ORIGINAL ARTICLE

Prevalence of Depression among Patients with Type-1 and Type-2 Diabetes Mellitus

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ABSTRACT

The diabetic patients are more likely to experience depression. The study's objective was to determine the depression prevalence in newly diagnosed patients with type-I (T1DM) and type-II (T2DM) diabetes, as well as the relationship between these symptoms and several independent clinical and sociodemographic variables.

Place and Duration: Study took place in the Department of Endocrinology and metabolism in Services Hospital Lahore, Pakistan for six months of duration from January 2017 to June 2017.

Methods: A total of 320 patients included in the study, including two control groups of 180 people without diabetes and 75 patients in each group with T1DM and T2DM. The clinical, biochemical and sociodemographic characteristics of the patients were assessed and Beck Depression Inventory (BDI) was used to assess the symptoms of depression among patients. The association between the scores of BDI and independent factors such age, sex, mean arterial pressure, diabetes duration, BMI, diabetic complications and HbA1c level were assessed in the logistic regression analysis.

Results: Compared to controls, females and males with T1DM and T2DM had significantly higher mean BDI scores. Females had depression symptoms more frequently than males diagnosed with diabetes mellitus. Patients with T1DM reported depressive symptoms among 20% of females and 5.7% of males, whereas those with T2DM have depression among 40.6% of women and 23.2% of men. The depression increased with age in patients with T1DM and T2DM, their HbA1c level rises, and they experience more complications. Women with T2DM also have a three-fold high risk of developing depressive symptoms than males.

Conclusion: In conclusion, diabetic patients are more likely to experience depression in comparison to non-diabetics. 13.3% of T1DM patients and 30.7% of the T2DM patients having depressive symptoms. HbA1c level, age and the occurrence of comorbidities all raise the risk of depression in both T1DM and T2DM, and in T2DM depression is gender -specific.

Keywords: Depressive symptoms, Beck Depression Inventory, type I and type II diabetes mellitus.

INTRODUCTION

The most prevalent chronic disease in advanced countries is diabetes. According to estimates, more than 2.33 million peoples have been diagnosed with diabetes, including 2.15 million T2DM patients and 1.8 million with type-I diabetes (T1DM)[1-2]. According to the studies, diabetic patients experienced depression more frequently than people without the disease. According to Anderson et al published meta-analysis, patients with Type-I and Type II diabetes had a depression incidence two-folds in comparison to non-diabetics[3-4]. The maximum of the researches has demonstrated the incidence of depression in T2DM patients. Depending on the assessed countries, depression rates varied in T2DM patients. In Pakistan, T2DM patients had a depression prevalence of 41%, and this prevalence increases with age, the presence of comorbidities, and poorer glycemic control[5]. According to studies conducted in China, depression affects one in three T2DM patients. It also occurs more frequently in persons lives alone, have less social support, have inadequate health insurance, have longer disease duration, have more comorbidities, and have higher BMIs. 8% of T2DM patients in Finland showed signs of depression[6-7]. These symptoms became more severe when somatic diseases appeared and when there is loneliness and low physical activity. Studies on the T2DM population in Brazil have shown that coexistence of depression occurs in 1/3rd of patients and in another study in nearly every fifth patient have increased levels of HbA1c[8-9]. Almost 30% of T2DM patients from two hospitals in study held in Turkey exhibited depression[10]. Female sex, less exercise, lower level of education, prior major depressive disorder and higher levels of diabetes distress were all related with major depressive disorder[11-12]. The study's objective was to determine the depression prevalence in newly diagnosed patients with type-I (T1DM) and type-II (T2DM) diabetes, as well as the relationship between these symptoms and several independent clinical and sociodemographic variables.

METHODS

This study was held in the Department of Endocrinology and Metabolism in Services Hospital Lahore, Pakistan for six months of duration from January 2017 to June 2017 .

