

# Assessment of Depression in Patients of Type-2 Diabetes Mellitus Attending a Tertiary Care Centre

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## ABSTRACT

**Introduction:** Type-2 diabetes mellitus is a common, chronic metabolic disorder with multiple complications if not well controlled. Depression is a very common psychiatric co-morbidity in these patients. Multiple environmental and patient related factors are linked with this co-morbidity. It is important to address depression and related factors in these patients for a better outcome. This study aimed to assess depression and distribution of various socio-demographic and clinical details in patients of type-2 diabetes mellitus.

**Material and Methods:** Using a purposive sampling technique, a total of 118 patients of type-2 diabetes mellitus who fulfilled the inclusion and exclusion criteria of this study were enrolled. They were administered Hamilton Depression Rating Scale to assess depression. Overall 66.1% of the patients had co-morbidity of depression.

**Results:** Significantly more number of patients of type-2 diabetes mellitus with co-morbid depression were unmarried (41% vs 15%,  $\chi^2=9.029$ ,  $df=2$ ,  $p<.05$ ), unemployed/unskilled workers (21.8% vs 5% / 73.1% vs 55%,  $\chi^2=24.893$ ,  $df=2$ ,  $p<.01$ ), from lower socio-economic status (71.8% vs 52.5%,  $\chi^2=4.342$ ,  $df=1$ ,  $p<.05$ ), joint family (33.3% vs 7.5%,  $\chi^2=9.519$ ,  $df=1$ ,  $p<.05$ ) and rural background (82.1% vs 62.5%,  $\chi^2=5.453$ ,  $df=1$ ,  $p<.05$ ), and had poor control of the level of HbA1c (55.1% vs 2.5%,  $\chi^2=41.022$ ,  $df=2$ ,  $p<.01$ ) than those without co-morbid depression. There was a significant negative correlation of years in education with HAM-D total score ( $r=-.471$ ,  $p<0.01$ ).

**Conclusion:** A co-morbidity of depression is very common in patients of type-2 diabetes mellitus and various socio-demographic and clinical factors are linked to this co-morbidity. It is important to address these issues for the sake of overall better outcome in type-2 diabetes mellitus.

**Keywords:** Depression, Co-morbidity, Type-2 Diabetes Mellitus

Various guidelines on diabetes mellitus advocate life style modifications either with or without medications to control it but the psychological issues associated with it are never emphasized.<sup>1</sup> Although many people with diabetes cope well and live healthy lives, several studies have highlighted that co-morbidity of significant psychological problems can result in poor quality of life, reduced self management, poor treatment adherence and overall poorer outcome in diabetes.<sup>4,6</sup> Among various psychological issues in these patients, the depression stands out as the most common diagnosable psychiatric entity barring some psychological reactions arising due to diabetes such as an 'emotional crisis' on initial diagnosis of diabetes, an issue of 'diabetes-distress' in making adjustment with diabetes as well as occasional 'phobic reactions' during acute needs in diabetes.<sup>7</sup>

At present, issue of depression in diabetes mellitus is a global concern and the researchers in the field claim a bidirectional relationship between the two conditions where depression is identified as both cause and consequence of diabetes mellitus.<sup>8,9</sup> However, limited research is available on this relationship in India.<sup>2</sup> Here, the co-occurrence of these two conditions in population based studies is obvious but clinical studies of the co-morbidity are limited and inconsistent.<sup>2</sup> The researchers have recommended the need of an epidemiological evaluation of the clustering of depression and diabetes within specific populations in India as well as more in-depth analysis of social and cultural factors that mediate individual experiences with depression and diabetes

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## INTRODUCTION

Diabetes mellitus is a chronic, serious and complex metabolic disorder with multiple grave health consequences if left not well controlled. Type-2 diabetes mellitus is the commonest in all types of diabetes mellitus, and is usually linked with unhealthy life style. According to the International Diabetes Federation, there are 382 million people worldwide affected by diabetes, and it is expected to reach 592 million by 2035.<sup>1</sup> Out of this, India alone has 65.1 million people with diabetes in the age group of 20–79 years.<sup>1</sup> Over the past decade significant changes in quality, quantity and source of food consumption and physical activity patterns have facilitated the escalation of overweight, obesity and diabetes in India.<sup>2</sup>

in Indian context.<sup>2</sup>

With this background, the present study was designed to study prevalence of depression in a clinical sample of type-2 diabetes mellitus attending a tertiary care centre in North India. Distribution of various socio-demographic and clinical details was also sought in such patients.

