Prevalence of depression and its associated factors among outpatients with type 2 diabetes mellitus at a provincial endocrine center in Vietnam

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Abstract

Objectives: This study aimed to determine the prevalence and associated factors of depression among outpatients with type 2 diabetes at the Endocrine Center in Quang Ngai Province, Vietnam. **Methods:** A cross-sectional study was conducted among 606 outpatients in 2019. Depression was assessed by using patient health questionnaire-9 (PHQ-9). Bivariate and multivariate binary logistic regression were computed to assess factors associated with depression. **Results:** The prevalence of depression among participants was 25.6%. In multivariate analysis, poor household economic status, having accompanied chronic disease, lack of physical activities, having frequent family conflicts, and poor social support were independent predictors of depression.

Keywords: *Prevalence, depression, PHQ-9, type 2 diabetes mellitus, Vietnam.*

1. INTRODUCTION

Type 2 diabetes mellitus (T2DM) is one of non-communicable diseases characterized by hyperglycemia due to insulin deficiency and ineffective use of insulin (American Diabetes, 2009). With the current increasing prevalence of diabetes over the world, the number is expected to rise to 578.4 million by the year 2030 (Federation, 2019). The Global Burden of Diseases Projection found that approximately 70% of morbidity and 88% of mortality caused by diabetes happened in low and middle-income countries (Mathers and Loncar, 2006). Regarding coping with chronic disease, depression is one of the common and overwhelming psychiatric disorders among people with diabetes. It seems to be related to self-determination to control the emotional shock of the diagnoses and proper assimilation of self-care information to prevent disease complications (Ganasegeran et al., 2014). Depression among diabetes adds an increase in the burden of complications, financial stress, poor prognosis for quality health results (Ganasegeran et al., 2014). In particular, it is associated with patient's adherence, knowledge of diabetes, glycemic control, prolongation of the recovery from diabetes, and increase in mortality. Then, early screening depression in patients with diabetes will help medical physicians treat well as reducing the inpatients healthcare utilization, complications and improving the patient's quality of life.

Previous studies have found that the prevalence of depression among patients with type 2 diabetes ranges from 8 to 15%, compared with an estimated rate of only 3 to 4% in the general population (Anderson et al., 2001). Study in Bangladesh showed the prevalence of depression among patients with diabetes was 7 times higher than those without (Chowdhury et al., 2017). In Vietnam, 23.6% of diabetes patients have depressed by screening PHQ-9 scale (Chi and Khue, 2016).

Numerous related studies conducted in both developed and developing countries examined the risk factors of depression among type 2 diabetes people, including personal characteristic (gender, age, education status), family environments as living situation, and social support, social conflict (Chowdhury et al., 2017; Tovilla-Zárate et al., 2012; Sweileh et al., 2014). In Vietnam, there is limited research concerning psychiatric aspects of diabetes patients although many epidemiological researches of diabetes were done.

The aims of the researchers were to determine the prevalence and associated factors of depression among outpatients with T2DM at the Endocrine Center in Quang Ngai Province, Vietnam. The findings from this study would provide worthy evidence to develop more effective programs for screening, diagnosing and management of depression among diabetic patients in Vietnam and similar settings.

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2. METHODS

2.1. Study design and period

This was a cross-sectional study conducted from May 2 to May 31, 2019.

2.2. Study participants

The participants of this study adopted the following inclusion criteria: (i)out patients were diagnosed with T2DM at the Endocrine Center in Quang Ngai Province, Vietnam, (ii) patients were able to communicate independently, (iii) patients accepted to take part in the study.

2.3. Study setting

The study was conducted at the Quang Ngai Provincial Endocrine Center, Vietnam. This center is a leading specialized Unit in Quang Ngai Province in terms of preventing and treating diabetes. On average, approximately 30 to 40 patients with T2DM participate in outpatient treatment every day, and most of them were transferred from district hospitals. There were no inpatients of T2DM treated at this Center.