A total of 320 persons included in the study, including two control groups of 180 people without diabetes and 75 patients in each group with T1DM and T2DM. The patients diagnosed within one year of Type-I and Type-II DM was the inclusion criterion for the study. Patients who had inflammatory disorders , diagnosed depression, gestational diabetes, cancer, endocrine gland diseases, or alcoholics, on immunosuppressive medications, psychotropic medications, glucocorticoids and anti-inflammatory medications were not included in the study. The management of T1DM involved insulin therapy and dietary and life style modification and for T2DM it involved dietary and life style modification, oral hypoglycemic agents , insulin and GLP1 agonist . The patients in the control groups have no comorbidities and were taken as control. All patients who participated in the study has given written informed consent and study approval was taken from the Hospital Ethical Committee.

Blood fasting glucose and HbA1c levels, systolic and diastolic blood pressure were measured in all subjects. The biochemical, clinical and sociodemographic characteristics of the patients were assessed. Beck Depression Inventory (BDI) a screening tool was used to assess the symptoms of depression among patients.

The scale has 21 items with scores varies from 0 to 3, with high scores denoting more severe symptoms. The BDI results range from 0 to 63 scores. The cutoff point for diagnosing depression was ≥16 scores. The BDI is a validated and standardized questionnaire with a high reliability index (0.92-0.93 of Cronbach's α coefficient) that is frequently used in assessment of mood disorders.

The Statistica 10.0 Stat-Soft program was applied for statistical controls. The Student's t-test was applied to analyse the quantitative variables, and the Mann-Whitney U-test was applied

when none of the variables met the requirements of the parametric model (homogeneity of variances and normality of distribution). Several tests were applied for the assessment of qualitative variables: chi-square with Yates correction, chi-square and Fisher test. The association between the scores of BDI and independent factors such age, sex, mean arterial pressure, diabetes duration, BMI, diabetic complications and HbA1c level were assessed in the logistic regression analysis. The $P<0.05$ was considered as significant.

RESULTS

Patients with T1DM ranged in age from 27.3 ± 6.9 years for males and 29.4 ± 9.8 years for females (mean SD). Men and women in the T2DM group range in age from 55.2 ± 8.9 years and 52.9 ± 10.2 years, respectively. Males and females with ages 27.3 ± 6.9 and 28.6 ± 7.1, respectively, served as controls for T1DM, whereas males and females with ages 50.2 ± 6.2 and 48.1 ± 7.6, respectively, served as controls for T2DM. Both males and females who had T2DM were elder than the control groups (p <0.05–0.01) (Tables-I and II).

Table-1: shows the Biochemical, Sociodemographic and Clinical features of Type-I diabetic patients

Parameters	Patients with Type 1 Diabetes and Control					
	Female			Male		
	Diabetics (N=40)	Controls (N=37)	P-Value	Diabetics (N=35)	Controls (N=53)	P-Value
Age in years	29.4±9.8	28.6±7.1		27.3±6.9	30.1±7.8	
Education: Primary/ Secondary/Higher	10/18/12	15/18/8		14/15/11	25/12/16	
BMI (kg/m2)	25.1±2.5	20.2±1.6	<0.001	28.1±4.2	24.1±1.1	<0.001
Diabetes duration (years)	1.56±1.18	-		1.66±1.39		
Smoking: Never/ Past/ Present	25/5/10	30/4/6		4/6/25	38/6/9	
Systolic blood pressure (mmHg)	128.1±11.2	119.3±1.6	<0.01	129.5±10.2	117.4±3.2	<0.05
Diastolic blood pressure (mmHg)	82.5±10.2	66.1±3.2	<0.001	88.4±9.5	63.1±4.2	<0.001
Diabetic Complications: nephropathy, retinopathy, diabetic foot, polyneuropathy	2/10/6/4	-	-	5/12/6/2	-	-
Comorbidities: HTN/CAD/ Heart failure	15/3/9	-	-	22/4/5	-	-
Drug: Oral antidiabetic/ Insulin/ antihypertensive/ statins	18/38/32/2			22/39/30/10		
HbA1c (%)	7.88±0.84	-	-	6.55±1.1	-	-
Blood sugar fasting (mg/dL)	126.4±28.4	80.4±2.6	<0.001	128.9±29.2	88.1±3.6	<0.001

