ORIGINAL RESEARCH

Depressive symptoms among elderly diabetic patients in Vietnam

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Background and aims: Depression and diabetes are becoming increasingly prevalent within the Vietnamese elderly population. However, the linkage between these health conditions in the Vietnamese elderly has not yet been fully investigated. This study aimed to assess the level of depressive symptoms and associated factors among elderly diabetic patients.

Methods: A cross-sectional study was conducted at National Geriatric Hospital in the elder patients aged ≥60 years with type 2 diabetes mellitus (T2DM). Depressive symptoms were assessed using the Geriatric Depression Scale, with three categories: normal (0–4 points), mild (5–9 points), and moderate/severe depressive symptoms (≥10 points). We obtained information on the patient's sociodemographic, medical history, glycemic control (fasting plasma glucose and HbA_{1c}), daily activities (activities of daily living [ADLs] and instruments activities of daily living [IADLs] scale), and fall risks (Time Up and Go test). Logistic regression was used to analyze the factors associated with the presence of depressive symptoms.

Results: Among 412 patients, 236 (57.3%) had HbA_{1c} level at 7.0% or higher. There were 327 (79.4%) patients having depressive symptoms. The level of HbA_{1c} was significantly different between the depressive symptom group and the non-depressive symptom group (7.74% and 6.61%, $P<0.05$). The increased likelihood of having depressive symptoms was associated with having risk of falls (OR: 5.50; 95% CI: 1.88–16.11), suffering from 5–10 years of diabetes (OR: 2.74, 95% CI: 1.28–5.85), uncontrolled fasting plasma glucose (OR: 4.06, 95% CI: 1.81–9.12), and an impairment of IADLs (OR: 5.74, 95% CI: 2.24–14.7).

Conclusion: This study highlights a high prevalence of depressive symptoms among elderly T2DM patients in Vietnam, suggesting an urgent need for screening depressive symptoms and providing mental health care services to this population promptly, particularly to those suffering from diabetes for a long period of time or co-functional impairments.

Keywords: elder, depressive symptoms, diabetes, Vietnam

Introduction

Type 2 diabetes mellitus (T2DM) has been considered a global public health problem.[1–5] A recent estimate indicates that 422 million people are living with diabetes, accounting for 8.5% of the global adult population.[6] In the elderly population, T2DM is one of the top three leading causes of burden of diseases.[7] Complications of diabetes in both short term (eg, hypoglycemia) and long term (eg, stroke, kidney failure, leg amputation, vision loss) substantially reduce their physical functions, work productivity, and quality of life.[8–10] Moreover, older patients with diabetes have a significantly higher risk of premature death and a shortened life expectancy.[11]

Comorbid depression may worsen the outcomes of T2DM. Prior research emphasizes a bidirectional association between diabetes and depressive symptoms and that patients diagnosed with diabetes were twice as likely to suffer from depressive symptoms.[12,13] The correlation between these illnesses is attributed partly to the stress and anxiety due to serious complications of the disease.[14] Meanwhile, individuals with depressive symptoms are more prone to lead unhealthy lifestyles (eg, overeating or physical inactivity), resulting in the development of diabetes.[15] In terms of treatment, depressive symptoms may impede medication adherence and self-care regimens (eg, balanced diet, physical activity) among diabetic patients, leading to additional impairments, the reduction of quality of life, and an elevated health care cost and utilization.[10,12,16]

Depression or depressive symptoms among T2DM patients is varied across settings. A systematic review by Roy et al found that the overall prevalence of depression in individuals with T1DM and T2DM were 12% (5.8%–43.3%) and 19.1% (6.5%–33%), respectively.[17] In India, the rates of depression among patients with diabetes were from 7% to 84%.[18] In Japan, Ishizawa et al conducted a study in 4,283 elderly diabetic patients using the Patient Health Questionnaire 9 and found that 30.6% of patients had depressive symptoms (from mild to severe).[19] Other studies in Taiwan, China, and Poland employed the Geriatric Depression Scale (GDS) and indicate that the rates of depression in T2DM elderly patients were 15.4%, 26.0%, and 29.7%, respectively.[20–22] Notably, depressive symptoms are often not well-recognized and treated in clinical settings;[11] thus, it is essential to identify the patterns of depressive symptoms among T2DM elderly patients in order to provide timely treatment and reduce disease burden.

