

## Depression Among Diabetics Compared To Non-Diabetics And Its Correlation With Glycaemic Control.

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**Abstract:** This study was planned to know the prevalence of depression among diabetics when compared to non-diabetic patients and the associated factors with depression and to correlate with the glycaemic control. This study was an observational study and cross-sectional study. Institutional ethics committee approval was taken. The sample size calculated was 117 (117 diabetics and 117 non-diabetics). The study subjects were grouped into two groups (diabetics and non-diabetics) based on the history of diabetes. They were selected from medicine out-patient department randomly during the study period. The patients aged 19-70 yrs were included in the study. Type-1 diabetics, known psychiatric patients or who were on psychiatric drugs, terminally ill patients were excluded from the study. Informed consent was taken and confidentiality was maintained throughout the study period Results: the prevalence of depression among diabetics (32.5%) was found to be higher when compared with non-diabetics (16.2%). The difference was statistically significant with p value < 0.05. Most of the socio-demographic factors (female gender (76.3%), low levels of education (52.6%), income less than five thousand (47.37%) except age had positive association with presence of depression among diabetics. Lack of physical exercise (73.7%) was found to be associated with presence of depression among diabetics. In this study it was found that there was no positive correlation with poor glycaemic control and levels of depression. It can be concluded that there was high prevalence of depression among diabetics when compared with non-diabetics and that should be addressed in the form of routine check-up and management along with clinical symptoms.

**Key words:** Diabetes, Depression, HAM-D, Glycaemic control

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### I. Introduction

The diabetes and depression both are important basic health problems in the community. India is said to be a diabetic capital of the world with over 72million cases in India (2017)<sup>1</sup>. It is a growing challenge in India with estimated 8.7% diabetic population in the age group of 20 to 70 years<sup>2</sup>. Depression is also a major public health problem in India. As per National Mental Health Survey (2015-16) in India, one in 20 (5.25%) people over 18 years of age have ever suffered (at least once in their lifetime) from depression<sup>3</sup>. Depression is both a cause and consequence of several non-communicable diseases<sup>3</sup>. Depression usually goes unnoticed and unidentified among diabetics. The prevalence of depression among diabetics is around 40%<sup>4,5</sup> in the studies done in India using psychometric scales. The Hamilton Depression rating Scale -17<sup>6</sup> is the most widely used depression assessment scale. The severity of depression can be classified using the final score after application of HAM-D scale.

The studies about depression among diabetics are less in South India. Factors associated with diabetes may have influence on the person to get depression. National and international studies<sup>4,7</sup> have shown some socio-demographic factors, co-morbid conditions, and duration of diabetes are risk factors for depression among diabetics.

The **aim of the study** is to know the prevalence of depression among diabetics compared to non-diabetics and its correlation with glycaemic control.

**Objectives:**

1. To know the prevalence and severity of depression among diabetics when compared to non-diabetics.
2. To determine factors associated with depression among diabetics.
3. To correlate the level of depression with glycaemic control.

**II. Material And Methods**

**Study design:** An observational & cross-sectional study with comparison between diabetics and non-diabetics about prevalence of depression.

**Study population:**

Patients attending medical out-patient department were included in the study. Two groups (diabetics and non-diabetics) were done based on the history of diabetes.

**Sample size:** it was calculated by using following formula:  $N = Z^2 \frac{P(1-P)}{l^2}$

The 'Z' is value of area under normal curve (for two-tailed) and  $\alpha$  level of significance is taken as 0.05. The 'p' is prevalence (46.1%)<sup>4</sup>, l is allowable error (20%).

N= sample size =117. For each group (diabetics and non-diabetics) the sample size was 117. Study subjects were selected from medical out-patient department using simple random method.

**Selection criteria:** All the patients aged above 19 to 70yrs were included in the study.

**Exclusion criteria:** type-I diabetic patients, those who were already diagnosed with psychiatric problems, who were on psychotropic drugs, who were terminally ill.

**Study period:** April 2018 to September 2018

**Data collection procedures and instrument:**

A pre-tested, pre-designed, semi-structured schedule was applied. It contains questions related to socio-demographic details, personal habits like alcohol, smoking, physical exercise and Hamilton Depression Rating Scale-17.

