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A Study of Effect of Antidepressants on Quality of Life in Patients of Type 2 Diabetes Mellitus with Depression

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ABSTRACT

Background: The complicated interrelationship between depression and diabetes mellitus has been the topic of wide interest within the past 20 years because of the overwhelming human burden in view of the World Health Organization (WHO) projecting world prevalence of diabetes will be over double (135 million in 1995 to three hundred million by 2025). Depression is common among individuals with Diabetes Mellitus, and it's related to worse outcomes. Depression has a robust impact not solely on medical outcomes however conjointly on psychological and social outcomes in diabetic patients. Overall quality of life is significantly reduced in accordance with psychological, physical and social. **Methods:** Patients attending Medicine & Psychiatry OPD of Teerthanker Mahaveer Medical College and Research Centre Moradabad, Uttar Pradesh, India within the age group of 18-70 years who were known case of Diabetes Mellitus type 2 with depression as co-morbidity, diagnosed in accordance with criterion laid down by ICD-10 .A socio-demographic proforma, Hamilton Depression rating scale, and WHOQOL-BREF-Hindi version were administered. **Results:** Presence of depression in diabetes is associated with poorer Quality of life with marked deterioration in social and occupational functioning in all four domains of WHOQOL. Severity of depression is greater in complicated cases than in uncomplicated cases as observed from HAM-D score at baseline Existence of diabetic complications has positive association with poorer QOL. There was no significant alteration in degree of treatment outcome when compared in complicated and uncomplicated cases. **Conclusion:** Presence of depression in diabetes is associated with poorer Quality of life with marked deterioration in social and occupational functioning in all four domains of WHOQOL.

Keywords: Type-2 Diabetes Mellitus, Depression.

INTRODUCTION

The complicated interrelationship between depression and diabetes mellitus has been the topic of wide interest within the past 20 years because of the overwhelming human burden in view of the World Health Organization (WHO) projecting world prevalence of diabetes will be over double (135 million in 1995 to three hundred million by 2025).[1,2] Global projections by the World Health Organization has put depressive disorders third in ranking and it has set to become the leading disease in 2030,[3,4] with a general burden of 6.3% and diabetes mellitus with 2.3% is supposed to be at 10th place which makes it a necessity to urgently understand the bi-directional relationship between depression & diabetes and implement a suitable intervention.[3,4] Depression is common among individuals with Diabetes Mellitus, and it's related to worse outcomes.

The prevalence of Depression is higher in patients with diabetes who have chronic diseases co-morbid like coronary artery disease, Asthma, Chronic obstructive respiratory disease and Neuropathies.[5,6] These patients conjointly exhibit poorer self-management and poor adherence to anti-diabetic, lipid-lowering and antihypertensive drug treatment making them more likely to have higher cardiovascular risk factors like smoking, obesity, inactive life style,[7] and uncontrolled hyperglycemia.[6] A study found that the overall rate of psychiatric disorders was considerably higher in people with co-morbid diabetes (43.1 %) than in healthy controls (26.2 %).[8] The possible explanation for this could be higher rates of depression and other mild psychiatric diseases in the subset with diabetes. A study showed that patients with newly diagnosed T2DM were 30 % more likely to have had an episode of depression in the last 3 years than controls suggesting that depression possibly may escalate the risk for T2DM.[9]

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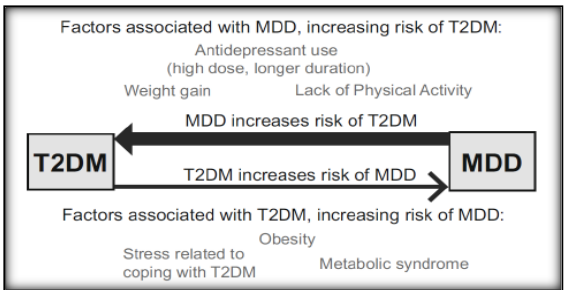

Figure 1: Factors associated with bidirectional relationship between type 2 diabetes mellitus and depression.

