

Research Article

Study of depression in patients with diabetes compared to non diabetics among elderly population and its association with blood sugar, HbA1c values

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Abstract

Introduction: Depression is very frequently observed in clinical practice especially in elderly individuals. Its prevalence is always underestimated and it is often undertreated resulting in a lot of suffering. It is one of important conditions resulting in reduced quality of living of diabetic subjects.

Aim: To compare prevalence of depression in elderly patients with diabetes with elderly subjects without diabetes and find out its relation with blood sugar and HbA1c values.

Material and Methods: Elderly patients (>65yrs) with diabetes attending out-patient departments as well as admitted in KIMS hospital were studied.

Result and Data Analysis: Our study involved 300 elderly subjects. This included 146 diabetics and 154 nondiabetic subjects. Presence of depression in each group was evaluated by Zung depression scale. Depression was found in significantly more number of diabetic subjects than non-diabetic subjects and depression scores showed significant correlation with PPBS values but only insignificant correlation with FBS and HbA1c values.

Conclusion: Depression in elderly diabetic population is significantly more compared to non-diabetic elderly population. Depression severity scores correlate with post prandial blood sugar values, but not with fasting blood sugar or glycated hemoglobin values.

Keywords: elderly diabetics, post prandial sugar, Zung depression scale

1. Introduction

Depression is very frequently observed in clinical practice especially in elderly individuals. It is more prevalent in patients with various chronic diseases like diabetes. In individuals with diabetes it is one of the important factors contributing to the morbidity. It is very important to recognize the condition early so that treatment is aptly initiated at an early stage, thus preventing lot of mental agony that the patients go through because of depression which may not be overtly evident initially. So there is a strong need to study the rate of prevalence of depression in elderly diabetic population so that remedial measures can be initiated. As of now, there is no consensus regarding the extent of impact of blood sugar control on depression. Considering that depression well known to be prevalent more near the twilight stage of life than in younger age due to obvious socio-economic factors, studying the impact of sugar control on depression in this age group becomes really important. If blood sugar control is found to influence depression significantly, then tight sugar control can be very simple as well as effective tool in reducing the ever increasing morbidity due to this very commonly present, yet most often

overlooked ailment.

2. Materials and Methods

Elderly patients (>65yrs) with diabetes attending out-patient departments as well as admitted in KIMS hospital were studied.

2.1 Inclusion Criteria for cases: 1) Age > 65 yrs. 2) case of DM on treatment.

2.2 Exclusion Criteria for controls: 1) Known case of depression on treatment. 2) Known case of psychosis. 3) Patients taking medicines known to cause depression. 4) Patients having acute medical illness. 5) Patients having serious medical conditions like heart failure, chronic kidney diseases, respiratory failure, cerebro-vascular accident.

The presence of depression in the patients was evaluated by Zung depression scale. A pilot study was initially conducted on 50 patients using Zung depression scale to evaluate the validity and reliability of the scale on Indian population. Results proved the scale to be valid and reliable on local population [Cronbach alpha full scale 0.7899, Correlation value 0.7113, Split half reliability 0.8313 and Validity 0.9118]. So, the study was conducted in all 300 patients.

Statistical analysis: Was done using SPSS version 16. Proportions, Pearson Chi square tests were used for analyzing descriptive variables. For comparison of continuous variables, unpaired t test was used. The association of blood sugar values and glycated hemoglobin with depression scores was evaluated by Pearsons' correlation and multiple linear regression analysis.