## MATERIAL AND METHODS

This was a hospital-based cross-sectional observational study conducted at a tertiary care centre of western Uttar Pradesh in India. With the help of purposive sampling technique, adult (age 18 or above) patients of either sex with a diagnosis of type 2 Diabetes Mellitus receiving treatment from department of General Medicine were included in the study. Those with a past history of any psychiatric disorder or co-morbidity of any chronic medical illness other than type 2 Diabetes Mellitus were excluded. The patients who were not willing to give written informed consent were also excluded from the study. Ethical clearance was taken from the institutional ethical committee prior to start the study. All the patients enrolled for the study were assessed on following tools:

**Socio-demographic and Clinical Data Sheet (Self Prepared):** This was especially prepared for this study to obtain various socio-demographic details like age, religion, gender, marital status, educational level, occupation, residence, socioeconomic status, family type etc. as well as various clinical details like duration of illness, type of medication receiving, level of HbA<sub>1c</sub>, significant history of mental illness and diabetes mellitus in family etc.

**Hamilton Depression Rating Scale (HAM-D or HDRS)<sup>10</sup>:** This was the principal tool to assess depression and its severity among patients of diabetes mellitus. This scale is available in two common variants with either 17 or 21 items and each item is scored between 0 and 4 points. In this study the 17-item scale was used. A total score on HAM-D of 8 or above was considered as presence of depression in the sample. The level of depression was further assigned on the total score as: 0-7 = Normal; 8-13 = Mild Depression 14-18 = Moderate depression; 19-22 = Severe depression;  $\geq 23$  = Very severe depression. A major review of 70 studies has suggested that the internal, inter-rater and retest reliability estimates are adequate for the global score but are weaker for individual items of HDRS.<sup>11</sup>

Subsequently, the data thus collected were tabulated and statistically analysed using IBM Statistical Package for the Social Sciences version 22 (i.e. SPSS 22) with parametric and nonparametric tests being used as applicable. The level  $P < 0.05$  was considered as the cut-off value of significance.

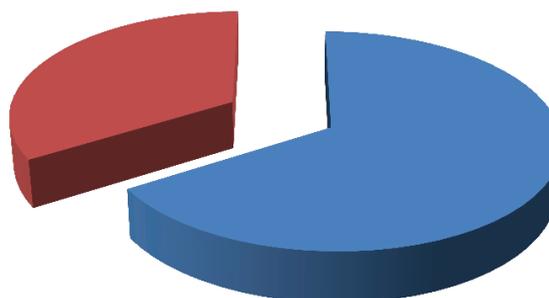
## RESULTS

The sample had a mean age of 35.06 ( $\pm 10.52$ ) years (range=18-65 years) and a mean years of education of 6.69 ( $\pm 4.81$ ) years. The socio-demographic composition of the sample was mostly of married (58.5%), Hindu (74.6%), unskilled workers (66.9%), females (53.4%) with nuclear

family (75.4%) and lower socio-economic background (65.3%) of Uttar Pradesh state of India (Table 1).

Table 2 shows clinical details of the sample. The mean duration of diabetes mellitus in them was 7.94 ( $\pm 2.77$ ) years. The mean total score of HAM-D was 10.16 ( $\pm 4.42$ ). The majority of the patients were already on oral hypoglycaemic drugs (70.3%) with good control of the level of HbA<sub>1c</sub> in blood (52.5%). A family history of diabetes (12.7%) or any psychiatric illness (11.9%) was seen in some of these patients.

