PREVALENCE AND SOME RELATED FACTORS TO DEPRESSION AMONG OUT-PATIENTS WITH TYPE 2 DIABETES IN CAN THO CITY

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ABSTRACT

Background: *Depression is a common mental disorder in both clinical psychiatry and primary care, increasing in different risk groups including patients with diabetes. However, this disorder could be missed as symptoms overlap with common medical conditions which might lead to bad outcomes of diabetes and mental health for patients.* ***Objectives:*** *To determine the prevalence of depression and some related factors to depression among patients with type 2 diabetes in out-patient departments.* ***Materials and methods:*** *A cross-sectional descriptive study was conducted on 192 patients who had been diagnosed and treated for diabetes for at least prior 3 months. The patients were recruited randomly at the Outpatient Departments of the two hospitals: Can Tho University of Medicine and Pharmacy Hospital and Can Tho Cardiovascular Hospital. Data collection was carried out from May to June 2022. PHQ-9 questionnaires were used to determine presence and severity levels of depression* ***Results****: 192 patients participated in the study. Their mean age was 60.6 years old. Most of the participants were women (60.4%), at primary education (35.4%), belonging to the age group of 60 - 69 (36%), married (77.1%) and lived with their families (92.2%). There were 50% of patients who were overweight and 12% of patients smoking. The rate of depression among patients with type 2 diabetes were 28.7%. The corresponding severity levels of depression were mild (65.5%), moderate (23.6%), moderate - severe (10.9%) and no severe cases.*

The statistically meaningful factors related to depression and diabetes with 95% confidence included the under 60-year-old group (OR = 1.80, 95%CI = 1.13 – 2.86), housewife (OR = 1.74, 95% CI = 1.10 – 2.70), overweight/obese (OR=2.50, 95%CI = 1.28 – 4.89), anxiety (OR = 3.06, 95%CI = 1.47 – 6.36.), being retired (OR = 0.52, 95% CI = 0.33 – 0.82) and smoking (OR = 0.28, 95%CI = 0.72 – 1.06). ***Conclusions:*** *Depression was common among outpatients with type 2 diabetes. Routine screening for depression among those patients should be performed.*

Keywords: *type 2 diabetes, depression, PHQ – 9.*

I. INTRODUCTION

Diabetes is a serious individual and global health problem, and one of the chronic diseases causing many complications. Numerous studies have shown there are correlations between depression and diabetes that the prevalence of depression in patients with diabetes is higher than in the general population [1], [2], [3], [4], [5], [6]. In recent studies it is up to 24-30% and two times higher than in people without any chronic diseases. Several studies in Vietnam showed very high rates of depression among patients with diabetes, such as 51.1% in Tra Vinh [2] in 2019, or 79.4% in the National Geriatric Hospital. In Brazil, patients with diabetes aged 30 – 65 years old visiting at Rio de Janeiro Institute of Diabetes and Endocrinology had 18.6% depressive disorder [5].

Depression has been identified as a risk factor for poor glycemic control, increased complications of diabetes, and high mortality. The diagnosis of diabetes and the occurrence of its complications have also been found to be risk factors for the development of subsequent episodes of depression [7], [8]. Although approximately 30% of people with diabetes report depressive symptoms, only about 10% of them have major depression. Many diabetic patients with depressive symptoms go undiagnosed and untreated, because the symptoms of depression are atypical, and the symptoms of depression can be overlapped by the symptoms of diabetes [5].

In addition, although considered a mild disorder, generalized anxiety disorder is often associated with significant mood impairment and is associated with excessive use of medical services. Cases of mild symptoms of depression and anxiety will often be found in primary care settings or exist in large populations without ever receiving mental health care [7], [8], [9].

Thus, we conducted this study with the two following objectives: to determine the prevalence of depression and to identify some related factors to depression among patients with type 2 diabetes.

II. MATERIALS AND METHODS

2.1. Study population

The study population was patients with type 2 diabetes receiving treatment at outpatient departments.

The sample was selected from the two outpatient departments of Can Tho University of Medicine and Pharmacy Hospital and Can Tho Cardiovascular Hospital.

Inclusion criteria: Patients who had been diagnosed and treated for type 2 diabetes for at least 3 months (with prescriptions as proof), and voluntarily accepted to participate in the study.

Exclusion criteria: Patients were diagnosed with renal failure, adrenal insufficiency, hypothyroidism, and hyperthyroidism, or had used glucocorticoids within 15 days. These criteria were reviewed at the beginning of study recruitment by interviewing patients about their clinical symptoms, checking their prescriptions and available blood test results if possible.

