DEPRESSION AMONG ELDERLY TYPE-2 DIABETICS IN A RURAL COMMUNITY

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Abstract- **Background**: Depression and elderly type 2 diabetes mellitus often coexist but poorly studied. This study evaluates depressive symptoms and the associated risk factors among elderly type 2 diabetes mellitus patients at selected primary care clinics in rural Perak, Malaysia.**Method**:Face-to-face interview was conducted to collate socio-demographic data and medical history among participants. The validated Malay version of the Hospital Anxiety and Depression scale (HADS) questionnaire was used to assess anxiety and depression symptoms. The cognitive impairment was assessed using the Elderly Cognitive Assessment Questionnaire (ECAQ) to screen for cognitive impairment among elderly. **Result**: 510 eligible elderly diabetic patients were screened and 464 consented to participate. Majority of participants were females (58.4%), Malays (64.2%), married (82.3%), had primary education (42.5%) and non-smokers (70%). Their mean age was 59.7 ± 10.2 years. Medical history revealed that hypertension, being either obese or overweight, hypercholesterolemia and having stroke accounted for 76%, 65.9%, 42.7% and 6.3% respectively. The prevalence of depressive symptoms was 15.7% (95% CI 12.4, 19.1). Majority of participants (81.1%) had HbA1c level of 6.5% and above. Using chi-square test, significant associations were found between depression and age 60 years and above ($p<0.05$), unemployment ($p=0.033$), smokers ($p=0.018$), cognitive impairment ($p=0.04$), anxiety symptoms ($p<0.001$) and underweight ($p< 0.038$). **Conclusion**: Depression continues to be a public mental health issue. Its early recognition and prompt treatment are crucial particularly in minority group, unemployed individuals, smokers, cognitive impaired subjects, anxious as well as underweight individuals

Keywords: Depression, Type 2 diabetes, elderly, rural

I. INTRODUCTION

Diabetes and depression are not uncommon in our society today as the prevalence rate of these conditions are rising substantially and is expected to increase in the coming years. Both diabetes and depression are among the five major Non-Communicable Diseases (NCD), which account for over 60% of all death and 48% of the years lost according to Disability Adjusted Life Years (DALYs) worldwide[1, 2]. The five major NCD are cardiovascular disease, cancer, chronic respiratory diseases, diabetes and mental illness [1]. Globally, diabetes accounted for 1.256 million of deaths in the year 2008 and

about 220 million of general population is estimated to be suffering from diabetes worldwide [3]. Depression was also quoted as the leading cause of disability worldwide, with more than 350 million people suffering from it [4].

In Malaysia, diabetes mellitus had affected approximately 2.6 million people and was ranked the third leading cause of total Years Lost Due To Disability (YLD) by the Malaysian National Burden of Disease and Injury Study 2004 [5] while unipolar major depression was ranked second and top most leading cause among males (7.2%) and females with 12.7% [5]. The overall prevalence of diabetes mellitus among

Malaysian adults of age above 18 years old has risen to 15.2% in the Malaysian National Health Morbidity Survey 2011 [6].

Numerous studies on comorbidity between medical illnesses and psychiatric disorders particularly depression have been widely conducted [7, 8]. Comorbidity between these two can be bidirectional or independent. In the case of diabetes and depression, studies found that diabetes has increased risk in leading towards other diseases whereas depression was found to influence the outcome and risks of diabetes [1, 9]. Many studies, including meta-analyses, supported the association between depression and chronic disease like diabetes [10-12]. The depressive symptoms and diabetic complications are debilitating to one another and this was clearly illustrated by Ciechanowski et al[13] who showed high severity of depressive symptoms among participants, were significantly associated with higher days in non-adherence to oral hypoglycemic regimes and more functional impairment. In another study, depression in individuals with diabetes has been associated with poor adherence to dietary recommendation besides incurring high cost of health care [13] and decreased quality of life [14, 15]. Looking at the complications, individuals with diabetes mellitus and depression face particularly hard challenges in successfully managing both the diseases.