2.4. Sample size and sampling

All T2DM patients who were outpatients treated at Quang Ngai Provincial Endocrine Center from May 2 to May 31, 2019 and met the inclusion criteria mentioned above were included. A total of 606 patients participated in this study with a response rate of 99%.

2.5. Measurements

The dependent variable was depression. Depression was measured by using the PHQ-9 (Patient Health Questionnaire-9) scale. This is a four-point Likert scale that included nine items required patients to recall their depressive symptoms which were happening within 2 weeks period. Each question was pointed from 0 (not) to 3 (nearly every day), and the total score ranged between 0 and 27. The cut-off point PHQ-9 score ≥10 was used to determine to have depression in this study. The PHQ-9 score ≥10 had high sensitivity (88%) and specificity (88%) for measuring major depression in previous study (Kroenke et al., 2001). This tool has been validated and widely used for measuring depression internationally, including Asian countries such as Thailand (Lotrakul et al., 2008). The PHQ-9 was also used in previous studies for measuring depression in Vietnam and was found to have high internal consistency in assessing depression (Dang Duy Thanh et al, 2011).

The severity of depression was assessed as mild, moderate and severe depression if the total score ranged between 10-14, 15-19 and 20-27 respectively (Arroll et al., 2010).

Independent variables included socio-demographic characteristics (age, sex, marital status, residence, ethnicity, religion, education level, occupation, household economic status), clinical factors (duration of diabetes, fasting plasma glucose (FPG) level, accompanied chronic disease, family history of depression), health risk behaviours (habit of smoking, drinking alcohol, physical activity), and psychosocial factors (family conflict, social conflict, social support).

Education level was defined as the highest academic level reached, including illiterate, primary school, secondary/high school and above high school. Household economic status was classified as poor and non-poor household according to Decision Number 59/2015/QĐ-TTg, issued on November 19, 2015 of Vietnam Prime Minister applied for the period 2016-2020 (Vietnam Prime Minister, 2015). Accompanied chronic disease was identified by patient's report of ever been diagnosed by physicians as having the following chronic conditions, including dyslipidemia, hypertension, cardiovascular disease, COPD, cancer, and other chronic diseases.

The FPG test was performed to measure patient's blood sugar level after fasting or not eating anything for at least 8 hours. This test was done to monitor glucose control among T2DM patients. Patients were classified as having good glucose control if FPG level ranged between 4.4 and 7.2 mmol/l (according to Diagnosis and Treatment Guideline for Type 2 Diabetes of The Vietnam Ministry of Health (Vietnam Ministry of Health, 2017). The classification of physical activity was based on the consensus statement on physical activity/exercise among Type 2 Diabetes of the American Diabetes Association (Sigal et al., 2006). Social support was measured by using MSPSS (Multidimensional Scale of Perceived Social Support) (Zimet et al., 1988). This scale included 12 items on a seven-point Likert-type scale addressing relationships with family, friends, and significant other. The total score ranged from 12 to 84. Poor and strong social support were assessed for respondents who scored <42 and ≥42, respectively.

2.6. Data collection

Data collection was undertaken by face-to-face interviews at Quang Ngai Provincial Endocrine Center by using a structured questionnaire. Data collectors approached participants when they attended the Center for regular monthly monitoring. Information related to socio-demographic factors,

clinical characteristics, health risk behaviours and psychosocial factors were collected by doctors working at Quang Ngai Provincial Endocrine Center. The information of the patient health questionnaire-9 (PHQ-9) was then collected by doctors working at Quang Ngai Provincial Psychiatric Hospital. The FPG test was undertaken by technicians from Quang Ngai Provincial Endocrine Center.