The sample size: The sample size formula to estimate the population prevalence was calculated. Based on a reference concerned study, a prevalence of 18.6% depression among

patients with type 2 diabetes was found [5]. The precision d was selected at 5.5%. The level of confidence was set at 95%. Totally the study required a sample size n = 192 participants.

Sampling: The participants were selected randomly from the list of all patients examined during each day of the week, in the study period from May to July 2022.

2.2. Study methods and content

This was a cross - sectional study using a standardized questionnaire.

The patients' age, sex, level of education, occupation, being married, family, BMI, smoking, and alcohol drinking was assessed using a questionnaire. Also, the number of years living with diabetes of patients (or diabetes duration), whether treatment goal was achieved, and presence of coincident hypertension and anxiety were assessed and analyzed as an associated factor [9].

For anxiety, it would be classified into 4 groups upon GAD-7 scores: No anxiety (0-4); Mild anxiety (5 - 9); Moderate anxiety (10 - 14); and Severe anxiety (15 - 21).

Assessment of depressive symptoms

We aimed to screen depression among patients at primary care, so the PHQ-9 screening questionnaire was used. PHQ-9 has high sensitivity, specificity, and internal consistency for screening major depressive disorder, so is recommended for use in primary care clinics in many countries around the world. The questionnaire consists of 9 questions, with 3 levels for each symptom and duration of symptom onset for at least the previous 2 weeks. Low PHQ-9 (≤ 4) has less than 1/25 chance of being depressed [10].

Based on patients' PHQ-9 scores, depression was divided into 5 groups: No depression (0-4); Mild depression (5-9); Moderate depression (10-14); Moderately severe (15-19); and Severe (20-27).

Statistical analysis

All statistical analyses were done using SPSS V.22.0. Continuous variables were expressed as mean ± SD. Categorical variables were expressed as absolute values and percentages. Differences in categorical variables were assessed using the Pearson $\chi 2$ test. OR were calculated. Multivariable logistic regression was also used. The minimum statistical significance level for all analyses was $p < 0.05$.

2.3. Research ethics

The protocol of this study was approved by the Medical Ethics Committee of Can Tho University of Medicine and Pharmacy (Approval Decision No. 22.020.GV/PCT-HĐĐĐ). All patients were explained about the study and taken for their oral consent. Newly diagnosed depressive patients would get some advice, be confirmed, and get treatment from their doctors if indicated.

III. RESULTS

3.1. Characteristics of the research participants

Table 1. Demographics of the research participants

Characteristics		Number (Percentage %) n=192
Age (years old)	Mean Range SD	60.6 36 – 84 9.8

Characteristics		Number (Percentage %) n=192
Age groups (Years old)	< 40	02 (1.0)
	40 - 49	25 (13.0)
	50 - 59	57 (29.7)
	60 - 69	69 (36.0)
	70 - 79	36 (18.8)
	>=80	03 (1.5)
Gender	Female	120 (62.5)
	Male	72 (37.5)
Job	Being retired	108 (56.3)
	Housewives	34 (17.7)
	Business	15 (7.8)
	Officers	12 (6.3)
	Farmers	06 (3.1)
	Workers	06 (3.1)
	Safe guarders	02 (1.0)
Being married	Married	148 (77.1)
	Widow	28 (14.6)
	Divorced	06 (3.1)
	Single	10 (5.2)
Living with family	Yes	177 (92.2)
	No	15 (7.8)

A total of 192 patients participated in the study. Their mean age was 60.6 (standard deviation 9.8). Age ranges from the youngest 36 to the highest 84 years old. Female gender accounts for 62.5%. The average number of years with diabetes was 7.4 years; ranges from 1–32 years. Research participants with primary education accounted for the most (35.4%). Most of them were retired or at working age (50.6%), followed by housewives (17.7%). There were 14.6% of participants who have lost their spouses and a small number of subjects who were divorced (3.1%) or single (5.2%) (Table 1).