Table-2: shows the Biochemical, Sociodemographic and Clinical features of Type-II diabetic patients

Parameter	Patients with Type-II Diabetes and Control					
	Female			Male		
	Diabetics N=32)	Controls N=50)	P-Value	Diabetics N=43)	Controls N=40)	P-Value
Age in years	52.9±10.2	48.1±7.6	<0.05	55.2±8.9	50.2±6.2	<0.01
Education: Primary/ Secondary/Higher	20/7/5	32/12/6	<0.001	26/11/5	15/19/6	<0.01
BMI (kg/m2)	30.2±4.1	22.4±2.2	<0.001	31.5±3.9	22.9±2.8	<0.001
Diabetes duration (years)	10.30± 5.42	-	-	11.01±8.40	-	-
Smoking: Never/ Past/ Present	26/3/4	38/8/4	-	5/10/28	29/5/6	-
Systolic blood pressure (mmHg)	134.1±11.8	120.6±6.2	<0.001	131.0±20.9	122.4±4.4	<0.001
Diastolic blood pressure (mmHg)	85.5±8.8	67.2±5.3	<0.001	82.5±14.1	62.9±6.4	<0.001
Diabetic Complications: nephropathy, retinopathy, diabetic foot, polyneuropathy	5/18/8/2	-	-	6/30/9/5	-	-
Comorbid condition: HTN/CAD/ Heart failure	20/10/3	-	-	25/15/9	-	-
Drug: Oral antidiabetic/ Insulin/ antihypertensive/ statins	25/29/30/16	-	-	34/39/40/28	-	-
HbA1c (%)	7.02±1.14	-	-	7.95±1.98	-	-
Blood sugar fasting (mg/dL)	132.4±15.5	80.2±4.2	<0.001	125.4±22.8	82.1±3.2	<0.001

Table-3: shows the prevalence of depression among diabetic patients and control group

Parameter	Type 1 Diabetics and Control					
	Female			Male		
	Diabetics (N=40)	Controls (N=37)	P-Value	Diabetics (N=35)	Controls (N=53)	P-Value
BDI (score) (mean ±SD)	7.9±9.2	3.1±2.9	<0.001	6.4±5.8	4.2±2.4	<0.001
Depression (BDI≥16) [n (%)]	8(20)	2(5.4)	<0.01	2(5.7)	1(1.9)	<0.01
Without depression (BDI	32(80)	35(94.6)		33(94.3)	52(98.1)	
Parameter	Type 1I Diabetics and Controls					
	Female			Male		
	Diabetics N=32)	Controls N=50)	P-Value	Diabetics N=43)	Controls N=40)	P-Value
BDI (score) (mean ±SD)	13.1±7.9	4.1±3.8	<0.001	10.2±8.2	3.1±2.4	<0.001
Depression (BDI≥16) [n (%)]	13(40.6)	2(4)	<0.001	10(23.2)	1(2.5)	<0.001
Without depression (BDI	19(59.4)	48(96)		33(76.8)	39(97.5)	

Table-4: shows the prevalence of depressive symptoms among Type-I diabetic patients and control group

