HHS Public Access

Author manuscript

J Affect Disord. Author manuscript; available in PMC 2015 August 26.

Published in final edited form as:

J Affect Disord. 2015 March 15; 174: 7–12. doi:10.1016/j.jad.2014.11.019.

The association between depression, quality of life, and the health care expenditure of patients with diabetes mellitus in Uganda

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Abstract

Background—Depression is one of the commonest neuropsychiatric disorders in patients with diabetes mellitus (DM) and is associated with poor glycaemic control, vascular complications, a low quality of life and increased health care expenditure. Co-morbid DM and depression remains poorly identified and inadequately treated in sub-Saharan Africa.

Methods—We conducted a cross-sectional survey of 437 patients with DM at 3 DM clinics in Uganda. Participants were assessed for depression, blood sugar levels, diabetic neuropathy, quality of life, and health care expenditures.

Results—The prevalence of depression was 34.8%. Depressed participants were more likely to be suicidal [OR=3.81, (CI 2.87–5.04)], younger [OR=3.98 CI (1.20–13.23)], un-employed [OR=1.99(CI 1.04–3.81)], and having lost a spouse [OR=2.36 (CI 1.29–4.31)]. Overall quality of life was poor [OR=0.67 (CI 0.47–0.96)], they scored poorer in the physical [OR=0.97, (CI 0.95–

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Conflict of interest

The authors declare no conflict of interest.

Author consent forms

All the stated authors in this article consented to have their names in the article.

Dr Dickens Akena conceptualized the project. Dr's Dickens Akena, Ekwaro Obuku, Phillipa Kadama, Rejani Lalitha, Dr Carolyne Akello and Mr Brendan Kwesiga wrote the protocol for the application of funds to conduct the study.

Dr Carolyne Akello was the statistician. Mr Brendan Kwesiga conducted the analysis of the health economics part of the project.

Dr's Scholastic Ashaba, and James Okello supervised data collection at Mbarara and Gulu University, respectively. Dr Emmanuel Mwesiga supervised data collection at Mulago Hospital.

All the authors provided constructive comments in shaping the article.

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0.99)], psychological [OR=1.05 (CI 1.03–1.07)], and environmental [OR=0.97, (CI 0.95–0.99)] domains. They had an increased likelihood of incurring direct out-of-pocket payments for health care services [OR=1.56 (CI 1.03–2.36)], and were more likely to be impoverished [OR=1.52 (CI 1.01–2.28)].

Limitation—The cross sectional nature of this study makes it difficult to examine causation. More studies are required in order to better understand the associations and impact of the factors examined above on patient outcomes.

Conclusions—Depression is highly prevalent among patients with DM in Uganda, and is associated with a number of adverse outcomes. A holistic approach that focuses on the depression management among patients with diabetes is recommended.

1. Introduction and background

Diabetes mellitus (DM) a chronic and disabling disease, is a major contributor to disability adjusted life years (Murray et al., 2012; International Diabetes Federation, 2013). Approximately 6.7% of people worldwide suffer from DM, and this figure is anticipated to rise to 7.8% by 2030. The prevalence of DM is on the increase the world over. In a national survey conducted in Australia, between 2001 and 2008, there was a 36% increase in the prevalence of DM in persons older than 25 years (Atlantis, 2012). Moreover, it is predicted that by 2030, there will be a 69% rise in prevalence of DM in low and middle income countries (LMIC) compared to a 20% rise in high income countries (HIC) (Shaw et al., 2009). Recent evidence already shows a rise in the prevalence of DM in sub-Saharan Africa (SSA) (Abegunde et al., 2007; Mbanya et al., 2010; Peer et al., 2012). The prevalence of DM in Uganda was reported as 7.4% in a recent population survey (Mayega et al., 2013).

A number of studies that have examined the causative relationship between DM and depression have shown that DM patients are more likely to develop depressive disorder compared to members of the general population (Renn et al., 2011; Rustad et al., 2011; Katon 2011; Stuarta and Baune, 2012). For example, results from systematic reviews (Anderson et al., 2001; Nouwen et al., 2010) and a host of other studies (Renn et al., 2011; Rustad et al., 2011; Katon, 2011; Stuarta and Baune, 2012) have documented increased likelihood (up to 2 fold) of developing depression in DM patients compared to non-DM patients (Nouwen et al., 2010). Indeed a number of studies including meta-analyses by Ali et al. (2006) and Mendenhall et al. (2014) have documented high depression prevalence in DM patients (17.6 and 35.7%, respectively).

