

# Depression, Anxiety and Quality of Life among Diabetic Patients: A Comparative Study

Kolawole Mosaku, MBBS, FMCPsych (Nig); Babatope Kolawole, MBChB, FWACP; Celestine Mume, BSc, MBChB, FMCPsych (Nig); Rosemary Ikem, MBChB, FWACP

**Objective:** The aim of this study was to compare psychiatric morbidity among diabetic patients, asthmatics and healthy individuals and also to assess the association of psychiatric morbidity and other variables with quality of life among diabetes patients.

**Method:** For each respondent, the questionnaire on sociodemographic and clinical variables was completed. They also completed the Zung Self-Rating Depression Scale and the State Trait Anxiety Inventory (STAI 1). Diabetic patients also completed the Diabetic Well-Being Questionnaire.

**Results:** A total of 180 subjects were used for this study—80 diabetics (males=37, females=43) were compared with 50 asthmatics (males=22, females=28) and 50 healthy individuals (males=23, females=27). Depression was more prevalent among diabetic patients (20%) compared with asthmatics (12%) and healthy individuals (4%), while anxiety was more prevalent among asthmatics (34%) compared with diabetics (20%) and healthy individuals (8%). Predictors of depression include age of the patient, poor glycemic control and duration of diabetes mellitus. Factors that correlated significantly with diabetic general well-being include depression, anxiety and fasting blood glucose level. Depression and the presence of comorbid medical conditions significantly predicted a low quality of life.

**Conclusion:** Psychiatric morbidity has significant effects on diabetic patients' quality of life.

**Key words:** diabetes mellitus ■ asthma ■ psychiatry morbidity ■ depression

© 2008. From the Departments of Mental Health (Mosaku, consultant psychiatrist; Mume, consultant psychiatrist) and Medicine (Kolawole, consultant endocrinologist; Ikem, consultant endocrinologist), Obafemi Awolowo University, Ile-ife, Osun State, Nigeria. Send correspondence and reprint requests for *J Natl Med Assoc.* 2008;100:73–78 to: Dr. Kolawole Mosaku, Department of Mental Health, Obafemi Awolowo University, Ile-ife, Osun State, Nigeria; Phone: 234-08037115412; e-mail: kmosaku@yahoo.co.uk

## INTRODUCTION

**D**iabetes is a heterogeneous group of disorders whose only common factor is hyperglycemia.<sup>1</sup> In the past, prominent psychoanalysts such

as Menninger<sup>2</sup> and Dunbar<sup>3</sup> claimed that diabetes was in part a psychosomatic disease caused by emotional stress. However, what is now recognized is that diabetes is a chronic condition, and like other chronic medical conditions, it constitutes a source of stress to sufferers and, as such, affects their quality of life.<sup>4</sup>

Studies in western societies have described symptoms such as reduced energy level, increased fatigue, irritability, depression and delayed psychosexual maturation as prominent among diabetics.<sup>5</sup> There have also been reports of high incidence of depression and anxiety occurring among diabetic patients.<sup>6–8</sup> Factors that have been reported as important predictors of psychological symptoms among diabetics, include level of education,<sup>8</sup> with better educated patients reporting fewer psychological symptoms. Others are blood sugar control,<sup>6,9</sup> gender<sup>6,9</sup> (more males likely to report psychological symptoms), and patients' age.<sup>6</sup> A more recent study on type-2 diabetics in Croatia<sup>10</sup> reported 33% of diabetics as having clinically recognized depression.

Few studies on psychological symptoms among diabetics have been reported in Nigeria. Akinlade et al.<sup>11</sup> reported 25% prevalence rate for depression and 4.8% prevalence rate for anxiety, while Coker et al.<sup>12</sup> reported that 31% of their cohort had psychiatric symptoms, 6% had generalized anxiety and 4% had depression. They also concluded that psychiatric symptomatology was associated with low occupational status, duration of diabetes and sexual dysfunction.

Quality of life is an important health outcome, representing the ultimate goal of all health interventions. Diabetes can be a difficult condition to live with for many patients. The demand of self-care can be burdensome, frustrating and overwhelming. The impact of long-term complications can be severe, leading to major changes in the patient's ability to function in daily life. There is also the continuing threat of complications, which can be depressing. Social relationship may be severely affected, and adjustment to the disease is often accompanied by a variety of negative emotional responses such as anger, guilt, frustration and loneliness. Thus, areas of quality of life that could be affected include physical, psychological and social functioning.

