

Comparative study of various socio-demographic variables in patients having type 2 diabetes mellitus with or without depressive disorder: a brief report

Abstract

Background: Group of common metabolic disorders, diabetes mellitus (DM) share hyperglycaemia as phenotype. When diabetes co-occurs with depression, adverse bidirectional relationship is seen which increases the burden of both illnesses. This affects patient's health, functioning, and quality of life. This relationship also results in increased mortality as compared to those with depression or DM alone. **Aims:** To determine and compare various socio-demographic factors of cases having type 2 DM with or without co-morbid depressive disorder and to find the prevalence of depressive disorder in these cases. **Material and methods:** A cross-sectional case-control study was done at Silchar Medical College and Hospital, Silchar after permission from ethics committee in which consecutive 50 cases were selected who were diagnosed cases of type 2 DM and were interviewed to find if they fulfilled the tenth revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) criteria for depressive disorder. Fifty consecutive controls were taken for the comparison of social-demographic variables between the cases and controls. **Results:** In our study sample, 54% of the subjects were males and 46% were females. Mean age of the cases was 49.22 (± 7.33) years. Prevalence of depressive disorder among the cases having type 2 DM was found to be 32%. Depressive disorder was higher in cases with age >50 years (36.36%), female gender (34.78%), rural background (40.62%), unmarried/separated subjects (50%), joint family structure (36.36%), lower education (38.70%), unemployment/unskilled/retired/housewife occupants (39.28%), and lower/lower middle socioeconomic status (42.42%). **Conclusion:** It is clear from our study that those who are already marginalised in the society are more prone to develop depressive disorder when they are suffering from a chronic condition such as DM. Association of DM with various co-morbid emotional disorders is extremely important for the formulation of long term strategies and management of both these chronic disorders.

Keywords: Glucose Metabolism Disorders. Quality of Life. Case-Control Studies. Chronic Disease.

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Introduction

Phenotype of hyperglycaemia is shared by the group of common metabolic disorders we call diabetes mellitus (DM).[1] Although several distinct types of DM are present but broadly it has been classified as insulin dependent DM (IDDM) and non-insulin dependent DM (NIDDM). Presently DM is spreading rapidly, and it is estimated that it will be a leading cause of mortality and morbidity in the world very soon. The world Health Organization (WHO) has projected that 300 million people worldwide will be affected from DM by the year 2025.[2] As far as India is concerned, it is estimated that 57 million people out of the total 1.4 billion of Indian population will be affected by it by the year 2025.[2] King *et al.*[2] have predicted that by the year 2025, the countries with the largest number of people with DM will be India, China, and the United States (US). DM is a chronic disease that

needs long term treatment, care, and modification in lifestyle. It is a well-known fact in the long run DM is associated with many physical complications, but it is also established that long term DM can also cause various emotional problems like depression, dysthymia, anxiety disorder, etc. From the time of DM being recognised as a disease, awareness is there regarding the role of emotional factors in the illness. Thakuria and Das[3] studied the role of life events in NIDDM and concluded that stress might be an aetiological factor. Anderson *et al.*[4] did a meta-analysis in which they found 42 studies from all around the world establishing the strong correlation between DM and depression. Some other studies done in this context include those by Weyerer *et al.*[5] on Upper Bavarian population in Germany and Lopez-de-Andrés *et al.*[6] in Spain. Depression can add up to the distress a diabetic person is having and it has a negative impact upon the social and physical functioning,