Co-morbidity of Depression in Patients of Type-2 Diabetes Mellitus (N=118)



■ Depression present (HAM-D total score  $\geq 8$ ), n= 78 (66.1%)

■ Depression absent (HAM-D total score  $\leq 7$ ), n=40 (33.9%)

**Figure-1:** Co-morbidity of Depression as per HAM-D Total Score in Patients of Type-2 Diabetes Mellitus (DM2; N=118)

Socio-demographic Variables		Patients of DM <sub>2</sub> (N=118)
		Mean $\pm$ SD
Age in years		35.06( $\pm 10.52$ )
Years in education		6.69( $\pm 4.81$ )
		n (%)
Gender	Male	55(46.6%)
	Female	63(53.4%)
Religion	Hindu	88(74.6%)
	Non-Hindu (Muslim/Sikh)	30(25.4%)
Marital Status	Unmarried	38(32.2%)
	Married	69(58.5%)
	Separated/ Widow/ widower	11(9.3%)
Occupation	Unemployed	19(16.1%)
	Unskilled Employment	79(66.9%)
	Skilled Employment	20(16.9%)
Residence	Rural	89(75.4%)
	Urban	29(24.6%)
Socio-economic Status	Middle	41(34.7%)
	Lower	77(65.3%)
Family type	Nuclear	89(75.4%)
	Joint	29(24.6%)
SD: Standard Deviation		

**Table-1:** Socio-demographic Details of Patients of Type-2 Diabetes Mellitus (DM2; N=118)

Clinical Variables		Patients of DM <sub>2</sub> (N=118)	
		Mean ± SD	
Years of duration of illness		7.94(±2.77)	
HAMD total score		10.16(±4.42)	
		n%	
Type of medication	Oral Hypoglycaemic	83(70.3%)	
	Insulin	26(22.0%)	
	Both	9(7.6%)	
Levels of HbA1c	Excellent control (>6)	12(10.2%)	
	Good control (7-8)	62(52.5%)	
	Poor control (>9)	44(37.3%)	
Family history of DM	Yes	15(12.7%)	
	No	103(87.3%)	
Family history of psychiatric illness	Yes	14(11.9%)	
	No	104(88.1%)	
SD: Standard Deviation			

**Table-2:** Clinical Details of Patients of Type-2 Diabetes Mellitus (DM<sub>2</sub>; N=118)

Socio-demographic and Clinical Variables		Patients of DM <sub>2</sub> without Depression (n=40)	Patients of DM <sub>2</sub> with Depression (n=78)	χ <sup>2</sup> (df)	p
Marital status	Unmarried	6 (15%)	32 (41%)	9.029 (2)	.011*
	Married	28 (70%)	41 (52.6%)		
	Separated/Widow/widower	6 (15%)	5 (6.4%)		
Occupation	Unemployed	2 (5%)	17 (21.8%)	24.893 (2)	.000**
	Unskilled employed	22 (55%)	57 (73.1%)		
	Skilled employed	16 (37.8%)	4 (7.4%)		
Resident	Rural	25 (62.5%)	64 (82.1%)	5.453 (1)	.025*
	Urban	15 (37.5)	14 (17.9%)		
Socio-economic status	Middle	19 (47.5%)	22 (28.2%)	4.342 (1)	.043*
	Lower	21 (52.5%)	56 (71.8%)		
Family	Nuclear	37 (92.5%)	52 (66.7%)	9.519 (1)	.002*
	Joint	3 (7.5%)	26 (33.3%)		
Level of HbA1c	Excellent control	11 (27.5%)	1 (1.3%)	41.022 (2)	.000**
	Good control	28 (70%)	34 (43.6%)		
	Poor control	1 (2.5%)	43 (55.1%)		

\*Significant at p<0.05 (2-traied); \*\*Significant at p<0.01 (2-traied)

**Table-3:** Comparison of Socio-Demographic and Clinical Details in Patients of Type-2 Diabetes Mellitus (DM<sub>2</sub>) according to Co-Morbidity of Depression

Variables	HAM-D Total Score	
	r	p
Years of Education	-.527	.000**

\*\*Significant at p<0.01 (2-traied); r: Pearson's correlation coefficient

**Table-4:** Correlation of HAM-D Total Score with Years of Education in all patients of Type-2 Diabetes Mellitus (N=118)

As shown in Figure 1, the co-morbidity of depression in the patients of type-2 diabetes mellitus was labelled according to total score obtained on the Hamilton Depression Rating Scale (HAM-D). Overall, 66.1% of the sample had depression (i.e. HAM-D total score ≥8).

