

Depression among type-II diabetes mellitus attending a tertiary hospital, Kolkata, evaluated by patient health questionnaire-9

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Abstract: *Back ground and Objectives:* India has the largest number of diabetic patients turning it a capital for Diabetes in recent days. Depression is a major public health problem associated with chronic disease like diabetes and co existence of Diabetes and depression is associated with significantly increases risk of morbidity and mortality. This study was conducted to determine the prevalence and the level of depression and to identify the associated factors related with the disease among the study population attending the Diabetic OPD of SSKM Hospital. *Methodology:* A cross-sectional study was conducted among 406 diabetic patients attending diabetic OPD of SSKM Hospital using a pre-designed, pre-tested, structured schedule by face-to-face interview method and reviewing of investigation records. Data were analysed using SPSS v16.0. Multi-variable binary logistic regression was performed to find the factors associated depression. *Results:* The prevalence of depression among adult diabetic patient in this study was found to be 44.4 %. Statistically significant factors associated with depression were fasting sugar, post pandial sugar, HbA_{1c}, medication socioeconomic class, gender and duration of diabetes. *Conclusion:* This study confirms the link between depression and Diabetes where the prevalence of depression was inevitable as a co-morbid condition with Diabetes. Universal screening for depression and management of depression in Diabetes can improve the health status and reduce the economic burden of the community.

Keyword: Psychosis, Glycosylated haemoglobin, Comorbidity, Quality of Life (QOL)

Introduction

Diabetes is one of the most important chronic diseases in the population, when regarding the impact on health. Most diabetic patients, i.e. especially those with type 2 diabetes, are cared for in primary health care. Diabetic patients without proper medical intervention could suffer from various diabetic complications in life. The lifelong nature of each patient's diabetic condition can make it more challenging to manage this condition as time passes [1].

Depression has been associated with hyperglycemia, diabetes-related complications and perceived functional limitations of diabetes [2-4]. Depression is defined by World Health Organization as “a common mental disorder, characterized by sadness, loss of interest or pleasure, feeling of guilt or low self worth,

disturbed sleep or appetite , feeling of tiredness and poor concentration” [5].

There is also good evidence among diabetics that psychosocial factors such as depression are stronger predictors of medical outcomes such as hospitalization and death than are physical and metabolic factors such as presence of complications, body mass index, or HbA_{1c} level [6]. The co existence of Diabetes and depression is associated with significantly increases risk of morbidity and mortality. Majority of diabetes patients have negative emotional feelings such as frustration and loneliness due to the diabetes [7].

Depression is an important global public health problem due to both its relatively high lifetime prevalence and the significant disability that it causes. It is responsible for

the greatest proportion of burden attributable to non-fatal health outcomes, accounting for almost 12% of total years lived with disability worldwide [8]. Adequate knowledge about the level and factors associated with depression in patients with diabetes might be of immense importance as it may formulate the way for the clinicians toward an improved and effective management of this lifelong disease. With this background the present study was conducted with the following objectives:

1. To determine the prevalence of depression among the study population attending the Diabetic OPD of SSKM Hospital
2. To estimate the level of depression among the study population.
3. To identify the associated factors related with the disease

Material and Methods

The present study was a single-centre, single interview, community based descriptive study with cross-sectional design; that was approved by the institutional ethics board (Approval letter no. IPGME&R/IEC/2018/616). It was conducted from September-October 2018 among the patients with a diagnosis of type 2 Diabetes Mellitus above age of 18 years, attending Diabetic OPD for follow up in Institute of Post Graduate Medical Education and Research (I.P.G.M.E & R) within the data collection period. Patients suffering from diabetes for >6 months and those who have given verbal consent to participate in the study were recruited this study. Gestational Diabetes, diabetes mellitus type 1, patients with any endocrinopathies, patients with long term corticosteroid use, patients who were unable to respond due to severe illness were excluded.

Estimating a population proportion with specified absolute precision;

Formula:

$n=(Z^2 *PQ)/d^2$, where n=sample size

CI=Confidence interval (95%)

Z=1.96(for CI=95%)

P=Prevalence of depression in diabetic patients in the community was 41.0% [9].

d=tolerated margin of error (5%)

Non Response=10%

Hence, putting the values in the equation:

$$n=373 + 10\% \text{ of } 373 = 410$$

For the study, the self-reported questionnaire consisted of socio-demographic questions such as age and duration of diabetes.