2.7. Data analysis and statistical methods

Data collected were checked for completeness and consistency before entering into Epi-data version 3.1. and exported to SPSS version 20.0 for analysis. Descriptive statistics, including frequencies, percentages were computed to describe socio-demographic characteristics, clinical factors, health risk behaviours variables, psychosocial factors and depression. The prevalence of depression by socio-demographic characteristics was computed using Chi Square test. Bivariate and Multivariate logistics regression were used to examine factors associated with depression. Variables that have *p*-value of <0.05 in the bivariate analysis were entered into the multivariate analysis. The odds ratio and corresponding 95% confidence interval were computed to measure the strength of association and *p*-value < 0.05 was taken to indicate statistical significance.

2.8. Ethical considerations

This study was approved by the Ethical Council of Hue University of Medicine and Pharmacy, Hue University, Vietnam (Decision No H2018/210).

3. RESULTS

3.1. Socio-demographic characteristics

Participants' age ranged from 24 to 89 years, with a mean age of 58.7 (±SD=10.7) years. About 41.7% of respondents were males. The majority of patients were married (93.7%), lived in rural areas (76.7%), belonged to Kinh ethnicity (99.3%), and had non-religion (86.3%). About 42.2% of participants attended secondary or high school. Concerning their occupation, the two largest proportions of the respondents were merchant (30.2%) and farmer (20.1%), unemployed group accounted for 0.7%. The proportion of poor household was 9.6% (Table 1).

Table 1. Socio-demographic characteristics of T2DM outpatients at the Endocrine Center in Quang Ngai Province, Vietnam (n = 606)

Variable	Category	Frequency	Percentage
Age (Min: 24, Max: 89 Mean: 58.7±10.7)	< 40	31	5.1
	40-59	321	52.9
	≥ 60	254	42.0
Sex	Male	253	41.7
	Female	353	58.3
Marital status	Single	38	6.3
	Married	568	93.7
Residence	Urban area	141	23.3
	Rural area	465	76.7
Ethnicity	Kinh	602	99.3
	Others	4	0.7
Religion	None	523	86.3
	Buddhism	61	10.1
	Catholicism	9	1.5
	Others	13	2.1
Education level	Illiterate	24	4.0
	Primary school	183	30.2
	Secondary/high school	256	42.2
	Above high school	143	23.6

Occupation	Merchant	183	30.2
	Farmer	122	20.1
	Government officer	60	9.9
	Worker	43	7.1
	Fisherman	39	6.4
	Others	155	25.6
	Unemployed	4	0.7
Household economic status	Poor	58	9.6
	Non-poor	548	90.4

Table 2. Clinical, health risk behaviour characteristics, and psychosocial factors of T2DM outpatients at the Endocrine Center in Quang Ngai Province, Vietnam (n = 606)

Variable	Category	Frequency	Percentage
Duration of diabetes	< 5 years	333	55.0
	5 to < 10 years	161	26.5
	≥ 10 years	112	18.5
FPG level (in mmol/l)	≤ 4.3	8	1.3
	4.4 -7.2	179	29.5
	≥ 7.3	419	69.1
Accompanied chronic disease	Yes	486	80.2
	No	120	19.8
Family history of depression	Yes	59	9.7
	No	547	90.3
Smoking	Yes	99	16.3
	No	507	83.7
Alcohol consumption	Yes	163	26.9
	No	443	73.1
Physical activity	Yes	374	61.7
	No	232	38.3
Frequent family conflict	Yes	72	11.9
	No	534	88.1
Frequent social conflict	Yes	39	6.4
	No	567	93.6
Social support	Strong	529	87.3
	Poor	77	12.7

3.2. Clinical, health risk behaviour and psychosocial characteristics

The percentage of patients who had been diagnosed with diabetes for less than 5 years, from 5 to 10 years, and over 10 years were 55%, 26.5%, and 18.5% respectively. More than 80% of the participants had accompanied chronic disease. Less than 30% (29.5%) had FPG level of between 4.4 -7.2 mmol/l. Approximately one-tenth (9.7%) of the participants had family history of depression. There were 16.3% of study subjects who had the habit of smoking, 26.9% using alcohol and 61.7% had physical activity. From the total interviewee, roughly 12% (11.9%) had frequent family conflicts and 6.4% had frequent social conflicts. The proportion of respondents received poor social support was 12.7% (Table 2).

