Prevalence of Depression and Associated Factors among Adult Patients with Diabetes Mellitus Attending Diabetic Clinic at Kampala International University Teaching Hospital

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ABSTRACT
Diabetes and depression regularly co-occur, but only about two-thirds of patients with both diseases receive recognition and treatment for it. The purpose of this study was to determine the prevalence of depression and associated factors among adult patients with diabetes attending diabetic clinic at Kampala International University Teaching Hospital. The prevalence of depression among diabetes mellitus patients attending diabetic clinic at Kampala International University Teaching Hospital. was found to be 26.6%. Gender, age bracket, area of Residence, level of education and marital status were statistically significantly associated with depression among diabetes mellitus patients attending diabetic Clinic at Kampala International University Teaching Hospital. in the model at 5% level. Females were 3times more likely to develop depression compared to the males (OR=**3.29**: 95%CI, **0.84–6.58**: P=**0.052**). Patients in the age bracket 31-39 years were 5times more likely to develop depression compared to those in age bracket 18-30 years (OR=**5.73**: 95%CI, **2.31-28.4**: P=<0.001). Patients who lived in urban areas were 5times more likely to develop depression compared to those who lived in rural areas (OR=**2.61**: 95%CI, **0.77–8.85**: P=0.04). Patients who were widows were 5times more likely to develop depression compared to those who were single (OR=**5.09**: 95%CI, **0.87–12.30**: P=**<0.001**). Patients with primary levels of education were 6times more likely to develop depression compared to those who attained secondary level of education (OR=**6.98**: 95%CI, **2.01–14.37**: P=**0.001**). The prevalence of depressive illness in patients with DM is high and is associated with low education level, period with diabetes, Sugar levels well controlled, chronic illness other than diabetes, number of chronic illness and mode of medication for diabetes history of being in the intensive phase of DM treatment and family history of depressive illness.
Keywords: Prevalence, depression, associated factors, diabetes mellitus

INTRODUCTION

Diabetes has long been stigmatized as a "disease of the rich," primarily affecting the elderly in affluent nations [1-4]. However, diabetes now affects all social classes and is a rapidly expanding issue in underprivileged areas [5-6]. Diabetes and depression regularly co-occur, but only about two-thirds of patients with both diseases receive recognition and treatment for it [7-11]. It is critical to note that the under diagnosis of depression in diabetes patients is concerning, as two thirds to three quarters of these individuals are not receiving any therapy from primary care doctors [12-16]. One explanation is that psychiatric illnesses are routinely undertreated, both by patients and by medical personnel, which results in inadequate care [4]. Diabetes and depression place a significant financial and future public health burden on health budgets [5]. When a patient has depression, they are less likely to take their medications as prescribed and practice self-care, which eventually results in diabetic complications that may be very expensive for both the patient and the healthcare system [17-22]. Both depression and diabetes are associated with morbidity and mortality, and when these two diseases coincide, the risk for developing comorbidities, poor blood glucose control, complications and complaints, and cost of the disease increase [23-26]. Both diabetes and depression are linked to morbidity and mortality, and when these two conditions coexist, there is an increased risk of comorbidities, poor blood glucose control, complications and complaints, as well as higher medical costs [27-31]. The mortality risk of depressed patients with diabetes was 1.5 times greater than that of non-depressed individuals with diabetes, according to a meta-analysis that pooled the findings from 10 research [8]. Numerous research have been conducted about depression in diabetic patients across Africa, but most of them have taken place in affluent nations, and there is little information available in underdeveloped nations, including Uganda, where Kampala International University Teaching Hospital is located. Furthermore, the causes of depression in diabetic patients in our situation are not well understood.

MATERIALS AND METHODS

Study design, duration, and site

The study was a cross-sectional descriptive study conducted at Kampala International University Teaching Hospital Bushenyi-Ishaka Municipality, Bushenyi District. along Mbarara-Kasese Road in western Uganda with seasonal climate Bushenyi district is about 360 km from Kampala city. It is bordered by Mitooma and Ntungamo districts in the south, Sheema in the east, Buhweju in the north and Rubirizi in the west. The collection of data was quantitative to establish the opinions of the respondents about the study problem under investigation.

Inclusion criteria

Adult patients aged 18years and older with diabetes mellitus attending the diabetic clinic at Kampala International University Teaching Hospital.

Exclusion criteria

- Patients with diabetes mellitus above 18 years attending Kampala International University Teaching Hospital diabetic clinic with speech and hearing impairments.

- Patients with diabetes mellitus having a medical emergency such as hyper-or hypoglycemia or diabetic ketoacidosis at the time of data collection.

