



**PREVALENCE OF DEPRESSION AMONG ELDERLY PATIENTS WITH DIABETES- A
HOSPITAL BASED CROSS-SECTIONAL STUDY**

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ABSTRACT

Introduction: Depression is a well established common co-morbidity among people with diabetes. Literature that has examined the prevalence and correlates of depression among elderly diabetics is limited. We compare the prevalence of depression between elderly diabetics and non-diabetics and identify correlates of depression.

Methods: 50 cases of elderly diabetics were selected randomly IPD/OPD of department of Medicine. Age and sex matched 50 elderly non diabetic were randomly selected from the community. All subjects belonged to Sub Himalayan region. Demographic characteristics including age, sex, body mass index, food habits, life style were recorded on a self designed performa. Geriatric Depression Scale was administered to both the groups. A cut off score of 9 was used to rule out depression. Subjects who had scores between 10-19 were categorized as having mild depression and severe depression was diagnosed when subjects scored between 20-30. **Results:** Age was comparable between both groups (66.6±5.5 years in cases and 68.7±7.1 years in controls: $t=1.65$; $p=0.105$). Proportion of females was comparable (22% in cases versus 12% in controls; $X_2=1.7$; $p=0.18$). Prevalence of depression was higher in the diabetes group (70% in diabetics versus 4% in control group: $X_2=0.0001$; $p=0.001$). On the multiple logistic regression, female gender (OR=22.01; $p=0.022$), dietary habits (OR=9.14; $p=0.011$) and repeated hospitalization (OR=5.05; $p=0.006$) were significantly associated with depression in diabetic elderly patients. **Conclusion:** Depression has negative effects on diabetes outcomes. So for optimum management of diabetes, identification and treatment of depression in the primary care setting would result in appreciable alleviation of suffering in those with diabetes and depression.

KEY WORDS: Diabetes, Depression, Geriatric Depression Scale.

INTRODUCTION

The prevalence of diabetes mellitus (DM) and impaired glucose tolerance increases with age.^[1] In India, 20% of the elderly population has DM.^[2] In addition over 25% of older persons have impaired glucose tolerance (IGT).^[1] In addition to multiple macrovascular and microvascular complications which elderly diabetes patients often have, they also suffer from various behavioral problems which occurs because of the demand of the lifestyle modification associated with the disease. All this may complicate the illness and makes its management complex. Furthermore, increased life expectancy means that more of the elderly will suffer impaired quality of life because of associated conditions of old age called 'Geriatric Giants'. Geriatric Giants are not the diseases, but conditions associated with old age.^[3] There has been a growing call to understand the medical and psychological challenges that elderly

patients confront. The statistics concerning mental health of the elderly are also alarming. Approximately 20% of the elderly experience diagnosable behavioral disorders (i.e., anxiety, severe cognitive impairment, and depression) that cannot be attributed to normal aging.^[4] Depression is a major concern. Compared to non-diabetic controls, patients with DM are reported to be about 1.4-3 times as likely to suffer from comorbid depression^[5,6,7] Although there have also been some studies that failed to find any significant difference in the prevalence of depression (or affective disorders, in general) between diabetic and non-diabetic individuals.^[8,9]

Given the described trends of growing numbers of elderly and increased rates of diabetes and depression, it is important to focus on the elderly who have co-morbid diabetes and depression especially in the region which

has limited resources and difficult terrain. Thus considering the existing evidence and paucity of literature regarding elderly population, this study was planned. We analyzed the prevalence and severity of depression among elderly diabetics and identified its various predictors in them.