Rubin et al.<sup>13</sup> in their review concluded that people with diabetes have a worse quality of life than people with no chronic illness but a better quality of life than people with most other chronic diseases. They also reported that good glycemic control is associated with better quality of life and that the most important disease-specific determinant of quality of life among diabetics was the presence of complications. Other researchers have reported similar findings.<sup>14,15</sup> There have also been reports of duration of diabetes<sup>16</sup> and low socioeconomic status<sup>17</sup> as contributing to poor quality of life among people with diabetes.

There have also been studies from Africa reporting on quality of life among people with diabetes in the continent. Westaway et al.<sup>18</sup> in South Africa reported that diabetes has more impact on general health and level of pain than on well-being. Also in an earlier study among a South-African black urban population,<sup>19</sup> it was found that patients with acceptable blood glucose control reported significantly better physical functioning, role functioning and mental health than patients with poor control. Using the medical outcomes questionnaire to assess the health-related quality of life (HRQOL) in insulin-treated diabetics in the Sudan, Elbagir et al.<sup>20</sup> reported that only 13% of their study had good control, and this group rated their HRQOL as worse than patients with poor control; however, the latter were significantly younger, with shorter diabetes duration and were free from complications. They concluded that HRQOL was generally low in this group of patients, and older age and complications were the most important predictors of quality of life. In a recent study by Kolawole et al.<sup>21</sup> in Nigeria, they reported that diabetic well-being did not correlate with age, disease duration, body mass index or glycemic control. However, none of these studies examined the association of quality of life and psychiatric morbidity.

Properly controlled diabetic patients can live a relatively normal life, but when present, psychological symptoms often make patient's life uncomfortable, reducing their functional capacity and disrupting family life.<sup>5</sup> Thus, knowledge of the psychological problems associated with this condition will only help to improve the quality of life of the patients.

Asthmatics were chosen for comparison because asthma, like diabetes, is a chronic condition and is one of the conditions considered earlier (also like diabetes) as having a psychosomatic<sup>2,3</sup> origin. Psychiatric morbidity among asthmatics has also been extensively studied worldwide<sup>22</sup> and in Nigeria.<sup>23</sup>

The purpose of this investigation was to identify psychiatric morbidity among diabetic patients compared with asthmatics and healthy controls, and to identify possible factors that can predict the presence of such symptoms among diabetic patients. We also assessed the effect of anxiety and depression on the overall quality of life of people with diabetes.

## METHOD

This study was conducted at the endocrinology clinic of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife unit. Ile-Ife is a Yoruba town located in Osun State in the southwestern part of Nigeria, with an estimated population of about 1 million inhabitants.<sup>24</sup>

The hospital receives referrals from within the town and from five neighboring states. The unit itself is overseen by two consultant endocrinologists who have worked with them, six resident doctors and other nursing staff. On the average, the unit sees between 3–4 new cases weekly.

Diagnosis of diabetes was made based on the following criteria:<sup>25</sup>

1. Fasting venous blood glucose level >6.7mmol/l (repeated twice)
2. Random blood glucose level or two-hour postprandial level >10 mmol/l
3. A single random blood sugar level >15 mmol/l in a symptomatic patient

The study protocol was approved by the ethical committee of the hospital. Written informed consent was obtained from each patient after the purpose of the study was explained to them before they were included in the study.

## Procedure

Each respondent completed the sociodemographic questionnaire, which elicited information on variables such as age, sex, marital status, level of education, type of diabetes, type and duration of treatment, co-morbid medical condition, and the fasting blood glucose. Information about co-morbid conditions was obtained from the case-notes. Patients with severe cognitive impairment were excluded from the study.

Each respondent also completed the State Trait Anxiety Inventory<sup>26</sup> (STAI I), Zung's Self-Rating Depression Scale<sup>27</sup> (SDS) and the Diabetic Well-Being Questionnaire.<sup>28</sup>

Two control groups were used for comparison. The first are healthy individuals taken from hospital workers, the other are asthma patients. Both groups were matched for age, sex, marital status, educational and occupational status (Table 1).

