

Original Research Article

A community-based study on the prevalence of depression and its determinants among elderly diabetic patients in a rural area of West Bengal, India

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ABSTRACT

Background: Type 2 diabetes mellitus often coexists with depressive symptoms and thereby complicating the overall outcome. Elderly diabetic patients are particularly at risk of having poor quality of life because of coexisting depression, which many a time is often not diagnosed and cared for. The current study aimed to estimate the prevalence and identify the determinants of depression among elderly diabetic patients in a rural area of West Bengal.

Methods: A community-based cross-sectional study was conducted in the Haringhata block, Nadia district, West Bengal, with the help of a predesigned and pretested semi-structured questionnaire, under which depression was measured by the patient health questionnaire 9 (PHQ-9). A total of 200 elderly diabetic patients were included by simple random sampling from the sampling frame available in the health and wellness centres of the block. The data, thus collected, were entered and analysed in Jamovi software.

Results: The majority (55%) of the study participants were suffering from minimal to mild depression, while nearly half (45%) were suffering from moderate and higher grades of depression. Multivariate analysis revealed that the number of pills taken per day, medication adherence, physical activity, socio-economic status, and educational level were significant predictors of depression among the study participants.

Conclusions: Strict medication adherence, practice of prescription of a minimum number of pills for glycemic control, and involvement in regular physical activity are the need of the hour for prevention and alleviation of depression among elderly diabetic patients and thereby achieving a better quality of life.

Keywords: Eastern India, Geriatrics, Glycemic control, Mental health, Survey

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is frequently associated with depressive symptoms and thereby needs special care.¹ The prevalence of depression among Indian diabetic's ranges from 2% to 84%.² Coexistence of depression with diabetes leads to enhanced chances of affecting daily living and influencing factors associated

with glycemic control; ultimately heading towards more disease-associated complications and out-of-pocket expenditure. It has now become a major issue of global concern with an increase in both the diabetic population as well as in co-existent depression, and thereby an increase in related consequences.³ Duration of diabetes has been suggested as an important predictor of the mental and social well-being of diabetic patients.⁴ India,

being the diabetic capital of the world, now it is of utmost need to diagnose the patients at the earliest and counsel them for self-care.⁵

Previous research in India was mainly institution-based and catered to the whole diabetic population, not specifically focusing on only elderly diabetics who are more prone to develop depression, neglect self-care, and thereby increasing economic as well as psycho-social burden of the family and the nation as a whole.⁶⁻⁸ Research, though, underscored depression as a common comorbid condition and suggested unmet need for psychological care among diabetic patients; the determinants, specifically the treatment-related ones, were not explored at a community level, more precisely at a rural community level.⁶⁻¹⁰ Little is known about the predictors of depression among elderly diabetics in India who are vulnerable to get affected by this co-morbid condition.¹¹ Comprehensive care identifying all the domains cannot be constructively planned without having an in-depth knowledge of the associated factors leading to the situation. Elderly diabetic patients who are specifically not attending the health care facilities on a regular basis need thorough evaluation for the same.

With this backdrop, the current study aimed to estimate the prevalence of depression along with its associates among the elderly diabetic population in a rural area of eastern India.

METHODS

This community-based cross-sectional study was conducted in the Haringhata Block under Kalyani subdivision, Nadia district, West Bengal. All the elderly people (aged 60 years and above) diagnosed with type 2 diabetes mellitus and residing permanently (at least for more than one year) in the study area were selected as study participants. Those who were mentally disabled or critically ill during data collection were excluded from the study.

Cochran's formula for determining the sample size was applied. The estimated prevalence of depression among adult diabetic patients was taken as 56.9%, as per a previous study conducted in Kolkata.¹² Assuming a confidence interval of 95% and absolute precision of 7.5%, the sample size was calculated to be 168. Considering a non-response allowance of 10%, the final estimated sample size was 185.

In the Haringhata block, Nadia district, there were a total of 42 Sub-Centres, out of which only 26 had been upgraded to Health and Wellness Centres (HWC). For the

selection of study participants, a pre-existing line-list of already diagnosed type 2 diabetic patients was necessary. Such a list was available with the HWCs. All the existing HWCs of the study area were included in this study. Line lists of the eligible participants were made at the level of each HWC; following which, 7-8 participants were selected from each of the HWCs by simple random sampling. Ultimately, a total of 200 elderly participants were surveyed from May 2023 to July 2023. Informed written consent had been taken from every participant.