METHODS

This cross sectional study was done at a tertiary health care center after obtaining permission from institutional ethics committee. 50 cases of elderly patients diagnosed with diabetes as per American Diabetes Association (ADA) were selected randomly from the Department of Medicine. Age and sex matched controls were randomly selected from the community. All subjects belonged to Sub Himalayan region. All the subjects were explained the rationale of the study and were requested to participate in this study and written informed consent was taken. However unconscious subjects, those already on antidepressants and those unwilling to participate were excluded from the study. The demographic characteristics including age in years, sex, body mass index (BMI), addictions (smoking, alcohol), type of diet (vegetarian versus mixed diet), financial and social support were recorded on a pre designed performa. Physical activity was graded as sedentary if patient was involved with domestic activities like watching television, walking, cooking food; moderate physical activity if person is involved in home maintenance activities like washing clothes, taking care of live stock, gardening; moderate physical activity if person is involved in agricultural work, pulling rickshaw, cycling. Clinical parameters were assessed by fasting and post prandial blood sugar levels and Hb1Ac in cases. History and relevant clinical examination was done in all subjects to find out associated retinopathy (by fundus examination), nephropathy (by urine dipstick method), neuropathy (by microfilament), coronary artery disease (by history and ECG) and cerebro-vascular disease (by history). Other associated co-morbidities like hypertension, chronic obstructive air disease (COAD), osteoarthritis, hearing and visual impairment were also recorded on a pre formed performa. Hearing impairment was diagnosed by whispering in the subject's ear from behind and those using hearing aids. Visual impairment was diagnosed by inability to count fingers from 6 meters and those using spectacles. Both cases and controls were subjected to questionnaire of Geriatric Depression Scale and were categorized as having no depression (score 0-9), mild depression (score 10-19) and severe depression (score 20-30). English version of the scale was used as Hindi version is not validated in India. Questions were read out to the participants by a trained doctor in the language which was understood by the participant. Geriatric Depression Scale (GDS) is designed specifically for rating depression in the elderly and represents a reliable and valid self-rating depression screening scale for elderly populations.^[10] Sensitivity and specificity of the GDS was examined in a study conducted by Brink *et al.*, 1981, found that among elderly persons, a cut-off score

of 11 on the GDS yielded 84% sensitivity rate and a 95% specificity rate.^[11]

STATISTICAL ANALYSIS

Data was analysed by using statistical software SPSS version 22. Quantitative data was expressed in terms of mean \pm SD. Qualitative data was expressed in terms of frequency and percentage. Chi square, independent t test was used to check the statistical significance of categorical and continuous variables, respectively. p value less than 0.05 was considered as statistical significant. Factors that appeared significant on the univariate analysis were put in the multiple logistic regression.

RESULTS

In total group 83% were males and 17% were females. Hearing was impaired in 27% of subjects and vision was impaired in 70%. Among the study group 47% were vegetarian and 53% were on mixed diet. 23% subjects were smokers, 22% were consuming alcohol and 8% were oral tobacco users. Among the whole group 37% were depressed and 63% were non-depressed. Mean age of the group was 67.6 \pm 6.4. Mean height, weight and BMI of the group was 1.6 \pm 0.1metres, 64.6 \pm 10.4 Kg and 23.9 \pm 3.6 respectively.

Comparison of subjects with diabetes with control group

Proportion of females was comparable (22% in cases versus 12% in controls; $X_2 = 1.7$; $p = 0.18$). Both groups were comparable with regards to proportion of patients with hearing impairment ($X_2 = 2.4$; $p = 0.1$) and visual impairment ($X_2 = 0.00$; $p = 1$). Proportion of vegetarians was higher among controls (58% versus 36% among cases; $X_2 = 4.8$; $p = 0.028$). Smoking, alcohol and oral tobacco were comparable among cases and controls ($X_2 = 4.5$; $p = 0.32$ for smokers; $X_2 = 2.0$; $p = 0.14$ for subjects using alcohol and $X_2 = 0.54$; $p = 0.46$ for oral tobacco users). Depression was more prevalent among subjects with diabetes (70% among cases versus 4% among controls; $X_2 = 46.75$; $p < 0.001$). Subjects who had diabetes mellitus had limited physical activity. Among the cases 40% of them were sedentary, 52% were bed bound and only 8% lead an active lifestyle whereas 26% subjects were active, 70% were sedentary and only 4% were bed bound among controls ($X_2 = 29.4$; $p > 0.001$).

Table 1 shows the clinical characteristics of cases and controls. Univariate analysis showed that depression was associated with presence of diabetes. Among the diabetic group 70% were depressed and among non-diabetics only 4% were depressed ($X_2 = 46.7$; $p < 0.001$).