Data collection procedure

Potential participants will be identified by review of their medical records on the clinic day. Then written informed consent will be obtained from each participant prior to administering the study questionnaire. Data will be collected by the use of questionnaire and writing materials like pens, papers. The data collection process will be performed in a period of three Months. The data for the study will be collected by use of researcher-administered questionnaires based on

associated factors and Beck depression index (BDI). The study questionnaire will have sections that will collect participant socio-demographic and clinical characteristics as well as Beck Depression Index (BDI) to evaluate depression symptoms.

BDI was developed by Aron T. Beck. In BDI there are 21 questions and 4 answers to choose, and each question is graded from 0 - 3. The total points are calculated and assigned ranging;

1-10--- Normal
11-16---Mild mood disturbance
17-20---Borderline clinical depression
21-30---Moderate depression
31-40---Severe depression
over 40---Extreme depression

Data management

Editing: This involved checking the questionnaire for completeness and improperly filled questionnaires will be sorted. Complete filled questionnaires were kept in the cupboard for safety and confidentiality and were later taken for analysis.

Coding: All questions in the questionnaire were coded for easy analysis and help in reducing data into manageable proportions.

Data analysis

Data will be collected, tallied and grouped in form of tables and pie charts as found applicable and appropriate. Scientific software Statistical Products and Service Solution (SPSS) will be used to analyze the data. The prevalence of depression will be determined as a proportion of participants who will score above 20 according to the BDI. The associated socio-demographic and clinical factors will be determined using univariate and multivariate logistic regression for since depression is a dichotomous outcome. The measure of association will be odds ratio and 5% statistical significance and 95% confidence intervals will be considered.

Ethical consideration

Ethical approval was obtained from Research Ethical Committee (REC) of Kampala International University Western Campus and Kampala International University Teaching Hospital, Ishaka. Informed consents were obtained from the subjects before collecting the data. The study was carried out following the Declaration of Helsinki.

RESULTS

Table 1 shows that the majority of the participants were female with 55.3% (193/349) and the remaining were male with 44.7 (156/349). The median age of the patients was 33 years and it ranged from a minimum of 18 years to a maximum of 70 years. Majority of the respondents belonged to the age group of 40-49 years while the least belonged to the age group of 18 – 30 years. Of the 349 patients with diabetes mellitus, 93(26.6%) were found with the problem of depression while 256(73.4%) patients did not have depression. Majority 193(55.3%) were living in urban areas while the least156 (44.7%) were living in rural areas. Majority 189(54.1%) were married while the least 24(6.9%) were widowed. Majority 37(25.7%) were employed while the least 7(4.9%) were peasant. Most 114(32.7%) were Catholics while the least 49(14.0%) were Muslims. Most 101(28.9%) of the respondents secondary level of education while the least 71(20.3%) attained tertiary level of education. The prevalence of depression among diabetes mellitus patients attending diabetic clinic at Kampala International University Teaching Hospital. was found to be 26.6%. **Figure 1 shows** Gender, age bracket, area of Residence, level of education and marital status were statistically significantly associated with depression among diabetes mellitus patients attending diabetic Clinic at Kampala International University Teaching Hospital. in the model at 5% level. Females were 3times more likely to develop depression compared to the males (OR=**3.29**: 95%CI, **0.84–6.58**: P=**0.052**). Patients in the age bracket 31-39 years were 5times more likely to develop depression compared to those in age bracket 18-30 years(OR=**5.73**: 95%CI,

2.31-28.4: P=<0.001). Patients who lived in urban areas were 5times more likely to develop depression compared to those who lived in rural areas (OR=**2.61**: 95%CI, **0.77–8.85**: P=0.04). Patients who were widows were 5times more likely to develop depression compared to those who were single (OR=**5.09**: 95%CI, **0.87–12.30**: P=**<0.001**). Patients with primary levels of education were 6times more likely to develop depression compared to those who attained secondary level of education (OR=**6.98**: 95%CI, **2.01-14.37**: P=**0.001**).

