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Original article

Depression in patients with type 2 diabetes attending at Chao Phya Abhaibhubejhr Hospital

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Background: Diabetes mellitus (DM) is one of the most common public health problems worldwide. It is a chronic, debilitating disease that needs lifelong care for both physical and psychological aspects. Previous studies on depression in diabetic patients are scant in Thailand.

Objective: To determine the prevalence of depression and its associated factors in patients with type 2 diabetes at Chao Phya Abhaibhubejhr Hospital, Prachinburi Province.

Methods: A cross-sectional descriptive study was conducted among patients with type 2 diabetes at the Outpatient Clinic of Chao Phya Abhaibhubejhr Hospital, Prachinburi Province, Thailand from August to December 2017. The instruments were demographic and clinical characteristics questionnaires, the Thai Hospital Anxiety and Depression Scale (Thai HADS), Health Perception Questionnaire, and family status and functioning assessment scale. The statistics used to analyze data were frequencies, percentages, mean and standard deviation, Chi-square test, Fisher exact test, Pearson product-moment correlation coefficient and logistic regression.

Results: Of the total 355 participants, the mean age was 55.7 years, 60 % had been diagnosed type 2 diabetes for more than 5 years; 25 % had used traditional herbs. The prevalence of depression in patients with type 2 diabetes was 20.8 %. Depression was significantly related to the age group above 50 years old, unemployment, licorice herb use and lower family functioning.

Conclusion: One-fifth of the patients with type 2 diabetes were found to have depression. The results of this study will be beneficial for recognizing depression and providing appropriate care for patients with type 2 diabetes.

Keywords: Depression, diabetes type 2, licorice, family functioning.

Diabetes mellitus type 2 is one of the most common chronic diseases;⁽¹⁾ it imposes an increasing economic burden on national healthcare systems worldwide.⁽²⁾ The data represented by the National Survey of Risk Factors for Non-Communicable Diseases of Thailand indicate that the number of patients suffering from diabetes is 8.9%, equal to 4 million patients. The disease is associated with serious complications and commonly found comorbidities which affect one's health.⁽³⁾ The disease also has a great impact on the psychological and social performance of diabetic patients. Depression is a

common mental disorder characterized by sadness, loss of activities and by decreased energy. It is more common in medically ill individuals including diabetes. Patients with type 2 diabetes mellitus often have depression⁽⁴⁾, impaired family functioning and quality of life.^(5,6) The presence of diabetes doubles the odds of comorbid depression. The prevalence of comorbid depression was significantly higher in diabetic women (28%) than in diabetic men (18%).⁽⁴⁾ Wang J, *et al.* reported a significantly negative relationship between family function and quality of life in Chinese patients with diabetes type 2.⁽⁵⁾ Significant evidence supports a range of interventions and strategies to improve diabetes outcomes.⁽⁷⁾ Thailand is facing increasing numbers of patients with diabetes and the Thai government recognizes the burden of diabetes and has launched nationwide programs of health promotion and disease prevention.⁽⁸⁾ Addressing the psychological

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and family factors related to diabetes is very important. Understanding depression would be expected to produce substantial health benefits and improve the outcomes of patients with diabetes in Thailand. Prachinburi Province was found to have the second highest prevalence rate of diabetes in Thailand. Therefore, this study was conducted to determine the prevalence of depression and associated factors in patients with type 2 diabetes at Chao Phya Abhaibhubejhr Hospital, Prachinburi Province.

Methods

A cross-sectional study was conducted at the Outpatient Clinic of Chao Phya Abhaibhubejhr Hospital, Prachinburi Province, Thailand. The recruited subjects were 355 adults with type 2 diabetes attending the Outpatient Clinic, Chao Phya Abhaibhubejhr Hospital from August to December 2017. They were able to understand Thai language and willing to participate in the study. Systematic random sampling was employed by randomly choosing a number to start with. The patients who received the queue numbered would be prioritized for selection; then every four persons would be recruited until the sample size was reached. The study has been approved by the Institutional Review Board (IRB) of the Faculty of Medicine, Chulalongkorn University IRB NO.179/60 and of the Chao Phya Abhaibhubejhr Hospital. Written informed consent was obtained from each subject who agreed to participate in the study. Self-administered questionnaires were used and a fasting blood glucose level was recorded.