quality of life, together with increased cost of treatment causing socioeconomic stress and further complications. It has also been seen that the concurrent presence of both these disorders causes a significant rise in the mortality rates which has been well depicted by a meta-analysis done by Hofmann *et al.*, [7] which included sixteen worldwide studies. When depression is associated with DM, a bi-directional relationship is seen. DM can cause complications and health problems that may worsen symptoms of depression. On the other hand depression can lead to poor lifestyle decisions, such as unhealthy eating, less exercise, smoking, and weight gain — all of which are risk factors for DM. Depression also affects the ability to perform tasks, communicate, and think clearly which can interfere with the ability to successfully manage DM. Recent research by Tabák *et al.* [8] and Musselman *et al.* [9] has confirmed the bi-directional nature of relationship between both of these disorders. There is also evidence that treatment of depression in early stages help improve the glycaemic control. [10,11] Coming to the prevalence and pattern of depression in diabetics, a noteworthy variation is found in the eastern and western countries which could be due to the differences in various cultural and socio-demographic variables such as male: female ratio, marital status of population, literacy rate, family structure and family support, rural and urban distribution of population, socioeconomic status, quality of life etc., thus highlighting the role of these factors in the pathogenesis of both the disorders. So, the adequate information regarding the socio-demographic variables and its association with DM with or without various co-morbid emotional disorders is extremely important for the formulation of long term strategies and management of both these chronic debilitating disorders.

Studies on this context in the North-eastern part of India are very limited and therefore we have taken up this subject with the aim of understanding the whole phenomenon from socio-cultural point of view.

Aims and objectives

- To determine various socio-demographic factors of study subjects having type 2 DM
- To find the prevalence of depressive disorder in the type 2 diabetic subjects in our sample
- To compare the various socio-demographic factors in patients having type 2 DM with or without co-morbid depressive disorder.

Materials and methods

Case

Any patient having type 2 DM aged 18 years or above attending the inpatient or outpatient departments (OPD) of medicine or psychiatry, Silchar Medical College and Hospital (SMCH), Silchar diagnosed as diabetic by faculty of Department of Medicine, SMCH based on venous blood sugar levels (fasting blood sugar [FBS], post prandial blood sugar [PPBS], or glycosylated haemoglobin [HbA1c]) according to the criteria adapted from the American Diabetic Association, [12] six months prior to contact was considered as a case.

Control

Equal number of subjects were selected consecutively from the medicine OPD as control subjects with the criteria being that their age should be 18 years and above and they should be suffering from a chronic medical condition (namely hypertension), six months prior to contact. Diagnosis of hypertension was established by the faculty of Department of Medicine, SMCH. Control group was taken only for the comparison of socio-demographic variables between the cases and controls.

Place of study

This study was conducted in SMCH, which is a tertiary care centre. The average patients coming to this hospital is about 800-1000 per day. The study was conducted after taking approval from the institutional ethics committee.

Catchment area

Main catchment area of this hospital is the whole Cachar district with an estimated population of 1.736 million according to the 2011 census report, [13] along with the neighbouring districts of Karimganj and Hailakandi, and states like Manipur, Mizoram, and Tripura.

Inclusion criteria

Cases from both the sexes were included. All patients aged 18 years and above who had been diagnosed as a case of type 2 DM by the faculty of Department of Medicine, SMCH based on venous blood sugar levels (FBS, PPBS, or HbA1c) according to the criteria adapted from the American Diabetic Association, [12] six months prior to the interview were included. Patients and guardians who had given written consent to participate in the study were included in the study.

Exclusion criteria

Patients under 18 years of age, with gestational DM, abusing any kind of substance, suffering from severe debilitating or other co-morbid chronic diseases (e.g. hypertension, hypothyroidism, etc.) were not included. Absence of these co-morbid chronic medical conditions was confirmed by the faculty of Department of Medicine, SMCH after relevant clinical examination and investigations. Patients or guardians not giving consent to participate in study were excluded from the study. Patients having past or family history of depression or previous diagnosis of bipolar affective disorder were excluded. If the information provided by patients was not adequate or reliable they were excluded from the study.

Sampling procedure

This is a hospital-based case-control cross-sectional single interview study in which 50 cases were selected consecutively who were diagnosed cases of type 2 DM by the faculty of Department of Medicine, SMCH and were interviewed to find if they fulfilled the tenth revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) criteria for depressive disorder. [14] The

psychiatric evaluation of the subjects was done by all the authors taking the interview combined. Fifty consecutively selected controls were taken for the comparison of socio-demographic variables between the cases and controls.