During the course of their illness, patients with co-morbid DM and depression suffer from a number of adverse health complications that negatively impact both DM and depression treatment outcomes. For example, existing literature (Lin et al., 2004; Ciechanowski et al., 2000) including a meta-analysis of 47 studies by Gonzalez et al. (2008b) show that patients with co-morbid DM and depression are almost two times less likely to adhere to hypoglycaemic medications compared to DM patients without depression. Literature also shows that patients with co-morbid DM and depression adhere poorly to dietary recommendations, exercise regimens and foot care (Gonzalez et al., 2008a). Moreover suboptimal adherence to both medications and dietary regimens has been associated with

poor glycaemic control. Poor glycaemic control predicts vascular complications including stroke (deGroot et al., 2001; Katon et al., 2009; Lin et al., 2010; Sanal et al., 2011). Some work also shows that co-morbid DM and depression is associated with poor quality of life (Goldney et al., 2004; Lustman and Clouse, 2005; Egede and Hernández-Tejada, 2013). Poor quality of life may significantly impede patient recovery from existing ailments, as they often have a negative perception toward their lives.

Current evidence also shows that patients with co-morbid DM and depression have increased health care costs compared to members of the general public. In a review of 62 studies by Molosankwe et al. (2012), patients with co-morbid DM and depression were more likely to have an increased expenditure on their health care compared to non-depressed DM patients. Indeed, some studies have shown that patients with co-morbid DM and depression are likely to spend twice the amount of money on DM related medical costs, and four times on total medical costs compared to DM patients without co-morbid depression (Le et al., 2006; Egede and Ellis, 2010). Increased health care expenditures in patients with co-morbid DM and depression in SSA where direct out-of-pocket payment is the dominant health care financing mechanism could drive them into poverty.

The majority of studies that have investigated the burden of depression in DM and the adverse outcomes associated with it have been conducted in high income countries (HIC), with little work having been done in SSA. Moreover, generalizability of data about the burden of co-morbid DM and depression from HIC to SSA settings is limited in two important respects. First, the high patient–clinician ratio in SSA could have a direct impact on the ability of clinicians to identify and treat mental illnesses including depression (Kigozi et al., 2010; Faydi et al., 2011), leading to under-reporting of mental illnesses in DM patients. Second, cultural factors and explanatory models of diseases differ between SSA and HIC populations (Tylee, 1999; Okello and Ekblad, 2006), and so the ability of patients to report symptoms of mental illnesses, and disease presentation may be influenced by such factors. As recommended in a review by Lloyd et al. (2012), the understanding of mental illnesses, and cultural diversity issues need to be considered while assessing people for mental illness. Differences in cultural presentation and appreciation of mental illness, and high patient ratios between the two settings call for more studies to further examine the occurrence of co-morbid DM and depression.

In this study, we assessed the prevalence of depression and suicidality among patients with DM at three referral hospitals in Uganda. The factors that are associated with co-morbid DM and depression including fasting blood sugar levels, diabetic neuropathy, quality of life, and health care expenditure (direct out-of-pocket payment and its impact) were also assessed.

2. Methods

2.1. Study design and setting

This was a cross sectional study at the out-patients DM clinics of Mulago, Mbarara and Gulu hospitals in Uganda. Mulago Hospital is a national referral 1500 bed capacity Hospital in the centre of Kampala, the capital city of Uganda. Mbarara Hospital is a 600 bed capacity regional referral hospital 275 km west of the capital Kampala. Gulu regional referral

Hospital is 340 km north of the capital Kampala. All three hospitals have diabetic clinics which run once a week with an average of 100 patients seen daily (150 Mulago, 100 Mbarara and 50 in Gulu).

2.2. Study procedure

Participants were enrolled if they were confirmed DM patients attending the DM clinic, 18 years and older and able to provide informed consent. All participants provided written informed consent before being enrolled into the study. To prevent making a diagnosis of acute psychological distress or adjustment reaction resulting from recently receiving a diagnosis of DM, participants were only included if they had been diagnosed as diabetic, and attended the DM clinic for at least 2 months.