Measures

Demographic information (such as age, gender, marital status, educational level, occupation), clinical characteristics (regarding medical illnesses, duration of diabetes, history of substances and herbal use) and other relevant information were assessed. Depression was assessed by the Hospital Anxiety and Depression Scale (HADS). The HADS was developed by Zigmond S, *et al.*⁽⁹⁾ and the Thai version of HADS was developed by Nilchaikovit T, *et al.*⁽¹⁰⁾ It comprises fourteen items for two sub-scales. Each of the two sub-scales relates to anxiety and depression and consists of seven items which obtain responses on a four-point Likert scale, ranging from 0 = mostly to 3 = not at all. Possible sub-scale scores range from 0 to 21. Even numbered questions are for depression. Recommended cut-off scores according to Zigmond S, *et al.*⁽⁸⁾ are 8 – 10 for doubtful cases and 11 or

above for definite cases. An optimal balance between sensitivity and specificity was found using a cut-off score of 8 or above for HADS Depression.⁽¹¹⁾ For statistical purposes, HADS scores on the depression subscale were calculated and participants with a depression score of 8 or more were considered to have depression.⁽¹⁰⁾ The Cronbach's alpha coefficient of depression sub-scale was 0.83.

Health perception was assessed by the Health Perception Questionnaire.⁽¹²⁾ This scale was developed by Chaninphon Temrat for her research. It was modified from the health belief questionnaire of Wongwairoj A.⁽¹³⁾ that is based on the concept of health belief model by Becker MH, *et al.*⁽¹⁴⁾ The questionnaire consisted of 20 questions related to 4 aspects of health perception. Moreover, 8 questions related to diabetes perception were also added to the questionnaire. Therefore, this questionnaire contained 28 questions in total. The content validity was verified by 3 specialists: a psychiatrist, a general practitioner and a nurse; and the Cronbach's Alpha coefficient of the research tool was 0.84. Each question of the questionnaire was on a 5-point Likert response from 1 = strongly disagree to 5 = strongly agree. The results from the sum of the total items ranges from 5 to 140 and were categorized into 3 levels of health perception: 50% and lower indicate mild; 51% - 69% indicate moderate; and 70% - 100% indicate high.

Family functioning was assessed by the family state and functioning assessment scale (FSFAS)⁽¹⁵⁾ that was based on the Family Assessment Device (FAD) questionnaire designed by Epstein NB, *et al.*^(16,17) and the Chulalongkorn Family Inventory by Trangkasombat U.⁽¹⁸⁾ This instrument appraises five family factors on a 4 - Likert response from "1 = strongly disagree" to "4 = fully agree". The scale is composed of both positive and negative statements, and recoding score on negative statement items should be done before calculating the total score. The positive statements are items number 2, 4, 5, 6, 8, 9, 10, 12, 17, 20, 23, 24, 25, 26, 27, 29, 30 and the negative statements are the remaining items. The total score of the FSFAS is obtained by summing the raw scores across 30 items that can range from 30 to 120 and then one can also calculate the mean score ranged from 1 to 4. The higher the score the better the family is functioning. Cronbach's alpha coefficient of this test in the Epstein NB, *et al.* study was 0.92, in the Trangkasombat study was 0.8, in the Suppapatiporn study was 0.87 and in the present study was 0.8.

Statistical analyses

To summarize the characteristics of the participants, descriptive statistics, percentage and frequency were used for categorical variables and mean, standard deviation were calculated for continuous variables. Chi-square test, Fisher exact test, Pearson product-moment correlation coefficient and logistic regression were used to explore the relationships between depression and other variables. All statistical tests were considered significant at P - value < 0.05.

Results

Demographic and clinical characteristics of the study sample are shown in Table 1. The mean age of

the participants was 55.7 years (SD = 13.6). The majority of the patients (78.9%) had medical comorbidities such as hypertension, dyslipidemia and renal problems. Herbal use was found in 25% of the sample. In these, 43 participants used curcuma (12.1%) and 10 used licorice herb (2.8%). More than 60% had fasting blood glucose levels above 126 mg/dL. Of the sample (355), 52 participants had HADS scores for depression between 8 to10 and 22 participants had scores of 11 or above so the prevalence of depression in patients with diabetes type 2 was 20.8 %. Most of them had moderate levels of health perception (84.8%) and good family functioning (75.8%) (Table 2.).

Table 1. Socio-demographic and clinical characteristics of the participants (n = 355).