Therefore, it is important to look into the prevalence, epidemiology, and risk factors of depression among the diabetics in order to improve the general well-being. Brown et al[14] found that the quality of life among the diabetics decreased with the presence of general co-morbidities and depression. Furthermore, knowing the burden of these conditions and the risk factors, it would certainly serve as a platform for future management and prevention strategies.

A cross sectional study among diabetic patients age 30 years and above involving 12 randomly selected urban primary care clinic in Malaysia showed the prevalence of depression was11.5% [16].
Hence, this study was conducted to determine the prevalence of depressive symptoms and the associated factors among the elderly type 2 diabetics in the rural areas of Malaysia.

II. MATERIALS AND METHODS

Participants and data collection
A cross-sectional study was done among elderly patients with type 2 diabetes mellitus attending 10 primary care clinics in the rural area of Perak, Malaysia.
Participants were screened for eligibility. The purpose of this study and the procedure involved were explained to potential participants. Patients who refused to participate, with known case of depression, anxiety or other psychiatric illnesses were excluded.

Survey questionnaires
Data was collected by trained interviewers through a face-to-face interview using questionnaires. The items included in the questionnaire were age, gender, marital status, educational levels, occupation, household income and smoking status.To reduce recall bias, the information given by patients were verified with their medical records. Detailed medical history was extracted from the medical record. The

body mass index (BMI) was calculated using the formula weight (kg) / [height (m)] ^{2}.

The Hospital anxiety and depression scale (HADS) questionnaire[17] was used to assess anxiety and depression. This is a brief assessment of anxiety and depression, consisting of 14 items divided equally into two subscales for anxiety (7 items) and depression (7 items). Individual items are scored from 0-3 to 3-0, depending on the direction of the item wording. The higher scores indicate the presence of problems. Using psychiatric diagnoses as a gold standard, HADS depression ratings of 7 or less were considered to be non-cases; scores of 8-10 were considered doubtful or borderline cases and scores of 11+ implies definite cases. The cut off point for a 'case' may be either the upper or the lower end of the borderline range. In this study, the researchers included all possible cases and hence, the lower end of borderline (score of 8 for each subscale) was used. The HADS has been validated and used previously in other studies [18]. Pretesting of questionnaire was carried out among similar age group of diabetic patients in another outpatient clinic. Questions which were vague were revised accordingly before the actual study was conducted.

The cognitive impairment was assessed using the Elderly Cognitive Assessment Questionnaire (ECAQ) to screen for cognitive impairment among elderly.The ECAQ is derived from items in the Mini-Mental State Examination and Geriatric Mental State Schedule. It consisted of 10-item that grouped into 3 categories which are memory, orientation and memory-recall. Each correct answer will earn one mark. Scoring with 5 and below was classified as having cognitive impairment.

Sample size estimation
Sample size was estimated using OpenEpi software (http://www.openepi.com/v37/Menu/OE_Menu.htm). Taking depression as an exposure factor, with the confidence interval (CI) of 95%, power of study 80%, the expected frequency of exposure 48%, a minimum sample size of 384 was required.

Training of interviewers
Interviewers were trained through theory and practical means to ensure that they performed as expected. They undergo practical sessions on how to conduct face-to-face interview and extract relevant information from medical record.

Statistical analysis
Data were entered manually into the Statistical Package for the Social Science (SPSS) version 21.0 and cleaned before analyses. Data entry errors were checked by running frequencies and distributions. Both descriptive and inferential statistics were used. The χ^2 test was used to test for statistical significance. All test were two-tailed with significance defined as $p < 0.05$.

Ethical clearance
Prior ethics approval for the research protocol was sought from UniversitiTeknologi MARA (UiTM) ethics committee. Written informed consent was obtained from each participant before recruitment.

III. RESULTS

Socio-demographic variables of the respondents

A total of 510 eligible diabetic patients were screened and 464 consented to participate in this study (giving a response rate of 90.9%).Their mean age was 59.7 ± 10.2 years. Table 1 shows the baseline characteristics of respondents. Majority of the respondents were females (58.4%), Malays (64.2%), married (82.3%)and had primary education (42.5%).