Table 2 shows demographic factors associated with depression among diabetes mellitus patients in diabetic clinic

Period with diabetes, Sugar levels well controlled, chronic illness other than diabetes, number of chronic illness and mode of medication for diabetes were found to be statistically significantly associated with depression among diabetes mellitus patients attending diabetic Clinic, Kampala International University Teaching Hospital in the model at 5% level. Patients who had less than six months period with diabetes were 4times more likely to develop depression compared to those who had more than five years (OR=**4.69**: 95%CI, **2.17-9.34**: P=0.001). Patients who had hand not well controlled their sugar levels were 3 times more likely to develop depression as compared to those who had controlled their sugar levels. Patients who had chronic illness other than diabetes were 3 times more likely to develop depression compared to those with no history of chronic illnesses (OR=**3.66**: 95%CI, **0.24–11.33**: P=**0.001**). Patients who had more than three number of chronic illness were 4 times more likely to develop depression compared to those who did not (OR=**24.75**: 95%CI, **1.86-18.72**: P=0.001). Patients who had insulin injections as the mode of medication for diabetes were 3 times more likely to develop depression compared to those who were using both (OR=**3.81**: 95%CI, **0.57-15.01**: P=**0.001**). The above findings were in with the study findings by Bădescu, et al., (2016) who revealed that insulin injection mode of medication. Table **3** shows the clinical factors associated with depression among diabetes mellitus patients attending diabetic clinic at Kampala International University Teaching Hospital.

RESULTS
Table 1: Demographic data of respondents

Variable	Frequency (n=349)	Percentage (%)
Gender		
Male	156	44.7
Female	193	55.3
Age bracket		
18-30	19	5.4
31-39	109	31.2
40-49	123	35.3
>50	98	28.1
Area of Residence		
Urban	193	55.3
Rural	156	44.7
Marital status		
Separated	56	16.0
Married	189	54.1
Single	80	22.9
Widowed	24	6.9
Occupation		
Employed	121	34.7
Housewife	73	20.9
Self employed	92	26.3
Peasant	63	18.1
Religion		
Anglican	108	30.9
Catholics	114	32.7
Moslems	49	14.0
other religion	78	22.4
Level of education		
Primary	98	28.1
Secondary	101	28.9
Tertiary	71	20.3
None	79	22.7

Table 2: shows demographic factors associated with depression among diabetes mellitus patients in diabetic clinic

Variable	Depression status		OR (95% CI)	P-Values
	Depressed n=93	Normal n=256		
Gender				
Male	39(25%)	117(75%)	ref	
Female	54(28%)	139(72%)	**3.29 (0.84–6.58)**	**0.052**
Age bracket				
18-30	06(31.6%)	13(68.4%)	ref	
31-39	51(46.8%)	58(53.2%)	**5.73(2.31-28.4)**	**<0.001**
40-49	26(21.1%)	97(78.9%)	1.98(0.27-13.6)	0.071
>50	10(10.2%)	88(89.8%)	1.50(0.19-11.45)	0.096
Area of Residence				
Urban	41(21.2%)	152(78.8%)	ref	
Rural	52(33.3%)	104(66.7%)	**2.61 (0.77–8.85)**	**0.04**
Marital status				
Separated	21(22.6%)	35(77.4%)	**3.29 (1.94–5.57)**	**0.055**
Married	25(13.2%)	164(86.8%)	1.47 (0.86–2.53)	0.620
Single	36(45%)	44(55%)	ref	
Widowed	11(45.8%)	13(54.2%)	**5.09(0.87–12.30)**	**<0.001**
Occupation				
Employed	13(10.7%)	108(89.3%)	4.36(3.18-29.63)	0.671
Housewife	19(26.0%)	54(74.0%)	1.33(0.15-6.46)	0.023
Self employed	15(16.3%)	77(83.7%)	ref	
Peasant	12(19.0%)	51(81.0%)	1.36(0.23-0.73)	0.931
Religion				
Anglican	38(35.2%)	70(64.8%)	5.88(169-13.36)	0.063
Catholics	35(32.1%)	79(67.9%)	ref	
Moslems	9(18.4%)	40(81.6%)	1.24(1.76-1.95)	0.012
other religion	10(12.8%)	68(87.2%)	0.28(1.69-1.36)	0.670
Level of education				
Primary	37(37.8%)	61(62.2%)	**6.98 (2.01–14.37)**	**0.001**
Secondary	17(16.8%)	84(83.2%)	ref	
Tertiary	14(19.7%)	57(80.3%)	1.87 (0.82–1.78)	0.373
None	13(16.5%)	66(83.5%)	1.14(1.06-1.38)	0.042

Table 3 shows the clinical factors associated with depression among diabetes mellitus patients attending diabetic clinic at Kampala International University Teaching Hospital

