existing type 2 Diabetes atleast for a year and Patients able to read and understand English and On Oral Medication/Insulin.

Exclusion criteria

Inclusion criteria for current study were; No pre-existing psychiatric illness and Type 1 Diabetes or other variants of diabetes

Procedure

All patients with type 2 diabetes who fulfil the inclusion and exclusion criteria will be included in the study. At the time of admission, basic information will be collected such as patient demographics (age, sex, BMI), medical and social history and pre-existing comorbidities. The duration of Diabetes, medications patient is on and the HbA1c will be collected. The study will be conducted on 100 in-patients admitted at Apollo Hospitals, Sheshadripuram from November to December 2022. Only those patients who consent to be questioned will be included in the study. Patients will be assessed on diabetes anxiety depression scale and scores will be calculated. The duration of diabetes and recent Hba1c values will be noted. All

patients completed the PHQ-9 which consists of nine items corresponding to the nine DSM-5 criteria for major depression. Each item is rated as 0 (symptom is not present), 1 (symptom present for several days), 2 (symptom present for more than half the days), or 3 (symptom present nearly every day). For the present study, the total PHQ-9 score18 was added to the four GADS items scores19 (worrying, feeling irritable, muscle tension, and restlessness)

Statistical analysis

Data was entered into Microsoft Excel (Windows 7; Version 2007) and analyses were done using the Statistical Package for Social Sciences (SPSS) for Windows software (version 20.0; SPSS Inc, Chicago). Descriptive statistics such as mean and standard deviation (SD) for continuous variables, frequencies and percentages were calculated for categorical Variables were determined. Comparison between males and females were analysed using Chi-Square test and unpaired t test respectively for categorical and continuous variables. SAD was divided into 4 quartiles and comparison in between quartiles was done using Kruskal- Wallis Test. Pearson s correlation coefficient was calculated between various quantitative Variables in the study. Bar charts and Pie charts were used for visual representation of the analysed data. Level of significance was set at 0.05.

RESULTS

Age/sex distribution

Among the subjects studied, 57 (57%) were male and 43 (43%) were female. The study population had different age groups. The maximum number of subjects i.e., 31% were in the age group of 51-60 years. The least number of subjects were in the age group of 31- 40 years. The mean age was 62.76 years.

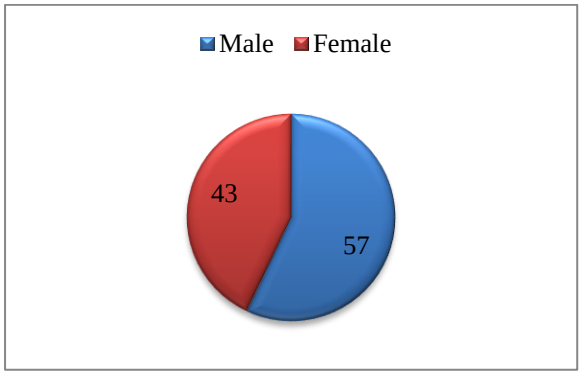

Figure 1: Distribution of gender.

Duration of diabetes

Of the study subjects, 55% of the subjects were found to be affected by Type 2 DM for a period of more than 10 years.11% of the subjects were found to be affected by Type 2 DM for less than 5 years. The mean duration of Type 2 DM in the study subjects was 12.34 years.

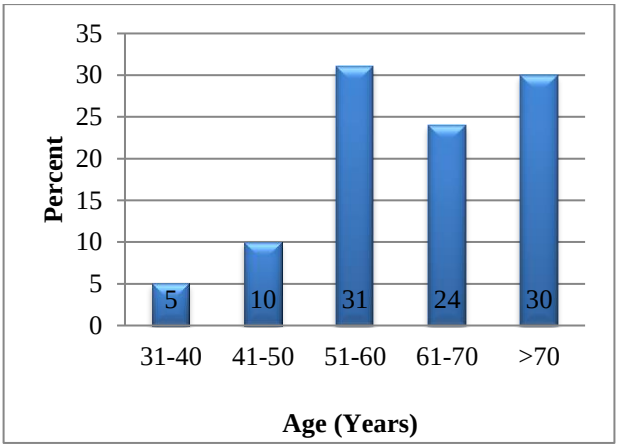

Figure 2: Distribution of age.