The study was conducted via face-to-face interviews using a predesigned and pretested semi-structured questionnaire. The first part of the questionnaire contained questions regarding socio-demographic characteristics, and the second part intended to measure depression by a standardized questionnaire i.e., PHQ-9.¹³

The collected data were entered in MS Excel and analyzed using Jamovi software version 2.5.1. Appropriate descriptive statistics were used to analyze the socio-demographic and clinical characteristics of the participants. Depression among the study participants was also analyzed using descriptive statistics. For analytical purposes, depression had been categorized dichotomously into minimal to mild depression (score up to 9 as measured by PHQ-9) and moderate to severe depression (score 10-27 as measured by PHQ-9).

The factors associated with depression among elderly diabetic patients were determined by bivariate analysis and odds ratios (ORs), including raw odds ratio (OR) and respective 95% confidence interval (95% CI) were reported, followed by multivariate analysis. The factors found to have a statistically significant association with depression were included in multivariate analysis by the enter method to estimate the adjusted odds ratio (aOR). All the tests were two-tailed, and a p value <0.05 was considered significant throughout the analysis.

RESULTS

Among the 200 study participants, 110 (55%) were women, and 90 (45%) were men. The mean age of the participants was 63.90±5.77 years, and the majority belonged to the 60-70 years age group (90%). The majority of the study participants were Hindu (65%), and 38.5% belonged to the other backward caste (OBC).

The majority were married (71%) and living in nuclear families (81%). Approximately 47% of the study participants were illiterate, and most of them belonged to the middle socio-economic class (32.5%). Half of the study participants were financially independent (Table 1).

Table 1: Distribution of elderly diabetics according to socio-demographic characteristics (n=200).

Variables	Categories	Frequency	Percentage
Age (in completed years)	60-70	180	90.0
Mean±SD=63.90±5.77	71-80	17	8.5

Continued.

Variables	Categories	Frequency	Percentage
	≥81	3	1.5
Sex	Male	90	45.0
	Female	110	55.0
Religion	Hindu	130	65.0
	Muslim	70	35.0
Caste	General	55	27.5
	Scheduled caste	65	32.5
	Scheduled tribe	3	1.5
	Other backward classes	77	38.5
Socio-economic status*	Upper	19	9.5
	Upper middle	36	18.0
	Middle	65	32.5
	Lower middle	63	31.5
	Lower	17	8.5
Family type	Nuclear	162	81.0
	Joint	38	19.0
Educational status	Illiterate	94	47.0
	Primary	66	33.0
	Secondary	22	11.0
	Higher secondary	7	3.5
	Graduation and above	11	5.5
Marital status	Currently married	142	71.0
	Unmarried	12	6.0
	Widowed	42	21.0
	Separated	4	2.0
Financial dependence	Independent	100	50.0
	Dependent	100	50.0

*According to the Modified BG Prasad Scale 2022.

Among the study participants, 106 (53%) had been diagnosed with diabetes mellitus for more than 3 years. The majority had a recent RBS level above the threshold of 140 mg/dl (83.5%), yet 85% of the participants reported adherence to medication as prescribed. Most of them were taking 4 or more pills per day to control diabetes (48.5%). Approximately 33.5% of participants had obesity, although the majority reported that they practice physical exercise like brisk walking for more than 150 minutes/week (68.5%). Of all the participants, 144 (72%) reported having any co-morbidity, with hypertension being the commonest (93.75%). Approximately 55% of the participants had minimal or mild depression, whereas the remaining 45% of the participants had a moderate or higher degree of depression (Table 2).

In the multivariate analysis model, five variables emerged as significantly associated with depression among the elderly diabetic individuals. These included educational status (adjusted Odds Ratio, aOR=2.981, 95% confidence interval, CI=1.389-6.394), socio-economic status (aOR=3.169, 95% CI=1.302-7.712), physical exercise (aOR=10.029, 95% CI=4.284-23.477), adherence to medicine (aOR=5.449, 95 CI=1.783-16.652) and number of pill intake per day (aOR=4.913, 95% CI=1.910-12.638). In this model, those who were taking up to 2 pills per day, adherent to medication specific to diabetes, doing physical exercise for >150 minutes/week, belonging to socio-economic status I and II (according to modified BG Prasad scale 2022) and having educational level primary and above, showed higher odds of minimal to mild depression than moderate and higher grades of depression (Table 3).

