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Prevalence and Major Risk Factors of Type 2 Diabetes Mellitus Among Adult Psychiatric Patients in Taif Mental Hospital in Saudi Arabia

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Abstract **Original Research Article**

Background: Patients who suffer from psychiatric disorders have a higher likelihood of developing Type 2 Diabetes Mellitus (T2DM). Determining the prevalence of T2DM among individuals with psychiatric disorders is challenging due to the underdiagnosis of diabetes among this population. ***Objective:*** This study aimed to investigate the prevalence and risk factors of T2DM among adult psychiatric patients in Taif Mental Hospital, Saudi Arabia. Method: A cross-sectional study was conducted among adult psychiatric patients from June to November 2023 using a data collection sheet comprised of socio-demographic characteristics, the prevalence of T2DM, and the factors that may contribute to T2DM. ***Results:*** A study was conducted on 138 patients with psychiatric orders, most of whom (95.7%) were Saudi nationals, with 60.9% of them being female. Patients had a mean (Standard deviation [SD]) age of 42.7 (13.45) years old and a mean (SD) body mass index (BMI) of 29.3 (6.59) kg/m^2. The patients had been suffering from psychiatric disorders for a mean (SD) of years of 10.3 (9.34) years. The prevalence of T2DM among patients with psychiatric disorders was 23.2%. The psychiatric patients aged more than 40 years (37.5%) had a significantly higher prevalence of T2DM compared to those aged less than or equal to 40 years (7.6%) ($p<0.001$). The patients with anxiety disorders (42.1%) had a significantly higher prevalence of T2DM compared to those who had other psychotic disorders (20.2%) ($p=0.044$). Psychiatric patients with complications (47.2%) had a significantly higher prevalence of T2DM compared to those who had not (7.3%) ($p<0.001$). ***Conclusion:*** Our study provides further evidence of the association between psychiatric disorders and an increased risk of T2DM. Implementing regular screening programs, managing anxiety disorders, promoting a healthy lifestyle, and providing comprehensive care are recommended for psychiatric patients with T2DM and comorbidities.

Keywords: Type 2 Diabetes Mellitus, Psychiatric, Risk factors, Prevalence, Saudi Arabia.

INTRODUCTION

Psychiatric disorders are a common health issue worldwide, affecting a large portion of the population and impairing their quality of life.[1,2] Additionally, individuals with psychiatric conditions face a significant risk of developing multiple medical disorders and experience higher mortality rates, resulting in a reduced life expectancy of up to 15 years.[3,4,5,6] One example of these medical disorders is developing diabetes (particularly type 2) among patients with psychiatric disorders.[7]

Type 2 Diabetes Mellitus (T2DM) is a complex disorder that causes physical, psychological, and social burdens and is common in Saudi Arabia. It is estimated that T2DM affects more than 18% of the Saudi population, and the prevalence of this disease is increasing every year, making it a significant public health concern.[8]

According to a systematic review relied on cohort studies, individuals with psychiatric conditions, such as depression, anxiety, or insomnia, are at high risk of developing T2DM. The prevalence of T2DM among patients with psychiatric disorders varies between 5% and 22%, depending on the specific psychiatric condition.[9] A study by Lindekilde et al. found that the occurrence of T2DM increases among people with different types of psychiatric disorders, especially in younger individuals.[10] Another study suggests that people with a psychiatric disorder are more likely to experience complications and mortality associated with diabetes at an earlier age.[11] De Hert et al. reported diabetes as a significant issue in patients with severe mental illness ten years ago.[12]

The relationship between T2DM and psychiatric conditions is complex and influenced by multiple factors. For instance, individuals with psychotic disorders have a higher prevalence of several traditional risk factors for T2DM, such as obesity, hypertension, and hyperlipidemia, compared to the general population. These factors likely contribute to the increased occurrence of diabetes in this population. Moreover, the use of antipsychotic medications has been extensively studied, and found that it may contribute to diabetes through both indirect means, such as weight gain, and direct means, such as promoting insulin resistance.[13]

Furthermore, patients with diabetes who suffer from psychiatric disorders have a lower quality of life due to difficulties in regulating their blood glucose levels. Studies have shown that a combination of medication and physical activity can improve the effectiveness of treatment. As a result of exercising, the body releases β-endorphins and cerebral neurotransmitters, which reduce anxiety levels and improve these patients' overall quality of life.[14] As the burden of psychiatric disorders continues to rise globally, it is crucial to identify these conditions early to prevent diabetes-related illness and death.[15]

Understanding the prevalence and risk factors of T2DM among adult psychiatric patients in Saudi Arabia is crucial for healthcare interventions and management strategies for patients. Research on this topic provides valuable insights for healthcare policies, prevention, and treatment approaches, ultimately enhancing the well-being of marginalized psychiatric patients. Therefore, we aimed to assess the prevalence and risk factors of T2DM among adult psychiatric patients in Taif Mental Hospital, Saudi Arabia.