Variables	Number	Percentage	
Gender	Male/ Female	163/192	45.9/54.1
Age (years) [mean 55.7 (SD13.6), min = 18, max = 89]			
	40 years or lower	48	13.5
	41 – 50	87	24.5
	51 - 60	95	26.8
	61-70	72	20.3
	above 70	53	14.9
Educational			
	No formal education	34	9.6
	Primary school	152	42.8
	Secondary school	56	15.8
	College or graduate or diploma	113	31.8
Employment			
	Unemployed	111	31.3
	Business	122	34.3
	Employee	39	11.0
	Agriculturist	29	8.2
	Government officer	29	8.2
	Others	25	7.0
Comorbidities level			
	No/ Yes	75/280	21.1/78.9
	Hypertension	229	64.5
	Dyslipidemia	203	57.2
	Renal disease	33	9.7
	Others	35	9.9
Duration of diabetes (years) [mean 9.2 (SD 7.6), min = 0.8, max = 50]			
	Less than 1	24	6.8
	1- 5	109	31.0
	5.1 - 10	118	33.5
	More than 10	101	28.7
Blood glucose level (mg/dL) [mean 153 (SD 51.9), min = 53, max = 400]			
	Less than 126	114	32.1
	126 or above	241	67.9
Herbal use			
	No/Yes	265/90	76.4/24.6
	Curcuma	43	12.1
	Bitter gourd	40	11.3
	Indian Gooseberry	34	9.6
	Licorice	10	2.8
	Others	5	4.2

Table 2. Frequency of participants by selected variables.

Variables	Number	Percentage
Thai-HADS [mean 4.6 (SD3.4), min = 0, max = 13]		
No depression (score 0 - 7)	281	79.2
Depression (score 8 or above)	74	20.8
Health perception [mean 73.7 (SD8.6), min = 40, max = 95]		
Mild (score < 50)	33	9.3
Moderate (51 - 69)	301	84.8
High (70 - 100)	21	5.9
Family functioning [mean 2.95 (SD 0.43), min = 2, max = 4]		
Fair (score 1.00 - 1.49)	0	0
Slightly good (1.50 - 2.49)	50	14.1
Good (2.50 - 3.49)	269	75.8
Very good (3.50 - 4.00)	36	10.1

Depression was significantly related to age above 50 years, unemployment, licorice herb use and lower family state and functioning, as shown in Table 3. There was a significant correlation between depression and age, duration of diabetes, family functioning overall, support, communication and problem solving, emotional state, and relationship (Table 4).

Further analysis using logistic regression showed that licorice, as a herb, unemployment, and family functioning (slightly good / good or very good) were independently associated with depression ($P < 0.05$) (Table 5). Statistical analysis indicated no significant associations between depression and fasting blood glucose levels and other herbal use.

Table 3. Association between depression and variables (n = 355).

Variables	No depression	depression	X ²	P - value
	N (%)	N (%)		
Gender				
Male	128 (78.5)	35 (21.5)	0.072	0.789
Female	153 (79.7)	39 (20.3)		
Age (years)				
≤ 50	115 (85.2)	20 (14.8)	4.801	0.028*
> 50	166 (75.5)	54 (24.5)		
Employment				
Unemployed	80 (72.1)	31 (27.9)	4.910	0.027*
Employed	201 (82.4)	43 (17.6)		
Licorice use				
Yes	5 (50)	5 (50)	5.301	0.036*
No	276 (80)	69 (20)		
Family functioning				
Slightly good	34 (68)	16 (32)	10.912	0.004**
Good	212 (78.8)	57 (21.1)		
Very good	35 (97.2)	1 (2.8)		

* $P < 0.05$ ** $P < 0.01$

Table 4. Pearson correlation between depression score and variables.

Variables	<i>r</i>	<i>P</i> - value
Age (years)	0.199	<0.001**
Blood glucose level	0.023	0.668
Duration of diabetes	0.136	0.01*
Health perception	-0.080	1.310
Family functioning	-0.266	<0.001**
Family support	-0.194	<0.001**
Discipline	0.008	0.120
Communication and problem solving	-0.165	0.002**
Emotional state	-0.188	<0.001**
Relationship	-0.197	<0.001**

P* < 0.05 *P* < 0.01

Table 5. Logistic regression for variables associated with depression.