Table 2: Distribution of study population according to clinical characteristics (n=200).

Variables	Categories	Frequency	Percentage
Duration of diabetes mellitus	<3 years	94	47.0
	≥3 years	106	53.0
Adherence to medicine	Yes	170	85.0
	No	30	15.0
Number of pills taken per	1	17	8.50

Continued.

Variables	Categories	Frequency	Percentage
day	2	40	20.0
	3	47	23.5
	4	39	19.5
	≥5	57	28.5
Recent random blood sugar	<140 mg/dl	33	16.5
	≥140 mg/dl	167	83.5
BMI	Underweight	16	8.0
	Normal	66	33.0
	Overweight	50	25.0
	Obesity	68	34.0
Physical exercise	≥150 minutes/ week	137	68.5
	<150 minutes/ week	63	31.5
Co-morbidity	Yes	144	72.0
	No	56	28.0
Depression*	Minimal (1-4)	66	33.0
	Mild (5-9)	44	22.0
	Moderate (10-14)	39	19.5
	Moderately severe (15-19)	31	15.5
	Severe (20-27)	20	10.0

*Measured by PHQ-9.

Table 3: Determinants of depression among study population: multivariate analysis (n=200).

Variables	Categories	Depression		Test of significance χ^2 (df=1)	Odds ratio (OR) (95% CI)	Adjusted odds ratio (aOR) (95% CI)
		Minimal to mild (%)	Moderate or above (%)			
Age (in completed years)	<61	54 (58.1)	39 (41.9)	0.660	1.261	-
	≥61	56 (52.3)	51 (47.7)	p=0.417	(0.720-2.207)	
Sex	Male	50 (55.6)	40 (44.4)	0.020	1.042	-
	Female	60 (54.5)	50 (45.5)	p=0.886	(0.595-1.824)	
Family type	Nuclear	90 (55.6)	72 (44.4)	0.106	1.125 (0.554-	-
	Joint	20 (52.6)	18 (47.4)	p=0.744	2.284)	
Religion	Hindu	77 (59.2)	53 (40.8)	2.686	1.629 (0.907-	-
	Muslim	33 (47.1)	37 (52.9)	p=0.101	2.925)	
Caste	General	34 (61.8)	21 (38.2)	1.425	1.470 (0.780-	-
	Others	76 (52.4)	69 (47.6)	p=0.233	2.771)	
Marital status	Currently married	81 (57.0)	61 (43.0)	0.825	1.328 (0.720-	-
	Others	29 (50.0)	29 (50.0)	p=0.364	2.450)	
Education	Primary and above	70 (66.0)	36 (34.0)	11.102	2.625	2.981 (1.389-
	Illiterate	38 (40.4)	56 (59.6)	p=0.001	(1.480-4.657)	6.394)
Socioeconomic Status	II and below	44 (80.0)	11 (20.0)	19.157	4.788 (2.291-	3.169 (1.302-
	III and above	66 (45.5)	79 (54.5)	p=0.000	10.006)	7.712)
Financial dependence	Independent	66 (66.0)	34 (34.0)	9.350	2.426 (1.368-	1.375 (0.651-
	Dependent	45 (45.0)	55 (55.0)	p=0.002	4.304)	2.902)
Physical exercise	>150 min/week	63 (46.0)	74 (54.0)	33.169	17.027 (5.092-	10.029 (4.284-
	≤150 min/week	03 (4.8)	60 (95.2)	p=0.000	56.942)	23.477)
Adherence to medicine	Yes	99 (58.2)	71 (41.8)	4.793	2.408 (1.079-	5.449 (1.783-
	No	11 (36.7)	19 (63.3)	p=0.029	5.375)	16.652)
Duration of diabetes	<3 years	53 (56.4)	41 (43.6)	0.137	1.111 (0.636-	-
	≥3 years	57 (33.8)	49 (46.2)	p=0.711	1.943)	
Knowledge about complications	Yes	48 (49.0)	50 (51.0)	2.814	0.619 (0.353-	-
	No	62 (60.8)	40 (39.2)	p=0.093	1.086)	
No of pills taken per day	0-2	41 (71.9)	16 (28.1)	9.232	2.748 (1.414-	4.913 (1.910-
	>2	69 (48.3)	74 (51.7)	p=0.002	5.340)	12.638)
Comorbidity	No	33 (58.9)	23 (41.1)	0.485	1.248	-

Continued.