We used a simple random sampling technique to select patients from clinic attendees till the total sample of 437 was accrued. Trained medical officers obtained consent from the eligible participants before administering the study questionnaires and conducting a diagnostic depressive disorder interview. Data was collected over a 6 month period between November 2013 and April 2014.

Approval for the study was obtained from all relevant authorities including the Makerere University College of Health Sciences ethical committee (#REC REF 2013-135) and the Uganda National Council of Science and Technology (SS 3389). All participants provided written informed consent before being enrolled into the study.

2.3. Measures

The following data was collected from all 437 participants: (a) sociodemographic information including marital status, age, education level and occupation, (b) depression diagnosis and suicidality using the mini international neuropsychiatric inventory (MINI) (Sheehan et al., 1998), (c) diabetic neuropathy using the Michigan Neuropathic Screening Instrument (MNSI) (Feldman et al., 1994), (d) quality of life using the World Health Organization brief quality of life scale (WHO-QOL) (The World Health Organization quality of life assessment (WHOQOL), 1995), (e) health care expenditure and house socio-economic status (SES) based on reported household income from employment, household enterprises, current transfers and other benefits, property income and any other income sources using a standardized questionnaire.

2.4. Data analysis plan

Data was analyzed using STATA 11.2(STATA Statistics/Data Analysis 4905 Lakeway Drive College Station Texas 77845 USA 800-STATA-PC http://www.stata.com) (STATA, 2011). The presence of depression was the dependent variable; suicadility, socioeconomic variables, fasting blood sugar levels, diabetic neuropathy, quality of life, and health care expenditure (direct out-of-pocket payments and impoverishment due to these direct out-of-pocket payments) were the independent variables. Factors found statistically significant at bi-variable analysis (p-value ≤ 0.05) were entered into a stepwise logistic regression model to test for associations, controlling for age and gender.

For the analysis of association between the presence of depression and impoverishment due to direct out-of-pocket payments incurred by the DM patients, the study adjusts the Foster–Greer–Thorbecke (FGT) indices for poverty measurement for the impact of direct out-of-pocket payments using the approach by Wagstaff and Doorslaer (2003). Using this approach, variables that capture households who are pushed below the $1.25/day poverty line and those whose depth of poverty increases due to direct out-of-pocket payments for DM were generated.

2.5. Results

The prevalence of depression was 34.8%. Of the 437 participants enrolled, 54.4% (238) were from Mulago Hospital, 22.7% (99) from Mbarara Hospital and 22.9% (100) from Gulu Hospital. About 2/3rd 64.8% (283) of the participants were females. The mean age of the participants was 51 years (SD14.06, Range 18–90). The mean random blood sugar was 9.75 (SD6.86 Range 5.1–19.6) and 69.5% (303) of the participants had diabetic neuropathy.

At multivariable analysis, there was no statistically significant difference between the depressed and non-depressed participants by gender, blood sugar level, and presence of diabetic neuropathy. After controlling for age and gender, depressed patients were more likely to be suicidal [OR=3.81, (CI 2.87–5.04)], younger [OR=3.98 CI (1.20–13.23)], un-employed [OR=1.99(CI 1.04–3.81)], and lost a spouse [OR=2.36 (CI 1.29–4.31)]. Table 1. Depressed participants perceived their overall quality of life as poor [OR=0.67 (CI 0.47–0.96)], and scored poorer on the physical [OR=0.97, (CI 0.95–0.99)], psychological [OR=1.05 (CI 1.03–1.07)], and environmental [OR=0.97, (CI 0.95–0.99)] QOL domains (Table 2).

Participants with co-morbid DM and depression were also more likely to incur direct out-of-pocket payments [OR=1.56 (CI 1.03–2.36)], and be impoverished [OR=1.52 (CI 1.01–2.28)] due to these payments.