Table 3. Prevalence of depression by socio-demographic characteristics of T2DM outpatients at the Endocrine Center in Quang Ngai Province, Vietnam (n = 606)

		Depression		*p*-value
		Yes 155 (25.6%)	**No 451 (74.4%)**	
Age				
	< 40 years	7 (22.6%)	24 (77.4%)	0.894
	40-59	84 (26.2%)	237 (73.8%)	
	≥ 60	64 (25.2%)	190 (74.8%)	
Sex				
	Male	53 (20.9%)	200 (79.1%)	0.027
	Female	102 (28.9%)	251 (71.1%)	
Marital status				
	Single	8 (21.1%)	30 (78.9%)	0.509
	Married	147 (25.9%)	421 (74.1%)	
Residence				
	Urban area	29 (20.6%)	112 (79.4%)	0.12
	Rural area	126 (27.1%)	339 (72.9%)	
Education level				
	Illiterate/Primary school	67 (32.4%)	140 (67.6%)	0.006
	Secondary school and above	88 (21.1%)	311 (77.9%)	
Occupation				
	Merchant	51 (27.9%)	132 (72.1%)	
	Farmer	38 (31.1%)	84 (68.9%)	
	Government officer	12 (20.0%)	48 (80.0%)	
	Worker	9 (20.9%)	34 (79.1%)	0.086
	Fisherman	10 (25.6%)	29 (74.4%)	
	Unemployed	3 (75%)	1 (25%)	
	Others	32 (20.6%)	123 (79.4%)	
Household economic status				
	Poor	34 (58.6%)	24 (41.4%)	< 0.001
	Non-poor	121 (22.1%)	427 (77.9%)	

3.3. Prevalence of depression among T2DM outpatients

The prevalence of depression among outpatients with T2DM was found to be 25.6%. Among 606 study participants, 15.2%, 6.9% and 3.5% were classified as having mild, moderate and severe form of depression respectively.

In this study, sex, education level, and household economic situation illustrated statistically significant differences according to depression ($p<0.05$). The proportion of depression was higher among women than that among men (28.9% vs 20.9%, $p<0.05$). Moreover, patients who attended secondary school or above had a lower proportion of depression (21.1%) than those attended primary school or less (32.4%). The household economic situation was strongly associated with depression: poor household income group showed a considerable higher percentage of depression (58.6%) compared to non-poor household group (22.1%). No statistically significant difference in depression was found by age, marital status, residence, and occupation characteristics (Table 3).

Table 4. Bivariate and multivariate analysis of depression among T2DM outpatients at the Endocrine Center in Quang Ngai Province, Vietnam (n = 606)

		COR (95%CI)	p-value	AOR (95%CI)	p-value
Sex					
	Male	1		1	
	Female	1.533 (1.048-2.243)	0.028	1.223 (0.753-1.986)	0.416
Education level					
	Secondary school and above	1		1	
	Illiterate/Primary school	1.691 (1.162-2.461)	0.006	1.379 (0.851-2.233)	0.192
Household economic status					
	Non-poor	1		1	
	Poor	4.999 (2.855-8.754)	<0.001	**2.434 (1.157-5.12)**	**0.019**
Duration of diabetes					
	< 5 years	1		1	
	5 to < 10 years	1.674 (1.091-2.567)	0.018	1.615 (0.959-2.722)	0.072
	≥ 10 years	1.888 (1.174-3.034)	0.009	1.728 (0.936-3.193)	0.081
Accompanied chronic disease					
	No	1		**1**	
	Yes	2.224 (1.298-3.812)	0.004	**2.632 (1.334-5.192)**	**0.005**
Controlling fasting blood glucose					
	Good	1		1	
	Bad	1.686 (1.098-2.589)	0.017	1.354 (0.803-2.285)	0.256
Family history of depression					
	No	1		1	
	Yes	5.189 (2.972-9.062)	<0.001	1.828 (0.855-3.912)	0.12
Physical activity					
	Yes	1		1	
	No	4.944 (3.344-7.310)	<0.001	**4.710 (2.973-7.462)**	**<0.001**
Frequent family conflict					
	No	1		**1**	
	Yes	10.880 (6.223-19.022)	<0.001	**6.142 (3.025-12.47)**	**<0.001**