3.2. Depression of the research participants

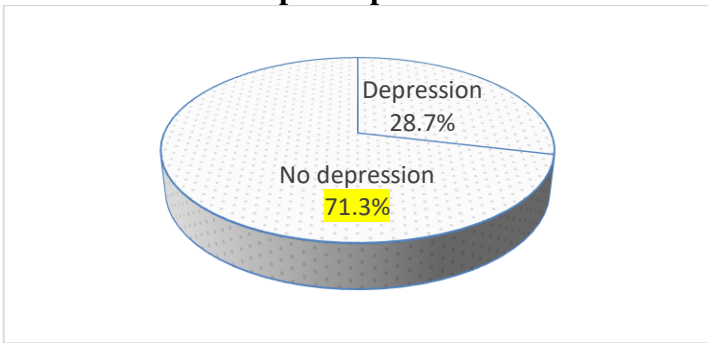

Figure 1. Distribution of depression among the research participants

Table 2. Distribution of depression severity

Severity	Number (n=55)	Percentage (%)
Mild	36	65.5
Moderate	13	23.6

Severity	Number (n=55)	Percentage (%)
Moderately severe	6	10.9
Severe	0	0

There were 28.7% of patients with depression (Figure 1). The corresponding levels of depression severity were mild (65.5%), moderate (23.6%), moderately severe (10.9%) and no severe cases (Table 2).

3.3. Several related factors to depression among the diabetic patients

Table 3. The relationships between several demographic characteristics and depression among the research participants

Factors		Depression		Odd ratio (95% CI) and p-value
		Yes	No	
Age group	60 years old and below	34 (37.4%)	57 (62.6%)	OR = 1.8 (1.13 – 2.86)
	Over 60 years old	21 (20.8%)	80 (79.2%)	
Gender	Female	37 (30.8%)	83 (69.2%)	OR = 1.34 (0.69 – 2.59)
	Male	18 (25.0%)	54 (75.0%)	
Education	No	02 (20.0%)	08 (80.0%)	OR = 0.69 (0.10 – 2.42)
	Primary	21 (30.9%)	47 (69.1%)	OR = 1.13 (0.71 – 1.78)
	Secondary	15 (28.3%)	38 (71.7%)	OR = 1.02 (0.51 – 2.06)
	High school	10 (31.3%)	22 (68.8%)	OR = 1.30 (0.52 – 3.28)
	Higher education	07 (24.1%)	22 (75.9%)	OR = 0.82 (0.41 – 1.63)
Job	Being retired	22 (20.4%)	86 (79.6%)	**OR = 0.52** (0.33 – 0.82)
	Housewives	15 (44.1%)	19 (55.9%)	**OR = 1.74** (1.10 – 2.78)
	Business	4 (26.7%)	11 (73.3%)	OR = 2.67 (0.82 – 8.69)
	Officers	6 (50.0%)	6 (50.5%)	OR = 0.93 (0.39 – 2.20)
	Farmers	3 (33.3%)	6 (66.7%)	OR = 1.17 (0.45 – 3.04)
	Worker	2 (33.3%)	4 (44.7%)	OR = 1.17 (0.37 – 3.71)
	Safeguarders	0	2 (100%)	-
Living with family	Yes	51 (28.8%)	126 (71.2%)	OR = 1.11 (0.34 – 3.66)
	No	04 (26.7%)	11 (73.3%)	
Being married	Married	45 (30.4%)	103 (69.6%)	OR = 1.34 (0.74 – 2.43)
	Widow	01 (33.3%)	02 (66.7%)	OR = 1.76 (0.43 – 7.16)
	Divorced	06 (21.4%)	22 (78.6%)	OR = 0.72 (0.34 – 1.51)
	Single	01 (10.0%)	09 (90.0%)	OR = 0.34 (0.05 – 2.19)

The age group 60 years or younger was statistically significantly associated with depression (OR = 1.8, 95%CI = 1.13 – 2.86). Those diabetic patients at age group 60 years or younger had 1.8 time getting depression than the older one. Being a housewife was an associated factor increasing risks of getting depression while being retired group had lower risks, in contrast. Factors that were surveyed but found no statistically significant relationship included: gender, education level, marital status and living with family.

Table 4. The relationships between several health behaviors, condition and comorbidity of diabetes, and depression among the diabetic patients

Factors		Depression		Odd ratio and 95% Confidence Interval
		Yes	No	
Smoking	Yes	02 (8.7%)	21 (91.3%)	OR = 0.28 (0.72 – 1.06)
	No	53 (31.9%)	113 (68.1%)	