Table 1 Baseline characteristics of respondents

Characteristics	N	%
Age (years)		
<60	214	46.1
≥60	250	53.9
Gender		
Male	193	41.6
Female	271	58.4
Ethnicity		
Malay	298	64.2
Chinese	93	20.0
Indian	73	15.7
Marital Status		
Single	82	17.7
Married	382	82.3
Educational Status		
No Formal Education	64	13.8
Primary	197	42.5
Secondary	172	37.0
Tertiary	31	6.7
Employment status		
Employed	130	28.0
Others	334	72.0

Table 2 presents the clinical characteristics of the respondents. Majority of respondents were non-smokers (70%) while the rest were either current smokers or ex-smokers. Seventy-six percent had history of hypertension, 42.7% hypercholesterolemia, 6.3% stroke and 65.9% were either overweight or obese. The prevalence of anxiety and depression was 14.9% (95% CI 12, 18) and 15.7% (95% CI 12.4, 19.1) respectively. Majority of respondents had HbA1c ≥ 6.5% (81.1%). Twenty-seven (5.8%) respondent was found to have cognitive impairment.

Table 2 Clinical characteristics of respondents

Characteristics	N	%
Smoking history		
Non Smoker	325	70.0
Current Smoker	76	16.4
Ex-Smoker	63	13.6
Hypertension		
No	111	23.9
Yes	353	76.1
Hypercholesterolemia		
No	266	57.3
Yes	198	42.7
Ischemic heart disease		
No	435	93.8
Yes	29	6.3
Stroke		
No	449	96.8
Yes	15	3.2
Anxiety		
No	395	85.1
Yes	69	14.9
Depression		
No	391	84.3
Yes	73	15.7
BMI (kg/m²)		
Normal (18.5 to 25)	150	32.3
Underweight (<18.5)	8	1.7
Overweight (>25)	306	65.9
HbA1c %		
<6.5	71	18.9
≥6.5	305	81.1
Cognitive impairment		
Yes	27	5.8
No	437	94.2

Table 3 shows the association between depression and characteristics of respondents. Using chi-square test, significant association were found between depression and age ≥60 years

(p<0.05), unemployment (p=0.033), smokers (p=0.018), cognitive impairment (p=0.04), anxiety symptoms (p<0.001) and underweight (p< 0.038) respectively.

Table 3 Association between depression and characteristics of respondents

Variable	Depression n (%)	No depression n (%)	χ²	p
Age (years)				
<60	53(13.8)	332(86.2)	6.596	0.010
≥60	20(25.3)	59(74.7)		
Gender				
Male	29(15)	164 (85)	0.125	0.724
Female	44 (16.2)	226 (83.8)		
Ethnicity				
Malay	38 (12.8)	260 (87.2)	5.612	0.060
Chinese	20 (21.5)	73(78.5)		
Indian	15(20.5)	58(79.5)		
Ethnicity				
Malay	38(12.8)	260(87.2)	5.584	0.018
Others	35(21.1)	131 (78.9)		
Marital Status				
Single	0(0)	8(100)	5.778	0.216
Married	60(15.7)	322(84.3)		
Widowed	13(19.4)	54(91)		
Divorced	0(0)	6(100)		
Separated	0(0)	1(100)		
Educational Status				
No Formal Education	9(14.1)	55(85.9)	1.447	0.695
Primary	34(17.3)	163(82.7)		
Secondary	27 (15.7)	145(84.3)		
Tertiary	3 (9.7)	28(90.3)		
Employment				
Employed	12(9.2)	118(90.8)	4.538	0.033
Unemployed	57(16.8)	277(82.9)		
Smoking				
Non Smoker	46(14.2)	279(85.8)	8.047	0.018
Current Smoker	20(26.3)	56(73.7)		
Ex-Smoker	7(11.1)	56(88.9)		
Hypertension				
Yes	53(15)	300(85)	0.575	0.448
No	20(18)	91(82)		
Hypercholesterolemia				
Yes	33(16.7)	165(83.3)	0.227	0.634
No	40(15)	226(85)		
Ischemic heart disease				
Yes	6(20.7)	23(79.3)	0.244	0.621
No	67(15.4)	368(84.6)		
Stroke			0.000	1.000
Yes	2(13.3)	13(86.7)		
No	71(15.8)	378(84.2)		
Cognitive impairment				
Yes	8(29.6)	19(70.4)	4.176	0.041
No	65(14.9)	372(85.1)		
Anxious				
Yes	45(65.2)	24(34.8)	149.71	0.000
No	28(7.1)	367(92.9)		
BMI				
Underweight (<18.5)	3(37.5)	5(62.5)	6.554	0.038
Normal (18.5-24.9)	30(20)	120(80)		
Overweight/Obese (≥25)	40(13.1)	266(86.9)		
HbA1c %				
>6.5	38(12.5)	267(87.5)	0.137	0.712
≤6.5	10(14.1)	61(85.9)		