Frequent social conflict					
	No	1		1	
	Yes	2.142 (1.1-4.17)	<0.025	1.131 (0.427-2.994)	0.804
Social support					
	Strong	1		1	
	Poor	7.478 (4.47-12.51)	<0.001	**5.415 (2.936-9.988)**	**<0.001**

cOR: Crude odds ratio
aOR: Adjusted odds ratio
CI: Confidence interval

3.4. Factors associated with depression among T2DM outpatients

Table 4 shows the results of bivariate analysis and multiple logistic regression analysis regarding depression among T2DM outpatients. Overall, the factors included female, illiterate/primary school, poor household economic status, duration of diabetes from 5 years and above, having accompanied chronic disease, bad control of fasting blood glucose, having family history of depression, no physical activity, having frequent family conflict, having frequent social conflict, and having poor social support were associated with higher prevalence of depression in the bivariate analysis. In the multivariate logistic regression analysis, poor household economic status (AOR: 2.434, 95%CI = 1.157, 5.12), having accompanied chronic disease (AOR: 2.632, 95%CI = 1.334, 5.192), no physical activity (AOR: 4.71, 95%CI = 2.973, 7.462), having frequent family conflict (AOR: 6.142, 95%CI = 3.025, 12.472), and having poor social support (AOR: 5.415, 95%CI = 2.936, 9.988) were found to be statistically significant associated with depression among T2DM patients.

4. DISCUSSION

Of the total 606 participants with T2DM at the Endocrine Center in Quang Ngai Province, Vietnam, 25.6% was the prevalence of depression, and it was also identified that associated factors with depression included: poor household economic status, having accompanied chronic disease, lack of physical activities, having frequent family conflicts, poor social support.

The overall prevalence of depression among T2DM outpatients was 25.6%. Of them, 15.2% were mildly depressed, 6.9% were moderately depressed, and 3.5% were severely depressed. Compared with the other studies using the PHQ-9 scale for screening globally, the proportion of depression in our study was lower than in Spain, Pakistan, Saudi Arabia and India (Albasheer et al., 2018; Cols-Sagarra et al., 2016; Khullar et al., 2016) and was in line with the cross-sectional study conducted in Ethiopia (Engidaw et al., 2020). Among a total of 411 patients in Spain, Cols-Sagarra et al. found 29.2% of patients met the diagnostic criteria of depression, of whom 17% had known depression and 12.2% undiagnosed depression (Cols-Sagarra et al., 2016). In addition, 37.6%, 44% and 65.02% were proportion of depression reported in Saudi Arabia, Pakistan and India, respectively (Albasheer et al., 2018; Khullar et al., 2016). From all of the above, there is a difference in the prevalence of depression among T2DM patients between countries from the overview of literature, depending on methodology, sample size, survey tool and selected cut-off score of depression scale. In particular, depression in the current study was assessed by patient health questionnaire-9 (PHQ-9) while HADS (Hospital Anxiety and Depression Scale) or CES-D was used in other study (Khuwaja et al., 2010). The other explanation of the difference can be attributed to differences in socio-economic, cultural, ethnic characteristics and health care system. In Vietnam context, social connectedness due to community lifestyles and perceived feeling of family support from multi-generation family might be protective factors against depression among T2DM outpatients. Moreover, health care management system in Vietnam also focused on preventing and controlling non-communicable diseases, in particularly, diabetes outpatients are monitored regularly every month and have their blood glucose tested. It would be well-environment for patient's medical adherence and reducing their stress during treatment.