The study was done using a validated self-reported depression tool, the Bengali translation of Patient health questionnaire was used (PHQ-9), a free tool developed by Kroenke *et al.* [10] with an educational grant from Pfizer Inc. The PHQ-9 is a 9 questions questionnaire used to screen for depression, to assess its severity, and to detect major depression. It assesses the symptoms experienced by participants during the 2-week period before the survey. On the basis of participant response to the frequency of any particular symptom (0 = not at all, 1 = several days, 2 = more than ½ of the days, 3 = nearly every day), a total score ranging from 0 to 27 was obtained.

The higher scores were indicating patients' increased self reported depression severity. The arbitrary division of PHQ-9 scores into ratings of minimal (0–4), mild (5–9), and moderate to severe depression (≥ 10) suggested by Reddy *et al.* [11] was used in this study. Minimal (or no depression), mild, moderate, and severe depression are defined by the tool as total scores of 0–4, 5–9, 10–14, and 15 and above, respectively. The variables included in the study were socio-demographic factors, the presence of hypertension; micro-vascular complications were also assessed. Since most of the patients were recruited as first-timers attending the endocrine clinic of the hospital, Glycated haemoglobin (HbA1c) was not available for all patients. The analysis is, therefore, with recent fasting blood glucose (FBG) value (within the last 7 days), which was available for all patients.

The subjects were identified during their regular diabetes clinical follow-up and were selected using a systematic random sampling method. The subjects were approached based on the ratio of 1: 4 centered upon registration lists at the clinic. Written informed consent was obtained from the study participants. All data was entered, compiled and analyzed using Statistical Program for Social Sciences (SPSS) version 20.0 (SPSS Inc.2003). The continuous variables were described in mean

and standard deviation (SD) while frequency and percentages was used for categorical variables. Simple logistic regression was used as a screening in selection of variables for further analysis. Results presented as 95 % confidence interval and adjusted odds ratio. The level of significance was set as $p < 0.05$.

Results

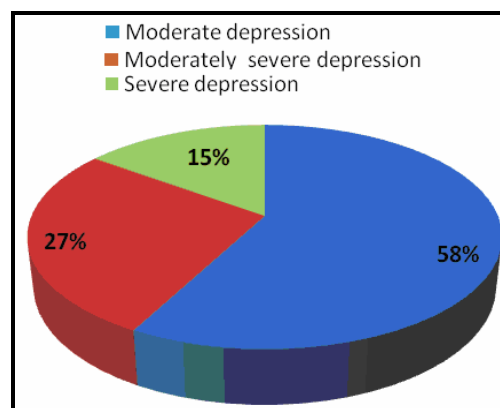
Socio-demographic characteristics of respondents: A total of 406 respondents were interviewed. The mean age of the patients was 50.18(\pm 10.11) years. The majority of the respondents (50.7%) were male patients and almost all the respondents were currently married (94.6%).65.8% of the participant were Hindu by religion and almost half of them were from urban area(50.7%). Majority (56.2%) of the respondents had formal education (primary to intermediate school) followed by (23.9%) had at least higher secondary school education level and majority of them (60.1%) were currently unemployed or retired. 32.3% of the total study participant were belongs to socio-economic class IV according to modified BG Prasad scale 2020 and majority of the participant were living in the nuclear family.

Prevalence of depression: The prevalence of depression among adult diabetic patient in this study was 44.4 % (180 out of 406 respondents) (Table 1).

Presence of depression	Frequency	(%)
No depression (0-9 total score)	226	55.6
Moderate to severe depression (\geq 10 total score)	180	44.4
Total	406	100.0

Among the depressed group, 57.8% were moderately depressed (N=104), 27.2% had moderately severe depression (N=49), and 15.0% had very severe depression (N=27) according to the PHQ-9 scale (Figure 1).

Fig-1: Pie diagram showing distribution of study population according to severity of depression



Variables	Depressed (n= 180)		Non-depressed (n= 226)		T test	
	Mean	SD	Mean	SD		
Fasting Blood Sugar (mg%)	150.08	45.86	138.95	44.60	t=-2.45 p=0.014	
Post pandial blood sugar	228.81	85.52	211.84	70.32	t=-2.14 p=0.033	
HBA _{1c}	7.69	1.39	6.98	1.03	t = -5.75 p = 0.000	
Medication	OHD	106 ^a	58.9 ^b	169 ^a	74.8 ^b	X ² =12.45 p=0.002
	Insulin	18 ^a	10.0 ^b	10 ^a	4.4 ^b	
	Both	56 ^a	31.1 ^b	47 ^a	20.8 ^b	

a- frequency; b- percentage

Medical characteristics of the respondents: The mean duration of diabetes mellitus was 93.9 \pm 80.7months amongst depressed participant and 85.7 \pm 81.2 months among non-depressed

respondent. The mean fasting blood glucose was 150.7 \pm 45.8 mg% among depressed and 138.9 \pm 44.6 mg% among non-depressed which shows significant statistical association