## Instruments

1. Sociodemographic questionnaire: This questionnaire was prepared to elicit information on demographic and clinical variables such as age, sex, marital status, type of diabetes and fasting blood sugar.
2. STAI I: This instrument was developed by Spielberger et al.<sup>26</sup> It measures anxiety as a state, which is a transitory experience. It is a self-rating questionnaire that has been validated in Nigeria,<sup>29</sup> and has been used in research and clinical evaluation of patients. The Yoruba version of the instrument was used where necessary.

3. Zung's SDS: This is a 20-item self-rating instrument designed by Zung et al.<sup>27</sup> Responses are given on a four-point scale. It was validated in Nigeria by Jegede<sup>30</sup> and has been used in clinical and research work. A mean raw score of 35 [standard deviation (SD)=7.4] has been identified among Nigerians, and a score of  $\geq 45$  is regarded as indicative of depression.<sup>30</sup>
4. Diabetic Well-Being Questionnaire:<sup>28</sup> This questionnaire consists of 22 items scored on a Likert scale, from which are calculated subscales for depression, anxiety, energy and positive well-being. A higher value on the scale indicates more of the mood described on the scale description. A general well-being score was calculated by reversing the scores of negative items, summing the subscale scores and adjusting to achieve a scale maximum of 66. The instrument has been validated in this environment and found to be a reliable measure of quality of life among Nigerian diabetics, Kolawole et al.<sup>21</sup> reported alpha coefficient ranging from 0.73–0.88, and satisfactory interitem correlations.

## Statistical Analysis

Data obtained were analyzed using the Statistical Package for the Social Sciences<sup>®</sup>, (SPSS) version 11. Proportions were compared using Chi square, while comparison of means was done using Student's t test and analysis of variance (ANOVA) where appropriate. Pearson's correlation and multiple regression analyses were also done. Significant level was fixed at  $<0.05$ .

## RESULTS

A total of 180 subjects were used in the study (80 diabetics, 50 asthmatics and 50 healthy controls). Male:female ratio for all the groups was approximately 1:1.2. There were no significant differences in the other sociodemographic variables of the three comparison groups. A comparison of anxiety and depression symptoms among the groups showed that 16 (20%) of diabetic patients had anxiety symptoms, while 17 (34%) of the asthmatics had anxiety symptoms, and four (8%) of the healthy controls had anxiety symptoms. For depression, 16 (20%) of the diabetic patients had depressive symptoms, while six (12%) and two (4%) of the asth-

**Table 1. Sociodemographic and psychological variables**

|   | Diabetics   | Asthmatics  | Healthy Controls | Statistics     |
|---|-------------|-------------|------------------|----------------|
| Age, Mean (sd)                          | 54.65 (9.5) | 50.65 (8.4) | 52.3 (6.1)       |                |
| Marital Status                          |             |             |                  |                |
| Married                                 | 56 (70%)    | 33 (66%)    | 30 (60%)         | $\chi^2=5.14$  |
| Single                                  | 16 (20%)    | 14 (28%)    | 18 (36%)         | $p=0.27$       |
| Divorced/separated                      | 8 (10%)     | 3 (8%)      | 2 (4%)           | $df=4$         |
| Gender                                  |             |             |                  | $\chi^2=0.67$  |
| Male                                    | 37 (46.3%)  | 22 (44%)    | 23 (47%)         | $p=0.97$       |
| Female                                  | 43 (53.7%)  | 28 (56%)    | 27 (53%)         | $df=2$         |
| Level of Education                      |             |             |                  |                |
| Nil                                     | 15 (18.8%)  | 7 (14%)     | 6 (12%)          | $\chi^2=1.84$  |
| Primary                                 | 13 (16.3%)  | 9 (18%)     | 8 (16%)          | $p=0.934$      |
| Secondary                               | 25 (31.3%)  | 14 (28%)    | 15 (30%)         | $df=6$         |
| Tertiary                                | 27 (33.8%)  | 20 (40%)    | 21 (42%)         |                |
| Occupation                              |             |             |                  |                |
| Government employed                     | 20 (25%)    | 17 (34%)    | 25 (50%)         | $\chi^2=11.9$  |
| Private employed                        | 30 (38.8%)  | 19 (38%)    | 17 (34%)         | $p=0.16$       |
| Unemployed                              | 5 (6.2%)    | 3 (6%)      | 0 (0%)           | $df=8$         |
| Retired                                 | 16 (20%)    | 6 (12%)     | 5 (10%)          |                |
| Student                                 | 8 (10%)     | 5 (10%)     | 3 (6%)           |                |
| State Trait Anxiety Inventory Score     |             |             |                  |                |
| $\leq 39$                               | 64 (89%)    | 33 (66%)    | 46 (92%)         | $\chi^2=10.38$ |
| $\geq 40$                               | 16 (20%)    | 17 (34%)    | 4 (8%)           | $p=0.006$      |
| Total                                   | 80(100%)    | 50 (100%)   | 50 (100%)        | $df=2$         |
| Zung Self-Rating Depression Scale Score |             |             |                  |                |
| $<45$                                   | 64 (80%)    | 44 (88%)    | 48 (96%)         | $\chi^2=6.92$  |
| $\geq 45$                               | 16 (20%)    | 6 (12%)     | 2 (4%)           | $p=0.03$       |
| Total                                   | 80(100%)    | 50 (100%)   | 50(100%)         | $df=2$         |

