Association of Depression with Type-2 Diabetes

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I. Introduction

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycaemia resulting from defects in insulin production, insulin action or both.

Type 2 Diabetes: results from insulin resistance, a condition in which cells fail to use insulin properly, sometimes combined with an absolute insulin deficiency.

Diagnosis of diabetes is of importance to psychiatry for a number of reasons. Psychiatric disorders, particularly emotional disorders, are more prevalent in the diabetic population, whilst the development of depression in diabetic patients is associated with poorer glycaemic control, higher prevalence of multiple diabetic complications and greater functional impairment.

Current criteria for the diagnosis of diabetes[1]

HbA1C $\geq$6.5%. The test should be performed in a laboratory using a method that is National Glycolatedhemoglobin Standardization Program (NGSP)-certified and standardized to the Diabetes Control and Complications Trial (DCCT) assay.

Fasting plasma glucose (FPG) $\geq$126 mg/dl (7.0 m mol/l). Fasting is defined as no caloric intake for at least 8 h, or2-h plasma glucose $\geq$200 mg/dl (11.1 m mol/l) during an oral glucose tolerance test (OGTT). The test should be performed as described by the World Health Organization, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.

Depression: Depression is a common mental disorder that presents with depressed mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy, and poor concentration.

The association of depression with diabetes was first noted in the scientific literature more than 300 years ago when Willis made the surprising remark that diabetes was the result of sadness or prolonged sorrow .[2]

After that time, investigators have studied this co morbidity in patients with either diabetes or depression as the primary disorder and focused on the prevalence of depression in patients with diabetes, the relationship of depression with measures of diabetes severity, the risk of developing Type 2 diabetes in depressed patients, and the effect of depression on diabetes related mortality.

II. Review Of Literature

Prevalance Of Depression In Diabetics

The lifetime prevalence of psychiatric illness was determined in patients with diabetes mellitus who were undergoing diabetes evaluations at a large medical centre by Lust man P J et al [3] in 1986. Seventy-one present of the patients had a lifetime history of at least one criteria-defined psychiatric illness; affective and anxiety disorders were the most common diagnoses.

Marsha D Marcus et al [4] in 1992 reported a life time prevalence of mood disorder, depression in 32% of type II diabetic patients by using the Inventory to Diagnose Depression-Lifetime Version.

Mark Peyrot et al [5] in 1997 reported that rates of depression (41.3%); and anxiety (49.2%); were higher than those typical in the general population (10–20%). Gregory A Nichols[6], in 2003 compared the prevalence of diagnosed depression in all 16,180 persons with type 2 diabetes and in 16,180 members without diabetes matched for age and sex. Depression was more common in individuals with type 2 diabetes than among matched control subjects (17.9 vs 11.2%). Depression remained associated with diabetes after adjustment for several other possible causes.Gonzalez J S et al[7] in 2007 surveyed 879 type 2 diabetic patients from two primary care clinics in Boston, Massachusetts .Of the patients, 19% met the criteria for probable major depression and an additional 66.5% reported at least some depressive symptoms.Khuwaja AK et al[8]conducted a cross-sectional, multi-center study in four out-patient clinics in Karachi, Pakistan in 2010, on 889 adults with type-2 diabetes. Overall, 57.9% and 43.5% study participants had anxiety and depression respectively.

A study was carried out to investigate the prevalence and determinants of depression in patients with established type 2 diabetes (T2DM) attending a tertiary care hospital in North India by AmitRavalet al.[9] Patients with type II diabetes mellitus were assessed for symptoms of depression by LEEDOM. L. et al[10], and they were compared with a group of demographically matched, non medically ill control subjects. No significant difference was seen between diabetic patients without complications and the control subjects.

Depression Is Associated With Glycemic Control

The relationship of psychiatric illness to diabetic control was studied by Lust man PJ et al.[11] A significant difference in mean glycosylated hemoglobin levels was observed comparing patients with a recent psychiatric illness to those never psychiatrically ill. Connell et alassessed the impact of diabetes-specific psychosocial variables on self-care behavior, blood glucose regulation, and depression among 191 older adults (aged 60–92 yrs) with type 2 diabetes mellitus. Hierarchical multiple regression results indicate depression was a significant predictor of increased glycosylated hemoglobin values.

Treatment Of Depression In Diabetes

In a study by Patrick J Lustmanet al[12] the reduction in depression symptoms was significantly greater in depressed patients treated with nortriptyline compared with those receiving placebo.Ray E Clouse et al studied 152 patients with type 2 diabetes who recovered from major depression during 16 weeks of open-label treatment with sertraline and continued at recovery dose or identical-appearing placebo. Sertraline conferred significantly greater prophylaxis against depression recurrence than did placebo. Elapsed time before major depression recurred in one third of the patients increased from 57 days in patients who received placebo to 226 days in patients treated with sertraline.A study by Patrick J Lust man[139] shows that CBT combined with diabetes education is an effective non pharmacologic treatment for major depression in patients with type-2 diabetes. This therapy was associated with improvement in glycemic control.