Parameter	Score	Patients with Type 1 Diabetes and Control					
		Female			Male		
		Diabetics (N=40)	Controls (N=37)	P-Value	Diabetics (N=35)	Controls (N=53)	P-Value
Pessimism	0	24(60)	34(91.9)	<0.06	15(42.9)	47(88.7)	<0.05
	1–3	16(40)	3(8.1)		20(57.1)	6(11.3)	
Sadness	0	27(67.5)	30(81.1)	<0.04	18(51.4)	48(90.6)	
	1–3	13(32.5)	7(18.9)		17(48.6)	5(9.4)	
Loss of pleasure	0	30(75)	35(94.6)		26(74.3)	49(92.4)	
	1–3	10(25)	2(5.4)		9(25.7)	4(7.5)	
Past failure	0	28(70)	33(89.2)		28(80)	50(94.3)	
	1–3	12(30)	4(10.8)		7(20)	3(5.6)	
Punishment feeling	0	34(85)	36(97.3)		20(57.1)	45(84.9)	
	1–3	6(15)	1(2.7)		15(42.9)	8(15.1)	
Guilty feeling	0	27(67.5)	35(94.6)		24(68.6)	44(83.1)	
	1–3	13(32.5)	2(5.4)		11(31.4)	9(16.9)	
Self-criticalness	0	32(80)	33(89.1)		23(65.7)	43(81.1)	
	1–3	8(20)	4(10.9)		12(34.3)	10(18.8)	
Self-dislike	0	30(75)	31(83.8)		21(60)	49(92.5)	
	1–3	10(25)	6(16.2)		14(40)	4(7.5)	

Parameter	Score	Female			Male		
		Diabetics	Controls	P-Value	Diabetics	Controls	P-Value
Crying	0	35(87.5)	36(97.3)		30(85.7)	50(94.3)	
	1–3	5(12.5)	1(2.7)		5(14.3)	3(5.7)	
Suicidal thoughts	0	36(90)	36(97.3)		26(74.3)	51(96.2)	
	1–3	4(10)	1(2.7)		9(25.7)	2(3.8)	
Loss of interest	0	29(72.5)	35(94.6)	<0.02	18(51.4)	42(79.2)	
	1–3	11(27.5)	2(5.4)		17(48.6)	11(20.7)	
Agitation	0	25(62.5)	30(81.1)	<0.04	15(42.9)	40(75.4)	
	1–3	15(37.5)	7(18.9)		20(57.1)	13(24.6)	
Worthlessness	0	28(70)	32(86.4)	<0.04	20(57.1)	42(79.2)	
	1–3	12(30)	5(13.6)		15(42.9)	11(20.7)	
Indecisiveness	0	27(67.5)	31(83.7)	<0.02	29(82.9)	45(84.9)	
	1–3	13(32.4)	6(16.3)		6(17.1)	8(15.1)	
Changes in sleeping pattern	0	32(70)	28(75.7)		21(60)	40(75.5)	
	1–3	8(30)	9(24.3)		14(40)	13(24.5)	
Loss of energy	0	25(62.5)	27(72.9)		22(62.8)	43(81.1)	<0.05
	1–3	15(37.5)	10(27.1)		13(37.2)	10(18.9)	
Changes in appetite	0	29(72.5)	29(78.4)		15(42.9)	49(92.5)	<0.05
	1–3	11(27.5)	8(21.6)		20(57.1)	4(7.5)	
Irritability	0	22(55)	34(91.8)	<0.02	19(54.2)	50(94.3)	<0.05
	1–3	18(45)	3(8.2)		16(45.8)	3(5.6)	
Tiredness or fatigue	0	14(35)	30(81.1)		20(57.1)	38(71.6)	
	1–3	26(65)	7(18.9)		15(42.9)	15(28.3)	
Concentration difficulty	0	24(60)	28(75.7)		22(62.8)	35(66.1)	
	1–3	16(30)	9(24.4)		13(37.2)	18(33.9)	
Loss of interest in sex	0	12(30)	34(91.9)		21(60)	45(84.9)	
	1–3	28(70)	3(8.1)		14(40)	8(15.1)	

Table-5: shows the prevalence of depressive symptoms among Type-II diabetic patients and control group

