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Estimate the Prevalence of Depression in Type 2 Diabetes Patients

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ABSTRACT

Background: Diabetes is a chronic disease characterized by high blood sugar levels, resulting from insulin resistance and the destruction of pancreatic beta cells. This disease is associated with several serious complications that are sometimes life-threatening to patients. One of these complications is that it can depression accompanies patients with type 2 diabetes, as it is a Major Depressive Disorder (MDD), and the most important symptoms are social isolation, sleep disturbances, lack of appetite, loss of desire, and passion for daily activities. Opinions differed about the origin of the emergence of this psychological disorder in terms of the involvement of multiple factors, including internal, and some of them are external to causing this disorder. In this study, we will shed light on one of the complications associated with diabetes, which is depression. Method and Results: This cross-sectional study included the selection of 128 individuals diagnosed with type 2 diabetes from the Diabetes and Endocrinology Center located in Najaf, Iraq from August 2023 to October 2023. The study included 43 men and 85 women. The ages of the participants ranged from 30 to 75 years. Patients were randomly selected during their visit to the center. Results: 31(24.2%) individuals did not manifest any symptoms of depression 75.78% suffered from depression, most of the depressed people were women, and the difference between the sexes was statistically significant p-value (0. 002).

Conclusion; Our study highlights a striking connection between type 2 diabetes and depression, with a significantly higher incidence of depression in diabetic patients. Additionally, the fact that females are more likely to suffer from depression compared to males also calls for further research into other factors that could potentially exacerbate mental health issues in type 2 diabetes women. Keywords: Diabetes Mellitus, Insulin Resistance, Depression.

Article Information

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INTRUDUCTION

Diabetes is defined, according to the World Health Organization, as high levels of blood glucose resulting in long-term harm to the heart, blood vessels, eyes, kidneys, and nerves.

More than 90% of instances of diabetes mellitus are classified as type 2 diabetes mellitus (T2DM), which is a medical disorder insufficient release of insulin by the β -cells in the pancreatic islets, together with the presence of tissue insulin resistance (IR) and inadequate insulin secretion. The compensatory insulin secretory response is insufficient^(1,2,3). T2DM was initially characterized as a constituent of metabolic syndrome in the year 1988. Previously referred to as non-insulin-dependent

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DM, is the prevailing manifestation of DM. T2DM arises due to the interplay of many risk factors, including genetic predisposition, environmental influences, and behavioral variables⁽⁴⁾.

The prognosis for patients with both depression and T2DM is worse than for patients with either illness alone. Comorbid depression and T2DM are associated with a higher risk of complications and death⁽⁵⁾. These Two disorders are associated, with depression serving as a risk factor for diabetes and diabetes serving as a risk factor for depression in the future⁽⁶⁾. There are substantial health and financial consequences associated with both MDD and T2DM, and estimates show increased expenses in both highand low-income nations⁽⁷⁾. More commonly than would be predicted by chance, people with T2DM and depression share a common etiology, which is generally thought to be either shared genetic or environmental factors. Numerous population-based studies have conclusively demonstrated that individuals diagnosed with type 2 diabetes exhibit higher rates of both depression prevalence and incidence when compared to individuals without diabetes⁽⁸⁾. Diabetes and depressive disorders are connected, both of which are quite common worldwide and contribute significantly to the global disease burden^(9,10).

Major depressive disorder (MDD) is a psychiatric condition defined by a profound feeling of melancholy, encompassing a range of symptoms influenced by factors such as biochemical, environmental, genetic, and other related factors .Various psychological issues can impede an individual's capacity to engage in productive work. Problems in sleeping, studying, eating, and deriving pleasure from previously enjoyable activities ^(11, 12, 13).

MDD is influenced by several factors, and there exists a diversity of perspectives on the nomenclature and categorization of these causal elements. Depression can be attributed to two distinct categories of variables: endogenous factors, which involve internal inflammatory reactions or abnormalities in nerve transmission. and external factors. encompassing stressors related to daily life, loss, and related circumstances⁽¹³⁾. The etiology and pathophysiology of MDD are associated with a range of factors, such as psychological stress, immunological activation, changes in opioids, endogenous and genetic predisposition⁽¹⁴⁾.

Study design

This is a cross-sectional study that included the selection of 128 individuals diagnosed with type 2 diabetes from the Diabetes and Endocrinology Center located in Najaf, Iraq from August 2023 to October 2023.