There is possibility of shared etiology as evident from multidimensional linkages among stress, depression, weight gain, insulin resistance and T2DM.[10] There is imbalance in HPA axis which polices cortisol production and release in both depressive and diabetic patient leading to increase in blood cortisol levels.[10,11] Neurological changes including modifications of the hippocampus, a portion of the brain 's limbic system responsible for memory and emotion processing is also seen in these patients which is due to existing anatomical connections between hippocampus and HPA axis, helping the hippocampus to control feedback inhibition of the HPA axis.[12,13] A study showed that increased release of counterregulatory hormones (catecholamine, glucocorticoids, growth hormone, and glucagon) is associated with hyperglycemia and leads to insulin resistance seen in major depression.[14] A study showed that depression was a significant predictor of treatment adherence and poorer physical functioning even when medical co-morbidity and DM related complications were controlled.[15] A meta-analysis of ten controlled studies reported higher prevalence of depression in patients with Type 2 Diabetes Mellitus in comparison to non-Diabetes Mellitus (17.6 vs. 9.8%) with females having double the risk (23.8% Vs 12.8%).[16] A study showed that course of depression was more chronic and severe with up to 80% of patients showing re-appearance of depressive symptoms over a 5-year period and depression being significantly associated with non-adherence to Diabetes Mellitus selfcare resulting in worse clinical outcomes.[1]

Diabetes has shown to doubles the chances of depression independent of the study design, patient source and methodology of assessing depression. Depression has a robust impact not solely on medical outcomes however conjointly on psychological and social outcomes in diabetic patients. Overall quality of life is significantly reduced in accordance with psychological, physical and social functioning. A study to correlate the quality of life with various sociodemographic variables of individuals with T2DM and concluded coexistence of depression and DM had significant association with socioeconomic status, education, and habitual physical activity.

MATERIALS AND METHODS

This study which was a cross sectional follow up study which was carried out in the Psychiatry and Medicine Out Patient Department Teerthanker Mahaveer Hospital, a multi -specialty hospital with attached medical college which is situated on the outskirts of Moradabad surrounded by villages and semirural area. Diagnosed Type 2 Diabetes Mellitus cases that constituted the sample of study were informed about the purpose of study & informed consent was taken. All the patients were subjected to detailed evaluation on a specially designed proforma to find out socio-demographic data. Patients were then clinically interviewed for presence of depressive symptoms and a diagnosis of depression was made as per criterion laid out in ICD-10.[18]

Inclusion Criteria

1. Patients attending Medicine & Psychiatry OPD within the age group of 18-70 years who were known case of Diabetes Mellitus type 2 with depression as co-morbidity.
2. Those patients and/ or accompanying relatives willing to give written informed consent regarding participation in study.

Exclusion Criteria

1. Patients with any other diagnosed co-morbid cardiac, medical or surgical illness.
2. Patients with co-morbid substance use disorder.
3. Patients with type 1 Diabetes Mellitus.
4. Diabetic patient with any other known psychiatric illness.
5. Patients developing any major medical illness during the course of treatment shall be excluded from the study.

Instruments

1. A semi-structured psychiatric interview.
2. Diagnostic criterion for depression according to ICD 10.[18]
3. Hamilton scale for depression (HAM-D).[19]
4. Scale to measure quality of life (WHOQOL-BREF).[20]

Data Analysis

Data was entered in Microsoft Excel 2016 and analysis was done using SPSS version 21-software. Statistical differences in proportion were calculated using the chi square test, t-test. Correlation between the various comorbidities and quality of life domains were assessed using pearson's correlation coefficient and results have been presented using appropriate pie charts, bar charts wherever applicable.

RESULTS

- Most common age group was 50-59 years (31, 32.3%) of age followed by 60-69 (24,25%) years of age.

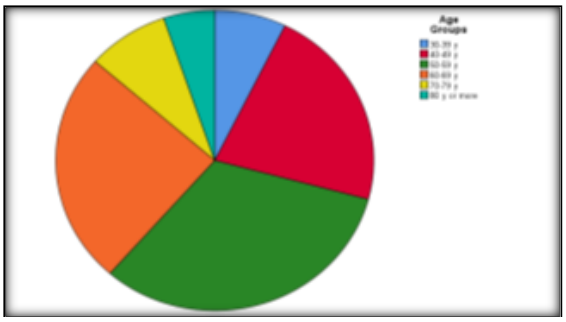

Figure 2: Pie chart showing the age distribution of Participants

- More than half were females (53, 55.2%) followed by males (43, 44.8%).

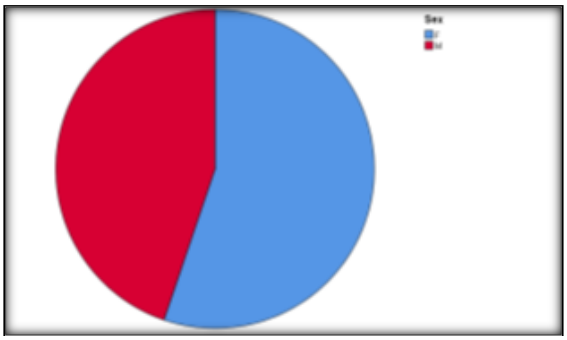

Figure 3: Pie chart showing distribution of participants according to sex

- Most of the participants were married (84, 87.5%). Very few were widow/widower (11, 11.5%) followed by unmarried (1, 1%).