3. Results and Data Analysis

Our study involved 300 elderly subjects. This included 172 females and 128 males. 146 subjects had diabetes mellitus and 154 subjects were free from the disease. Among the females, 78 were diabetics and 94 were non diabetics. Among the males, 68 were diabetics and 60 were non diabetics. Mean fasting blood sugar among diabetic subjects were 120.74 (SD 48.4523) and among non diabetic subjects were 96.3377(15.2424). Mean post prandial blood sugar among diabetic subjects were 209.4726 (SD 81.7144) and among non diabetic subjects were 132.6753 (SD 15.2424). Mean HbA1c values among the diabetic were 7.5959 (60mol/ml) (SD 7.7873) and non diabetic population were 6.0065 (42 mol/ml) (SD 0.0806). Presence of depression in each group was evaluated by Zung depression scale. Patients with depression scores more than 50 were considered to be having depression. There was no significant gender difference regarding presence of depression scores among the diabetic population [mean score in males 48.94± SD 6.87; females mean score 48.59± SD 7.15; t 0.30, p 0.76] but depression scores were significantly higher among males in non-diabetic population [males- mean score in males 44.16 ± 7.58; females- mean score 41.78 ± 7.02; t 1.97 p 0.049]. The FBS values [males 120.68± 48.27, females 120.79± 48.92, p 0.98] and PPBS [males 220± 86.25, females 200± 76.85] had no gender difference among diabetic patients. The FBS values [males 95.35± 13.35, females 96.97± 16.37 p 0.52] among non diabetic patients showed no gender difference but PPBS [males 126.58± 19.58, females 136.56± 22.13 p 0.05] were higher in females. HbA1c levels were higher in males among diabetic population [males 7.16%± 1.24% (55± -10 mmol/ml), females 6.77± 1.37(50± -9 mmol/ml) t 2.05, p 0.04], but HbA1c values among non-diabetic population showed no significant difference [males 6.00%± 0.00% (42± -23 mmol/ml), females 6.01%± 0.10% (42± -22 mmol/ml), t -0.80, p 0.43]. There was no significant difference in depression scores in diabetic [alcoholics mean score 49.96± 7.49, non alcoholics 48.44± 6.87, t 1.06, p 0.28] and non-diabetic [alcoholics mean score 42.19± 7.35, non alcoholics 42.88± 7.33, t -0.49, p 0.62] individuals with alcoholism (table 5). HbA1c levels in diabetic individuals [alcoholics mean score 7.33%± 1.32% (57± -9 mmol/ml), non alcoholics 6.85± 1.10 (51± -11mmol/ml), t 2.03, p 0.04] with alcoholism were significantly higher. But HbA1c levels in non diabetic patients with alcoholism were not significantly higher [alcoholics mean score 6.00± 0.00 (42± -23 mmol/ml), non alcoholics 6.00%± 0.09% (42± -23 mmol/ml), t -0.55, p 0.58]. There was no significant difference in depression scores in diabetic [smokers mean score 48.95± 8.45, nonsmokers 48.72± 6.76, t 0.14, p 0.89] and non-diabetic [smokers mean score 44.12± 7.91, non smokers 42.45± 7.19, t 1.04, p 0.29] individuals with smoking habit. Depression was found in significantly more number of diabetic subjects than non- diabetic subjects (table 1) and also depression scores were higher in diabetic patients (table 2). Depression scores showed significant correlation with PPBS values (table 3, figure 1) but only insignificant correlation with FBS and HbA1c values. On regression analysis, post prandial blood sugars predicted the depression severity scores (table 4). Socio economic status did not have correlation with depression scores but patients with family history of depression had significantly higher depression scores (table 5).

4. Discussion

Depression is a condition with high prevalence worldwide. Hundreds of millions of people are affected by

depression at any point of time, which is always increasing and is expected to reach a prevalence rate of 7.7% by 2030.¹ India is no exception and depression is prevalent at quite a high rate even in rural areas.² It is one of the very important conditions responsible for lots of suffering in elderly population, very often without being evident clinically. Elderly are always at higher risk of depression because of the fragility creeping into the physical as well as mental strength due to ageing process per se, economic instability that majority of them face, especially in a developing country like ours, various ailments affecting them and the problems due to treatment of these ailments, reduced family, social and moral support from the younger generation due to changes in life-style and thinking these days. W.H.O. estimates that depression accounts for as high as 12% of the total years lived with disability.³ Ustun TB et al have estimated that depressive disorders are more common in women than men and also that these are fourth most common disease burden in women and seventh in men.⁴

Diabetes, as we all know, is one of diseases with fast increasing incidence world-wide. Diabetes and Impaired Glucose Tolerance, are unfortunately not diagnosed in quite a significant number of elderly population (up to 20-30%).⁵⁻⁷ Similarly, the depression associated with this disease also remains undiagnosed. Several studies have reported increased depression in individuals with diabetes mellitus.⁸⁻¹¹ To estimate the prevalence of mood, anxiety and alcohol related disorders, World Mental Health Survey was conducted in 17 countries spread across different continents.⁸ About half of the adults surveyed here confirmed presence of diabetes in them. Diabetic subjects in this survey, were found to be at higher risk of developing mood and anxiety disorders compared to non-diabetic individuals with odds ratio for depression of 1.38, even after adjusting for age and gender. Our study also supports significantly increased depression in elderly patients with diabetes compared to non-diabetic elderly subjects. Depression in diabetic subjects has been found to be influenced by several socio-demographic and behavioral factors. Age, gender, education, income are the factors found to influence depression in diabetic individuals in several studies.^{5,13-16} Family history of depression has been strongly associated with depression in our study. Depression has not only been found to be associated with diabetes¹⁷ but also been shown to be a factor influencing onset of diabetes.^{9,18-20} It is associated with insulin dependence,²¹ the risk factors for adverse outcomes in diabetes like smoking, poor adherence to the treatment,²⁴ higher blood glucose levels^{9,22} as well as adverse outcomes like various diabetic complications,^{9,23} coronary heart disease and mortality.^{19,22,23,25-27}