matics and healthy controls, respectively, had depressive symptoms. Among diabetic patients, seven (9%) had both anxiety and depressive symptoms.

The clinical parameters measured among the diabetic patients are described in Table 2. Among these patients, 86% had type-2 diabetes, while 14% had type-1 diabetes. The mean fasting blood glucose for the patients was 7.1 (SD=2.1) mmol/l, with a mean symptom duration of 8 years (SD=7.4). Among the diabetics, 56 (70%) had some form of comorbid condition. The most common condition was hypertension 22 (27.5%), while 24 (30%) had no recognizable condition associated with their condition (Table 2). The fasting blood glucose level showed that there was a significant difference in the mean fasting blood glucose of the patients with psychological symptoms (anxiety and depression), compared with those without anxiety and depression (anxiety  $t=2.7$ ,  $p=0.001$ ,  $df=78$ ; depression  $t=2.0$ ,  $p=0.05$ ,  $df=78$ ).

Multiple regression analysis shows that patient's age, duration of diabetes and the fasting blood glucose level all significantly predicted the presence of depression, while fasting blood glucose alone significantly predicted the presence of anxiety symptoms (Table 3).

Correlation between the general well-being and pos-

itive well-being subscales of the diabetic well-being questionnaire and demographic, clinical and psychological variables (Table 4) showed that anxiety, depression and fasting blood glucose level all correlated significantly with diabetic patients' well-being (negative correlation). Multiple regression analysis also showed that depression and the presence of comorbid conditions significantly contributed to these patients general well-being (Table 5).

## DISCUSSION

The presence of psychological symptoms in patients with chronic medical conditions has been widely researched in western societies. Findings from various studies have shown that between 10–30% of medical patients have psychological symptoms (anxiety and/or depressive symptoms), with a large percentage of these patients not receiving any treatment.<sup>31</sup>

The prevalence rate of anxiety symptoms among diabetic patients is 20% compared to 34% among asthmatics and 8% among healthy controls. A similarly high level of anxiety symptoms has been reported among asthmatics. Kolbe et al.<sup>32</sup> reported 36% anxiety symptoms in their study, and an earlier study in this environment also reported high levels of anxiety among asthmatics.<sup>23</sup> However, compared to the reported lifetime prevalence of anxiety in the general population—which is 15%<sup>33</sup>—and the 8% found among the healthy controls in this study, the level of anxiety symptoms among diabetic patients obtained in this study is still high.

The prevalence of depressive symptoms in this study was 20% among diabetics compared to 12% among asthmatics and 4% among the healthy control group. Research has shown that diabetes is associated with increased risk of psychological symptoms, especially depression. For example, Pibernik-Okanovic et al.<sup>10</sup> reported 33% prevalence rate of depression in their study. Hermanns et al.<sup>6</sup> also reported in their study that 12.6% had clinical affective disorder, with an additional 18.8% of the patients reporting depressive symptoms without fulfilling all the criteria for a clinical affective disorder. Compared to asthmatics, diabetic patients