Tools

1. Socio-demographic proforma: A standard proforma describing socio-demographic variables was used which was designed and standardised in the Department of Psychiatry, SMCH. The socio-demographic proforma gives information about age, sex, religion, marital status, family type and domicile, education of patient, occupation, and socioeconomic status.
2. Depressive disorder was diagnosed using ICD-10 criteria.[14]

Interview procedure: At first, written informed consent from all patients/guardians was taken after explaining them the purpose and procedure of the study. Then all the cases and controls who were selected consecutively for study were interviewed in detail using the above mentioned tools without any set limit. Interview pattern was flexible to elicit maximum data. For all cases, privacy of interview and confidentiality was strictly maintained.

Analysis of data: Appropriate data was collected, tabulated, and statistical analysis was done by GraphPad prism for windows version 6.01 and Statistical Package for the Social Sciences (SPSS v22). Fischer exact test was applied to find out p-value and statistical significance wherever necessary. Relative risk and odds ratio were also calculated.

Results and observations

Comparison of socio-demographic variables of cases and controls

In this hospital-based cross-sectional case-control study, done on a total of 50 cases and 50 controls, Table 1 shows the comparison of the cases with controls. We found that among cases 27 (54%) were males and 23 (46%) were females as compared to control group which had 29 (58%) males and 21 (42%) females. Maximum number of cases belonged to age group of 40-49 years (50%), while in controls equal number of subjects, i.e. 15 (30%) were from the age group of 50-59 years and 60-69 years. The mean age of the cases was 49.22 (± 7.33) years and of controls was 56.68 (± 11.11) years. Twenty seven (54%) of the cases were Hindu while 23 (46%) were Muslims which was similar to controls. Thirty two (64%) cases and 28 (56%) controls were from rural background. Most of cases and controls, i.e. (48 [96%] vs. 41 [82%]) in the study were married while one case (two per cent) and two (four per cent) controls were unmarried. Among the cases, 22 (48%) were from joint family while 28 (56%) were from nuclear family as compared to controls which had 38 (76%) and 12 (24%) subjects from joint and nuclear family respectively. Maximum cases and controls were primary educated (22 [44%] vs. 27 [54%]) followed by secondary educated group (18 [36%] vs. 10 [20%]). When looking into profession among cases and controls, maximum was housewives (23 [46%] vs. 22 [44%]). Socioeconomic status wise lower middle class group

Table 1: Comparison of socio-demographic variables of the study subjects and controls

Socio-demographic variables	Study subjects (n=50) (%)	Controls (n=50) (%)
Age		
30-39	3 (6)	3 (6)
40-49	25 (50)	9 (18)
50-59	15 (30)	15 (30)
60-69	7 (14)	15 (30)
70-80	0	8 (16)
Sex		
Male	27 (54)	29 (58)
Female	23 (46)	21 (42)
Religion		
Hindu	27 (54)	27 (54)
Muslim	23 (46)	23 (46)
Domicile		
Rural	32 (64)	28 (56)
Urban	18 (36)	22 (44)
Marital status		
Married	48 (96)	41 (82)
Unmarried	1 (2)	2 (4)
Widow/widower	1 (2)	7 (14)
Type of family		
Joint	22 (44)	38 (76)
Nuclear	28 (56)	12 (24)
Education		
Illiterate	9 (18)	9 (18)
Primary	22 (44)	27 (54)
Secondary	18 (36)	10 (20)
Graduate	1 (2)	4 (8)
Occupation		
Unemployed	1 (2)	3 (6)
Unskilled	2 (4)	2 (4)
Housewife	23 (46)	22 (44)
Skilled	6 (12)	8 (16)
Business	6 (12)	6 (12)
Service	8 (16)	5 (10)
Professional	2 (4)	0
Retired	2 (4)	4 (8)
Socioeconomic status		
Lower	14 (28)	6 (12)
Lower middle	19 (38)	21 (42)
Middle	12 (24)	15 (30)
Upper middle	2 (4)	7 (14)
Upper	3 (6)	1 (2)

had maximum number of both cases 19 (38%) and controls 21 (42%) followed by lower class having 14 (28%) cases and middle class having 15 (30%) controls.