The Hamilton Depression Rating Scale (HAM-D) was designed to rate the severity of depression in patients. The HAM-D contains 17 items pertaining to symptoms of depression experienced over the past week. Each item has answers 0 to 4. Total score has to be calculated for 17 items. Based on total score the study subjects can be classified as normal (0-7), mild (8-13), moderate (14-18), severe (19-22), Very severe ( $\geq 23$ ) depression.

**Glycaemic control:** It was assessed on the basis of fasting and postprandial blood glucose levels among diabetic patients.

The institutional ethics committee approval was taken for conduction of the study.

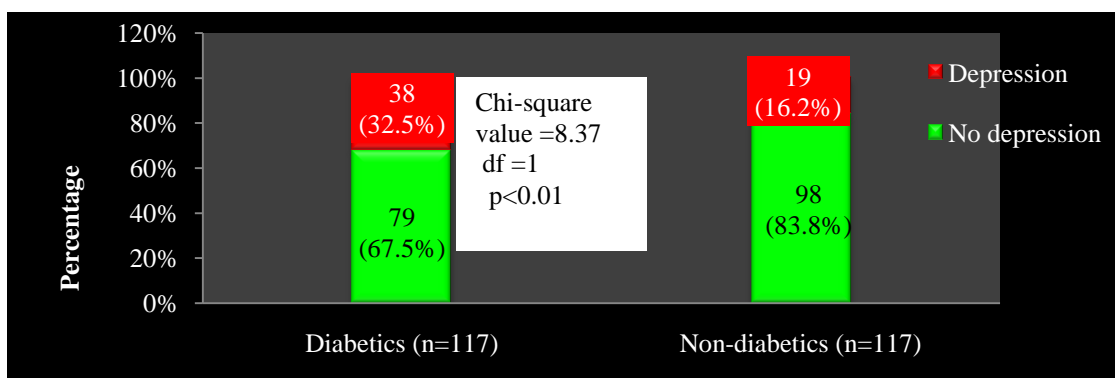
**Statistical analysis:** The data was analyzed using SPSS -22 version. The chi-square test was applied to know statistical significance.

**III. Result**

The sample calculated for study was 117 in each group (diabetics and non-diabetics). The mean age of diabetics (n=117) and non-diabetics (n=117) was  $51.03 \pm 11.47$  yrs,  $41.20 \pm 14.98$  yrs respectively. More than half the study subjects were females among diabetics (55.6%) and non-diabetic patients (57.3%). There was no significant age & gender difference between diabetics and non-diabetics statistically.

**Objective 1: Prevalence and severity of depression among diabetics when compared to non-diabetics:**

Prevalence of depression among diabetics was found to be 32.5% (38 out of 117 diabetics) and it was higher than the prevalence of depression found among non-diabetic patients (16.2%) in the study. The difference was statistically significant with p value less than 0.01.



**Figure-1:** Distribution of study subjects (diabetics and non-diabetic patients) based on the prevalence of depression.

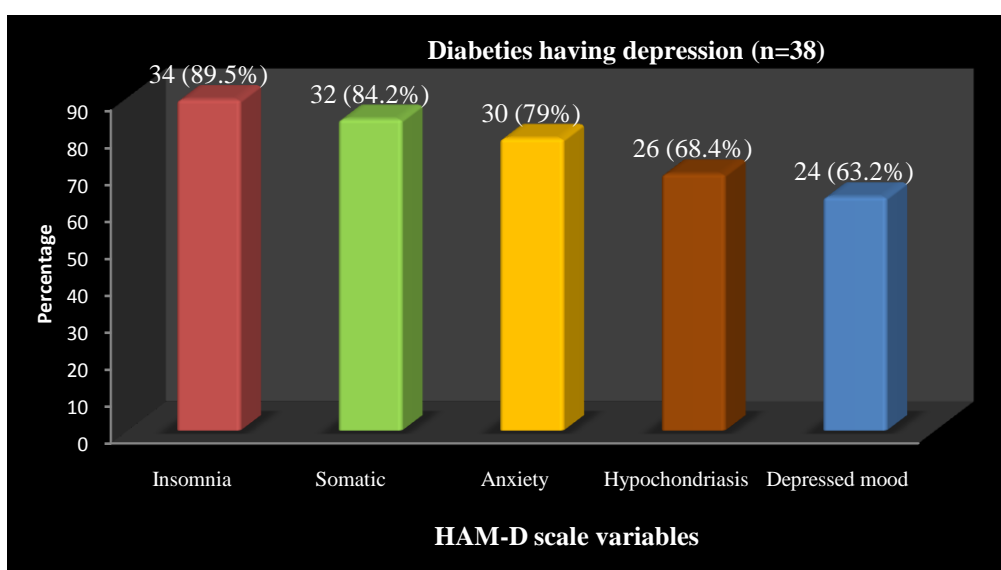
Table-1 shows that mild depression was the most common level of depression found among the study subjects in both the groups. More than one-fifth (21.37%) of the diabetic patients were found to have mild depression and next comes moderate level of depression (6.8%) and remaining 3.4% and 0.9% of the diabetics show severe and very severe form of depression respectively.