Table 1: Association between glycaemic control and DADS score (n=100).

HbA1c	Total Score		
	<8	8-17	18-39
Good	2 (33.3)	3 (50.0)	1 (16.7)
Fairly Good	9 (22.0)	18 (43.9)	14 (34.1)
Poor	18 (34.6)	18 (34.6)	16 (30.8)
Mean (SD)	10.83 (7.78)	13.83 (7.05)	12.69 (7.96)

Chi-Square Test, P Value = 0.645, Not Significant

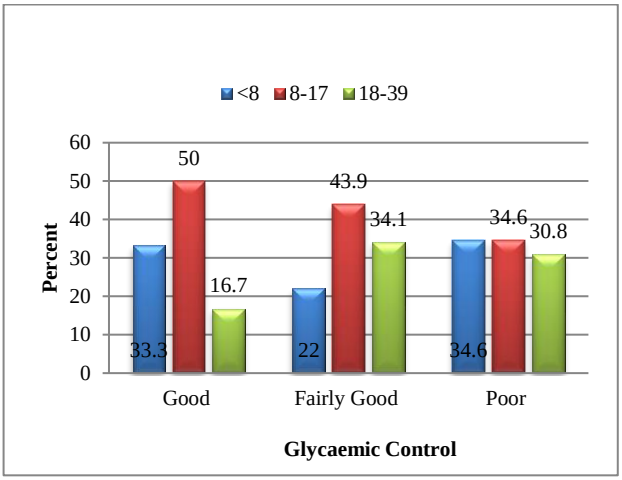

Figure 3: Glycaemic control and total score.

Impact of duration of diabetes-on-diabetes control

With duration of DM being more than 10 years, 51.7% of males had poor control of DM and 66.7 % of females had poor control of DM.

Glycaemic control in study subjects

Among the subjects included in the study, glycaemic control was assessed based on their HbA1C, 53% were

found to have poor glycaemic control which is a HbA1C value of more than equal to 8%. 41% were found to have fairly good glycaemic control which is an HbA1C value of 6.5%-7.9%.6% were found to have good glycaemic control which is an HbA1C value of less than equal to 6.5%. 8.66 was the mean HbA1C found in the study subjects.

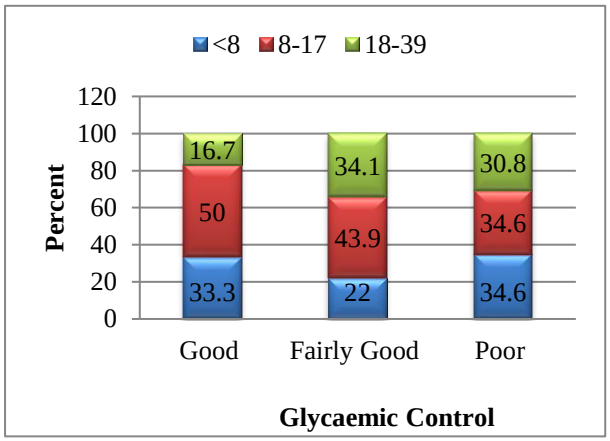

Figure 4: Correlation between anxious depression and diabetic control.

Prevalence of anxiety depression in study subjects

Among the study subjects, based on Diabetes Anxiety Depression Scale. 29% of the study subjects scored below 8. Score of <8 was suggestive of no anxious depression.40% of them scored 8-17. Score of 8-17 was suggestive of minor anxious depression.31% of them scored 18-39. Score of 18-39 was suggestive of major anxious depression. The mean score obtained by the study subjects was 13.04.