Table 3 shows comparison of patients of type-2 diabetes mellitus on the basis of presence or absence of co-morbidity of depression. The patients with co-morbid depression (n=78) were comparable to those without co-morbid depression (n=40) in respect to all socio-demographic and clinical details except marital status, occupation, residential background, socio-economic status, family type and the status of HbA1c. Significantly more number of patients of type-2 diabetes

mellitus with co-morbid depression were unmarried (41% vs 15%,  $\chi^2=9.029$ ,  $df=2$ ,  $p<.05$ ), unemployed/unskilled workers (21.8% vs 5% / 73.1% vs 55%,  $\chi^2=24.893$ ,  $df=2$ ,  $p<.01$ ) and from lower socio-economic status (71.8% vs 52.5%,  $\chi^2=4.342$ ,  $df=1$ ,  $p<.05$ ), joint family (33.3% vs 7.5%,  $\chi^2=9.519$ ,  $df=1$ ,  $p<.05$ ) and rural background (82.1% vs 62.5%,  $\chi^2=5.453$ ,  $df=1$ ,  $p<.05$ ) than those without co-morbid depression. Similarly, significantly more number of patients of type-2 diabetes mellitus with co-morbid depression had poor control of the level of HbA1c (55.1% vs 2.5%,  $\chi^2=41.022$ ,  $df=2$ ,  $p<.01$ ) than those without co-morbid depression.

Table 4 shows that there was a significant negative correlation

of years in education with HAM-D total score ( $r=-.471$ ,  $p<0.01$ ). No statically significant correlation of HAM-D score was observed with other variables.

## DISCUSSION

This was a hospital based cross-sectional study to assess depression among patients of type-2 diabetes mellitus attending a tertiary care centre of western Uttar Pradesh in North India. Overall, 66.1% of the patients of type-2 diabetes mellitus attending the General Medicine outpatient department in a tertiary care centre had depression as assessed on Hamilton Depression Rating Scale. This finding shows a higher prevalence of depression in a clinical population in India. A recent research work<sup>12</sup> with similar clinical population, setting and assessment tool from South India reports depression to be present in 56.8% of the patients of type-2 diabetes mellitus- a finding very close to that in our study. However, individual research works in last one decade in India have reported depression to be present in range of 41-49% of urban clinical populations of type-2 diabetes mellitus.<sup>13,14</sup> The prevalence of depression in population-based study<sup>15</sup> in urban India has been found to be as low as 20% of people with newly diagnosed diabetes. Because of lack of robust meta-analyses or review articles from India on relationship of depression with diabetes mellitus, a final conclusion cannot be dawn about the exact prevalence of the co-morbidity of depression in diabetes mellitus.

Recently, two different reviews<sup>16,17</sup> indicated three possible directions for the association of diabetes and depression: (1) both illnesses might have a common aetiology; (2) diabetes increasing the prevalence or risk for future depression; and (3) depression increasing the prevalence or risk for future diabetes. Many studies deny any robust common genetic link between diabetes or type-2 diabetes<sup>18,19</sup> but activation and disturbance of the stress system has been postulated to be a common etiological mechanism. Different environmental factors (i.e. epigenetic factors) like low socioeconomic status, poor sleep, lack of physical exercises, poor diet etc. induce the stress system in the body and the stress (through the chronic impairment of hypothalamus–pituitary–adrenal axis and sympathetic nervous system as well as deregulation of inflammatory cytokines) both promote depression and type-2 diabetes mellitus, giving a feasible common link between them.<sup>20</sup> In our study, we assessed the association of different socio-demographic factors as well as clinical details with depression in patients of type-2 diabetes mellitus coming to out-patient-door of General Medicine department in a tertiary care centre.

Marital status was significantly associated with depression in our study where more number of patients with depression were unmarried than those without depression (41% vs 15%). The majority of the patients in our study were married (70% without depression vs 52.6% without depression) but very few patients of either group were either separated, widow or widower. This finding is partially supported by a recent Indian study<sup>21</sup>, where depression was significantly high among single individuals, whether unmarried or

divorced/widowed/separated. In our study, a statistically significant relationship was observed with family type and co-morbidity of depression in patients of type-2 diabetes mellitus. The majority of the patients in this study were from nuclear family (92.55 without co-morbid depression vs 66.7% with co-morbid depression) and the remaining few patients of either group were from joint family. The association of family type with co-morbidity of depression in patients of type-2 diabetes mellitus was not highlighted in many research works done in India recently. But in view of these two findings of lesser depression in stable married persons and a lesser depression in nuclear family together, it is logical to infer that a protective role of familial support against depression is always there in patients with a chronic medical condition like type-2 diabetes mellitus requiring lifelong care. Here, protective familial system as nuclear family type and not joint family type suggests a probable role of changing social milieu in India which requires further exploration.