The second aim of this study was to identify the associated factors of depression among T2DM outpatients. It is well documented that poor

household economic status is significantly associated with depression among diabetes patients (Wu et al., 2011; Islam et al., 2015) and this resultsalso showed a similar association. The possible explanation is that the expensive expenditures for diabetes treatment, decreasing labor productivity due to chronic disease lead to economic instability. Then, access to health care services, as well as treatment adherence is difficult. It becomes a vicious circle that interaction between economic status - access to services - effectiveness of treatment and burden of disease disability. Moreover, there will be many complications when diabetes is not treated well. All of which contribute to an increase in depression (Ganasegeran et al., 2014).

Diabetes comorbid conditions like hypertension, dyslipidemia has been known to intensify disease complications and poor treatment outcomes (Mooradian, 2009; Pouwer et al., 2003; Téllez-Zenteno and Cardiel, 2002). This study found T2DM outpatients having accompanied chronic diseases were significant 2.6 times more likely to have depression than those without comorbid conditions. Ganasegeran et al. found similar findings (Ganasegeran et al., 2014).

T2DM outpatients who were physical inactivity were 4.7 times more likely to have depression than physical activity patients in multivariable logistic regression model. It is well known that being physical inactivity is significantly associated factor of depression among diabetes patients (Koopmans et al., 2009; Salinero-Fort et al., 2018; Lloyd et al., 2018). Accordingly, physical activity will help to maintain a healthy body, a fresh mind, promoting social-relationships, and reducing stress in daily life. It becomes a key to deal with depression. In detail, diabetes patients who have regular exercise will burn excess energy, control blood sugar through reducing insulin resistance by losing weight, especially obesity patients.

The odds of developing depression among T2DM patients who had frequent family conflict were 6.1 times more likely when compared with patients who had no family conflict. Similar finding was found in Bangladesh (Islam et al., 2015). The family climate has important roles in promoting treatment adherence, also reducing the stress of patients during treatment process. Conflict in family might contribute or increase the symptom of depression in T2DM patients, who might feel themselves as a burden of family and society. Then, family environment should be key point to decrease the depression among T2DM outpatients.

The social isolation reduces social support, which can have undesirable influence on physical and mental wellbeing. If the treatment is delayed due to poor social support, the patient will have an early sign of diabetic-related complication which predispose the patient to different psychiatric disorders including depression (Ramkisson et al., 2017). The present study found a significantly higher depression among T2DM outpatient having poor social support in comparison to those having strong social support. This result was similar in the study conducted in Ethiopia and Spain (Salinero-Fort et al., 2018; Engidaw et al., 2020).

Some studies observe the significant association between gender, education level, family history of depression, duration of diabetes and depression among T2DM outpatients. This study just showed the significantly related between those factors and depression in bivariate analysis. After adjusting all factors in final multivariable logistic regression, those were no significant.

Strength and Limitations of the study

The strength of this study is that it was carried out among a relatively high sample size with a very high response rate and used validated tool to measure depression. The study contributes to the existing knowledge of depression and its associated factors among T2DM outpatients in Vietnam. However, some of the limitations of the current study should be noted when interpreting the results. First, the information is self-reported, recall bias could have occurred during the collecting data process. Second, the present study was only a cross-sectional snapshot, we could not assess the temporal relationship between depression, and others diabetes related variables. Then, causality cannot be attributed. Third, study participants were recruited from health facility, therefore, limiting the generalizability of the findings to all T2DM patients in the community.

5. CONCLUSION

Depression is prevalent among T2DM patients. Poor household economic status, having accompanied chronic disease, lack of physical activities, having frequent family conflicts, and poor social support were the factors associated with depression. Early detection and treatment of depression among diabetic patients should be taken into account for clinicians. Health education should be emphasized for patients and family members

regarding the importance of physical activities, family and social relationship and support as well as management of accompanied chronic disease in the prevention of depression among T2DM patients.

Declaration of conflicting interests

The authors declare no conflict of interest.

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