3. Discussion

In this study we found a high (34.5%) prevalence of depression in DM patients, in keeping with rates reported in some studies conducted in SSA (Akinlade et al., 1996; Kagee 2008; Shehatah et al., 2010a, 2010b). A recent systematic review showed a wide variation in the prevalence of depression among DM patients in SSA (15.2–45.9%) (Mendenhall et al., 2014). The variations in the prevalence of depression among DM patients could be a result of a number of differences including different instruments (Akinlade et al., 1996; Ashraf, 2008; Shehatah et al., 2010a, 2010b) used to confirm the presence of depression, each with different cut-off scores for caseness. Studies assessing the prevalence of depression in persons with DM have been conducted in different settings including out-patients (Kagee, 2008), population surveys (Asghar et al., 2007), and the elderly (Shehatah et al., 2010a, 2010b). The use of depression screening instruments may fail to distinguish some conditions which mimic depressive disorders including depressive temperament. In a recent review by Gois et al. (2012), depressive temperament which presents with signs and symptoms of a depressive disorder (sadness, guilt, self-blame, being hypercritical of failures) is a common comobidity in persons with DM, and failure to distinguish these concepts may artificially

inflate the prevalence of depression in the study population. These factors may account for differences in the prevalence of depression among DM patients.

Findings from the sociodemographic variables indicate that depression was associated with a younger age, loss of a spouse and lack of employment. While some studies have shown that patients with DM in the younger age group are more likely to suffer from co-morbid depression (Zhao et al., 2006; Wexler et al., 2012), others have found that association for older individuals (Khuwaja et al., 2010; Ganasegeran et al., 2014). One possible explanation could be that the younger individuals in our study population were not fully psychologically adjusted to having a chronic illness in the form of DM, and failed to cope with the numerous stressors that could have led them to develop of depression.

Previous studies have documented a positive association between lack of employment and co-morbid depression in persons with DM (Friis and Nanjundappa, 1986; Igwe et al., 2013). A number of explanations could be responsible for these findings. For example, the stress that results from people losing their job and source of livelihood could have led to the development of depression. However, the presence of a depressive illness could also be the cause of loss of employment, as individuals are no longer able to concentrate on their work, and labour under the illness.

The loss of a spouse has been documented as a predictor of depression in DM patients (Téllez-Zenteno and Cardiel, 2002; Hailemariam et al., 2012). Our findings are in keeping with these previous studies, and could be explained by the fact that loss of a spouse is associated with high levels of stress and could be aetiological in the development of depression.

We found no association between depression and the levels of blood sugar level in our study population. Previous work that has assessed for the association between depression and glycemic control in DM patients have produced mixed results. While some studies have documented positive associations between depression and glycemic control in DM patients (Lustman et al., 2000; Richardson et al., 2008), others have found no such associations (Fisher et al., 2010; Papelbaum et al., 2010). One possible explanation for our findings could be the fact that extensive adherence support is provided by diabetic nurses to patients attending these clinics, which improves patient’s ability to follow treatment regimens. Since poor glycaemic control has been associated with vascular complications including diabetic neuropathy (deGroot et al., 2001; Katon et al., 2009; Lin et al., 2010; Sanal et al., 2011), the fact that we found no association between poor glycemic control and depression could also explain the lack of association between diabetic neuropathy and depression observed in this study.

Our study found a positive association between depression and a poor quality of life in four out of the six domains of the WHO-QOL, including the overall perception of a poor quality of life, physical, psychological and environmental domains. Previous studies have documented such associations (Goldney et al., 2004; Kiadaliri et al., 2013; Egede and Hernández-Tejada, 2013). These findings could be a result of a number of factors. First, some depressive symptoms including loss of interests and feeling worthless can have a

negative influence on one's perception of life. The cross sectional nature of the study means that an alternative explanation for these findings could exist, since persons who were leading a poor quality of life may have become more prone to developing depression, due to their poor outlook of life events. Clinical complications such as diabetic neuropathies, which are common among DM patients, could also influence the perception of overall quality of life as poor by the participants. We found no association between being depressed and the social domain of the quality of life measure. This finding could be explained by the presence of support structures available in the communities from where these participants came.

Study findings showed that depressed participants were more likely to incur direct out-of-pocket payments and also get impoverished as a result of making these payments compared to DM patients without depression. Our findings are in congruence with others which have documented poor health economic indices in persons with co-morbid DM and depression including increase in health care expenditures (Le et al., 2006; Egede and Ellis, 2010). A possible explanation to these findings is the fact that depressed participants could have been making payments for the treatment of depressive disorder symptoms which the patients with DM do not make. At the 3 clinics where our data was collected, there were no mental health care services (identification and treatment of depressed patients), and so the majority of depressed patients are unlikely to have received treatment, let alone being aware of their illness. Such situations may force patients to self-medicate, increasing their health care expenditures which are detrimental to the welfare of the households.