($p=0.014$, $t= 2.45$). The mean post-prandial blood sugar among depressed group was $228.8\pm 85.5\text{mg\%}$ which shows significant statistical association ($p=0.033$, $t=2.14$). The mean HbA_{1c} (7.69 ± 1.39) among depressed patient showed significant difference ($t= -5.75$, $p=0.000$). Regarding diabetic medication, both oral hypoglycemic drugs and insulin therapy was used more (31.1%) in the depressed group than non depressed (20.8%) and similar results was also found for the patient with insulin therapy only which was statistically significant ($p=0.002$) (Table 2).

Socio-demography variables according to depression status: Majority (52.3%) of patients among the depressed group was 46-60 years of age and that of the non-depressed group (50.4%) was of same age group ($\chi^2=3.895$, $P=0.273$). The difference in the age of both groups was not statistically significant. Among the depressed group, 104(57.8%) patients were female and rest (42.2%) were male and, among the non-depressed group, 42.5% patients were female and 57.5%

were male ($\chi^2=9.385$, $P=0.002$). Among the depressed group, 58(32.3%) patients belonged to class IV socio-economic group according to modified B.G.Prasad Scale and only 5.5% patients of class I SES were found to be depressed. Whereas, in non depressed group, patients belonged to class I,II and V showed almost similar distribution ($\chi^2=17.73$, $p=0.001$).

Amongst the depressed patients 75.0% were literate with formal education whereas, in patients of non-depressed category 84.1% were literate ($\chi^2=5.16$, $p=0.023$). in the depressed group, 101(56.2%) patients had diabetes for 5 years or more but in non-depressed participants 129 (57.0%) were suffering diabetes less than 5 years duration which shows statistical significant difference ($\chi^2=6.978$, $p=0.008$). There were no statistically significant differences found between the residence, occupation among depressive and non-depressed groups (Table 3).

Table-3: Distribution of socio-demography variables according to depression status (N= 406)

Socio-demography variables	Depression (n=180)		No depression (n=226)		X ² test	
	Frequency	Percentage (%)	Frequency	Percentage (%)		
Age group(yrs)	<=30	5	2.7	9	3.9	$\chi^2=3.895$ $P=0.273$
	31-45	60	33.3	63	27.9	
	46-60	94	52.3	114	50.4	
	>60	21	11.7	40	17.8	
Gender	Male	76	42.2	130	57.5	$\chi^2=9.385$ $P=0.002$
	Female	104	57.8	96	42.5	
Residence	Rural	94	52.2	106	46.9	$\chi^2=1.13$ $P=0.28$
	Urban	86	47.8	120	53.1	
Socioeconomic status	I	10	5.5	34	15.1	$\chi^2=17.73$ $P=0.001$
	II	21	11.7	35	15.4	
	III	38	21.1	48	21.3	
	IV	58	32.3	73	32.3	
	V	53	29.4	36	15.9	
literacy status	Illiterate	45	25.0	36	15.9	$\chi^2=5.162$ $P=0.023$
	Literate	135	75.0	190	84.1	
Occupation	skilled	104	15.0	139	19.9	$\chi^2=1.743$ $P=0.418$
	Retired & home maker	76	42.2	87	38.5	
Duration of diabetes	>5 yrs	79	43.8	129	57.0	$\chi^2=6.978$ $P=0.008$
	≤ 5 yrs	101	56.2	97	43.0	

Multivariate binary logistic regression analysis of variables with their relation to depression among study population: The result showed that the predictors for depression among adult with type 2 diabetes were gender(male), socio-economic status(class I and II)duration of diabetes (5 years and more) and types of medication (OHD). Compared to female subjects with male were less likely to get depressed (OR= 0.498,p=0.001).

Compared to those socio-economic class I and II with those class III, IV and V were less likely to be depressed (p=0.003 and 0.022 respectively). This results also showed that those with more than 5 yrs of duration of diabetes compared with those less than 5 yrs of sufferings from diabetes were more likely to be depressed(OR-1.64, p= 0.024) (Table 4).