METHODOLOGY

Study Design and Duration: This cross-sectional study was performed among adult psychiatric patients in a Mental health hospital in Taif, Saudi Arabia. The data was collected from June to November 2023.

Study Population: The study included adult patients who were diagnosed with a major psychiatric disorder in Taif, Saudi Arabia. Any patient who had no psychiatric disorder was excluded from the final analysis.

Data Collection: Data was collected through a data collection sheet from Taif Mental Hospital. The data collection sheet consisted of three sections. This first section included the participants' characteristics, such as age, gender, nationality, and body mass index (BMI). The second section included the professional psychiatric diagnosis and year of diagnosis. The last section was designed to collect information about serum glucose levels, usage of both anti-psychotic and anti-diabetic medication, and the presence of any risk factors.

Data Entry and Analysis: The data was extracted and revised in an Excel sheet. Statistical analysis was conducted using the IBM SPSS computer program (version 26.0, Armonk, NY, USA). Categorical variables were expressed in numbers and percentages. For continuous variables, mean and standard deviation (SD), median and interquartile range (IQR), and minimum and maximum values were reported. The Chi-square test and Fisher's Exact Test were used to compare different variables with the prevalence of T2DM. The statistical significance was established by considering p-values below 0.05.

Ethical Considerations: Approval was given by the local research and ethical committee. Verbal consent was taken from each subject to participate in the study. The study objective was illustrated at the beginning of the questionnaire.

RESULTS

The study included 138 patients with psychiatric orders, with a mean (SD) age of 42.7 (13.45) years old. The patients had been suffering from psychiatric disorders for a mean (SD) of years of having psychiatric disorders was 10.30 (9.3) years. Most participants (95.7%) were Saudi nationals, and 60.9% were females. Patients' mean (SD) BMI was 29.3 (6.59) kg/m^2. Depression (39.9%), schizophrenia (25.4%), bipolar disorder (14.5%), and anxiety (13.8%) were the most commonly reported psychiatric disorders. Of these patients, 79% were taking antipsychotic medications. Risperidone (11%), aripiprazole (10.1%), paliperidone (8.3%), and Cipralex (6.4%) were the most commonly reported medications.

The prevalence of T2DM among patients with psychiatric disorders was 23.2% (Figure 1). The fasting glucose level mean (SD) was 132.6 (63.91) mg/dl among the participants. Moreover, Metformin (85.7%) was the most commonly reported anti-diabetic medication. The majority of participants reported that they had risk factors for T2DM (68.1%), of which a family history of diabetes was the most risk factor reported (69.1%). All details are shown in Table 1.

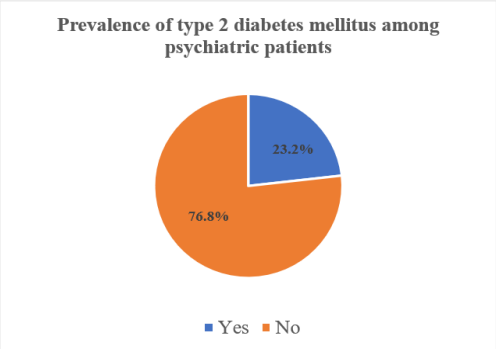

Figure 1: Prevalence of type 2 diabetes mellitus among psychiatric patients

Table 1: Demographic characteristics of the participants (N=138)