Prevalence of depressive disorder among the cases

Out of the 50 diabetic patients, 16 i.e. (32%) met the ICD-10 criteria of depressive disorder shown in Figure 1.

Comparison of socio-demographic variables in cases with or without depressive disorder

When we compared the socio-demographic factors in the type 2 DM cases with or without co-morbid depressive disorder as shown in Table 2, it was found that depression was more in the subjects in age group >50 years of age (36.36%) compared to those <50 years of age (28.28%). A higher prevalence of depression was found in the female population

(34.78%) as compared to the male population (29.62%) (Figure 2).

We found almost equal number of subjects among Hindus (33.33%) and Muslims (30.43%). Depression was higher in the subjects who were hailing from rural background (40.62%) as compared to those hailing from urban background (16.66%). Unmarried/widow/widower group (50%) had higher depression as compared to married subjects (31.25%) and subjects from joint family (36.36%) had a higher prevalence as compared those from nuclear family (28.57%). High prevalence of depression was present in the subjects who were either illiterate/primary educated (38.70%) as compared to those who had studied till secondary level/graduated. Unemployed/unskilled/retired/housewife

Table 2: Comparison of socio-demographic variables in study subjects with or without depressive disorder

Variables	Depression present (%)	Depression absent (%)	Total=50	P value	Odds ratio	95% confidence interval	Significance
Age							
≤50 years	8 (28.57)	20 (71.42)	28	0.7608	1.429	0.4325-4.718	Not significant
>50 years	8 (36.36)	14 (63.63)	22				
Gender							
Male	8 (29.62)	19 (70.37)	27	0.7666	0.7895	0.2398-2.599	Not significant
Female	8 (34.78)	15 (65.21)	23				
Religion							
Hindu	9 (33.33)	18 (66.66)	27	1.000	0.8750	0.2647-2.893	Not significant
Muslim	7 (30.43)	16 (69.56)	23				
Domicile							
Rural	13 (40.62)	19 (59.37)	32	0.1171	0.2923	0.07-1.217	Not significant
Urban	3 (16.66)	15 (83.33)	18				
Marital status							
Married	15 (31.25)	33 (68.75)	48	0.542	2.2	0.1287-37.6	Not significant
Unmarried/widow/widower	1 (50)	1 (50)	2				
Family type							
Joint	8 (36.36)	14 (63.63)	22	0.7608	0.7	0.2119-2.312	Not significant
Nuclear	8 (28.57)	20 (71.42)	28				
Education of subject							
Primary/illiterate	12 (38.70)	19 (61.29)	31	0.2282	0.422	0.1129-1.579	Not significant
Secondary/graduate	4 (21.05)	15 (78.94)	19				
Occupation of subject							
Unemployed/unskilled/housewife/retired	11 (39.28)	17 (60.71)	28	0.2404	0.4545	0.1298-1.591	Not significant
Skilled/business/service/professional	5 (22.72)	17 (77.27)	22				
Socioeconomic status							
Lower/lower middle	14 (42.42)	19 (57.57)	33	0.0526	0.1810	0.0354-0.9229	Not significant
Middle/upper middle/upper	2 (11.76)	15 (88.23)	17				