Comparison of subjects with and without depression:

Females were overrepresented in depressed group ($X_2 = 4.1$; $p = 0.041$). Impairment of hearing and vision were not the predictors of depression ($X_2 = 3.5$; $p = 0.06$ and $X_2 = 0.16$; $p = 0.6$ respectively). Type of diet was a predictor of depression. Among the depressed group

75.7% were on mixed diet and only 9% were vegetarian whereas there were 60.3% subjects who were vegetarian and only 39.7% were on mixed diet in non depressed group ($X_2=12.1$; $p<0.001$). Smoking ($X_2=2.9$; $p=0.08$), alcohol use ($X_2=3.7$; $p=0.05$) and oral tobacco use ($X_2=0.6$; $p=0.47$) were not the predictors of depression. Physical activity was a predictor of depression. Among the depressed group 59.5% were bed bound, 37.8% led the sedentary life and only 2.7% were active, whereas only 6% were bed bound, 65.1% were sedentary and 25.4% led an active life among non depressed group ($X_2=30.9$; $p<0.001$). Table 2 shows clinical characteristics of depressed versus non depressed.

Predictors of depression

Factors that appeared significant on univariate analysis e.g diabetes, sex, physical activity and number of hospitalization and dietary habits, were considered for the multivariate analysis. This model using multiple logistic regression classified 89% subjects correctly. Diabetes was shown to be a predictor depression on univariate analysis, was disproved by applying multiple logistic regression model (OR=4.55; $p=0.160$). Similarly physical activity which showed to be a predictor of depression in univariate analysis, was disproved by applying multiple logistic regression model (OR=0.347; $p=0.474$ for subjects with sedentary habits and OR=1.476; $p=0.783$ for bed bound subjects). In this model, being female, on mixed diet and repeated hospitalization were the predictors of depression (OR=22.01; $p=0.022$ for being female, OR=9.14; $p=0.011$ for subjects on mixed diet and OR=5.05; $p=0.006$ for subjects with more than 2 admissions).

DISCUSSION

World is witnessing a demographic shift of population which is associated with increase in worldwide prevalence of DM over the past two decades. Depression is very frequently observed in clinical practice in elderly individuals. The senior years are a developmental phase of life with its own unique challenges that affect the management of both diabetes and depression^[12] We undertook this cross sectional study to compare the prevalence of depression in elderly diabetic patients as compared to elderly non diabetics and find factors responsible for depression in diabetics.

In the present study, mean age of the study group was 67.6 ± 6.4 years whereas it was 62.3 ± 8.8 in a study by Andayani TM et al and 64.7 ± 11.1 in a study conducted by Kalda R et al. In our study there was a male preponderance with male to female ratio of 4.8:1. Male preponderance does not reflect the better health of females, but their lack of health awareness and they being lesser prevailed group among already less prevailed elderly class.

In our study 64% patients with diabetes had mild depressive symptoms and 6% had major depressive symptoms. This rate is quiet high as compared to

prevalence of depression (36.6%), as reported in a worldwide meta-analysis of studies among persons with diabetes in clinical settings.^[13] The rate is higher than that observed in the United States, where prevalence of depression among persons with diabetes ranges from 2%-28%.^[14] The prevalence of major depression in patients with DM is mostly estimated around 12% (ranging from 8-18%), while milder types of depression or elevated depressive symptoms, in general, are reported to be present in 15-35%.^[15]

The observed rate of depression in our study was at the upper range of other studies conducted in South Asia. Hospital-based studies from India showed prevalence ranging from 8.5%-32.5%¹⁶. Asghar *et al.* did a community based study in Bangladesh, which showed 27.9% depression among type 2 diabetes patients.^[17] A tertiary hospital based study conducted in Bangladesh showed 34.8% depression in persons living with diabetes.^[18]

Risk indicators for depression in patients with type 2 diabetes

Prevalence of general mental disorders seem not to be higher in diabetics when compared to non-diabetic individuals, but compared to non-diabetic controls, patients with DM are reported to be about 1.4-3 times as likely to suffer from comorbid depression.^[6,7,8] However in a cross-sectional population-based study by Kruse et al⁸ and a study by Das-Munshi et al^[9] failed to find any significant difference in the prevalence of depression (or affective disorders, in general) between diabetic and non-diabetic individuals. In our study also we failed to establish diabetes as a risk factor of depression. The reason for this could be that there are other social factors which predominate and decrease the importance of diabetes per se as a risk factor.