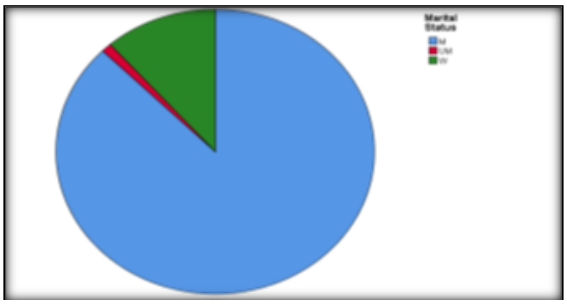

Figure 4: Pie chart showing distribution of participants according to marital status

- More than half of the participants were illiterate (49, 51%) followed by educated up to middle, senior secondary and bachelor degree equally (each 10, 10.4%)

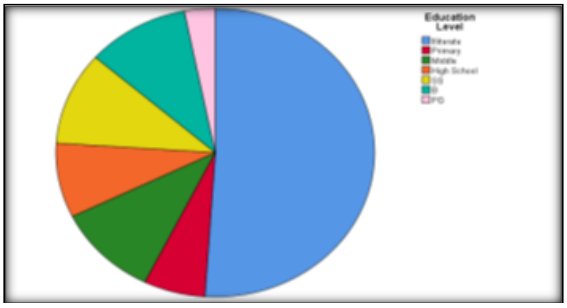

Figure 5: Pie chart showing distribution of participants according to education level

- Most (54, 56.3%) of the participants were belong to LMC (54, 56.3%) followed by LC (20, 20.8%), MC (15, 15.6%) and UMC (7, 7.3%).

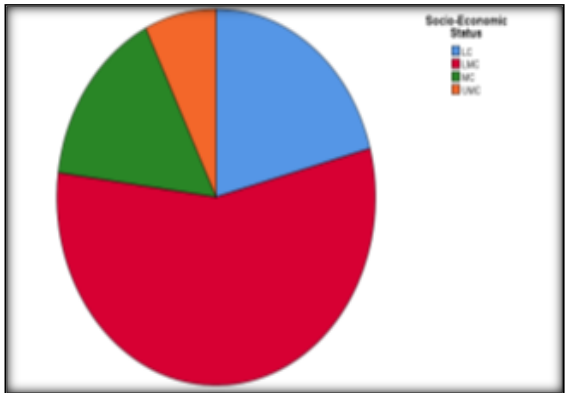

Figure 6: Pie chart showing distribution of participants according to socioeconomic status

- Most (72, 75%) of the participants were belong to Rural background followed by Urban (24, 25%).
- Most of the participants had duration of illness of less than 5 years (49, 51%) followed by 6-10 years (28, 29.2%).
- Most of the participants had positive (69, 71.9%) treatment history of DM .
- Over all 35 (36.5%) participants experienced one or more complications.
- Neuropathy (14, 14.6%) was most complication followed by Retinopathy (10, 10.4%). Cardiopathy (6, 6.3%) and Nephropathy (6, 6.3%) were also less frequent complications.

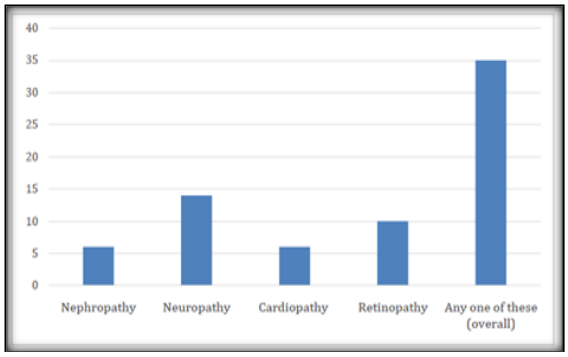

Figure 7: Bar chart showing Distribution of complications among participants.

- On comparing mean score of QOL D1 TS, QOL D2 TS, QOL D3 TS, QOL D4 TS, QOL total, FBS, PP, HbA1C and HAM-D scores, at baseline and at end of 8th week we found that all means were significantly different and p value of all mean differences were less than 0.05.
- Means of all variable belong to quality of life (QOL D1 TS, QOL D2 TS, QOL D3 TS, QOL D4 TS and QOL total) improved (increased) over time and means of all variable belong to disease condition (FBS, PP, HbA1C and HAM-D) were also improved (decreased) over this time duration.