III.   Method

Setting and study design

The study was conducted between Oct 2011 – Sep 2013 at Department of Psychiatry and the Medicine OPD, Maharajah's institute of Medical Sciences, Vizianagaram, Andhrapradesh. It was hypothesized that the Prevalence of depression tends to be higher among type 2 Diabetes mellitus patients.

In this cross-sectional study 300 out patients withtype-2 diabetes were 18 years and above, all participants provided written informed consent.Exclusion criteria included Persons with severe psychiatric illness, and other severe medical conditions, persons suffering from type-1 diabetes & gestational diabetes, prior diagnosis of anxiety and/or depression before the onset of diabetes mellitus, patients whose family member (parent, sibling, spouse, and child) expired in last six weeks, and/or those who lost their job during the same time period. The primary outcome measure was, thelevel of depression were assessed by using Hospital Anxiety and Depression scale (HADS). The Quality of Life is assessed by using WHO-BREF scale. Then the sample is divided into four groups, depressed group, anxiety group, mixed anxiety depression group, non anxiety non depressed group based on scores obtained from the above mentioned scale(HADS). The socio-demographic profile, clinical correlates and the Quality of Life are compared among these groups. The results are obtained by using Chi Square test and ANOVA test.

IV.   Analysis And Results

The sample consisted of 300 subjects divided basically into four groups of diabetic patients; with depression, with anxiety, with both depression and anxiety, without depression/anxiety after assessment with Hospital Anxiety and Depression Scale (HADS).

Statistical analysis was done with statistical package for social sciences-SPSS

Prevalence of Anxiety and Depression among subjects.

S.No.	Group	Prevalence in %
1.	Depression	21%
2.	Anxiety	15%
3.	Mixed anxiety depression	9 %
4.	Non anxiety non depressed group	55%

Fasting blood sugar levels Vs Group

FBS	Depressed	Anxiety	Depressed+ Anxiety	Non anxiety Non depressed	Total
< 126 mg/dl	24 (38.10%)	12 (26.67%)	6 (22.22%)	78 (47.27%)	120 (40%)
> 126 mg	39 (61.90%)	33 (73.33%)	21 (77.78%)	87 (52.73%)	180 (60%)
Total	63 (100%)	45 (100%)	27 (100%)	165 (100%)	300 (100%)

Post prandial blood sugar values Vs Group

PPBS	Depressed	Anxiety	Depressed+ Anxiety	Non anxiety Non depressed	Total
< 200 mg/dl	21 (33.33%)	9 (20%)	12 (44.44%)	89 (53.94%)	129 (43.67%)
>200mg/d l	42 (66.67%)	36 (80%)	15 (55.56%)	76 (46.06%)	171 (56.33%)
Total	63 (100%)	45 (100%)	27 (100%)	165 (100%)	300 (100%)

Quality Of Life Domain 1(Physical Health) vs Group

| Group Vs D1	N	Mean	S.D	F-value	P-value	Decision
Depressed	63	23.9524	3.68707	5.987	0.001	Significant
Anxiety	45	24.6667	2.94649			
Depressed + Anxiety	27	24.0000	2.67467			
Non Anxiety non depressed	165	25.6182	2.80781			

Physical health

This domain deals with features such as mobility, fatigue, pain and discomfort, sleep and rest, work capacity, activities of daily living etc.

The average score of D1 for Non Anxiety non depressed group is significantly higher than the remaining three groups followed by Anxiety. The Above ANOVA test value (5.987) and its corresponding P-value(0.001) make note that there is a significant difference among the four groups score related to D1. The quality of life is poor among the depressed group.

Quality Of Life Domain 2 (Psychological health) vs Group

Group Vs D2	N	Mean	S.D	F-value	P-value	Decision
Depressed	63	20.5714	2.61333	3.106	0.027	Significant
Anxiety	45	20.6000	4.04183			
Depressed + Anxiety	27	21.5556	4.02237			
Control	165	21.7091	2.62729			

Distribution of quality of life (D2) among the group
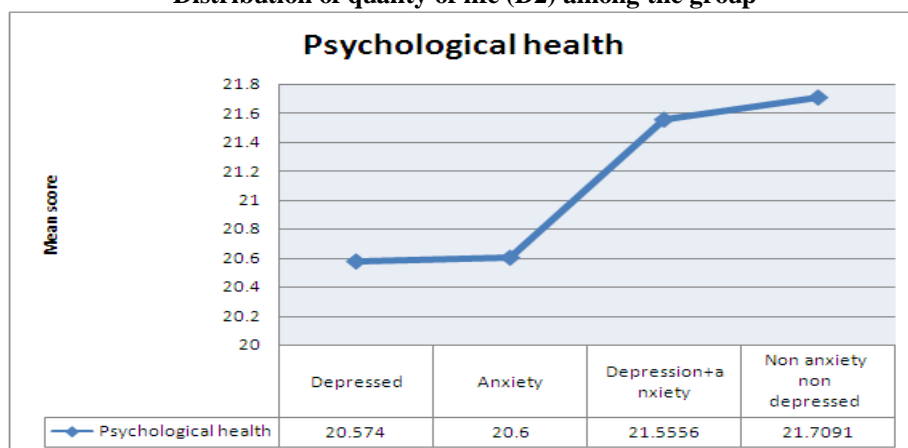
Psychological health