Parameter	Score	Patients with Type 2 Diabetes and Control					
		Female			Male		
		Diabetics N=32)	Controls N=50)	P-Value	Diabetics N=43)	Controls N=40)	P-Value
Pessimism	0	18(56.3)	48(96)	<0.001	30(69.9)	39(97.5)	<0.001
	1–3	14(43.7)	2(4)		13(30.1)	1(2.5)	
Sadness	0	20(62.5)	45(90)	<0.001	35(81.4)	35(87.5)	<0.001
	1–3	12(37.5)	5(10)		8(18.6)	5(12.5)	
Loss of pleasure	0	15(46.8)	42(84)	<0.001	33(76.7)	33(82.5)	<0.001
	1–3	17(53.2)	8(16)		10(23.3)	7(17.5)	
Past failure	0	14(43.7)	43(83)	<0.001	32(74.4)	34(85)	<0.001
	1–3	18(56.3)	7(14)		11(25.6)	6(15)	
Punishment feeling	0	17(53.2)	44(88)	-	30(69.9)	38(95)	<0.001
	1–3	15(46.8)	6(12)		13(30.1)	2(5)	
Guilty feeling	0	20(62.5)	45(90)	-	35(81.4)	36(90)	<0.005
	1–3	12(37.5)	5(10)		8(18.6)	4(10)	
Self-criticalness	0	20(62.5)	42(84)	<0.001	36(83.7)	37(92.5)	<0.001
	1–3	12(37.5)	8(16)		7(16.3)	3(7.5)	
Self-dislike	0	14(43.7)	46(92)	-	38(88.4)	35(87.5)	-
	1–3	18(56.3)	4(8)		4(9.3)	5(12.5)	
Crying	0	25(78.2)	48(96)	<0.005	30(69.9)	39(97.5)	<0.001
	1–3	7(21.8)	2(4)		13(30.1)	1(2.5)	
Suicidal thoughts	0	20(62.5)	47(94)	-	29(67.4)	38(95)	-
	1–3	12(37.5)	3(6)		14(32.6)	2(5)	
Loss of interest	0	22(68.8)	40(80)	<0.001	28(65.1)	37(92.5)	<0.001
	1–3	10(31.2)	10(20)		15(34.9)	3(7.5)	
Agitation	0	21(65.7)	42(84)	<0.001	25(58.1)	36(90)	<0.001
	1–3	11(34.3)	8(16)		18(41.9)	4(10)	
Worthlessness	0	23(71.9)	41(82)	-	26(60.5)	38(56.3)	<0.001
	1–3	9(28.1)	9(18)		17(39.5)	2(56.3)	
Indecisiveness	0	18(56.3)	40(80)	<0.001	24(55.8)	38(95)	<0.001
	1–3	14(43.7)	10(20)		19(44.2)	2(5)	
Changes in sleeping pattern	0	19(59.4)	38(76)	<0.001	20(46.5)	30(75)	<0.001
	1–3	13(40.6)	12(24)		23(53.5)	10(25)	
Loss of energy	0	17(53.2)	41(56.3)	<0.001	25(58.1)	32(80)	<0.001
	1–3	15(46.8)	9(56.3)		18(41.9)	8(20)	
Changes in appetite	0	16(50)	40(56.3)	<0.005	22(51.2)	31(77.5)	<0.005
	1–3	16(50)	10(56.3)		21(48.8)	9(22.5)	
Irritability	0	19(59.4)	48(56.3)	<0.001	38(88.4)	34(85)	-
	1–3	13(40.6)	2(56.3)		5(11.6)	6(15)	
Tiredness or fatigue	0	20(62.5)	43(56.3)	-	25(58.1)	29(72.5)	<0.001
	1–3	12(37.5)	7(56.3)		18(41.9)	11(27.5)	
Concentration difficulty	0	18(56.3)	42(56.3)		32(74.4)	36(90)	<0.001
	1–3	14(43.7)	8(56.3)		11(25.6)	4(10)	
Loss of interest in sex	0	22(68.8)	44		35(81.4)	37(92.5)	<0.001
	1–3	10(31.2)	6(56.3)		8(18.6)	3(7.5)	

In comparison to the control groups, males and females with Type-I and Type-II DM had significantly higher mean BDI scores (p 0.001; Table 3). In T1DM and T2DM, the BDI mean score for both men and women was 7, respectively. Diabetic patients had a considerably higher incidence of depression symptoms than control subjects, as measured by a BDI score of 16 (P<0.01–0.001).