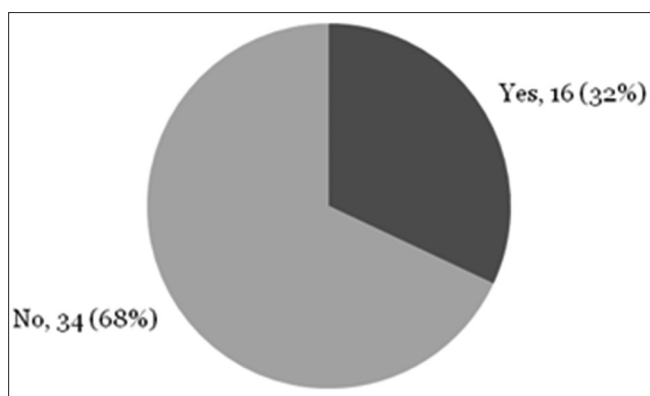


Figure 1: Prevalence of depression

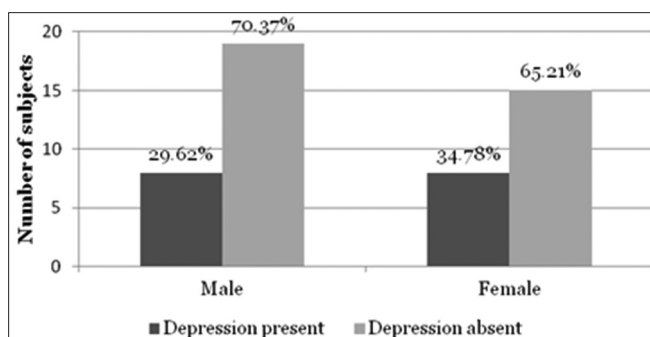


Figure 2: Gender wise distribution of depression in type 2 diabetic subjects

group (39.28%) had more prevalence as compared to skilled/service/business/professional group (22.72%). It was also found that subjects belonging to the lower/lower middle class group (42.42%) had more depression as compared to the subjects belonging to middle/upper middle/upper group (11.76%).

Discussion

The literature showing the correlation between DM and depression dates back to more than 300 years ago when Dr. Thomas Willis, a British physician, made the observation and he suggested that DM was the result of “sadness or long sorrow”. [15] Since then many studies have been conducted across the globe to find out the relationship between DM and depression.

In this hospital-based cross-sectional case-control study, we have aimed to compare the various socio-demographic variables of the patients with type 2 DM with or without co-morbid depressive disorder and also find out the prevalence of depressive disorder in diabetic subjects. We found that depressive disorder was present in 32% of the patients having DM which is much higher than the general population (ten to 20%). [16] Worldwide there has been variation in the prevalence of depressive disorder in the developed and the developing countries. Pouwer *et al.* [17] did an outpatient-based study in the Netherlands and found depressive effect to be ranging from 37-43% among the patients with type 2 DM. Similarly, Sotiropoulos *et al.* [18] in their outpatient-based study on Greek population found prevalence of depression to be 33.4% among the NIDDM patients. Raval *et al.* [19] in a

tertiary care centre-based study at Chandigarh found 41% of type 2 diabetic patients to be suffering from depression. Das *et al.* [20] found 46.15% type 2 DM patients attending diabetic clinic having depression. Of the 34% newly detected and diagnosed type 2 DM patients having psychiatric morbidity, Srivastava *et al.* [21] found major depressive disorder the most common (21%). However, there are some studies which have found much higher prevalence of depression than our result. Khamseh *et al.* [22] in a hospital-based research found the prevalence of depression to be 71.8% in the Iranian population of Tehran who were diabetics which could be attributed to the socio-demographic, socio-political, and other stressful life events that the people of this country face making them more vulnerable to depression.