**Table-1:** Distribution of study subjects based on severity of depression:

Depression	Diabetics N(%)	Non-diabetics N(%)
No depression	79 ( 67.53 )	98 ( 83.77 )
Mild	<b>25 ( 21.37 )</b>	<b>9 ( 7.7 )</b>
Moderate	8 ( 6.84 )	7 ( 5.99 )
Severe	4 ( 3.42 )	2 ( 1.71 )
Very severe	1 ( 0.86 )	1 ( 0.86 )
Total	117 ( 100 )	117 ( 100 )
<b>Chi-square value = 10.30 P-value = 0.04*</b>		

\*statistically significant

Figure-2 shows the frequency of variables in HAM-D scale among the diabetics having depression. The majority of diabetics having depression had insomnia (early in the night -84.2%, middle of night -78.9%, early hours of morning-89.5%), general somatic symptoms (84.2%), anxiety-somatic (79%), hypochondriasis (68.4%) and depressed mood (63.2%). More than half the diabetics having depression had anxiety-psychic (57.9%), retardation (slowness of thought and speech; impaired ability to concentrate etc) (55.3%).



**Figure- 2** Frequency of HAM-D scale variables among the diabetics having depression.

**Objective 2: Factors associated with depression among diabetics:**

Table-2 depicts that more than half of the diabetics having depression (52.6%) were belonged to the age group of 46-60yrs. Out of 38 diabetics having depression 29 (76.3%) were females. Males were predominant (54.4%) among diabetics who were not having depression. This difference was highly statistically significant with p value less than 0.01. It was found that 20 out of 38 (52.6%) of the diabetics having depression were uneducated. Whereas 32 out of 79 (40.5%) of the diabetics not having depression were found to be educated up to secondary level. The difference was found to be statistically significant with p value less than 0.05.

Out of 38 diabetics who are having depression, 34 subjects (89.5%) had provision of ration card (below poverty line). Out of 79 diabetics who are not having depression, 56 (70.9%) subjects had provision of ration card. Home makers were predominant group (55.2%) among diabetics having depression when compared to diabetics not having depression. The difference was statistically significant with p value equal to 0.02.