METHODS

In this study, informed consent was obtained directly from the patients. In addition, participants underwent depression screening using the Hamilton Depression Scale. This scale consists of multiple-choice questions, with each question having a specific score. At the end of the test, each patient's final score was calculated to determine if they suffer from depression and the severity of their depression, and a comprehensive interview was conducted with each patient. The study included 43 men and 85 women. The ages of the participants ranged from 30 to 75 years. Patients were randomly selected during their visit to the center.

Inclusion criteria: Patients with type 2 diabetes were diagnosed by performing basic tests to diagnose diabetes, such as fasting blood sugar and HbA1C, and confirming the diagnosis by the center's specialist.

Exclusion criteria: Type 1 diabetes patients, Pregnant women with gestational diabetes, and pre-diabetic patients.

RESULTS

The Hamilton Depression Rating Scale, a standardized instrument for assessing the severity of depression, was used to assess the depressive symptoms of 128 study participants. the study found a high prevalence of depression among patients with diabetes mellitus (DM), with over three-quarters (75.78%) experiencing symptoms,32 (33%) was detected to have mild depression, 33(34.02%) moderate, 17(17.52%) sever, and 15(15.46%) very severe depression. In contrast, a smaller proportion 31 (24.2%) did not report any depression.

Tab (2) below illustrates some of the main characteristics of the DM patients with and without depression, DM patients with depression had 30(30.9%) individuals under 50 vears old and 67(69.1%) individuals <50 years and older, while the DM patients without depression had 9(29.0%) individuals under 50 years old and 22(71.0%) individuals <50 years and more, the p-value was (0.516) indicating no statistically significant difference between the two groups. Similarly, the mean age of patients with and without depression did not differ significantly.

The mean age for those without depression was 53.70±9.93 years, and for those with depression, it was 53.64±8.90 years, with a pvalue of (0.975). Notably, women were more likely to be depressed than men, and this difference was statistically significant (pvalue=0.002).DM without depression 31 patients, 18(58.1%) were male and 13(41.9%)were female, DM with depression97 patients, male 25(28.5%), female 72(74.2%), There was no statistically significant difference in diabetes duration between the two groups.

The DM depressive group included 63 (64.9%) patients who had diabetes for less than 10 years, 26 (26.8%) patients who had diabetes for 10-15 years and 8(8.2%) patients with diabetes for 15 years or more. The non-depressive group had 14(45.2%) patients with diabetes for less than 10 years, 14(45.2%)

patients with diabetes for 10-15 years, and 3(9.7%) patients with diabetes for 15 years or more, the p-value was (0.128). The marital status of the participants did not show any significant difference between the two groups.

The depressive group had 29(93.5%) married patients and 2(6.5%) widows, the nondepressive group had 95(97.9%) married patients and 2(2.1%) widows, the p-value was (0.247). Our study revealed no significant association between educational level and depression among the participants. The nondepressive group had 21(67.7%) illiterate patients, 1(3.2%) patient who had completed primary school graduate, 4(12.9%) patients who had completed secondary school graduate, and 5(16.1%) patients who had higher education graduates. The depressive group had 67(75.3%)Illiterate patients, no patients who had completed primary school, 17(19.1%) patients who had completed secondary school, and 5(5.6%) patients who had completed higher education, the p-value was (0.086).

Outlines the mean routine screenings for type 2 diabetes. Diabetic patients without depression had a mean FBS of $(222.28\pm128.93 \text{ mg/dl})$, while those with depression had a mean FBS of $(211.25\pm102.28 \text{ mg/dl})$ with a p-value (0.687). The mean HbA1c of non-depressive patients was (8.52±3.10 mmol/dl), whereas those with depression had a mean of HbA1c (8.83±3.13 mmol/dl) with a p-value (0.741). However, the difference in these values between the two groups was not statistically significant.

This study found no significant link between a family history of diabetes and the risk of developing the disease. seven (22.6%) of the non-depressive group's individuals had a positive genetic component, whereas 24 (77.4%) had a negative one, of the participants in the depressed group, 22 (22.7%) had a positive genetic component and 75 (77.3%) had a negative genetic factor. The p-value found was (0.991). Additionally, there was no significant

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difference in the two groups' adherence to treatment. Of the individuals in the nondepressive group, 28 (90.3%) took their medication regularly, while 3 (9.7%) did not. Nine participants (9.3%) in the depressive group did not take their medication as prescribed, whereas 88 participants (90.7%) did. The obtained p-value was (0.594).