Not only depression, even memory problems have been found to be more prevalent in diabetic individuals.^{10,11,28,29} Diabetic patients have a lot of restrictions associated with the disease, which makes them perceive less control over their lives. This is especially true with diabetics on insulin, who, in addition to diabetics on oral drugs, have social stigma, injection fear and pain, inconvenience of carrying and self administering injections, having to follow strict and often difficult dosage schedule.^{30,31} There are conflicting reports concerning depression and glycemic control.³²⁻³⁵ We have found that depression scores correlate with post prandial blood sugar levels, but not with fasting blood sugar or glycated hemoglobin values in our study. Individuals with diabetes have to be constantly watchful about their food habits, caloric intake, blood sugar monitoring, physical activities they are permitted to perform and the fine balance they need to strike to avoid hypoglycemia and also keeping blood sugar levels within permitted range. This implies vigorous and continuous self care is strictly required. Consequently, the quality of life suffers in diabetic individuals compared to individuals free of the disease, which has been reflected in several studies.³⁶⁻⁴⁰ Further, if a patient develops local or systemic complication related to the disease, this again impacts quality of life negatively.^{38,41} On the other hand, symptoms of depression have been known to impact the quality of life negatively as well. Thus co-occurrence of depression, diabetes and old age, each factor known to impact quality of life adversely, can result in lot of mental agony to the patient, taking charm out of what otherwise would have been a happy life.

The association between depression in elderly with diabetes and its relation with blood sugars and glycated hemoglobin has not been studied in any large studies in our country. Our study has been a small initiation to understand this important, yet untouched aspect of this ever growing ailment. Stricter blood sugar control targets are probably the need in as higher blood sugars are associated with more severe depression scores, as can be inferred from our study. This may be partly due to prevention of the complications associated with chronically elevated blood sugars.

The number of diabetic subjects has been increasing world-wide and the incidence is expected to increase in the future as well.^{42,43} Similarly the number of elderly individuals has also been increasing all over because of increasing life span across the globe. The treatment of depression can bring fresh air into the life of the elderly individuals with diabetes and can improve the quality of the life dramatically. Improved blood sugar control can be a handy tool to sprinkle showers

of happiness into the life and keep this chronically agonizing disorder away as can be concluded from our study.

5. Conclusion

- * Depression in elderly diabetic population is significantly more compared to non-diabetic elderly population.
- * Depression severity scores correlate with post prandial blood sugar values, but not with fasting blood sugar or glycated hemoglobin values.
- * Further large scale studies are needed to extrapolate the results to entire population.

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Table 1: Comparison of diabetic and non-diabetics with respect to depression scores by unpaired t test

Group	N	Mean	SD	t-value	P-value
Diabetics	146	48.7534	7.0001	7.2891	0.0000*
Non-diabetics	154	42.7208	7.3177		

*p<0.05

Table 2: Association between diabetic and non-diabetic groups and depression

Groups	<50	>50	Totals
Diabetic	84	62	146
Normal	126	28	154
Totals	210	90	300
Chi-square	21.04608	df=1	p=.00000

Table 3: Karl Pearson’s correlation coefficient between depression scores with FBS, PPBS and HbA1C scores in diabetic and non-diabetics groups

Samples	Variables	Correlation coefficient between depression scores with		
		r-value	r ² -value	p-value
Total	FBS	0.1001	0.0100	0.0833
	PPBS	0.1596	0.0255	0.0056*
	HbA1C	0.0590	0.0035	0.3087
Diabetic	FBS	-0.0752	0.0057	0.3671
	PPBS	-0.1005	0.0101	0.2274
	HbA1C	0.0042	0.0001	0.9596
Non-diabetic	FBS	0.0811	0.0066	0.3172
	PPBS	-0.0126	0.0002	0.8770
	HbA1C	-0.0191	0.0004	0.8144

*p<0.05

Table 4: Multiple linear regression analysis of depression scores by FBS, PPBS and HbA1C scores in diabetic and non-diabetics groups

Samples	Independent variables	Regression coefficient	SE regression coefficient	t-values	p-level
Total	Intercept	43.0126	1.4185	30.3229	0.0000*
	FBS	-0.0182	0.0204	-0.8934	0.3724
	PPBS	0.0249	0.0109	2.2907	0.0227*
	HbA1C	0.0554	0.0818	0.6777	0.4985
R=0.1719, R ² =0.0295, F(3,296)=3.0054, p<0.0307, S, Std.Error of estimate: 7.6875					
Diabetic	Intercept	50.4339	1.7164	29.3843	0.0000*
	FBS	0.0036	0.0215	0.1683	0.8665
	PPBS	-0.0104	0.0128	-0.8185	0.4144
	HbA1C	0.0092	0.0752	0.1225	0.9027
R=0.1020, R ² =0.0104, F(3,142)=0.4980, p>0.05, Std.Error of estimate: 7.0367					

Non-Diabetic	Intercept	49.3157	44.4011	1.1107	0.2685
	FBS	0.0572	0.0456	1.2566	0.2109
	PPBS	-0.0246	0.0321	-0.7663	0.4447
	HbA1C	-1.4719	7.3991	-0.1989	0.8426
R=0.1043, R ² =0.0108, F(3,150)=0.5509 p>0.05, Std.Error of estimate: 7.3501					

Table 5: Association between Socio-Economic Status, Family history with depression scores

Variable	Spearman	t(N-2)	p-level
Socio Economic Status	-0.1042	-1.8081	0.0716
Family history	0.3431	6.3047	0.0000*

*p<0.05

Figure 1