The symptoms of depression were more prevalent in females than in males among diabetic patients (Table 3). 17.5% of females and 8.6% of males who had T1DM reported having depressive symptoms, while 29.1% of females and 20.1% of males who had T2DM reported having depressive symptoms.

Women with T1DM were more substantially to experience depression, agitation, pessimism, indecisiveness, lack of interest, irritability, worthlessness, lack of interest in intercourse and tiredness in comparison to the control group (P<0.05–0.001; Table 4).

Pessimism, irritability, lack of energy, exhaustion, appetite changes or fatigue were more commonly seen in the T1DM-affected males in the study than in the control men (Tables 4 and 5). Symptoms like pessimism, sadness, loss of pleasure, past

failures, lack of interest, crying, self-criticism, sleeping pattern changes, agitation, lack of energy, indecision, irritability, fatigue or tiredness, lack of interest in intercourse and changes in appetite were more frequently reported by females with T2DM than by women in the control group (p <0.05-0.001). (Table 5).

DISCUSSION

In this analysis, we demonstrated that individuals with Type-I and Type-II DM had considerably higher incidence and high severity of depressed symptoms than non-diabetic individuals. In both Type-I and Type-II DM, patients with T2DM had higher BDI scores than patients with T1DM, and women had higher BDI scores than males[13-14]. Other investigators that focused on the variations in values of BDI between healthy controls and diabetic patients came to similar conclusions. The BDI mean score was greater in T1DM patients than in non-diabetic controls, and roughly 20% of these patients used antidepressants in T1DM group but one in every eleven respondents reported using an antidepressant in control group. In comparison to non-diabetic controls, patients with T2DM also had higher BDI scores[15]. In our study, the mean BDI score for patients with T2DM was 11.5, but in previous studies, it was 9.5, 10.6, 12.6 or even 19.8. Depressive symptoms such indecisiveness, lack of interest, fatigue, tiredness, irritability and lack of interest in intercourse is more common in females and fatigue or tiredness is much common in males, were more prevalent symptoms in T1DM patients in comparison to control group[16].

On the other hand, there were significantly more depressive symptoms in T2DM patients when compared to the control group[17-18]. These symptoms included sadness, past failure, punishment or guilt feelings, crying, lack of interest, pessimism, agitation, worthlessness, indecision, sleeping patterns variations, loss of pleasure, appetite changes, self-dislike, lack of energy, irritability, loss of interest in sex and fatigue or tiredness in females[19-20]. One study in T2DM patients with concomitant chronic renal disease indicated that some of the depression symptoms such as sleep pattern disturbance, loss of energy, lack of interest in intercourse and fatigue or tiredness can occur more frequently[21-22].

The difference in the depressive symptoms incidence between patients with T1DM and those with T2DM in this analysis may be primarily associated with the patient age being studied (patients with Type-I DM had a mean age below 20 years and those with Type-II DM had a mean age over 50 years), the length of the diabetes (lengthier in Type-II DM), the incidence of complications in DM(in T2DM, the diabetic complications ratio was approximately 2 times greater than in Type-I DM), and the Sweileh et al and Mäntyselkä et al proposed the correlation of depressed symptoms with Type-II DM accompanying chronic somatic disorders[23-25].

CONCLUSION

In conclusion, diabetic patients are more likely to experience depression in comparison to non-diabetics. 13.3% of T1DM patients and 30.7% of the T2DM patients having depressive symptoms. HbA1c level, age and the occurrence of comorbidities all raise the risk of depression in both T1DM and T2DM, and in T2DM depression is gender -specific.

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