Diabetic Patients	
DM patients without depression	31 (24.2%)
DM patients with depression	97 (75.78%
Total	128
Hamilton Depression Rating Scale (HAM-D)	NO.
Mild depression	32(33%)
Moderate depression	33(34.02%
Severe depression	17(17.52%
Very severe depression	15(15.46%
Total	97

Table (1)	Classification	of the severity	y of depression	according to the	Hamilton scale.
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 Table (2): Comparison of Socio-demographic and clinical Parameters between diabetic patients

 with and without depression.

Patients' Sociodemographic characteristics		Depression		Total	Р	
		No	Yes	Total	value	
	Mean±SD		53.70±9.93	53.64±8.90	53.6641	0.975
Age group (Year)	50	Count	9	30	39	0.516
	<50	%	29.0%	30.9%	30.5%	
		Count	22	67	89	
	50 and more	%	71.0%	69.1%	69.5%	
		Count	18	25	43	0.002
	Male	%	58.1%	25.8%	33.6%	
Sex		Count	13	72	85	
	Female	%	41.9%	74.2%	66.4%	
	10	Count	14	63	77	
	<10	%	45.2%	64.9%	60.2%	0.128
		Count	14	26	40	
Onset of disease (years)	10-15	%	45.2%	26.8%	31.3%	
	15 and more	Count	3	8	11	
		%	9.7%	8.2%	8.6%	
		Count	29	95	124	0.247
Social	Married	%	93.5%	97.9%	96.9%	
	Widowed	Count	2	2	4	
		%	6.5%	2.1%	3.1%	
	Illiterate	Count	21	67	88	0.086
		%	67.7%	75.3%	73.3%	
	Primary school	Count	1	0	1	
Level of Education		%	3.2%	0.0%	0.8%	
	Secondary school	Count	4	17	21	
		%	12.9%	19.1%	17.5%	
	II: - h	Count	5	5	10	
	Higher	%	16.1%	5.6%	8.3%	
Family history	Negative	Count	24	75	99	0.991
		%	77.4%	77.3%	77.3%	
	Posative	Count %	7	22	29 22.7%	
	D 1	Count	28	88	116	0 594
Treatment	Kegular	%	90.3%	90.7%	90.6%	0.374
Traillelli	Unregular	Count	3	9	12	
	e e guitai	%	9.7%	9.3%	9.4%	

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Parameters	Mean ±SD			
	Non-depressive	Depressive	P value	
FBS mg\dl	222.28±128.93 (n=21)	211.25±102.28 (n=67)	0.687	
HbA1C mmol\dl	8.52±3.10 (n=15)	8.83±3.13 (n=38)	0.741	

 Table (3): Comparison of routine test value for diabetic Patients with and without depression.

DISCUSSION

The study's initial objectives were to determine the prevalence of depression among type 2 diabetic patients. So all study participants had their depression diagnosed using the Hamilton test, and it was revealed that 97 of type 2 diabetics, or over 75%, had depression in varying degrees, ranging from mild to moderate to severe and very severe, and 31 or 24.2% they do not experience depression, this study is in line with Das ⁽¹⁵⁾,Kawada⁽¹⁶⁾,Kalantari ⁽¹⁷⁾, Khaledi⁽¹⁸⁾, Wang⁽¹⁹⁾, a that have shown that people with type 2 diabetes are two or three times more likely than other people to experience depression. One such study suggests that patients with type 2 diabetes may be susceptible to several internal and environmental factors that might be responsible for this issue. Numerous investigations and perspectives on this subject have been conducted. Because the research populations were diverse and lived in varied environments, it is to be expected that the percentages would range from one study to the next. This is what Alajmani⁽²⁰⁾ demonstrated in his research and demonstrated the difference in the prevalence of depression among diabetic patients according to the environment and living conditions of the groups participating in the study.