Variables	β	S.E. (β)	<i>P</i> - value	Odds ratio (95% CI of OR)
Unemployment	0.59	0.27	0.028*	1.81 (1.06 - 3.07)
Licorice use	1.59	0.67	0.018*	4.91 (1.31-18.40)
Lower family functioning	0.69	0.33	0.039*	2.00 (1.03 - 3.87)
Constant	-1.542	0.131	<0.001**	

P* < 0.05 *P* < 0.01

Discussion

This study revealed that the prevalence of depression in patients with type 2 diabetes was 20.8 %. Depression was significantly related to age above 50 years, unemployment, licorice herb use and lower family functioning. The prevalence of depression in our study is comparable to studies using the same instrument by Engum A. (19%)⁽¹⁹⁾, Thaneerat T. (28%)⁽²⁰⁾ and Collin MM. (32%)⁽²¹⁾. A higher prevalence of depression was reported from studies among hospitalized diabetes patients (40 - 53.8%)^(22, 23) while a lower prevalence rate was found in the primary care setting (11.5%)⁽²⁴⁾. These have also demonstrated that depression is more common in diabetes patients compared with the general population.⁽²⁵⁾ Recognition of depression would be beneficial for providing appropriate care for patients with type 2 diabetes.

Age and unemployment were associated with depression. These findings are consistent with other studies which also found older age increased the risk of depression^(26, 27) and unemployment as well as retirement were significantly associated with

depression.⁽²⁸⁻³⁰⁾ It is likely that an unemployed person lacks a feeling of stability⁽³¹⁾, lower self-esteem, and is prone to have stress or about financial problems.

Our findings showed that there was a significant correlation between depression and family functioning. Family support, care and relationship are important parts of social support. Perceived support can be understood as a personal subjective evaluation that his or her social network will provide effective help when needed.⁽³²⁾ Due to diabetes being a chronic illness and usually being accompanied by many comorbidities, assessment of family functioning and emphasizing the importance of appropriate family intervention to improve the family's competence in problem solving and to promote better communication in the family should also be addressed in diabetes patients for reducing depression. In addition, previous studies found that family and social support were important aspects of adherence to diabetes management⁽³³⁾ and good family function is associated with better quality of life.⁽³⁴⁾ Moreover, some studies revealed that family functioning is also related to control of diabetes⁽³⁵⁾ but we did not find an association between blood

glucose levels with family functioning and depression. Therefore, individual circumstances, such as age, occupation, duration of diabetes and family factors must be considered and may lead to treatment targets and strategies to improve depression in diabetic patients.

This study showed that approximately 25% of the subjects had used herbs. Sawatsri P. revealed that nearly 60% of type 2 diabetic patients used herbs and indigenous food crop for blood glucose control.⁽³⁶⁾ Herbal use was not associated with glycemic control in our study. However, the finding that licorice use was associated with depression and that the likelihood of diabetes patients having depression being 4.9 times more in those with licorice use was of interest. A study on the effect of licorice on depression in nurses⁽³⁷⁾, showed that it seems this drug can be used to reduce the depressive symptoms. The mechanism may be explained by the certain flavonoids extracted from licorice root that inhibit the re-uptake of serotonin.⁽³⁸⁾ Limited data were available regarding licorice use in diabetes patients and its impact on depression. Therefore, further research is needed to explore the relationships and to show the reasons for our findings. In addition, providing correct information of herbal use for diabetes patients should be concerned with appropriate care for patients with type 2 diabetes.

Nevertheless, there are some limitations which need to be considered in this study. First, the study was conducted on a sample group of type 2 diabetes patients who attended the Diabetes Clinic of the Outpatient Department (OPD), Chao Phya Abhaibhubejhr Hospital, Prachinburi Province. As this hospital is a tertiary referral hospital, it may limit the extent to which these findings could be generalized to other hospitals with different settings. Second, since this study was of a cross-sectional descriptive design, we could not identify the causal relationship between these variables. Third, the Thai Hospital Anxiety and Depression Scale is a screening tool, not usually used for diagnosis of mental disorders. Lastly, fasting blood glucose levels were used for assessing glycemic control due to the limited data of blood HbA1c level.

Conclusion

One-fifth of the patients with type 2 diabetes were found to have depression. Older age, unemployment, licorice herb use and lower family functioning were associated with depression. The results of this study would be beneficial for recognizing depression and providing appropriate care for patients with type 2 diabetes.

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Conflict of interest

None of the authors has any potential conflict of interest to disclose.

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