3.1. Limitations

The cross sectional nature of this study makes it difficult to examine causation. More studies are required in order to better understand the associations and impact of the factors examined above on patient outcomes. Similarly, assessment of the poverty impact of direct out-of-pocket health payments needs complex household surveys.

3.2. Conclusions

Depression is highly prevalent among patients with DM in Uganda. The presence of co-morbid DM and depression is associated with a number of adverse outcomes like increased health expenditure and poorer quality of life. A holistic approach that focuses on the identification and management of depression among patients with diabetes is recommended.

Acknowledgments

Role of funding source

The project was supported by the MESAU-MEPI Programmatic Award through Award Number 1R24TW008886 from the Fogarty International Center.

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Table 1

Logistic regression for the sociodemographic, clinical, health outcome and direct out-of-pockets payments.

Variables	Unadjusted OR (95% CI)	*p*-Value	Adjusted OR (95% CI)	*p*-Value
Blood sugar level (mmol/l)				
<3.9				
3.9–7.2	0.94 (0.23–3.85)	0.936	0.90 (0.21–3.87)	0.889
>7.2	1.37 (0.35–5.43)	0.652	1.34 (0.32–5.58)	0.691
Age				
18–30				
31–43	**3.18 (1.08–9.37)**	**0.035**	**3.98 (1.20–13.23)**	**0.024**
44–56	**2.71 (0.99–7.45)**	**0.053**	2.82 (0.91–8.69)	0.071
57–69	**4.36 (1.57–12.13)**	**0.005**	3.66 (1.17–11.44)	0.389
≥70	2.50 (0.80–7.83)	0.117	1.77 (0.48–6.51)	0.389
Gender				
Male				
Female	**1.38 (1.01–2.48)**	**0.043**	1.01 (0.60–1.70)	0.061
Marital status				
Married				
Never married	1.15 (0.53–2.51)	0.718	1.80 (0.72–4.46)	0.206
Widowed/widower	**2.57 (0.52–4.35)**	**<0.001**	**2.36 (1.29–4.31)**	**0.005**
Separated/divorced	1.34 (0.66–2.71)	0.423	1.40 (0.66–2.97)	0.384
Occupation				
Employed				
Peasant farmer	**2.16 (1.25–3.73)**	**0.006**	**1.81 (1.01–3.26)**	**0.048**
Unemployed	**1.99 (1.10–3.59)**	**0.023**	**1.99 (1.04–3.81)**	**0.037**
Other	1.64 (0.78–3.45)	0.191	1.29 (0.59–2.86)	0.523
Suicidality	3.71 (2.84–4.83)	**<0.001**	3.81 (2.87–5.05)	**<0.001**
Diabetic neuropathy				
No				
Yes	**1.73 (1.12–2.67)**	**0.013**	1.56 (0.98–2.47)	0.061
Health care expenditure indices				
Payment for health care services	**1.88 (1.10–2.56)**	**0.026**	**1.56 (1.03–2.36)**	**0.032**
Being impoverished	**1.79 (1.44–3.00)**	**0.033**	**1.52 (1.01–2.28)**	**0.042**

Table 2

Multivariable logistic regression for quality of life domains.

Domains	Median (IQR)	Unadjusted OR (95% CI)	*p*-Value	Adjusted OR (95% CI)	*p*-Value
Overall perception of QOL	2 (2, 4)	0.44 (0.34–0.56)	<**0.001**	0.67 (0.47–0.96	**0.026**
Overall perception of health	3 (2, 4)	0.26 (0.20–0.34)	<**0.001**	0.75 (0.53–1.07)	0.110
Physical	88 (76, 100)	0.95 (0.93–0.96)	<**0.001**	0.97 (0.95–0.99)	**0.002**
Social	24 (20, 28)	0.95 (0.92–0.97)	<**0.001**	0.99 (0.96–1.03)	0.650
Psychological	76 (69, 88)	0.98 (0.97–0.99)	**0.002**	1.05 (1.03–1.07)	<**0.001**
Environment	100 (84, 116)	0.96 (0.95–0.97)	<**0.001**	0.97 (0.95–0.99)	<**0.001**