Gender was a significant risk factor of depression among persons with diabetes in the multivariable regression model. In a study of women with diabetes in India, Weaver and Hadley^[23] found that not fulfilling gender-specific social roles predicted greater levels of depression. Diabetes may have comparable functional consequences for both genders, whereas women in India are more vulnerable socially even in the absence of physical disease. Another explanation towards women being more depressed could be the social role attributed to women (passivity, dependence and emotional expression) which possibly allows them to be more emotional and extroversive.

Marital status was not a significant risk factor in our study and despite it being a predictor in studies of persons living with diabetes in other countries (Pakistan).^[21] The reason may be that there is a relatively good social support in our country. In this study, financial dependence was not associated with greater depression. However Bell et al.^[24], Egede et al.^[25], Everson et al.^[26] suggests patients with lower income

have more depression. In India, mixed methods research by Mendenhall and colleagues^[27] suggests that depression is greater among low-income persons with diabetes, likely influenced by both greater financial stressors and also by impaired access to diabetes care. The rapid economic transitions in India are demonstrating that high-income groups are able to mobilize behavioral and medical resources while a growing burden of chronic health problems falls upon the middle and lower class, which is the pattern observed in high-income countries.^[28,29]

The present study did not reveal any association between behavioral characteristics of use of tobacco and alcohol, and physical activity and depression. Most other studies have shown an association of these behaviors with depression among persons living with diabetes.^[30,31]

Present study showed that food habits had an impact presence of depression. Depression was more prevalent among subjects who were consuming mixed diet and less among subjects who were vegetarians. This may be because vegetarian diet is considered to be a healthier diet.

The third important risk factor of depression in our study was repeated hospitalization. Even though co-morbidity and financial status did not prove to be the risk factor of depression, but they might be indirectly related to depression. Patients who required repeated admissions were the ones with more co-morbidities or who were not adherent to treatment due to financial reasons and landed up in hospital with complications.

Table 1: Clinical characteristics of cases and controls

characteristics	Cases Mean±SD	controls Mean± SD	P value
Age	66.6±5.5	68.6±7.1	0.067
BMI	23.6±3.8	24.3±3.5	0.925
FBS	173.1±64.4	-	
PPBS	219.0±83.7	-	
No of comorbidity	2.0±0.7	0.4±0.6	0.242
No of admissions	1.2±0.8	0.08±0.2	<0.001

Table 2: Clinical characteristics of depressed versus non- depressed.

Characteristics	Non depressed(n=63) mean±SD	Depressed(n=37) mean±SD	P value
Age	68.3±7.1	66.4±4.9	0.034
BMI	23.7±3.1	24.3±4.4	0.033
FBS(n=15)	154.6±46.4	181.0±69.9	0.133
PPBS(n=35)	216.0±67.1	220.2±90.8	0.298
No of comorbidity	0.7±0.8	1.9±0.8	0.073
No of admissions	0.2±0.5	1.4±0.7	0.006

CONCLUSION

A good number of patients with diabetes were suffering from mild depressive symptoms. Being female, type of diet and repeated hospitalization were the predictors of depression in our study. Depression has negative effects on diabetes outcomes, diabetes complicates depression, and these problems are both worse and growing in the elderly population. Whatever the underlying cause for the connection, the evidence for the relationship is quite strong. This indicates that attention to the optimum management of depression in the primary care setting would result in appreciable alleviation of suffering in those with diabetes and depression. More so, failure to manage depression may compromise the management of diabetes itself. Thus, efforts to identify and treat depression in the diabetic elderly should be encouraged. It is important that specific attention be paid to the unique physical and emotional challenges experienced by elderly patients so that appropriate treatments can have maximum acceptability and efficacy and result in lasting gains. More research is needed with this growing

and important group. The limitation of the present study is the small sample size. Secondly the tool used for identification of depression in elderly is a screening tool and may not show the real prevalence. Patients who were found to have depression on screening were not subjected to expert opinion to confirm the diagnosis.

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