Now regarding the association between the socio-demographic variables and prevalence of depressive disorder in diabetic subjects, we found the depressive symptoms to be higher in females (34.78%) as compared to males (29.62%). Asghar *et al.* [23] found depression to be 29% in male diabetics and 30.5% in female diabetics of Bangladesh. Another study by Ali *et al.* [24] found higher prevalence of depression in female diabetics (23.8%) as compared to male diabetics (12.8%), thus showing the gender variation of depression in the diabetics. Our study demonstrated that the age group of >50 years had higher prevalence of depression (36.36%) as compared to age <50 years (28.57%). A study done by Raval *et al.* [19] on Indian population from Chandigarh found association of depression in diabetic subjects with age >54 years. We found that unmarried/widow group (50%) had higher depression as compared to married subjects (31.25%) which goes in accordance to the results found by Akhtar-Danesh and Landeen. [25] Depression was higher in the subjects who were hailing from rural background (40.2%) as compared to those hailing from urban background (16.66%). Sinha *et al.* [26] found a similar high prevalence of depression in rural population in Tamil Nadu, India. We found that depression was present in the subjects who were either illiterate/primary educated (38.70%) as compared to those who had studied till secondary level/graduated (21.05%). A study by Peyrot and Rubin [27] found similar results of higher depression in less educated group who were suffering from DM as well. Subjects from joint family (36.36%) had a higher prevalence as compared to those from nuclear family (28.57%). This finding is against the common belief that joint family system protects the individual from depression. The reason behind this could be that most of these families were from rural areas with only one or two members earning just enough to fulfil the basic needs thus having poor quality of life. We found that unemployed/unskilled/retired/housewives' group (39.28%) had more prevalence as compared to skilled/service/business/professional group (22.72%) and subjects belonging to the lower/lower middle class group (42.42%) had more depression as compared to the subjects belonging to middle/upper middle/upper group (11.76%). This can be explained as most of the population which is unemployed/unskilled/retired/housewives are suffering from economic problems and lie in the lower/lower middle class group. The psychological and financial burden is much more in this group and moreover when a member from this group is suffering from a chronic illness like DM, they become more

stressed. Also, presence of DM and its complications cause increase in the cost of treatment which most of them are not able to afford and further add to depression. We observed the association between socioeconomic status and presence of depressive disorder among the cases irrespective of the duration of DM. However, a clearer picture would have been obtained had we evaluated the association between duration of diabetes and socioeconomic status of the study subjects. Kuruvilla and Jacob[28] and Patel and Kleinman[29] found similar association of higher prevalence of depression associated with poverty. We did not find any association of religion with prevalence of depression.

Thus, age >50 years of age, female sex, rural background, unmarried/separated subjects, joint family structure, lower education, unemployment/unskilled/retired/housewife occupants, and lower/lower middle socioeconomic status were more likely to be associated with depressive disorder in the people suffering from DM. However, in our study, none of the associations between the different socio-demographic variables and depression in the people suffering from DM came out to be statistically significant ($p < 0.05$).

Conclusion

In our study, we found 80% of the cases were from the age group 40-59 years. In contrast, maximum number of subjects (60%) in the control group was from the age range of 50-69 years. Most of the cases were from rural background (64%) and were married (96%) as expected.

Since this was a tertiary care hospital-based study, the prevalence of depressive disorder in patients having type 2 DM was 32% which was significantly higher than the normal population and indicates a strong association between DM and depressive disorder. Such high comorbidity may not be entirely due to a psychological reaction to a chronic illness but a common underlying pathophysiological process may be involved. Our findings are in fact similar to most of the national and international studies which we have come across. We found higher prevalence of depressive disorder in the patients suffering from type 2 DM belonging to age group >50 years (36.36%), coming from rural background (40.62%) with educational level illiterate to primary education level (38.70%), and who were either unemployed/unskilled/housewife/retired (39.28%) with lower/lower-middle socioeconomic status (42.42%). All the above findings indicate clearly that those who are already marginalised in the society are more prone to develop depressive disorder when they are suffering from a chronic condition such as DM.

However, this study has few limitations. Since our study was restricted to a tertiary care medical centre, it may not reflect actual prevalence of depressive disorder in type 2 diabetic patients in general population as well as pattern of socio-demographic variables prevalent in the community. The number of study subjects was less and control group was taken only for comparison of socio-demographic variables with cases. Hence, more number of prospective studies involving larger number of cases followed up for longer duration need to be conducted for detailed evaluation of association between depressive disorder and DM.

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