Age (Years)	**Mean (SD)**	42.7 (13.45)	
	Median (IQR)	42 (23)	
	Min-Max	21-77	
BMI (kg/m^2) (N=136)	**Mean (SD)**	29.3 (6.59)	
	Median (IQR)	29.20 (9)	
	Min-Max	16-49	
How long has the patient suffered from psychiatric disorders? (Years) (N=136)	**Mean (SD)**	10.30 (9.34)	
	Median (IQR)	7 (13.75)	
	Min-Max	0-44	
Fasting glucose level (mg/dl) (N=93)	**Mean (SD)**	132.6 (63.91)	
	Median (IQR)	106 (44)	
	Min-Max	74-377	
Parameters	**Category**	**Number**	**Percentage**
Gender	Male	54	39.1
	Female	84	60.9
Nationality	Saudi	132	95.7
	Non-Saudi	6	4.3
Psychiatric disorders	Depression	55	39.9
	Schizophrenia	35	25.4
	Bipolar	20	14.5
	Anxiety	19	13.8
	Other diseases^	18	12.9
Using antipsychotic medication	Yes	109	79
	No	29	21
Antipsychotic medication (N=109)	Risperidone	12	11.0
	Aripiprazole	11	10.1
	Paliperidone	9	8.3
	Cipralex	7	6.4
	Depakine	6	5.5
	Mirtazapine	6	5.5
	Haloperidol	5	4.6
	Paroxetine	5	4.6
	Seroquel	5	4.6
	Citalopram	4	3.7
	Venlafaxine	3	2.8
	Carbamazepine	3	2.8
	Amitriptyline	3	2.8
	Amitriptyline	3	2.8
	Venlafaxine	3	2.8
	Benzodiazepine	3	2.8
	Tryptizol	2	1.8
	Olanzapine	2	1.8
	Alprazolam	2	1.8
	Palipedrone	2	1.8
	Sulpiride	2	1.8
	Mirtazapine	2	1.8
	Fluoxetine	2	1.8
	Escitalopram	2	1.8
	Benztropine	2	1.8
	Fluvoxamine	2	1.8
	Others*	19	17.4
Does the patient suffer from T2DM?	Yes	32	23.2
	No	106	76.8
Using anti-diabetes medication	Yes	30	21.9
	No	107	78.1
Name of anti-diabetic medication (N=28)	Metformin	24	85.7
	Insulin	8	28.6
	Other medications**	3	10.7
Risk factors for T2DM	Yes	94	68.1

	No	44	31.9
Type of risk factors for T2DM (N=94)	Family member with diabetes mellitus	65	69.1
	Complications¥	53	56.4

BMI: Body mass index
T2DM: Type 2 diabetes mellitus
* Other antipsychotic medications: Clomipramine, Cymbalta, Dogmatil, Duloxetine, ESperal, Fluphenazine, Tegretol, Imipramine, Lithium, Lorazepam, Cirquel, Desvenlafaxine, Pethidine, Acetalopram, Amisulpride, Chlorpromazine, Rispedral, Trifluperazine, Flubendazole.
* Other anti-diabetic medications: Januvia, Gliclazide, and Jaradiance
^ Other diseases: Resistant depression, Insomnia, Substance-induced psychosis, Phobia, Social phobia, Brief psychotic disorder, Trichotillomania, Dementia, OCD, Depression with psychotic features, Mild mental retardation.
¥Complications: Hypertension, hyperlipidemia, and females with polycystic ovary syndrome.

Several factors showed statistically significant association with the prevalence of T2DM among patients, such as age, anxiety, and complications such as hypertension, hyperlipidemia, and females with polycystic ovary syndrome.

The psychiatric patients aged more than 40 years (37.5%) had a significantly higher prevalence of T2DM compared to those aged less than or equal to 40 years (7.6%) (p<0.001). The patients with anxiety psychiatric disorders (42.1%) had a significantly higher prevalence of T2DM compared to those who had other psychotic disorders (20.2%) (p=0.044). Psychiatric patients with complications (47.2%) had a significantly higher prevalence of T2DM compared to those who had not (7.3%) (p<0.001), as shown in Table 2.

Table 2: Correlation between patients' characteristics and prevalence of diabetes mellitus type 2

Factors		**Prevalence of T2DM N (%)**		**P-value**
		Yes	**No**	
Age (Years)	Less than or equal to 40	5 (7.6)	61 (92.4)	**<0.001**
	More than 40	27 (37.5)	45 (62.5)	
Gender	Male	14 (25.9)	40 (74.1)	0.541
	Female	18 (21.4)	66 (78.6)	
Nationality	Saudi	31 (23.5)	101 (76.5)	1.000*
	Non-Saudi	1 (16.7)	5 (83.3)	
BMI (kg/m$^{2)}$	Underweight	1 (16.7)	5 (83.3)	0.862
	Normal	6 (18.8)	26 (81.3)	
	Overweight	25 (25)	75 (75)	
How long has the patient suffered from psychiatric disorders?	0-3 years	7 (17.5)	33 (82.5)	0.058
	4-10 years	6 (14.6)	35 (85.4)	
	More than 10 years	19 (33.3)	38 (66.7)	
Depression	Yes	11 (18.6)	48 (81.4)	0.274
	No	21 (26.6)	58 (73.4)	
Schizophrenia	Yes	10 (28.6)	25 (71.4)	0.382
	No	22 (21.4)	81 (78.6)	
Anxiety	Yes	8 (42.1)	11 (57.9)	**0.044***
	No	24 (20.2)	95 (79.8)	
Bipolar	Yes	3 (15)	17 (85)	0.566*
	No	29 (24.6)	89 (75.4)	
Other psychiatric disorders^	Yes	2 (15.4)	11 (84.6)	0.732*
	No	30 (24.0)	95 (76.0)	
Complications¥	Yes	25 (47.2)	28 (52.8)	**<0.001***
	No	3 (7.3)	38 (92.7)	