This domain deals with questions relating to feelings, self esteem, thinking, learning, memory etc. The Anova test value(3.106) and its corresponding significance value(3.106) discloses that there is a statistically significant difference in the Score of D2 among the four groups. Further, the average value of Non anxiety non depressed group is greater than the remaining three groups followed by Depressed+Anxiety.

Quality Of Life Domain 3 (Social relationships) vs Group

Group Vs D3	N	Mean	S.D	F-value	P-value	Decision
Depressed	63	11.1429	1.87391	0.706	0.549	Not Significant
Anxiety	45	11.4667	1.15994			
Depressed + Anxiety	27	11.0000	1.35873			
Control	165	11.1636	1.41547			

Social health

This domain deals with questions relating to problems in inter personal relationships, social support etc..

With regard to the Score D3, The average score of Anxiety is greater than the remaining three groups immediately followed by Non anxiety non depressed and Depressed, but the difference is not statistically significant at 5% level.

Quality Of Life Domain 4 (Environment health) vs Group

Group Vs D4	N	Mean	S.D	F-value	P-value	Decision
Depressed	63	26.7143	3.06609	3.154	0.025	Significant
Anxiety	45	26.8545	1.73205			
Depressed + Anxiety	27	25.7778	2.34247			
Control	165	28.0000	3.48211			

Environmental health

This domain has questions that deals with problems relating to financial resources, physical safety, physical environment such as noise, pollution, climate etc.

The ANOVA test value (3.154) and its P-value(0.025) of the score D4 make note that there is a statistically significant difference between the four groups score at 5% level. Further, the average score of Non anxiety non depressed group is significantly greater than the remaining three groups followed by Anxiety and then Depressed.

V. Discussion

Diabetes is a chronic disease which affects virtually every organ in the human system.

Depression is common among people with diabetes, and it is associated with worse diabetes outcomes.Depression may be an important barrier to effective diabetes management.

The prevalence of depression in T2DM patients in our study was 21 per cent.

The data regarding the prevalence of depression in patients with T2DM from India are scarce. North Indian study by AmitRavalet al[9] in a tertiary care hospital found a prevalence rate of 41%.In studies from US,UK, Europe & and other Asian countries, the range of clinically significant depression symptomatology in diabetic samples from tertiary care and teaching hospitals was 28%-72%.[4,6,8,9..]

The rate of prevalence in community based studies is 8.3 -41.3%[4,5,8,10,12.]

In clinic sample based studies it ranged from 9-60% [9,10,11..]

The prevalence of depression in our sample is 21%, in par with earlier studies.

Depression And Quality Of Life

The study compared the quality of life among those subjects with depression and without depression. In our study the scores for Quality of Life domains D1 (physical health), D2 (psychological health), D4(Environmental health) are significantly lower for depressed group.The findings on the quality of life of the present study was also similar to the previous studies.[5,7,9,11,12,]

Summary

The prevalence of depression in our sample is 21%, anxiety is 15%, mixed anxiety depression is 9%.Quality of life is poor among the subjects with depression and anxiety.

VI. Conclusion

Persistent depressive and anxiety symptomatology is present in a substantial number of diabetic adults and can be effectively predicted using simple screening instruments during initial contacts.

Depression screening and treatment should become routine components of diabetes care.

Evidence suggests that treatment of depression in people with diabetes is both efficacious and cost effective and can result in improved overall diabetes outcomes.

Many people with diabetes and depression are treated in primary care settings, but consistent recognition and treatment of depression is less than optimal in primary care settings.The challenges of treating people with diabetes and depression are influenced by both the individual and the healthcare system. Factors such as stigma and poor provider knowledge have limited the chances of people with diabetes and depression receiving optimal quality care, especially in rural areas.Effective management of people with diabetes and depression requires a multidisciplinary approach.

Coordinated clinical care requires the implementation of effective strategies to increase the recognition of depression, the adoption of evidence based interventions, and the integration of quality measures for the management of depression into diabetes clinical guidelines.

Limitations Of The Study

The study was done in a teaching hospital, so findings cannot be applied to general population.

As it is a cross sectional study, there is a possibility of missing depression and anxiety in earlier days than the 2 weeks mentioned in the questionnaire.

Most of the study subjects were from rural population, in whom there is a possibility of denying depressive symptoms due to stigma.

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