Variables	Categories	Depression		Test of significance χ^2 (df=1)	Odds ratio (OR) (95% CI)	Adjusted odds ratio (aOR) (95% CI)
		Minimal to mild (%)	Moderate or above (%)			
	Yes	77 (53.5)	67 (46.5)	p=0.486	(0.668-2.332)	
BMI	Normal BMI	34 (51.5)	32 (48.5)	0.483	0.811 (0.449-	-
	Abnormal BMI	76 (56.7)	58 (43.3)	p=0.487	1.465)	
Recent RBS in mg/ dl	<140	19 (59.4)	13 (40.6)	0.295	1.237 (0.574-	-
	≥140	91 (54.2)	77 (45.8)	p=0.587	2.666)	
Insulin therapy	No	5 (6.25)	3 (37.5)	0.189	1.381 (0.321-	-
	Yes	105 (54.7)	87 (45.3)	p=0.732	5.942)	

Nagelkerke R square=0.481, Hosmer and Lemeshow Test: $\chi^2=6.123$, df=8, p=0.633

DISCUSSION

Depression was reported to be frequently associated as a comorbid condition among elderly diabetic patients. The range varied as low as 5% to as high as 56.9% as seen in previous research.^{12,14-17} In the Indian context, two different systematic reviews found out the pooled prevalence to be 38% and the range to be from 8-84% among the diabetic population.^{2,18} The current study also found that nearly half (45%) of the study participants were suffering from moderate to severe depression.

The majority of the study participants belonged to the age group of 60-70 years (90%) with a mean age of 63.90±5.77 years. In another study conducted in Kolkata, the mean age was found to be 51.74 years with a prevalence of depression of 56.3%, though the study population was adults.¹² Both studies were similar in terms of finding the fact that depression was highly prevalent among older adults.

The current study revealed that educational status, socioeconomic status, physical exercise, adherence to medication, and number of pills per day were significant determinants of depression among elderly diabetics. But surprisingly, in contrast to a study in Kolkata, it did not show any statistically significant association with important socio-demographic characteristics like age, gender, marital status, financial independence, and type of family, enforcing the fact that family support might not be the major issue influencing the occurrence of depression among elderly diabetic patients, though socio-economic status did show significant association with depression in the current study as well.¹² Low income and marital status had also been found as significant predictors in other previous research.^{19,20} Insulin therapy had been indicated as an important predictor in previous studies, though in the current study, it did not show any association.^{20,21} In this study, disease profiles like duration of diabetes, associated co-morbidity as well as diabetic control did not reveal any statistically significant association for the occurrence of the event, whereas poor glycemic control, comorbid conditions like hypertension and ischemic heart disease were found to be important predictors in previous research.^{12,20,21}

The current study was a unique one, being a community-based study, to estimate the level of prevalence of

depression and identify the predictors among elderly diabetic patients in rural West Bengal. Few study variables related to blood investigations like glycemic control, FBS and PPBS could not be assessed due to resource constraints. The findings might not reflect the characteristics of an urban area. Despite hindrance due to some limitations, the current one, being a community-based study, had its inherent strength of better external validity than institution-based previous research.

CONCLUSION

Depression is highly prevalent among elderly diabetic patients in the current study area. Multivariate analysis revealed that the number of pills taken per day, adherence to medication, physical activity, socio-economic status, and educational level were significant predictors of depression among the study participants.

Identification of predictors is of utmost importance to build up health promotional and behavioural change models for the ultimate health and well-being of diabetic patients. Diabetes, being a chronic disease, leads to various complications if left untreated. Along with hidden comorbidities like depression, diabetes may further endanger the overall health-related quality of life of the patients. Strict medication adherence, practice of prescription of a minimum number of pills for glycemic control, and involvement in regular physical activity are the need of the hour for prevention and alleviation of depression and thereby achieving a better quality of life.

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