Study of Correlation of Perceived Stress and Depression in Type 2 Diabetes Mellitus Patients

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ABSTRACT

This study assess the prevalence of stress and depression and identify their associated factors among people with type 2 diabetes. This is a cross-sectional study done in 400 patients with type 2 diabetes. The depression and stress prevalence was estimated using the Beck Depression Inventory and the PSS scales, respectively. The rates of depression and stress were 67% and 83%, respectively. The higher prevalence was observed in the 51-60 group., the total mean age was observed as 47.12±12.52 years. Female predominance was observed as 62.0%. Most of the patients were married (79%) and mainly employed (62%). 185 out of 280 (66.08%) patients having fasting blood sugar (FBS), ≥125 were observed to be potential cases of depression. 69 out of 152 (45.39%) patients having a duration of diabetes <5 years were observed to be potential cases of depression. 164 out of 208 (78.85%) patients having a duration of diabetes in the range 5-10 years were observed to be potential cases of depression. 36 out of 40 (90%) patients having a duration of diabetes >10 years were observed potential cases of depression. 180 out of 216 (83.3%) patients having a duration of treatment in the range of 5-10 years were observed potential cases of depression. 44 out of 240 (60%) patients undergoing oral treatment., 88 out of 112 (78.56%) patients undergoing injectable treatment were observed to be potential cases of depression. PSS scores ranged from 1-25., there were 128 participants (32%) with high scores and 12 (3%) with very high scores. The 192 participants(48%) were average score. On univariate analysis, important factors associated with high/very high stress were age 30-40 years, lack of physical activity and professional work. After multi variate regression, age 30-40 years, working in a professional job and lack of physical activity were still significant associated with high/very high stress.

INTRODUCTION

Diabetes mellitus (Type 2) is one of the most prevalent chronic diseases and is the 4th major cause of mortality in developed countries. According to the International Diabetes Federation (IDF), "diabetes is one of the largest global health emergencies of the 21st century[1]. In 2015, the prevalence of diabetes worldwide was one in 11 adults and the estimated prevalence of the impaired glucose toleration was one in 15 adults. This prevalence expected to further increase, especially in the urban population, leading to more medical and economic challenges, added on top of the 12% of global health expenditure currently spent on diabetes. The worldwide prevalence of diabetes mellitus among adults was estimated at 366 million in 2011 and by 2030 this is estimated to increase up to 552 million[2,3]. As a lifestyle and genetic factors, such as high carbohydrate diet and lack of exercise, appear to account for the increased prevalence of type 2 diabetes[4], psychological factors such as stress, anxiety and depression have also been associated with type 2 diabetes mellitus as well as the metabolic syndrome[5]. 'Diabetes distress' is the emotional burden specifically related to living with Type 2 diabetes, which includes guilt, anxiety and feeling overwhelmed or unsupported in relation to diabetes[6]. In the general population, approximately one in three individuals, are suffering from Type 2 diabetes report a high diabetes distress level, which is associated with higher HbA1c, poor self-care behaviors and lower self-efficacy to treatment. These higher levels are found in people having complications and who are on insulin[6,7]. Depression is the most common and serious medical disease, with a lifetime prevalence ranging from approximately 11% in low-income countries to 15% in high- income countries. The risk of having a mental health problem in life is about 50%, leading to drop-in employment, wages and productivity[8]. The general appraisal instrument used as an empirical index established by researchers is the Perceived Stress Scale (PSS). The PSS was developed based on the concept of appraisal by Lazarus. The PSS measures the degree to which circumstances in one's life are estimated as stressful[8]. The first factor was comprised primarily of items reflecting adaptational symptoms. The second factor was found to reflect coping ability. Extensive normative data of 2,387 respondents are available for the original 14-item version of PSS and ten-item (PSS-10) and four-item versions, which provide a rich reference base for studying perceived stress across gender, SES, age groups, race and other characteristics. Roberti *et al.* (2006) updated the PSS-10, explanatory factor analysis, and psychometric analysis revealed a two-factor structure measuring Perceived Helplessness and Perceived Self-efficacy. It included Items 1, 2, 3, 6, 9 and 10 were in the first factor and items 4, 5, 7 and 8 were included in the second factor. In the present study, the 10-item version is used.