Vietnam has been undergoing an epidemiological transition from communicable diseases to noncommunicable diseases in recent years,[23] and the prevalence of diabetes among Vietnamese people has been increasing rapidly, particularly in urban areas. For instance, in Ho Chi Minh City, the diabetes rate rose from ~2.5% in the early 1990s to >11% in 2008.[24,25] Because of the dearth of evidence about depressive symptoms among T2DM elderly people in Vietnam, this study aimed to explore the prevalence of depressive symptoms in this population and to identify associated factors.

Research design and methods
Study designs and sampling method
We conducted a cross-sectional study from October 2015 to October 2016 at the National Geriatric Hospital in Hanoi,

Vietnam. Patients were invited to enroll in the study if they met the following inclusion criteria: 1) aged ≥60 years; 2) diagnosed with T2DM according to the WHO guidelines; 3) agreed to participate; 4) be able to answer the questionnaire; and 5) did not have any acute and severe diseases such as stroke, acute renal failure, or cognitive impairments. We applied a formula for a proportion with a specified relative precision to calculate the sample size of this study. With the confidence level of 0.05, a relative precision of 0.15, and the expected proportion of depressive symptoms among T2DM patients at 30.6% (according to a previous study in Japan),[19] we found that the essential sample size was 388 T2DM elderly patients. To compensate for the patients who might not answer the questionnaire completely or might end up refusing to participate, an additional 10% was added to the sample size. Eligible patients were recruited by a convenient sampling technique until the final sample size of 427 was reached. However, after explaining the research, 15 of the selected patients decided not to enroll. Finally, data of 412 patients (96.5%) were used for analysis.

Ethical approval
The study protocol was approved by the institutional review board of the National Geriatric Hospital. Patients were invited to participate in the study and, if they agreed to join, were asked to give their written informed consent. They could withdraw anytime without impacting their current treatment. Their information was kept confidential and used only for research purposes.

Data measurements
In this study, a structured questionnaire was used to collect sociodemographic information (age, gender, occupation, marital status, and education) and clinical information (duration of diabetes, comorbidities, blood pressure, body mass index, fasting plasma glucose, and HbA_{1c}) from patients. The data collection team included well-trained medical doctors and undergraduate medical students.

A 15-item GDS was employed to measure the presence of depressive symptoms. This instrument consisted of 15 items with yes/no answers. The range of total score was from 0 to 15, which could be classified into three categories: normal (0–4 points), mild (5–9 points), and moderate/severe depressive symptoms (≥10 points).[26] GDS had been used and validated previously in the context of Vietnam.[27]

Activities of daily living (ADLs) and instrumental activities of daily living (IADLs) instruments were used to evaluate the capabilities to perform daily activities without

assistance.[28] The ADLs (six items) measured the ability of patients to do daily activities by themselves. The range of score was from 0 (complete dependence) to 6 (complete independence).[29] Meanwhile, the IADLs (eight items) assessed the ability to use a telephone, to cook, to shop, do laundry, do housekeeping, manage finances, take medications, and prepare meals. The score range was from 0 (complete dependence) to 8 (complete independence).[30]

The Time Up and Go Test (TUGT) was also used to determine the fall risk of patients. A 45 cm chair was used with a mark 3 m away from the chair on the floor. The patients performed the test after hearing verbal instructions. They began the test by sitting on the chair, then standing up, walking to the mark, turning around, returning to the chair, and finally sitting down again.[31] A digital stopwatch was used to record the testing time. Patients had a higher risk of falling if the time they took to complete the test was 12 seconds or above.[31]