Criteria	Mean at 0 week	SD at 0 week	Mean at 8th week	SD at 8th week	t test value*	p-value
QOL D1 TS	19.9	12.3	64.1	11.4	-34.238	<0.001
QOL D2 TS	25.2	13.6	58.0	9.9	-25.734	<0.001
QOL D3 TS	40.4	16.9	57.7	10.9	-12.355	<0.001
QOL D4 TS	34.5	13.6	52.5	9.3	-15.717	<0.001
QOL total	30.0	10.9	58.1	8.4	-28.957	<0.001
FBS	181.1	28.8	125.5	24.9	22.385	<0.001
PP	297.9	91.7	192.2	56.0	15.186	<0.001
HbA1C	9.7	2.5	8.6	2.4	9.092	<0.001
HAM-D	24.2	4.6	12.3	3.4	32.779	<0.001

*paired t test was applied to all criteria (number of observation: 96; degree of freedom: 95)

Figure 8: Table showing the changes in studied parameters over time in all patients.

- Given results show that having completion (at baseline) adversely affect parameters of QOL and Depression.
- Means of all domains of QOL were higher in non-complicated cases and these differences were statistically significant in all (p value <0.05 in all parameters) except domain 3.
- Mean of HAM-D score was higher in complicated cases as compared to non-complicated cases and this difference was statistically significant (p value <0.001).

Parameter	Mean (SD) Presence of Complication N = 35	Mean (SD) Absence of Complications N= 61	Difference of means	t-test value *	p-value
WHOQOLDomain 1 (Physical)	13.1 (10.4)	23.7 (11.6)	10.6	1.893	<0.001
WHOQOLDomain 2 (Psychological)	17.7 (12.2)	29.4 (12.4)	11.7	0.288	<0.001
WHOQOLDomain 3 (Social Relationships)	38.7 (15.9)	41.3 (17.4)	2.6	0.277	0.465
WHOQOL Domain 4 (Environmental)	29.1 (13.7)	37.5 (12.5)	8.3	1.738	0.003
WHOQOL overall score	24.6 (10.2)	33.0 (10.0)	8.3	0.014	<0.001
Depression (HAM-D scores)	27 (3.7)	22.6 (4.3)	-4.3	0.185	<0.001

Figure 9: Effect of presence of complication at baseline on various parameter of QOL and severity of Depression

- Results show that, presence of complications at baseline do not have any role in improvement of depression and quality of life parameters over time.

Parameter	Mean (SE) of parameter				F value	p-value
	Presence of completions		Absence of complication			
	Baseline	At 8th week	Baseline	At 8th week		
WHOQOLDomain1 (Physical)	23.7 (1.4)	67.4 (1.3)	13.1 (1.8)	58.2 (1.7)	0.274	0.602
WHOQOLDomain 2 (Psychological)	29.4 (1.5)	60.4 (1.1)	17.7 (2.0)	53.7 (1.5)	3.770	0.055
WHOQOLDomain 3 (Social Relationships)	41.3 (2.1)	59.9 (1.3)	38.7 (2.8)	53.9 (1.7)	1.344	0.249
WHOQOL Domain 4 (Environmental Relationships)	37.5 (1.6)	54.2 (1.1)	29.1 (2.1)	49.5 (1.5)	2.52	0.116
WHOQOL overall score	33.0 (1.2)	60.4 (0.9)	24.6 (1.7)	53.8 (1.3)	0.722	0.398
Depression (HAM-D scores)	22.6 (0.52)	11.1 (0.39)	27.0 (0.69)	14.2 (0.52)	3.24	0.075

*analysed using repeated-measure linear mixed models

Figure 10: Comparison of treatment outcome in complicated and uncomplicated cases.

DISCUSSION

On the basis of age as a variable we found 7% of the total sample in the range of 30-39years, 21% are in the range of 40-49yr, 31% patients are in the range of 50-59yr, 24% are in the range of 60-69 yrs. and 8% in the range of 70-79 years which was statistically not significant.

Our findings uphold with the study done by Yogesh Gautam et al,[21] who observed that 80% of the patients were in the age group of 40 to 69 years and also by similar findings in studies of A.O.Coker et al,[22] who reported maximum representation of age group 30- 60 years.

This might possibly ensue because depression and diabetes are disorders affecting middle to late middle age population, hence maximum no. of cases belong to the age group 30-60 years in our study.

In contrast to our findings, Chou et al,[23] & Raval et al,[24] reported a significant correlation between old age and diabetic depression symptomatology‖ and that old age (60-80 years) diabetics were found to harbor eminent depressive symptoms (26%).