MATERIALS AND METHODS

Source of Data: This was a hospital-based study done in who came to the out-patient department.

Sample of the Study: The study sample screened 400 participants.

Inclusion Criteria:
- Patients aged 30-65 years
- Both females and males with type 2 diabetes mellitus.
- Duration of type 2 diabetes-1-10 years
- Patients were willing to participate in the study and willing to give an informed consent.

Exclusion Criteria:
- Age<30and >65.
- Patients are unwilling to participate in the study.
- Organic disorders.
- Seizure disorder.
- Mental retardation.
- Persistent neurological deficits.
- Chronic debilitating medical illnesses such as chronic obstructive pulmonary disease, thyroid disease, heart disease, hypertension, dyslipidemia, chronic kidney disease, etc.,
- Patients without any history of previous psychiatric illness.
- Any other psychiatric comorbidity or psychoactive substance use.

Study Type: Cross-sectional study

Instrument Used:
- Beck depression inventory (BDI).
- Perceived stress scale (PSS).

A specially designed semi-structured proforma was used to collect socio-demographic, illness-related variables.

Data Collection:
- Patients were first screened from the out-patient department to satisfy the Inclusion criteria and exclusion criteria.
- After taking the consent from patients they were then brought to a separate room to answer the questionnaires. Those without recent FBS , PPBS and HbA1c values were excluded at this stage.
- The general proforma was used, consisting of the initial demographic details like age, address, occupation, income and information on treatment, weight, height and blood pressure and investigations like FBS, PPBS, HbA1c, Lipid profile, creatinine and urine albumin done over the previous month.
- Patients were then made to answer the perceived stress scale, the becks depressive inventory.

- The interview was ended by giving feedback to the patient. The treating clinician was informed in case of significant depressive symptoms being present.

Scales Used:
- Beck Depression Inventory score questionnaire:
- Perceived stress scale (PSS).

RESULTS AND DISCUSSIONS

The mean age was 47.12±12.52 years with a range of 30-65 years old. Female predominance was observed as 65% in the study. Most of them were married (79%) and mainly employed (62%). The mean level of education was 9.5±5.5 years. Seven percent of patients had not received formal education or were illiterate. The mean body mass index was 27.5±5.5with a range of 18-39. The average glucose FBS (mg/dl) level was 179.5±5.5 mg/dL, with a range of 82-500 mg/dL. The mean systolic BP was 122.5±14.2 (range 90-180) and the corresponding average diastolic BP was 82.5±10.5 (range 60-125). Majority of the patients (78%) in our study were having family history of type-2 diabetes. Most of the patients (71%) were observed to be overweight having BMI >25. Fasting blood sugar was observed to be >125mg/dl in majority of the patients (70%). Duration of diabetes and treatment was 5-10 years in majority of the patients (52%) and (58%) respectively. Majority of the patients (60%) were on oral medication.

Correlation Analysis: Based on Pearson's correlation between depression and demographic parameters, it is observed that only age and marital status are found to be significantly associated with high BDI-II scores. The mean HbA1c was 7.8±1.6 (range 7.1-8.2), mean LDL-C was 111.5±34.7, mean TG was 1.6±1.5 (mmol/L), and mean HDL-C was 1.5±0.4 (mmol/L). There were 128 participants (32%) with high scores and 12 (3%) with very high scores. The 192 participants(48%) have average score.