Statistical analysis

SPSS software version 16.0 was used to analyze the data. Mann–Whitney U test, t-test, and chi-squared test were employed to measure the difference of characteristics between those with and without depressive symptoms. A P-value <0.05 was considered statistical significance. Multivariate logistic regression was employed to identify the potential factors associated with the presence of depressive symptoms among elderly patients with T2DM. A stepwise backward selection strategy, which started with a full model, was used with the P<0.2 as a threshold of log likelihood test to remove the variables to construct the reduced multivariate models.

Results

Among the 412 patients, the mean age was 71.9 (SD =7.6) years. The majority were females (56.5%), having a high school education or above (86.7%), retired (94.6%), and living with a spouse (93.2%). About 20.6% of the patients did not experience any depressive symptoms. Meanwhile, the rates of mild and moderate/severe depressive symptoms were 69.4% and 10.0%, respectively (Table 1).

Table 2 shows that the proportion of depressed patients living with a spouse was significantly lower than it was in single and widow groups (P<0.01). Likewise, the rate of depressive symptoms in patients with age ≥75 years old was also higher compared to those with an age under 75 years old. Other sociodemographic factors were not found to be significantly different between those with and without depressive symptoms.

Table 1 Depressive symptoms among type 2 diabetes mellitus patients

Categories of depressive symptoms	n	%
Normal	85	20.6
Mild	286	69.4
Moderate to severe	41	10.0
	Mean	**SD**
Geriatric Depression Score	6.2	2.2

Table 3 reveals that statistically significant differences were found in history of hypertension, duration of diabetes, current treatment regimes, fasting plasma glucose levels, HbA$_{1c}$, ADLs, IADLs, fall risk, and body mass index between those with and without depressive symptoms (P<0.05).

The results of multivariate logistic regression are shown in Table 4. Age, higher education, higher duration of diabetes, having IADLs impairment, fasting plasma glucose >7.2 mmol/L, and having fall risk were positively associated with the occurrence of depressive symptoms among T2DM patients. Meanwhile, people with a history of hypertension and a history of cardiovascular diseases were less likely to suffer from depressive symptoms.

Discussion

Our study provides an insight into the mental health of T2DM elderly patients in Vietnam. This study highlights a substantially high rate of depressive symptoms among elderly T2DM patients and determines which patients should require more attention from clinicians and public health practitioners.

In this study, we found that the prevalence of depressive symptoms among respondents was 79.4%, of which 69.4% of the patients had mild depressive symptoms and 10.0% had moderate to severe depressive symptoms. Our finding was 4.6 times higher compared to the rate of 17.2% among general Vietnamese elders.[27] In addition, this was also much higher than the results from previous studies done in Japan, China, Taiwan, and Poland.[20–22,32] This could be explained by the differences in setting and instruments used for measuring depressive symptoms. We enrolled the sample from one national hospital, a tertiary care center, where patients having a poor health status might be referred by other hospitals. Because our sample included elderly patients, we could not evaluate whether or not the severity of depressive symptoms in our population was more prevalent than it was in the young patients.[19] However, the results of this study raised concerns for the urgent need of early detection of depressive symptoms and treatment among T2DM elderly patients.

After adjusting sociodemographic characteristics, we found positive associations between GDS score and IADLs

Table 2 Differences between patients with and without depressive symptoms by sociodemographic factors