Factors		Depression		Odd ratio and 95% Confidence Interval
		Yes	No	
Alcohol drinking	Yes No	12 (30.0%) 43 (28.7%)	28 (70.0%) 107 (71.3%)	OR = 0.92 (0.43 – 1.97)
Overweight	Yes No	35 (36.5%) 20 (20.8%)	61 (63.5%) 76 (79.2%)	OR = 2.5 (1.28 – 4.89)
Hypertension	Yes No	46 (32.4%) 09 (18.0%)	96 (67.6%) 41 (82.0%)	OR = 2.18 (0.98 – 4.87)
Duration of diabetes Standard deviation		7.2 5.69	7.46 7.11	p = 0.81
Achievement of diabetes treatment goal	Yes No	20 (23.5%) 35 (32.7%)	65 (76.5%) 72 (67.3%)	OR = 1.58 (0.83 – 3.0) p = 0.16
Anxiety comorbid	Yes No	19 (48.7%) 36 (23.7%)	20 (51.3%) 116 (76.3%)	OR = 3.06 (1.47 – 6.36)

The following factors were found statistically significant association with depression including overweight/obesity (OR = 2.5, 95%CI = 1.28 – 4.89), anxiety disorder (OR = 3.06, 95%CI = 1.47 – 6.36), while smoking was found to be a risk reducing factor for depression (OR = 0.28, 95%CI =0.72 – 1.06).

Factors that were surveyed but found no statistically significant relationship included: alcohol drinking, hypertension, duration of diabetes, and achievement of treatment goal for diabetes.

Table 5. The relationships between several factors and depression among diabetic patients in multivariate regression model

Independent variables		Standardized coefficient Beta	p value
Smoking	No Yes	0.154	p = 0.03
Anxiety	Yes No	0.146	p = 0.05
Overweight/Obesity	Yes No	0.138	p = 0.07
Age group < 60 years old	Yes No ng	0.106	p = 0.18

The multivariable regression model analysis showed that the factor statistically significantly associated with depression among diabetic patients was smoking, with the standardized coefficient Beta 0.154 (p = 0.03). The remaining survey factors that did not have a statistically significant association were anxiety disorders, overweight/obesity, and age group under 60.

IV. DISCUSSION

The research participants' average age was 60,6. Female sex accounts for 62.5%. Compared with some domestic studies, the sample was representative of the study population who were patients with type 2 diabetes visiting the out-patient departments [11].

Based on the PHQ-9 depression scale, the results of our study showed that the rate of depression in patients with type 2 diabetes undergoing outpatient treatment accounted for

28.7%, in which patients with mild depression accounted for 65.5%, moderate 23.6%, moderately severe 10.9% and no patient with severe depression.

This result was higher than a study at the Institute of Diabetes and Endocrinology Rio de Janeiro, Brazil in 2011, where 13/70 patients with type 2 diabetes had depressive disorder (18.6%) [5], but lower than the results of many other studies. A study performed on 296 patients with type 2 diabetes at Chitwan Medical University Hospital, Nepal in 2019, using the PHQ-9 and GAD-7 questionnaires showed that depression and anxiety were detected in 57.8% and 49.7% [12]. Similarly, in the study of Nguyen Thi Hong Tuyen (2019), the rate of depression in patients with type 2 diabetes was 51.1% (114 out of 223) [2], 44.5% by Tran Thi Ha An (2018) using ICD- 10 and 48.2% using Beck scale [1]. The research by Vu Thi Huyen Thanh (2018) at the National Hospital of Geriatrics using the Geriatric Depression Scale found 79.4% of type 2 diabetes patients with depressive symptoms [6]. A recent study in Ethiopia by Nigussie, K et al (2023) on 421 outpatients with type 2 diabetes, using the hospital anxiety and depression scale, resulted in 42.3% depression and 40.4% anxiety disorder [13].

The results obtained from our study were somewhat lower than those of other studies because of several objective and subjective reasons such as studies using different scales, inpatients having many problems, severe or complicated health conditions, in which the rates of mental disorders such as depression, anxiety disorders, etc. was also more common [4], [6], [12], [13], [15]. On the other hand, most patients in our study lived with their families, came for regular chronic disease follow-up, at the outpatient department, and were monitored and counseled by doctors, so the patients can reduce stress, and mild depressive symptoms if present.

Regarding related factors, Sharma K's study showed results including current living conditions, education level, drug treatment adherence, satisfaction with treatment methods and family history of mental illness. Family was an important factor associated with anxiety disorders in patients with diabetes [12]. Cognitive dysfunction increased the risk of depression; conversely, poor glycemic control led to functional disability, higher rates of depression and increased cognitive impairments. In addition, comorbid depression and diabetes also increased the risk of dementia [14]. There was strong evidence that diabetic complications significantly increased the risk of depression [11]; These risk factors included insulin therapy, retinopathy, kidney disease, and ischemic heart disease [12].