Table-4: Multivariate Binary logistic regression predicting factors with depression among the study population (n=406)

Socio-demographic characteristics and factors		Diabetes with depression				
		β	S.E	AOR	95% C.I	p-value
Gender	Male	-0.697	0.219	0.498	0.324-0.765	0.001
	Female	-	-	1		
Residence	Rural	0.180	0.217	1.197	0.783-1.831	0.407
	Urban	-	-	1		
Socio-economic status	I	-1.319	0.444	0.267	0.112-0.639	0.003
	II	-0.852	0.371	0.427	0.206-0.884	0.022
	III	-0.518	0.328	0.595	0.313-1.132	0.114
	IV	-0.470	0.277	0.625	0.350-1.117	0.113
	V	-	-	1		-
Education	Illiterate	-0.259	0.277	0.772	0.449-1.328	0.350
	Formally educated	-	-	1		
Duration	≥5 yrs	0.496	0.221	1.643	1.066-2.531	0.024
	<5 yrs	-	-	1		
Medication	OHD	-0.511	0.252	0.600	0.366-0.983	0.043
	Insulin	0.116	0.462	1.123	0.454-2.777	0.802
	both	-	-	1	-	-

Discussion

The present study had an aimed to estimate the prevalence and severity of depression among the diabetic patients attending a tertiary care hospital in Kolkata, West Bengal. In our study, the prevalence of depression among patient with diabetes mellitus was 44.4%. In the community based study done by Abdullahi S. Aminu, *et al.* in Udupi District, Karnataka State of southern India showed 37.5% [12]. The result from the study done by R. Das *et al* in diabetic clinic Burdwan Medical College and Hospital, West Bengal shows the rate of MDD to be 46.15% in diabetic patient [13]. The prevalence of depression in the study done by Thour, *et al.* in 2015 was found in

41% of the patients [9]. The prevalence of depression in our study was also much higher compared to a study done by Roy. T et al. in Bangladesh with reported a prevalence of 34.8% [14].

In contrast, the study conducted by Mohamed. R *et al* in Malaysia in 2012 [15] and study done by SN. Ravishankar *et al* in Akash Hospital, Devanahalli [16] using Montgomery Asberg Depression Scale (MADRS) in rural India revealed that prevalence of depression among diabetic patients was 12.3% and 11.6% respectively. Majority (57.8%) were moderately depressed among our study

population whereas study done by R. Das *et al.* showed 36.7% were moderately depressed. [13]

In our study various social factors was associated with depression among Type 2 Diabetes mellitus, gender, socio-economic status, level of education and duration of diabetes were the factors most frequently cited with its occurrence. A study done by Katon, *et al.* noted that younger age, female and being single were significantly associated with major depression [17]. This study was conducted among 4,193 diabetic patients from primary care in western Washington using PHQ-9. The study conducted by SN. Ravishankar, *et al.* has also revealed rate of depression is higher in females than males, higher among rural population than urban, the low socioeconomic status has emerged as one of the important parameter with high prevalence of depression the duration of Diabetes increases the risk of depression [16].

The study conducted by Abdullahi S. Aminu, *et al.* in Udupi District, Karnataka revealed that depression was significantly more common among women ($P < 0.01$) than men. A common explanation to this gender difference was the fact that women play differing social roles as opposed to their male partner as they were financially dependent [12]. Asghar *et al.* found evidence of depressive symptoms in 29% of males and 30.5% of females with newly diagnosed diabetes in rural Bangladesh [18]. There was no residence prediction for depression in our study in the contrary the interesting finding being higher prevalence of depression in a rural population, when compared to urban ones and the difference was statistically significant revealed by Thour, *et al.* in Chandigarh 2015 [9]. It can be explained that being unemployed may affect an individual's mental balance in several ways including forcing someone to stay at home with little or no company for most parts of the day and to depend

on others for their day to day financial expenses including that of diabetes care.

In the present study the medical factor was associated with depression were presence of high FBS, PPBS and HBA_{1c}; similarly Vileikyte *et al.* revealed that patients with type 2 diabetes who had more long term complications and concomitant medical disorders reported significantly more depressive symptoms [19]. Similarly a study done by Katon *et al.* (2004) found that having an HbA_{1c} level $\geq 8.0\%$ was associated with significantly increased odds of having major depression in younger age group [17]. They had also used PHQ-9 to screen for depression.

In the present study gender, class I and II socio-economic status, more than 5 years of duration of suffering diabetes and oral hypoglycaemic drug intake showed significant statistical association.

Conclusion

The present study reveals a high prevalence of depression among patients with diabetes. Rural individuals are more depressed than the urban ones. Gender, socioeconomic status, education and duration of diabetes were significantly associated with depression. Universal screening for depression should be done in patients with diabetes. The effect of treatment of depression on glycemic control, and types of medication of diabetes should be evaluated periodically to address depressive illness in diabetic patients in prolong duration.

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