IV. DISCUSSION

Our study revealed that the prevalence of depression was 15.7% among the diabetes individuals residing in the rural areas of Malaysia. This figure was comparable to studies among Diabetes Mellitus individuals in both rural America (15.8%) [19]as well as urban Malaysian populations (11.5%) [16].

This study showed that subjects of 60 years old and above had significantly higher percentage of being depressed compared to those less than 60 years of age. It is not uncommon to find that increasing age is significantly associated with depression as this is could be ascribed to genetic, biological, co-morbid medical illness, social shortfall following loss of income or spouse or a combination of the aforesaid especially beyond 70 years of age [20].

With reference to ethnicity, the category of others indeed forms the minority group when compared to Malays who constituted the majority in Malaysia. The minority group certainly is more likely to be exposed to a gamut of psychosocial stressors such associoeconomic adversities, poor education, increased burden of caregiving and perhaps perceived discrimination. Consequently, these issues enhance distress thereby increasing the levels of depression among them. This finding is consistent with several previous data pertaining to depression among minority ethnic group [16, 21-23] including diabetes mellitus subjects [16, 22].

Furthermore, our data affirmed that unemployed/housewife/retired subjects had significantly higher percentage of depression than those being employed. It is natural that being gainfully employed would undoubtedly buffer against the many adversities among unemployed/housewife/retired subjects as the latter might be unable to meet the basics needs of survival leading to feeling of instability. This lack of income translates into increase struggle to get ahead, making life goals and difficulties acquiring essentials needs. Consequently, these increases hardship, anguish and distress and eventually depression.

Pertaining to smoking status, this study inferred that the percentage of depression was significantly highest among current smokers. The association between depression and smoking has been extensively acknowledged among not only different population but also various study designs be it cross sectional or longitudinal [24-26].

This study established that subjects with cognitive impairment had significantly higher percentage of depression than those without cognitive impairment. Both depression and cognitive impairment do co-occur. Controversies exist whether depression leads to cognitive deficits or vice versa [27, 28]. A prospective population based study by Vinkers *et al*[29] in the Netherland, found that cognitive impairment involving attention and memory domains preceded depression.

Our study also revealed that, there was significantly higher percentage of depression among anxious than non-anxious subjects. Anxious individuals have increased predilection to develop depression. Literature has consistently replicated this finding[30].

With regards to BMI, the percentage of depression was significantly highest among underweight subjects. Some of the typical manifestations of depression such as loss of interest that encompass food intake, reduced appetite and weight loss themselves aptly contribute to decreased food intake and ultimately undernourishment. Hence, it is not surprising that increased levels of depression are understandably associated with underweight subjects [31, 32].

CONCLUSION

The prevalence of depression among the elderly type 2 diabetic in the rural community was high. Its early recognition and prompt treatment are crucial particularly in minority group, unemployed individuals, smokers, cognitive impaired subjects, anxious as well as underweight individuals.

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