Depression can be viewed as a modifiable independent risk factor for developing type 2 diabetes mellitus and the progression of complications from type 2 diabetes. When these conditions co-exist, the risk of developing comorbidities, complications, patient suffering and associate cost escalates. Some studies have been conducted in India to study the Prevalence of depression among type 2 diabetes in the past. In our study, four hundred DMT2 patients were questioned for the presence of depression symptoms using the Beck Depression Inventory (BDI-II) scale and PSS. Our study found that the higher Prevalence is in the 51-60 age group., the total mean age we observed as 47.12 ±12.52 years with a range of 30-65. Study results correlate with the previous study. Our study showed 267 cases out of 400 patients who had depression(67%). In our research, most potential cases of depression (n=134., 33.5%) were in the age group 51-60 years. In our study, based on the BDI score, most potential cases of depression (n=134., 33.5%) were in the age group 51-60 years. Out of 248 males, 169 were possible causes of depression, whereas out of 152 females, 100 were potential cases of depression. The majority of married patients (232 out of 316) were potential cases of depression.

Our study results correlate with the previous study of Nichols[9] showed an increased prevalence of depression among type 2 diabetic women than type 2 diabetic men. Our study observed 36 out of 48(75%) patients having fasting blood sugar (FBS) ≤110 to be potential cases of depression, 78 out of 72 (66.66%) patients having fasting blood sugar (FBS) in the range 110-125 to be potential cases of depression. Our study observed 185 out of 280 (66.08%) patients having fasting blood sugar (FBS) ≥125 to be potential cases of depression. We observed 69 out of 152 (45.39%) patients having a duration of diabetes less than 5 years to be potential cases of depression. 164 out of 208 (78.85%) patients having a duration of diabetes in the range 5-10 years were observed to be potential cases of depression. 36 out of 40 (90%) patients having a duration of diabetes more than ten years were observed potential cases of depression. 180 out of 216 (83.3%) patients having a duration of treatment in the range 5-10 years were observed potential cases of depression. In our study, 144 out of 240 (60%) patients undergoing oral treatment., 88 out of 112 (78.56%) patients undergoing injectable treatment were observed to be potential cases of depression. In this study, depression showed that age is an independent factor. According to a previous report that showed a significant association between age and depression and other psychological disorders. This may be due to more isolation in older age that may lead to the development of psychological conditions. In our study, among 400 participants included in the study, the clinically defined depression prevalence (BDI ≥16) and the BDI-II score was found to be 67%. The current study findings show that the PSS-10 is a reliable and valid instrument for assessing perceived stress among diabetic patients. In our study, PSS scores ranged from 1-25., there were 128 participants (32%) with high scores and 12 (3%) with very high scores. Overall, stress was observed in 83% among the 400 population. In our study, the prevalence of stress and depression was estimated at 83% and 67%, respectively. Two of the other studies have analyzed the prevalence of depression in people with diabetes in Kerman and did not report anxiety prevalence. Those results were published in a systematic review study. Physical activity is known to promote the feeling of well-being and reduce stress. Several reasonable mechanisms for how physical inactivity affects mental well-being have been proposed.

Table1. Distribution of Cases According to Disease-Related Variables in DM.

Characteristics			Number	Percent	P value
Cigarette Smoking (Dependency)	Yes		144	36	<0.001
	No		256	64	
Alcohol Abuse/Dependency	Yes		104	26	<0.001
	No		296	74	
Insulin Use	Yes		104	26	<0.001
	No		296	74.0	
High FBS Level (mg/dl)	Yes		340	85	<0.001
	No		60	15	
High LDL-C (mmol/L)	Yes		80	20	<0.001
	No		320	80	
Low HDL-C (mmol/L)	Yes		52	13	<0.001
	No		348	87	
High TG (mmol/L)	Yes		316	79	<0.001
	No		84	21	
HbA1c	Yes		336	84	<0.001
	No		64	16	
Hypertension	Yes		156	39	<0.001
	No		244	61	
Depression With depression	268		67	0.04	
Without depression	132		33		
Complications	Yes		16	4	<0.001
	No		384	96	
Physical Activity	Yes		172	43	0.158
	No		228	57	