BMI: Body mass index
T2DM: Type 2 diabetes mellitus
^Other psychiatric disorders: Insomnia, Substance-induced psychosis, Phobia, Social phobia, Brief psychotic disorder, Trichotillomania, Dementia, OCD, Mild mental retardation
¥Complications: Hypertension, hyperlipidemia, and females with polycystic ovary syndrome.
*: Fisher's Exact Test

DISCUSSION

Epidemiological studies have revealed an association between psychiatric disorders and an increased risk of developing T2DM.[16] Our research aimed to determine the prevalence and risk factors of T2DM among adult psychiatric patients in Taif, Saudi Arabia.

The current study found that the prevalence of T2DM in Taif, Saudi Arabia, was 23.2%, which was higher than in previous studies. Another study reported that the prevalence of T2DM was high among adult psychiatric inpatients, where the prevalence was 11.63% among patients with schizophrenia and 10.17% among patients with other psychiatric disorders.[17] A meta-analysis study found that the prevalence of T2DM in people with schizophrenia was 9.5%.[18] Moreover, a systematic review concluded that the overall prevalence of T2DM was 8.7%, where it was significantly more common in people with major dispersive disorders.[19] Another systematic review reported that the overall prevalence of T2DM was 9.4%, which was significantly more common in people with bipolar disorder.[20] Additionally, another meta-analysis revealed that the overall prevalence of T2DM was 10.0% among people with posttraumatic stress disorder.[21]

In our study, psychiatric patients aged more than 40 years had a significantly higher prevalence of T2DM. A similar study concluded that older patients with posttraumatic stress disorder had a higher prevalence of T2DM.[21] Another study reported that elderly psychiatric patients had a higher prevalence of T2DM.[17] However, a prior study found that young adults diagnosed with schizophrenia and bipolar disorder were at a higher risk of developing T2DM, in contrast with our study.[22]

Evidence suggests a bidirectional relationship between diabetes mellitus and anxiety disorders, as patients with anxiety symptoms may be at increased risk of developing T2DM and vice versa.[23] It was similar to our study that patients with anxiety had a significantly higher prevalence of T2DM. A systematic review reported a higher prevalence and incidence of anxiety disorders in people with T2DM compared with the general population.[24]

The presence of comorbidities, such as hypertension and hyperglycemia, among T2DM patients contributed to the incidence of psychiatric disorders.[25,26] This is similar to our results, where psychiatric patients with complications such as hypertension and hyperlipidemia had a significantly higher prevalence of T2DM. Another study reported that psychiatric patients with hypertension and lipid disorders had a higher prevalence of T2DM.[17] Moreover, a study reported that the risk for T2DM among adults with psychosis was significantly increased in association with hypercholesterolemia and hypertension.[27] Therefore, encouraging lifestyle modifications, including regular exercise, a balanced diet, and weight management, can reduce the risk of T2DM and manage comorbidities. Additionally, collaborative care between mental health professionals and primary care providers ensures comprehensive management.

Limitation

The validity of our findings is limited to the small sample size, and the nature of the study design was a cross-sectional observational study using a collection data form that was conducted in a single place in Saudi Arabia. That may lead to collecting data at a single point in time. In addition, this study may have considered only some potential factors that could impact the prevalence of T2DM among psychiatric patients. As a result, it is highly recommended that future studies be conducted as generalized studies with a larger sample size and a more comprehensive investigation of all possible variables that could affect the prevalence of T2DM among psychiatric patients.

CONCLUSION

Our study provides further evidence of the association between psychiatric disorders and an increased risk of T2DM. The study also found that elderly patients, those with anxiety disorders and complications, were at a higher risk of developing T2DM among psychiatric patients. To address this issue, it is recommended to implement regular screening programs for T2DM in psychiatric settings, with a focus on elderly patients, anxiety disorders, and complications such as hypertension, hyperlipidemia, and females with polycystic ovary syndrome. Additionally, interventions should be made to manage anxiety disorders, promote healthy lifestyle modifications, and provide comprehensive care for psychiatric patients with T2DM and comorbidities.

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