There was a significant negative correlation of years in education with HAM-D total score. It means the lower the education level the greater is the depression in patients of type-2 diabetes mellitus. Similar association has also been seen in many studies done in India<sup>12,21,22</sup> and abroad.<sup>23-25</sup> It is argued that type-2 diabetes mellitus with lower educational level have difficulty in following dietary and life style modifications needed to check blood sugar in control. Further, without proper understanding of the disease, its course, emergent complications and treatment options, these patients are more prone for complications and disturbed psychological wellbeing.

In this study, depression was significantly more common in patients who were either unemployed or unskilled worker as well as those who belonged to lower socioeconomic status. Many individual original research works<sup>21,22,26,27</sup> done both in South and North India over last one decade have highlighted that depression is commoner in people with low earning or lower socioeconomic status. A similar finding was there in a study<sup>28</sup> done in Bangladesh recently. These studies have stressed that these people face the twin burdens of paying for health care and meeting the needs of their family. Our study further supports these findings done in context of India and neighbour country and claims that not only unemployment but unskilled employment too is related to depression in patients of type-2 diabetes mellitus. However, another study<sup>12</sup> from India with similar methodology to our study did not find any relationship of lower socio-economic status with depression.

In our study, the patients of type-2 diabetes mellitus with co-morbid depression were significantly more number to belong from rural background. The association of rural/urban background and depression in patients of type-2 diabetes mellitus has not been emphasized much in various original research works done in India recently. One study from North India by Thour et al<sup>29</sup> found depression to be significantly more prevalent in rural subjects (57%) than the urban ones (31%) while another study from India by Raval

et al<sup>13</sup> reported no significant association between depression and rural-urban residence among diabetes patients.

In this study, a statistically significant relationship was observed between level of HbA1c and co-morbidity of depression in patients of type-2 diabetes mellitus. In comparison to more than half (55%) of the patients with co-morbid depression, only a single patient without co-morbid depression was having poor control of the level of HbA1c. The majority of the research works done in India exploring association of depression and diabetes have not emphasized this issue in their methodologies. Recently, an Indian study<sup>12</sup> tried to look relationship of level of HbA1c with co-morbid depression and diabetes-distress in patients of type-2 diabetes mellitus, but final conclusion was not made as HbA1c values were not routinely estimated due to financial constraint of a majority of the study sample. However, previous research works done across the world have found a robust relationship between HbA1c levels and diabetes distress than depression.<sup>30-32</sup> It has been argued that the association between depression and glycaemic control is mediated by several pathways and/or the impact of depression on glycaemic control can vary with other concurrent stressors and needs.<sup>33</sup>

Overall, the present study furthers the understanding of the under-recognized complex interrelationship between diabetes and depression. It gives a fair socio-demographic and clinical details of patients of type-2 diabetes mellitus as well as emphasizes that occurrence of depression is very common in these patients. The association of some of the socio-demographic and clinical details with depression is significant. The results of this study are in line of different research works done both in our country and abroad. However, the purposive sampling from a single outpatient clinic of a tertiary care hospital may not be representative of the all patients of type-2 diabetes mellitus in general population and thereby it limits the generalization of findings of this study.

## CONCLUSION

The present study concluded that it is common for the patients of type-2 diabetes mellitus to have a co-morbidity of depression to be present in more than half of such patients. Depression in these patients is commonly linked with poorer education, unmarried status, lower socioeconomic status, rural background, unemployed or unskilled employment and poor control of HbA1c level. It is important for healthcare providers to address the depression and related issues in such patients for their holistic management as well as to avoid many complications of diabetes due to co-morbidity of depression. Future studies should apply comprehensive psychiatric assessment on different samples of type-2 diabetes mellitus (larger, different settings, and geographical areas) and by different investigators.

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