Correlation between anxious depression and diabetic control

Among the study subjects, the association between glycemic control and total score was assessed. In subjects with good glycemic control (HbA1C of less than equal to 6.5) 3 (50%) were found to have a score of 8-17 (indicative of mild anxious depression). 1 (16.7%) were found to score 18-39 (indicative of major anxious depression. 2 (33.3%) subjects were found to score less than 8 (indicative of no anxious depression). Maximum subjects with good glycemic control had mild anxious depression. In subjects with fairly good glycaemic control (HbA1C of 6.5-7.9). 18 (43.9%) were found to score 8-17 (indicative of mild anxious depression). 9 (22%) were found to score < 8 (indicative of no anxious depression) 14 (34.1%) subjects were found to score 18-39 (indicative of major anxious depression. Maximum subjects with fairly good glycemic control had mild anxious depression. In subjects with poor glycaemic control (HbA1C of more than equal to 8). 16 (30.8%) were found to score 18-39 (indicative of major anxious depression. 18 (34.6%) subjects were found to score 8-17 (indicative of mild anxious depression). 18 (34.6%) subjects were found to score <8 (indicative of no anxious depression).

DISCUSSION

Glycemic variability and depression

The mean HbA1C in subjects with no anxious depression, mild and major anxious depression were respectively 8.72, 8.59 and 8.67. There was no statistically significant difference among glycemic variability across the anxious depression spectrum. Generally, anxiety, depression and disease related distress are linked to overall worse glycaemic control in terms of HbA1C. The mechanisms that explain the relationship between psychological problems and diabetes complications are not fully understood, but long-term glycaemic variability could act as a putative link between both conditions, as mood and anxiety disorders can promote significant fluctuations in treatment adherence and self-care.[12]

Correlation between age and anxious depression in diabetic patients

The mean age in subjects who had no anxious depression was 58.73. The mean age in subjects with mild anxious depression was 62.28 and the mean age in subjects with major anxious depression was 67.7. The mean score in subjects more than 60 years was 15 whereas mean score in subjects less than 40 years was 7.2. In the current study increasing age showed positive correlation with anxious depression in diabetic subjects. Older people may experience life stressors common to all people, but also stressors that are more common in later life, like a significant ongoing loss in capacities and a decline in functional ability.[13] Duration of diabetes correlates positively with DADS score. The mean duration of diabetes in subjects having no anxious depression was 11 years. The mean duration of Diabetes in subjects having major anxious depression was 13.38 years.

Gender differences in prevalence of anxious depression

The mean score in males was 13.09 when compared to 12.98 in females. 26.3% of males and 32.6% of females had no anxious depression. 73.7% of males and 67.6% of females had anxious depression both minor and major. The numbers of male subjects having anxious depression were more when compared to their female counterparts. The Diabetes Anxiety Depression score was higher in males when compared to females. This can be attributed to the gender differences in coping style and self-reporting of symptoms. Male depression is generally under diagnosed and under treated, however in the current study we found a male preponderance.[14]

Impact of duration of diabetes-on-diabetes control

With duration of DM being more than 10 years, 51.7% of males had poor control of DM and 66.7 % of females had

poor control of DM. People with type 2 diabetes mellitus who have a longer diabetes duration tend to show lower adherence to physical activity frequency and dietary education causing elevated mean A1C levels as compared to the more recently diagnosed patients.[15] Women with T2DM had worse glycaemic control than men. Possible causes for poorer glycaemic control in women compared with men include differences in regulation of glucose homeostasis, treatment response and psychological factors Also women were worse than men in performing glucose self-measurements and in managing persistent hyperglycaemia, and consequently, had poorer glycaemic control overall.[16,17] In women, the decrease in oestrogen levels after menopause occurs concurrently with increased elevated blood glucose levels, whereas in men, elevated oestrogen levels may be a risk factor for insulin resistance. There are also metabolic differences between men and women in the pharmacodynamics of the medications used to treat T2D.

Limitations

The present study findings have potential clinical implications but also have certain limitations. First, due to the cross-sectional study design, it is not possible to draw long-term conclusions. Second, the study had a small sample size and carried out in a tertiary care center; the results cannot be generalized to general population setting. Third, there are certain confounding variables such as smoking, alcohol use, and duration of diabetes, present in the study group. Further, multi-central, longitudinal studies in different geographical areas need to be considered to establish causal relationship between depression and diabetes.

CONCLUSION

Anxious depression was prevalent across all categories of glycemic variability. There, was no statistically significant difference among glycemic variability across the anxious depression spectrum. DADS score had a positive correlation with increasing age. Male diabetic patients had more anxious depression than female patients. Female diabetic patients had poorer diabetic control over prolonged periods of time. The present study findings have potential clinical implications but also have certain limitations in terms of sample size.

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