Characteristics	Having depressive symptoms		Not having depressive symptoms		Total		*P*-value
	n	%	n	%	n	%	
Age group							
<75 years	180	70.6	75	29.4	255	61.9	<0.01
≥75 years	147	93.6	10	6.4	157	38.1	
Gender							
Female	185	79.4	48	20.6	233	56.5	0.99
Male	142	79.3	37	20.7	179	43.5	
Education							
<High school	51	86.4	8	13.6	59	14.3	0.13
High school	161	80.9	38	19.1	199	48.3	
>High school	115	74.7	39	25.3	154	38.4	
Occupation							
Retirement	306	79.1	81	20.9	387	94.6	0.21
Farmer	9	69.2	4	30.8	13	3.2	
Self-employed	9	100.0	0	0.0	9	2.2	
Marital status							
Single	3	100.0	0	0.0	3	0.7	<0.01
Living with spouse	299	77.9	85	22.1	384	93.2	
Widow	25	100.0	0	0.0	25	6.1	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	
Age, years	73.0	7.7	67.6	5.4	71.9	7.6	<0.01

and TUG, which reaffirmed the bidirectional relationship between functional disability (measured by ADLs and IADLs), fall risk (measured by TUG test), and the occurrence of depressive symptoms as mentioned in previous studies.[12,13,16,20–22,33,34] Furthermore, depressive symptoms were identified to be associated with T2DM control,[35] and depressed patients had a significantly higher plasma glucose and HbA$_{1c}$ concentration.[10]

Our findings revealed that there was a significant relationship between duration of diabetes and the risk of depressive symptoms, which is in line with previous findings among T2DM patients and patients with other diseases.[20,36] Diabetes is a noncommunicable disease which requires a long-term treatment; hence, the patients might not only be concerned about their health but also be worried about their families and their socioeconomic status. All of these issues facilitate the occurrence of depressive symptoms. In addition, we found that patients with history of hypertension and cardiovascular diseases were less likely to have depressive symptoms. This might be because these diseases required long-term treatment and self-care management as diabetes; thus, these patients were prepared with sufficient capacities to cope up with the long-term treatment, leading to the decrement in the risk of depressive symptoms. Indeed, we observed that

those patients having history of these diseases regularly received short-term intensive trainings, which improve their self-efficacy in coping psychological issues-related hypertension and cardiovascular diseases. Therefore, it is necessary to provide appropriate counseling and training for elderly T2DM patients in the initial treatment stage to control the complications of diabetes as well as reduce the risk of depressive symptoms.

Notably, we found a preliminary evidence about the relationship between being treated by injecting insulin and the presence of depressive symptoms although this result was not statistically significant. Previous studies worldwide had highlighted this association.[16,20,37,38] Some authors argued that T2DM patients could use self-management to treat the disease. Therefore, when injecting insulin, patients might have depressive symptoms due to experiencing pain, feeling uncomfortable in daily life, being frequently hospitalized, and reducing quality of life.[38,39] Noh et al also emphasized that insulin-treated patients might more frequently experience some negative emotions such as hopelessness, dissatisfaction, and feeling punished compared to patients who were receiving oral drug regimens.[39] Moreover, these patients might have misconceptions about the side effects of insulin and assume that taking insulin meant their treatment was failing as well

Table 3 Differences between patients with and without depressive symptoms by clinical characteristics