Variable	Depression status		OR (95% CI)	P-Values
	Depressed n=93	Normal n=256		
Period with diabetes				
Less than six months	26(35.6%)	47(64.4%)	**4.69 (2.17–9.34)**	**0.001**
Six months to one year	21(26.9%)	57(73.1%)	1.03 (0.83–2.28)	0.027
One to five years	29(24.6%)	89(75.4%)	2.51 (1.55–8.06)	0.031
More than five years	17(21.3%)	63(78.8%)	Ref	
Sugar levels well controlled				
Yes	54(23.2%)	179(76.8%)	ref	
No	39(33.6%)	77(66.4%)	3.93(0.55–12.43)	**0.001**
Chronic illness other than diabetes				
Yes	31(30.4%)	71(69.6%)	3.66(0.24–11.33)	**0.001**
No	62(25.1%)	185(74.9%)	ref	
Number of chronic illness				
1	04(100%)	0(0%)	1	
2	01(20%)	4(80%)	ref	
3	5(38.5%)	8(61.5%)	1.37 (0.89–2.45)	0.012
More than three	04(44.4%)	05(55.6%)	**4.53 (1.86–18.72)**	**0.001**
Mode of medication for diabetes				
Oral tablets	13(11.7%)	98(88.3%)	0.97(0.65–1.35)	0.030
Insulin injections	66(38.6%)	105(61.4%)	**3.81(0.57–15.01)**	**0.001**
1 and 2	14(21.5%)	51(78.5%)	Ref	

DISCUSSION

The prevalence of depression among Diabetes mellitus patients attending diabetic Clinic, Kampala International University Teaching Hospital was found to be 26.6%. This prevalence is slightly higher than that of a retrospective study by Arabia which showed a prevalence of 20.68% in Makkah city and lower than that in Jeddah city (34%) which showed that there was a high prevalence of 26.6% depression among people with diabetes mellitus in Arab. In contrast with this study, a study done in a rural community clinic in Mulago Uganda, reported a higher prevalence of depression which was at 23.7%. Patients in the age bracket 31-39 years were 5times more likely to develop depression compared to those in age bracket 18-30 years (P=<0.001). These findings were in with findings from a study by Wexler et al. [9] and Zhao *et al.* [10] which revealed that the younger age group are more likely to suffer from co-morbid depression as compared to males. Patients who lived in urban areas were 5times more likely to develop depression compared to those who lived in rural areas (P=0.04). Patients with primary levels of education were 6times more likely to develop depression compared to those who attained secondary level of education (P=**0.001**). In this study, patients who had less than six months period with diabetes were 4times more likely to develop depression compared to those who had more than five years (P=0.001). This was in line with the study findings in a prospective representative study of patients with type 2 diabetes which revealed that depression predicted problems with medication adherence, and unsatisfactory glycemic control [11]. Patients who had not well controlled their sugar levels were 3 times more likely to develop depression as compared to those who had controlled their sugar levels.

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Patients who had chronic illness other than diabetes were 3 times more likely to develop depression compared to those with no history of chronic illnesses (**P=0.001**). The study findings are in line with findings of the study by Dahal *et al.* [12] on prevalence and Predictors of Depression among Diabetes Mellitus in Adult Population which revealed that patients with chronic illnesses were more likely to develop depression compared to those with no history of chronic illnesses. Patients who had more than three number of chronic illness were 4 times more likely to develop depression compared to those who did not (P=0.001). Patients who had insulin injections as the mode of medication for diabetes were 3 times more likely to develop depression compared to those who were using both (**P=0.001**). The above findings are in agreement with the findings of Almawi, *et al.*[13] on association of comorbid depression, anxiety, and stress disorders with Type 2 diabetes in Bahrain, a country with a very high prevalence of Type 2 diabetes which revealed that diabetic patients who use insulin injections as the mode of medication for diabetes were more likely to develop depression compared to those who use other methods [14-20].

CONCLUSION

The prevalence of depressive illness in patients with DM is high and is associated with low education level, period with diabetes, Sugar levels well controlled, chronic illness other than diabetes, number of chronic illness and mode of medication for diabetes history of being in the intensive phase of DM treatment and family history of depressive illness.

RECOMMENDATIONS

Mental illnesses like depression should be routinely screened and managed among patients with chronic physical illnesses like DM. This can be achieved through regular training of hospital staff about common mental illnesses like depression to enable them screen for these disorders and manage the minor cases but refer the severe ones.

Declarations

Ethical Approval

Competing of Interests

The authors promulgate that they have no conflicts of interest about the publication of this article.

Authors' contributions

GE conceptualized the study and participated in data collection. EIO guided and contributed to study design and analysis, MR contributed to data analysis, and OM oversaw the overall running of the study from start to finish and wrote the final manuscript. All authors read and approved the final version of the manuscript.

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Availability of data and materials

The data and materials are will be made available after publishing the paper.

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