Table 2.Distribution of Cases According to Beck's Depression Inventory

Beck's depression inventory	Score	Number	Percentage
Minimal	1-10	92	23
Mild	11-16	40	10.00
Borderline	17-20	80	20
Moderate	21-30	160	40
Severe	≥31	28	7

Table 3.Perceived Stress Levels of Persons with Diabetes Mellitus Type 2

PSS-category	Score	Number	Percentage
Very low	0-7	4	1
Low	8-11	64	16
Average	12-15	192	48
High	16-20	128	32
Very high	21-40	12	3

Table 4. Association Between Diseases Related Variables and Depression

Variables		Number of patients (%)					
Family history	%	Minim al Depression	Mild Depression	Borderline Depression	Moderate Depression	Severe Depression	p-value
Yes	320(80%)	76 (23.75)	24 (7.50)	64 (20.00)	132 (41.25)	24 (7.50)	<0.001
No	80(20%)	16 (20.00)	16 (20.00)	16 (20.00)	28 (35.00)	4 (5.00)	<0.001
BMI (kg/m2)							
≤25	116(29%)	16 (13.79)	12 (10.34)	32 (27.59)	56 (48.28)	0 (0.00)	<0.001
25-30	200(50%)	48 (24.00)	16 (8.00)	36 (18.00)	76 (38.00)	24 (12.00)	<0.001
>30	84(21%)	28 (33.34)	7 (8.34)	8 (9.52)	28 (33.34)	13 (15.47)	<0.001
FBS (mg/dl)							
≤110	48(12%)	12 (25.00)	0 (0.00)	0 (0.00)	32 (66.67)	4 (8.34)	<0.001
110-125	72(18%)	20 (27.78)	4 (5.56)	12 (16.65)	28 (38.89)	8 (11.12)	<0.001
>125	280(70%)	59 (21.07)	36 (12.86)	68 (24.29)	100 (35.72)	17 (6.071)	<0.001
HbA1c (%)							
<7	152(38%)	40 (26.32)	16 (10.53)	8 (5.26)	64 (42.11)	8 (5.27)	0.025
≥7	248(62%)	52 (20.97)	24 (9.68)	56 (22.58)	96 (38.71)	20 (8.06)	0.032
DoD (years)							
>5	152(38%)	60 (39.48)	23 (15.13)	28 (18.42)	28 (18.42)	13 (8.55)	<0.001
5-10	208(52%)	28 (13.47)	16 (7.70)	48 (23.08)	112 (53.84)	4 (1.93)	<0.001
>10	40(10%)	4(10.00)	0 (0.00)	4(10.00)	20 (50.00)	12 (30.00)	<0.001
DoT (years)							
>5	168(42%)	68 (40.48)	24 (14.29)	32 (19.04)	32 (19.04)	12 (7.14)	<0.001
5-10	216(54%)	20 (9.259)	416(7.41)	48 (22.23)	124 (57.41)	8 (3.71)	<0.001
>10	16(4%)	4 (25.00)	0 (0.00)	0 (0.00)	4 (25.00)	8 (50.00)	<0.001
Medication							
Oral	240(60%)	64 (26.67)	32 (13.33)	44 (18.34)	88 (36.67)	12 (5.00)	<0.001
Injection	112(28%)	20 (17.86)	4 (3.59)	33 (29.46)	52 (46.43)	3 (2.67)	<0.001
Oral+Injection	48(12%)	8 (16.67)	4 (8.33)	4 (8.33)	20 (41.67)	12 (25.00)	<0.001

CONCLUSION

67% of depression and 83% of stress were observed in the studied DMT2 population. 7% illiterates, hence our study results showed the association of low education and depression. The study confirmed the association of diabetes with both depression and stress. In PSS scores, there were 128 participants (32%) with high scores and 12 (3%) with very high scores,192(48%) participants are moderate score. Nearly 83% of the participants with DM seen at our diabetic center in the general medicine department had stress levels. This indicates the need for counseling and psychological

care at diabetes centers and people with diabetes in general.

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