Characteristics	Depression		Non-depression		Total		P-value
	n	%	n	%	n	%	
History of diseases							
Hypertension	243	74.3	77	90.6	320	77.7	0.01
Dyslipidemia	121	37.0	35	41.2	156	37.9	0.48
Stroke	48	14.7	7	8.2	55	13.3	0.12
Heart disease	52	15.9	17	20.0	69	16.7	0.37
Duration of diabetes (years)							
<5	72	22.0	56	65.9	128	31.1	<0.01
5–10	158	48.3	21	24.7	179	43.4	
>10	97	29.7	8	9.4	105	25.5	
Current treatment regime							
OAD	119	36.4	60	70.6	179	43.5	<0.01
Insulin + OAD	141	43.1	20	23.5	161	39.0	
Insulin	67	20.5	5	5.9	72	17.5	
Plasma glucose (mmol/L)							
≤7.2	104	31.8	68	90.0	172	41.7	<0.01
>7.2	223	68.2	17	20.0	240	58.3	
HbA1c (%)							
<7.0	111	33.9	65	76.5	176	42.7	<0.01
≥7.0	216	66.1	20	23.5	236	57.3	
ADLs							
Decrease (<6 points)	185	56.6	9	10.6	194	47.1	<0.01
Normal (6 point)	142	43.4	76	89.4	218	52.9	
IADLs							
Decrease (<8 points)	255	78.0	13	15.3	268	65.0	<0.01
Normal (8 points)	142	43.4	72	89.4	218	52.9	
Fall risk (TUG test)							
Yes (time ≥12 seconds)	314	96.0	52	61.2	366	88.8	<0.01
No (time <12 seconds)	13	4.0	33	38.8	46	11.2	
Current smokers							
Yes	314	96.0	80	94.1	394	95.6	0.44
No	13	4.0	5	5.9	18	4.4	
	Mean	SD	Mean	SD	Mean	SD	
Body mass index (kg/m^2)	23.8	2.2	22.9	2.5	23.1	2.4	<0.01
SBP (mmHg)	136.1	14.1	136.3	14.1	136.2	14.1	0.93
DBP (mmHg)	82.1	6.7	82.3	7.4	82.2	7.3	0.83

Abbreviations: ADLs, activities of daily living; IADLs, instrumental activities of daily living; TUG, Time Up and Go Test; OAD, oral antidiabetic drug.

Table 4 Multivariate logistic regression to identify factors associated with the presence of depressive symptoms among type 2 diabetes mellitus patients

Characteristics	Having depressive symptoms (yes vs no)			
	OR	P-value	95% CI	
Age	1.11	<0.01	1.04	1.20
Education (vs< high school)				
>High school	3.09	<0.01	1.38	6.92
History of hypertension (yes vs no)	0.15	<0.01	0.05	0.47
History of cardiovascular diseases (yes vs no)	0.30	<0.01	0.12	0.78
Duration of diabetes (vs <5 years)				
5–10 years	2.74	<0.01	1.28	5.85
Current treatment regimen (vs OAD)				
Insulin	2.56	0.16	0.68	9.61
IADLs (decrease vs normal)	5.74	<0.01	2.24	14.70
Plasma glucose (>7.2 mmol/L vs ≤7.2 mmol/L)	4.06	<0.01	1.81	9.12
HbA1c (≥7.0% vs <7.0%)	1.94	0.12	0.83	4.49
Fall risk (yes vs no)	5.50	<0.01	1.88	16.11

Abbreviations: IADLs, instrumental activities of daily living; OAD, oral anti-diabetic drug.

as afraid of the high risk of hypoglycemia.[40] This result raised a caution in mental health care for the elderly insulin-treated diabetic patients.

This study has some limitations. First, this study used the convenience sampling method to recruit patients in one tertiary hospital, restricting the generalizability of our findings to other community, primary and secondary care settings. In addition, the causal relationships between the occurrence of depressive symptoms and T2DM, as well as other covariates could not be established due to the limitation of cross-sectional study. Third, we did not collect some potential variables such as receiving short-term training in noncommunicable disease management or history of mental health, which may be important associated factors of depressive symptoms. Finally, GDS in this study could not be used to confirm depression among our patients without clinical diagnosis. Previous research studies claim that there might be misconception between depression and diabetes distress, which referred to emotional responses to the disease, when measuring depression in T2DM patients.[34,41,42] Therefore, further studies with clinically confirmed depression among patients with T2DM in various hospital settings should be warranted to develop comprehensive mental health care services for these patients in Vietnam.

Conclusion

This study highlights a high prevalence of depressive symptoms among elderly T2DM patients in Vietnam, suggesting an urgent need for screening depressive symptoms and providing mental health care services to this population promptly, particularly those suffering from diabetes for a long period of time or co-functional impairments.

Data availability

The data sets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Disclosure

The authors report no conflicts of interest in this work.

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