**Table 2. Clinical parameters among diabetics**

|                                       |              |
|---------------------------------------|--------------|
| Type of Diabetes Mellitus             |              |
| Type 1                                | 11 (13.8%)   |
| Type 2                                | 69 (86.5%)   |
| Mean Fasting Blood Glucose (mmol/l)   | 7.1 (2.1)    |
| Mean Age of Onset of Symptoms (Years) | 49.2 (13.64) |
| Mean Duration of Symptoms (Years)     | 8.0 (7.4)    |
| Current Treatment Type                |              |
| Oral hypoglycemic drugs               | 60 (75%)     |
| Insulin injection                     | 20 (25%)     |
| Comorbid Conditions                   |              |
| Hypertension                          | 22 (27.5%)   |
| Cardiovascular disease                | 5 (6.3)      |
| Renal condition                       | 4 (5%)       |
| Eye condition                         | 6 (7.5%)     |
| Diabetic ulcers                       | 6 (7.5%)     |
| Amputations                           | 3 (4.7%)     |
| Multiple conditions                   | 10 (12.5%)   |
| None                                  | 24 (30%)     |

**Table 3. Multiple regression analysis—regression of variables on anxiety and depression scores**

|                                 | Depression      |      |         | Anxiety         |      |         |
|---------------------------------|-----------------|------|---------|-----------------|------|---------|
|                                 | Coefficient (β) | t    | P Value | Coefficient (β) | t    | P Value |
| Age (years)                     | 1.04            | 2.03 | 0.05*   | 0.49            | 0.74 | 0.46    |
| Age at onset of DM (years)      | 0.25            | 1.84 | 0.07    | 0.68            | 0.96 | 0.34    |
| Presence of comorbid conditions | 0.52            | 0.40 | 0.67    | 0.12            | 1.00 | 0.32    |
| Fasting blood glucose (mmol/l)  | 0.25            | 2.10 | 0.04*   | 0.32            | 2.19 | 0.04*   |
| Duration of DM (years)          | 0.36            | 2.04 | 0.05*   | 0.24            | 0.63 | 0.54    |

\* Significant at <0.05; DM: diabetes mellitus

have a higher prevalence of depressive symptoms in this study. Other researchers have also found that asthmatics do not have high rates of depression compared to the general population.<sup>32,34</sup> The high prevalence of depressive symptoms has been associated with variables such as age, insulin treatment in type-2 diabetes, hypoglycemic problems and poor glycemic control.<sup>6</sup>

From this study, poor glycemic control was the only variable that significantly predicted the occurrence of anxiety symptoms in this group of patients; however, other studies have linked anxiety with the development of complications<sup>35</sup> and glycemic control.<sup>9</sup> Glycemic control, age of the patient and the duration of diabetes significantly predicted depressive symptoms in this study. Similar findings have been reported by other researchers.<sup>9,10</sup>

The negative impact of the presence of psychological symptoms on the quality of life of diabetics is further emphasized in this study. The presence of these symptoms, especially depression, correlated significantly with a reduced general well-being and affected the patients' feeling of positive well-being. The other factor that significantly correlated with patients' well-being was the fasting blood sugar level. These agree with the earlier findings of Kolawole et al.<sup>21</sup> that age, disease duration and body mass index did not correlate with diabetic patients' quality of life. However, this study found that fasting blood sugar significantly correlated with well-

being scores as against the earlier study, which reported glycemic control as not significantly correlated with diabetic well-being. Other researchers have reported similar findings. Arcega-Dominquez,<sup>36</sup> in a cross-sectional study, reported that psychological and social variables correlated significantly with diabetic patients' quality of life. Wang et al.<sup>37</sup> reported that age, occupation, duration of disease and complications, and the level of fasting blood glucose all affected diabetic patients' quality of life. Rubin et al.<sup>13</sup> in their review showed that better glycemic control is associated with better quality of life and that complications of diabetes are the most important disease-specific determinants of quality of life, while Jacobson<sup>38</sup> reported that diabetes-related complications lead to a diminished quality of life.

Depression and the presence of comorbid medical conditions which often are complications of diabetes were the only factors that significantly predicted patient's well-being in this study. Appropriate intervention programs should be instituted for patients with psychological symptoms especially those who already have complication since their quality of life can be significantly compromised.

The study has some limitations, the sample size is moderate, this is because patients with diagnosed psychiatric conditions were excluded from the study, and those who had cognitive impairment were also excluded to avoid the confounding effects of this variables.

**Table 4. Measure of association between subscales of Well-Being Questionnaire and other variables**

| Variables                  | General Well-Being        |          |         | Positive Well-Being       |          |           |
|----------------------------|---------------------------|----------|---------|---------------------------|----------|-----------|
|                            | