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EPIDEMIOLOGY OF DEPRESSION IN DIABETES PATIENTS: A CROSS-SECTIONAL STUDY CONDUCTED AT A TERTIARY CARE INSTITUTION.

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Abstract

Background

Food habits and sedentary lifestyles have a substantial impact on mental and physiological health. The rise in the number of patients suffering from diabetes mellitus is exponential. Diabetes and depression both spread widely, and the association between diabetes and depression has been reported in previous studies. This study aims to determine the prevalence of depression among patients with diabetes and to investigate the association between diabetes-related factors, sociodemographic factors, and the occurrence of depression.

Method

This observational study was conducted prospectively at Narayana Medical College, Nellore. 109 patients who visited the outpatient department of the medical college were considered for this study. The sociodemographic profile of the patients was determined by interviewing them. The occurrence of depression was correlated with diabetes-related factors and sociodemographic factors.

Results

The study included both men and women, however over 60% were men. Study participants were mostly 50–60 years old. More than 70% of study participants reported Beck Depression Inventory scores over 16, suggesting depression and development. In the 50–60 age range, 42 of 43 patients experienced depression. Depression was correlated with age (p=0.032), gender (p=0.046), marital status (p=0.038), BMI (p=0.042), fasting blood sugar levels (p=0.029), HbA1c levels (p=0.039), and diabetes duration (p=0.037).

Conclusion

In this study, it was found that over 70% of the diabetics participating in this had depression. Most of the patients participating in this study were males belonging to the age group of 50 to 60 years. Diabetes and depression were found to be associated in the population participating in this study.

Recommendation

More such studies are required with large cohorts and inclusive of various geographical locations are required.

Keywords: *Depression, Diabetes, Beck Depression Inventory*
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Introduction

The importance of mental health is gaining acknowledgment more than any other era before. Depression is widely prevalent in the modern society. Food habits and sedentary lifestyles have a substantial impact on mental and physiological health. The rise in the number of patients suffering from diabetes mellitus is exponential [1,2]. Both physiological disorders diabetes mellitus and psychological disorder depression are prevalent. The presence of diabetes and depression results in worsening of the former.

Management of diabetes mellitus has poor outcomes if the patient is suffering from depression as it can lead to poor lifestyle habits such as eating disorders and sleeping disorders [3]. Diabetes mellitus is a metabolic disorder that affects various facets of physiological health. Diabetes can be treated if good lifestyle habits are adopted which can lower the blood sugar level. Diabetes and depression both spread widely, and the association between diabetes and depression has been reported in previous studies [4,5]. The association between diabetes and depression is rarely studied among the Indian population. Depression makes it difficult to follow the prescribed schedule which increases

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the complexity of diabetes. Also, it is seen that the burden of diabetes results in the burden of depression.
Treatment of diabetes is expensive as the lifestyle changes required cannot be achieved without investing in it. Although the association between diabetes and depression has been studied for high-income groups [6,7]. The literature is not available on the association of diabetes and depression in lower-income groups.

Objectives of the study
In India, much literature is not available about mental health disorders. The association between diabetes and depression is rarely studied among the Indian population. The purpose of this study is to determine the diabetes prevalence.

Method
Study design
A cross-sectional observational study.

Study setting
The study was conducted prospectively at Narayana Medical College, Nellore, India, spanning from January 2023 to March 2024.

Participants
109 patients who visited the outpatient department of the medical college were considered for this study.

Inclusion Criteria
1. Patients diagnosed with diabetes mellitus.
2. Patients who visited the outpatient department of Narayana Medical College, Nellore.
3. Patients aged 18 years and above.

Exclusion Criteria
1. Patients with any mental disorder other than depression that could interfere with the reporting of data.
2. Patients with incomplete sociodemographic or clinical data.
3. Patients younger than 18 years of age.

Sample size
To calculate the sample size for this study, the following formula was used for estimating a proportion of a population:

$$n=\frac{Z2 \times p \times (1-p)}{E2}$$

Where:
- n = sample size
- Z = Z-score corresponding to the desired level of confidence
- p = estimated proportion in the population
- E = margin of error

Bias
There was a chance that bias would arise when the study first started, but it was avoided by giving all participants identical information and hiding the group allocation from the nurses who collected the data.

Data Collection and Procedure
The sociodemographic profile of the patients was determined by interviewing them. Beck's depression inventory was used to determine the prevalence of depression. An 8-item Morisky medication index was used to determine if the patient followed the medication regimen. The details regarding the family history of diabetes, medication of diabetes, duration of diabetes, and control of diabetes were recorded. The details such as income, age, and occupation were also recorded to understand the presence of depression. The control of the diabetes was determined by estimating the HbA1c level, blood glucose level, and other parameters.

Ethical consideration
The institutional ethics committee approved this study. Informed consent was obtained from the patients participating in this study.

Statistical analysis
The data obtained was arranged in a tabular format. A pie chart was used to analyze the data and understand the association between diabetes and depression.

Result
Among the 109 patients participating most of the patients in this study were more than 40 years old figure no.1 shows the age distribution of the patients participating. 66 of them were male and 43 of them were female, figure no.2 shows the gender distribution. 83 out of 109 patients had diabetes in their family history. Figure no. 3 illustrates the marital status of the patients.

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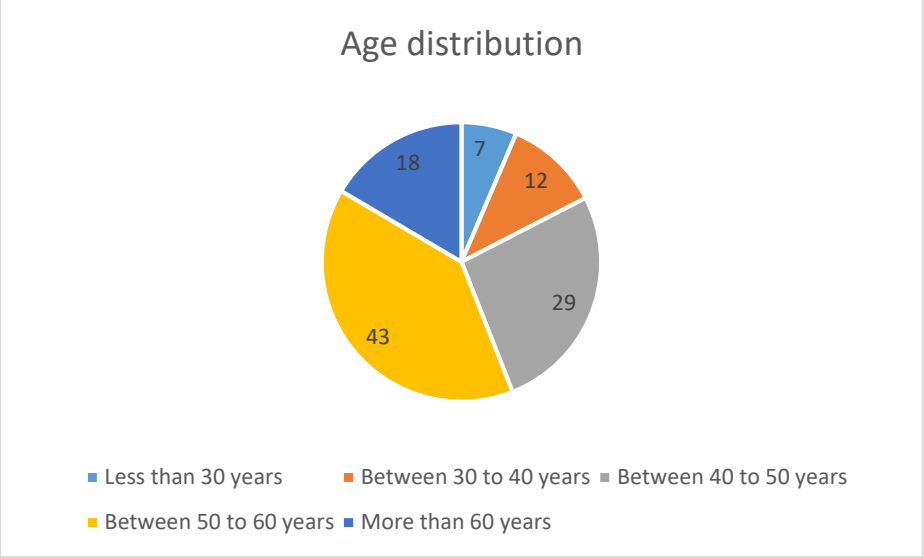

Figure No.1: Age distribution of the patients

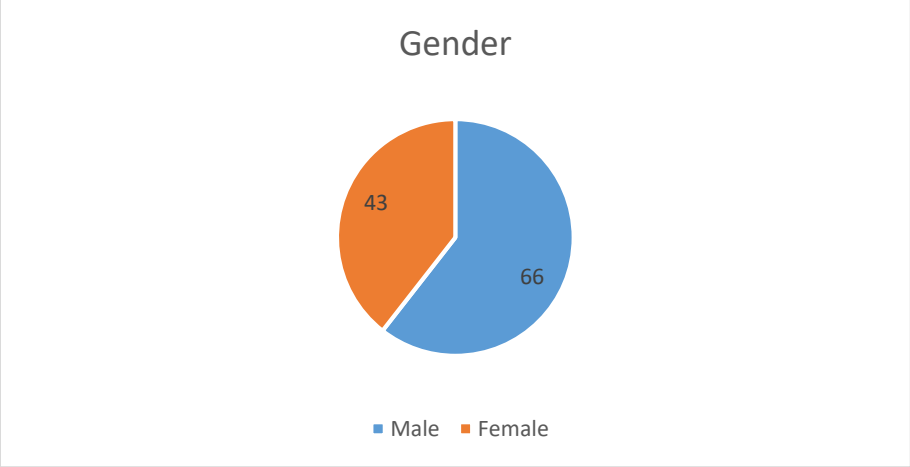

Figure no.2: Gender distribution

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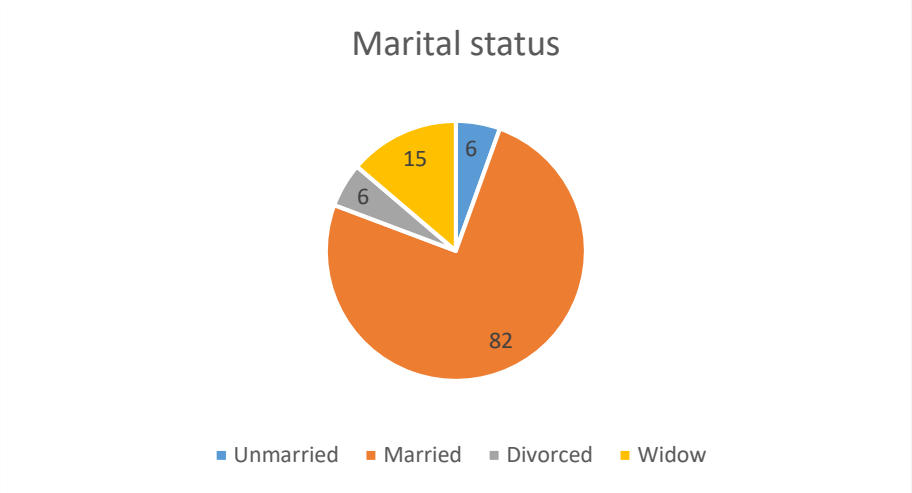

Fig No.3: Distribution of marital status

Over 50% of the patients had a family history of diabetes and were suffering from diabetes for about 5 to 10 years. Considering the control over the blood sugar levels most of the patients had higher than 125mg/dl of blood sugar and HbA1c higher than or equal to 7. The majority of the patients had higher BMI.

Table no.1 summarizes the data on the association between diabetes and depression considering the socio demographic factors and disease-related factors. Age, gender, and marital status had a significant relationship with the occurrence of diabetes and depression. Similarly, disease-related factors such as fasting blood sugar level, HbA1c level, and duration of disease had a significant relationship with the occurrence of diabetes and depression.

Table 1: Association between Sociodemographic and Diabetes-Related Factors with Depression in Diabetic Patients

Sociodemographic variables		Frequency	Frequency of patients with depression	P-value
Age	Less than 30 years	7	6	p=0.032
	Between 30 to 40 years	12	11	
	Between 40 to 50 years	29	28	
	Between 50 to 60 years	43	42	
	More than 60 years	18	17	
Gender	Male	66	62	p=0.046
	Female	43	42	
Marital status	Unmarried	6	5	p=0.038
	Married	82	80	
	Divorced	6	5	
	Widow	15	14	
Diabetes-related factors				
BMI	Less than 25	31	29	p=0.042
	25 to 30	55	53	
	More than 30	23	23	
Fasting blood sugar levels	Less than 110	14	12	p=0.029
	Between 110 to 125	23	21	
	More than 125	72	71	

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HbA1c %	Less than 7	42	40	p=0.039
	More than or equal to 7	67	64	
Duration of disease	More than 5	40	38	p=0.037
	Between 5 to 10	56	54	
	More than 10	11	10	

According to Beck's depression inventory, the severity of the depression was assessed in patients. The following table no.2 illustrates the score of the patients which indicates the severity of depression.

Table 2: Severity of Depression among Diabetic Patients According to Beck Depression Inventory Scores

Beck depression inventory	Score	Number of patients	p-value
Minimum	Below 10	23	>0.05
Mild	11 to 16	10	>0.05
Marginal	17 to 20	23	<0.05
Medial	21 to 30	43	<0.01
Severe	Above 31	10	<0.01

Discussion

The demography and social profile of patients participating in this study and other studies conducted within a similar domain are consistent [8]. The patients participating in the study were male as well as females but more than 60% of the patients were male. The common age group in the study was between 50 to 60 years. Similarly, another study found that the age group of the patients was above 40 years [9].

More than 70% of the patients participating in the study had a Beck depression inventory score of more than 16 which indicated the presence and progression of depression among the participants. A significant correlation was observed between the severity of depression, as quantified by the Beck Depression Inventory scores, and the presence of diabetes, with a p-value of less than 0.05. This statistical significance underscores the intertwined nature of diabetes and depression, highlighting how the exacerbation of one condition can lead to the deterioration of the other. Consequently, the management of diabetes mellitus appears to have poorer outcomes in patients suffering from depression, which could lead to adverse lifestyle habits impacting diabetes control.

Yet another study conducted on a similar population found that the occurrence of depression was 76.9% [10]. On the other hand, certain studies reported a much lesser percentage of the occurrence of depression [11,12].

According to this study, 30 % of the patients had milder symptoms of depression and 9% of the patients had severe depression. The rest of the patients had depression moderately. As per the geographic location of such study, the percentage of the patients with diabetes and depression may vary but the association of diabetes and depression is quite prevalent [13]. In this study, it was found that diabetes-related factors had a significant association with the occurrence of depression. Also, the demography of the patients such as income, marital status, and age had a significant correlation with the occurrence of depression.

Depression alters the quality of life which makes it difficult to maintain the lifestyle changes required to manage diabetes thus these two comorbid diseases together make it difficult for clinicians to treat either. Arresting the progression of depression in patients diagnosed with diabetes results in better clinical outcomes.

The findings of this study highlight a significant association between diabetes and depression. Specifically, more than 70% of the diabetic patients in the study exhibited signs of depression as indicated by a Beck Depression Inventory score of more than 16. This high prevalence underscores the critical mental health burden faced by individuals with diabetes.

The study identified that age, gender, marital status, BMI, fasting blood sugar levels, HbA1c levels, and the duration of diabetes were significantly correlated with the occurrence of depression. Notably, patients in the age group of 50 to 60 years, males, and those with a higher BMI were more likely to suffer from depression. The duration of diabetes and poor glycemic control, as indicated by higher fasting blood sugar levels and HbA1c percentages, also emerged as important factors contributing to depression among diabetic patients.

These results suggest that diabetes management strategies must incorporate mental health assessments and interventions. The bidirectional relationship between diabetes and depression indicates that addressing one condition could potentially improve the outcomes of the other. Therefore, healthcare providers should adopt a

holistic approach to treating diabetic patients, recognizing the intertwined nature of physical and mental health.

Generalizability

While this study provides valuable insights into the prevalence and factors associated with depression among diabetic patients in a tertiary care setting, caution is needed in generalizing these findings due to the single-site study with a small sample size of 109 patients. However, the significant correlations between sociodemographic and diabetes-related factors with depression likely apply to similar populations elsewhere, underscoring the need for comprehensive diabetes care that includes mental health evaluations. Further research with larger, more diverse cohorts is essential to validate these findings and improve tailored interventions, particularly in low- and middle-income countries where diabetes and mental health disorders are rising.

Conclusion

In this study, it was found that over 70% of the diabetics participating in this had depression. majority of the patients participating in this study were males belonging to the age group of 50 to 60 years. Diabetes and depression were found to be associated in the population participating in this study.

Limitation

The sample population participating in this is smaller in comparison to the patients of diabetes around the country. To confirm the findings of this study a larger cohort of diabetics is required.

Recommendation

More such studies are required with large cohorts and inclusive of various geographical locations are required.

Acknowledgment

We are grateful to the hospital's staff and patients involved in the study for their cooperation during the study.

List of abbreviation

BMI- Body mass index
HbA1c- Glycated Haemoglobin

Source of funding

No funding received.

Conflict of interest

The authors have no competing interests to declare.

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