Concerning age, the present study found the mean age of diabetics with depression (53.64 ± 8.90) was somewhat the same as the mean age of those without depression

(53.70 \pm 9.93). Additionally, a majority of depressed individuals in this study were 50 and over, and there was no statistically significant difference in this finding, the present results are consistent with Bruce ⁽²¹⁾, which demonstrated that there was no statistically significant difference between the two groups and that the average age of depressed individuals was lower than that of non-depressed individuals and contradict with Lloyd ⁽²²⁾. Based on what was mentioned previously, we can say perhaps the age factor may have a smaller effect when compared to the other factors that have a greater effect on creating depression.

Our study found a significant difference in depression rates between males and females with type 2 diabetes (p-value = 0.002). A significantly higher number of women 72(74.2%) experienced depression compared to men 25 (25.8%). This aligns with previous research by $Yang^{(23)}$, which obtained similar and statistically significant results that showed that the prevalence of depression in women with type 2 diabetes was higher than in men in different regions of the world. There are many factors, such as continuous hormonal changes in women and other physiological factors that contribute to increasing the possibility of depression in women compared to men. Suggesting that sex is an important factor to consider when evaluating mental health in this population.

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Patients were categorized into three groups based on the duration of their diabetes: less than 10 years, from 10 to 15 years, and more than 15 years. Among these groups, the majority of patients who were suffering from depression had a diabetes duration of less than 10 years, while those without depression had a diabetes duration ranging from less than 10 years to 15 years. After conducting a statistical analysis, the difference was not considered statistically significant with a p-value of (0.128). These results agree with Ahmad ⁽²⁴⁾.

The majority of participants in this study, both those experiencing depression and those who were not (non-depressed 93.5%, depressed97.9%), were married. Only 3.1% of participants (non-depressed 6.5%, depressed 2.1%) were widows, and the difference between the two groups was not statistically significant (p-value=0.247). This finding aligns with Al-Mohaimeed ⁽²⁵⁾and Al-Ozairi ⁽²⁶⁾ who also found no significant difference in the marital status of participants.

The study shows that illiterates, those with secondary school, and those with higher education were suffer from depression more than those with primary school; this finding is in line with Mushtaque (27) since it was demonstrated that the degree of education significantly contributes to the development of depression in people with diabetes. It is possible that some patients provided inaccurate or incomplete information about their education level, while others may have chosen not to disclose this information due to embarrassment. In this case, It is important to distinguish between health awareness and educational background because it is not always the case that those with less education will not be aware of health awareness.

Participant's positive family history of diabetes was (nondepressed 77.4%, depressed 77.3%), and the p-value (0.991), the difference did not indicate statistical significance, and this is consistent with Kim ⁽²⁸⁾, which reached a

result similar to what this study reached and lagged with Wu ⁽²⁹⁾who found that a family history of diabetes has an important relationship with depression. Regularity in taking diabetes treatment was studied for the participants in this study, and more than 90% of both depressed and non-depressed groups were regular in taking treatment, and the p-value (0.594), which was not statistically significant and agrees with Lunghi ⁽³⁰⁾, differs with Mendes ⁽³¹⁾. Adherence to treatment alone may not be enough to control the disease. The patient needs to have a special diet and a healthy lifestyle in addition to medication adherence to achieve this. The study involved routine screening for diabetes in both the depressed and non-depressed groups. The mean of FBS for the depressed group (211.25 ± 102.28) and the non-depressed group (222.28 ± 128.93) were compared, and the results showed no statistically significant difference between the two groups p-value (0.687). Although the study agrees with Albekairy ⁽³²⁾ and disagrees with Mallorquí-Bagué ⁽³³⁾. The HbA1c levels were, DM with the depressed group (8.83±3.13) and DM nondepressed (8.52 ± 3.10) , but the difference was not significant p-value (0.741). Although the study agrees with Mansori ⁽³⁴⁾, it differs from Amelia & Yunanda⁽³⁵⁾

CONCLUSION

Our study highlights a striking connection between type 2 diabetes and depression, with a significantly higher incidence of depression in diabetic patients. Additionally, the fact that females are more likely to suffer from depression compared to males also calls for further research into other factors that could potentially exacerbate mental health issues in type 2 diabetes women.

RECOMMENDATIONS

In-depth studies are crucial to explore the multifaceted link between type 2 diabetes and depression. This will help us understand the

underlying mechanisms and potential contributing factors. It is also very important to create special departments and cadres in the specialized centers for diabetics to provide psychological support to patients and follow up on the condition. Psychological treatment of patients and including this matter in the treatment plan for diabetics in general.

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