**Table-2:** Distribution of diabetics with or without depression in relation with socio-demographic factors:

Factors	Depression		Total Diabetics (n=117)	Chi-square value & P-value
	Yes (n=38)	No (n=79)		
<b>Age in yrs</b>				
18 - 30	0 ( 0 )	4 ( 5.07 )	4 ( 3.42 )	3.47 P=0.33
31 - 45	12 ( 31.58 )	19 ( 24.06 )	31 ( 26.5 )	
46 - 60	<b>20 ( 52.64 )</b>	<b>37 ( 46.84 )</b>	57 ( 48.72 )	
61 - 70	6 ( 15.79 )	19 ( 24.06 )	25 ( 21.37 )	
<b>Gender</b>				
Male	9 ( 23.69 )	<b>43 ( 54.44 )</b>	52 ( 44.45 )	9.82 P<0.01*
Female	<b>29 ( 76.32 )</b>	36 ( 45.57 )	65 ( 55.56 )	
<b>Education</b>				
No education	<b>20 ( 52.64 )</b>	21 ( 26.59 )	41 ( 35.05 )	8.85 P=0.03*
Primary school	5 ( 13.16 )	12 ( 15.19 )	17 ( 14.53 )	
Secondary school	7 ( 18.43 )	<b>32 ( 40.51 )</b>	39 ( 33.34 )	
Above Intermediate	6 ( 15.80 )	14 ( 17.73 )	20 ( 17.10 )	
<b>Ration card</b>				
Yes	<b>34 ( 89.48 )</b>	<b>56 ( 70.89 )</b>	90 ( 76.93 )	4.99 P = 0.02*
No	4 ( 10.53 )	23 ( 29.12 )	27 ( 23.08 )	
<b>Occupation</b>				
Home maker	<b>21 ( 55.27 )</b>	32 ( 40.51 )	53 ( 45.3 )	9.92 P=0.02*
Retired / Unemployed	5 ( 13.17 )	6 ( 7.61 )	11 ( 4.41 )	
Skilled / Semi skilled	5 ( 13.17 )	<b>33 ( 41.78 )</b>	38 ( 32.49 )	
Unskilled	7 ( 18.43 )	8 ( 10.13 )	15 ( 12.83 )	

\*statistically significant

Table-3 shows that majority (28 out of 38 (73.7%) of the diabetics having depression had no habit of physical exercise for at least 30 minutes/day for 5 days in a week. Only 10 out of 38 (26.3%) diabetics having depression were said that they had habit of physical exercise, but more than half (56.9%) of the diabetics who are not having depression were found to have habit of physical exercise at least for 30 minutes per day 5 days in a week. The difference between two groups was statistically significant with p value less than 0.01. Only 4 out of 38 (10.53%) and 14 out of 79 (17.73%) diabetics having depression and diabetics not having depression respectively were found to be alcoholics. When smoking habit was taken into consideration, 5 out of 38 (13.16%) and 3 out of 79 (3.8%) diabetics having depression and diabetics not having depression respectively had the habit of smoking. There was no significant statistical difference with respect to alcohol, smoking habits between the diabetics having depression and diabetics not having depression.

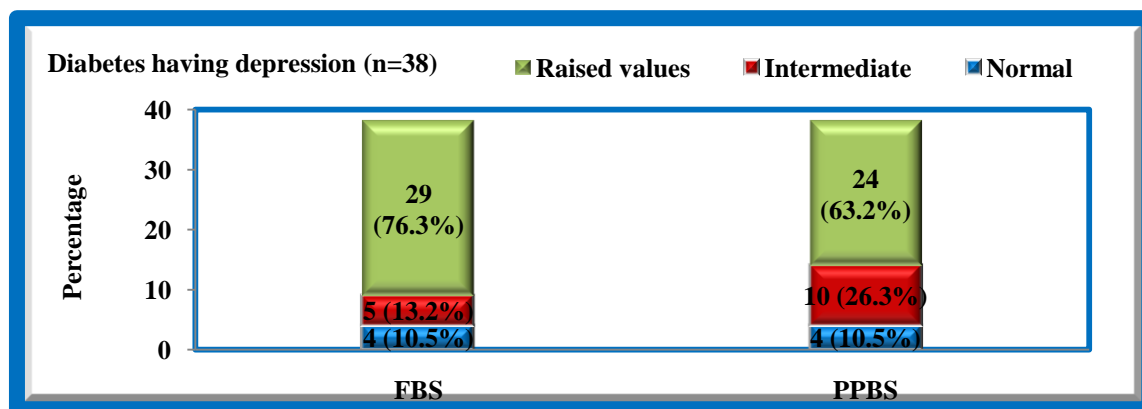
**Table-3:** Distribution of diabetics with or without depression in relation with personal habits:

Personal habits	Depression		Total (n=117)	Chi-square value & P-value
	Yes (n=38)	No (n=79)		
<b>Alcohol</b>				
Yes	4 ( 10.53 )	14 ( 17.73 )	16 ( 13.68 )	1.81 P=0.4
No	34 ( 89.48 )	65 ( 82.28 )	99 ( 84.62 )	
<b>Smoking</b>				
Yes	5 ( 13.16 )	3 ( 3.8 )	8 ( 6.84 )	4.26 P=0.12
No	33 ( 86.85 )	76 ( 96.21 )	109 ( 93.17 )	
<b>Physical exercise</b>				
Yes	10 ( 26.32 )	<b>45 ( 56.97 )</b>	55 ( 47.01 )	9.67 p<0.01*
No	<b>28 ( 73.69 )</b>	34 ( 43.04 )	62 ( 53 )	

\*statistically significant

**Objective 3: To correlate the level of depression with glycaemic control.**

The mean fasting blood glucose values and mean post prandial blood glucose values of diabetics (n=117) were found to be 165.12±59.52 mg/dl and 266.30±108.77 mg/dl respectively. The mean fasting blood glucose levels of diabetics having depression (n=38) and diabetics not having depression (n=79) were found to be 174.53±67.65 mg/dl and 160.63±55.08 mg/dl respectively. The mean fasting blood glucose levels of diabetics having depression were found to be higher than diabetics not having depression, but it was not statistically significant. The mean post-prandial blood glucose levels of diabetics having depression (n=38) and diabetics not having depression (79) were found to be 256.55±102.35 mg/dl and 270.99±112.06 mg/dl respectively. The difference of values between two groups was not statistically significant. For the study purpose, the blood glucose levels were grouped into normal, intermediate and raised levels. Figure-4 represents that 29 out of 38 (76.3%) and 24 out of 38 (63.2%) diabetics having depression were found to have raised fasting blood glucose and raised post prandial levels respectively.



**Figure-4:** Bar chart showing distribution of blood sugar values among diabetics having depression.

#FBS ---Normal - < 110 mg/dl, Intermediate - 110 - 125 mg/dl, Raised values -  $\geq$  126 mg/dl

#PPBS----Normal - < 140 mg/dl, Intermediate - 140 - 200 mg/dl, Raised values - > 200 mg/dl

#### IV. Discussion

In the present study, the prevalence of depression among diabetics was found to be 32.5% which was significantly higher when compared to non-diabetic patients (16.2%) (Figure-1). This finding was in similar lines with the study done by Rajesh Rajput et al<sup>8</sup>. The prevalence of depression among diabetics (32.5%) found in the present study was nearer to the finding of the study done by Anantha EVM et al<sup>9</sup> (39.7%) in Tamilnadu.

Mild depression was most common level of depression among diabetics that had been reported by the present study (Table-1) which was consistent with the findings in the studies done by Aminu A.S et al<sup>10</sup> and Anantha EVM et al<sup>9</sup>.

In this study, there was statistically significant association found between female gender, low levels of education & income and presence of depression among diabetics (table-2). Rajesh Rajput et al<sup>8</sup> and Anantha EVM et al<sup>9</sup>. also found the positive association between female gender and depression among diabetics in their studies which were in similar lines with the finding of the present study.

In the present study, when personal habits (physical exercise, smoking, alcohol intake) were considered, lack of physical exercise was found to be associated with presence of depression among diabetics (73.7%)(table-3). It was highly statistically significant with p value less than 0.01. This finding was collaborated to results of study done by P.Dahal et al<sup>11</sup>, where it was reported the positive association between lack of physical exercise and presence of depression among diabetics.

In the present study, it was found that there was no positive association between poor glycaemic control and depression among diabetics, even though raised blood sugar levels were observed among most of the diabetics having depression (Figure-4). This finding was contradictory with findings of the study done by Sonasree et al<sup>12</sup>, where they have found positive correlation with presence of depression and poor glycaemic control. The reason for the difference in the results of studies may be the raised blood glucose levels in all the study subjects irrespective of presence of depression in the present study.

#### V. Conclusion

The study demonstrated high prevalence of depression among diabetics compared to non-diabetic patients. Poor socio-economic status, female gender had positive association with presence of depression among diabetics. Poor glycaemic control was observed in majority of study subjects but there was no positive correlation with presence of depression among diabetics. Based on the present study findings, it can be understood that, a regular assessment of psychological condition along with clinical and bio-chemical tests is needed for diabetics. All diabetics who were found to have depression in this study were referred to the psychiatrist for further evaluation and management.

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