Our study found a statistically significant association between depression and anxiety (OR = 3.06, $p < 0.01$); overweight/obesity (OR = 2.5, $p < 0.01$), but no correlation with alcohol consumption. There was no significant association between depression and hypertension, diabetes-related factors. such as the duration of the disease and whether the treatment goal was reached.

In our study, smoking was a risk reduction factor for depression (OR = 0.28, $p < 0.05$), and a statistically significant related factor in the multivariate regression model, with the standardized coefficient Beta 0.154 ($p = 0.03$). Several studies showed that smoking increased the risk of depression, It was also said that nicotine stimulates the release of the chemical dopamine in the brain, and dopamine was involved in triggering positive feelings. It was often found to be low in people with depression, who may then use cigarettes to temporarily increase their dopamine supply. In our research, it was not studied in detail about smoking behavior such as duration of smoking, number of cigarettes... so it should be further investigated for this association later.

Despite high effort, our study may encounter information bias due to recall, especially in elderly patients, with many chronic diseases, and short exposure time in clinics. The study may not be representative to the population with diabetes at all levels of the health system.

V. CONCLUSIONS

Depression was found to be common, with around one third among outpatients with type 2 diabetes. Most cases were at mild, medium or severely medium levels which could be underdiagnosed at primary care settings. Several statistically significant risk factors have been recognized that could be helpful for chronic disease management of doctors. Routine screening for depression among patients with type 2 diabetes was strongly recommended.

REFERENCES

1. Tran Thi Ha An. Research on clinical characteristics of depression and some related factors in patients with type 2 diabetes. Doctoral thesis. Hanoi Medical University. 2018.
2. Nguyen Thi Hong Tuyen, Nguyen Van Trung, Nguyen Thanh Binh. Depression and some related factors in patients with type 2 diabetes in Tra Vinh city.2019. 189-190.
3. American Diabetes Association. Standards of Medical Care in Diabetes. *The Journal of Clinical and Applied Research and Education.* 2022. Volume 45, Supplement.
4. Lindekilde N, Rutters F, Erik Henriksen J, et al. Psychiatric disorders as risk factors for type 2 diabetes: An umbrella review of systematic reviews with and without meta-analyses. *Diabetes Res Clin Pract.* 2021. 176 108855.
5. Papelbaum M, Moreira RO, Coutinho W, Kupfer R, Zagury L, Freitas S, Appolinário JC. Depression, glycemic control, and type 2 diabetes. *Diabetol Metab Syndr.* 2011. 3(1), 26.
6. H. T. T. Vu, et al. Depressive symptoms among elderly diabetic patients in Vietnam. *Diabetes Metab Syndr Obes.* 2018. 11, 659-665.
7. Thai Thi Ngoc Thuy. Behavioral Medicine. *Medical Publishing House*. 2022.
8. Ngo Van Truyen, Nguyen Van Thong. Psychology. *Medical Publishing House.* 2020.
9. Roger Smyth David Semple. Oxford Handbook of Psychiatry. Oxford University Press. 2019. .235 - (1).
10. Levis B, Benedetti A, Thombs BD. DEPRESsion Screening Data (DEPRESSD) Collaboration, "Accuracy of Patient Health Questionnaire-9 (PHQ-9) for screening to detect major depression: individual participant data meta-analysis", *BMJ.* 2019.
11. N. T. Khue. Diabetes in Vietnam. *Ann Glob Health*. 2015. 81(6), 870-3.
12. Sharma K, Dhungana G, Adhikari S, Bista Pandey A, Sharma M. Depression and Anxiety among Patients with Type II Diabetes Mellitus in Chitwan Medical College Teaching Hospital, Nepal. *Nurs Res Pract.* 2021. 2021:8846915.
13. Z Nigussie, K., Sertsu, A., et al. Determinants of depression and anxiety among type 2 diabetes patients in governments' hospitals at Harari regional state, Eastern Ethiopia: A multi-center cross-sectional study. *BMC Psychiatry.* 2023. 23, 13.
14. Sartorius N. Depression and diabetes. *Dialogues Clin Neurosci.* 2018. 20(1), 47-52.
15. N. Sun, Lou P., Shang Y., Zhang P., Wang J., Chang G. and Shi C. Prevalence and determinants of depressive and anxiety symptoms in adults with type 2 diabetes in China: a cross-sectional study. *BMJ Open.* 2016. 6(8), e012540.