On the basis of sex, we found female preponderance which was similar to the findings of Ali khan Khuwaja et al,[25] that reported predominance of female patients (57.5%) in their study, Jayanti Das Munshiet al,[26] showed 58.3% female predominance, Ali et al56 (23.8% women Vs. 12% men) and TM Agbir et al,[27] (31.8% females Vs. 10.6% males).This might be explainable by the overall rate of depression being higher in females as quoted in literature elsewhere.

In our study, majority of participants were married (84, 87.5%). Sparingly were Widow/widower (11, 11.5%) followed by unmarried (1, 1%). These results are according to demography of India, as majority of the participants in this age group are married (census 2011).

More than 50% of the participants were illiterate (49, 51%) followed by education up to middle, senior

secondary and bachelor degree equally (each 10, 10.4%). Most (54, 56.3%) of the participants belonged to LMC (54, 56.3%) followed by LC (20, 20.8%), MC (15, 15.6%) and UMC (7, 7.3%).

In our research, most of the participants had duration of illness of >5 years (49, 51%) followed by 6-10 years (28, 29.2%).

Most of the participants had encouraging (69, 71.9%) treatment history of DM while (27, 28.1%) had not yet received any form of treatment due to lack of basic resources as majority of them befell in LMC, being ill informed about disease symptom and poor adherence to treatment regime because of depression.

35 (36.5%) participants experienced one or added complications. Neuropathy (14, 14.6%) was the most commonly occurring complication followed by Retinopathy (10, 10.4%), Cardiomyopathy (6, 6.3%) and Nephropathy (6, 6.3%). Alike high prevalence of complication rate was observed by Morgan CL et al (2000). [28]

They reported that coronary heart disease was present in 25.2%, cerebrovascular disease in 9.6%, retinopathy in 16.5% and nephropathy in 2.0%.

Over a half of the patients (52.1%) had neither of the observed complications. The basis of Neuropathy being the most common complication in our study could be poor nutritional status.

We observed higher mean values of HAM-D score and poor QOL at baseline in comparison to uncomplicated cases which implies that presence of complications & severity of depression and impaired quality of life.

At 0-week 55 patient belonged to very severe, 32 severe, 8 moderate and 1 in mild category of depression as per the scores of HAM-D. At the end of 8th week 5 patients fell in the normal, 1 in mild, 8 in moderate, 32 in severe and 0 in very severe category. The swing to less severe side is attributable to Antidepressant treatment resulting in significant reduction in HAM-D score ―At 0 week Mean=24.2 SD=4.6, At 8 weeks Mean=12.3 SD=3.4 t test=32.779 p<0.001‖. Our findings show congruence with Petrack & Herpertz[29], Lustman et al,[30] and Rupesh choudhary et al.[31]

With regards to our findings of elevated HbA1c levels, Lustmanet al,[30] found that depression is linked with hyperglycemia in patients with T2DM. This was supported by Richardson et al,[32] and Erin I et al.[33]

In regard to diminishing and subsequent improvement in quality of life post treatment on WHOQOL-BREF, our findings find consonance in findings of Jayanti Das Munshi et al,[26] who reported a significant association between deterioration of social & occupational functioning in diabetic patients with depression which led to worsening of health-related quality of life. Kolawole Mosakuet al,[34] showed occurrence of comorbid depression in diabetic patients significantly foretold a low quality of life.

We found highest QOL mean score at baseline in Social Domain (40.4±16.9) followed by Environmental (34.5±13.6), Psychological (25.2±13.6) and Physical (19.9±12.3) which is in line with findings of Mishra SR, et al,[35] who observed that the highest QOL mean score was reported in social relationship domain (57.32 ± 11.83), followed by environment domain (54.71 ± 7.74), psychological health (53.25 ± 10.32) and physical health (50.74 ± 11.83). Same was seen in study conducted by Derakhshanpour F, et al.[36]

CONCLUSION

Following important conclusions were drawn from the present study:

- Presence of depression in diabetes is associated with poorer Quality of life with marked deterioration in social and occupational functioning in all four domains of WHOQOL.
- Severity of depression is greater in complicated cases than in uncomplicated cases as observed from HAM-D score at baseline.
- Existence of diabetic complications has positive association with poorer QOL.

LIMITATION

- The study was done multi-specialty private hospital which was situated in rural area so there was over representation rural patient.

  Size of the sample seems to be comparatively small hence the comparison of treatment effectiveness among three different antidepressant drugs on studied parameters showed no difference.

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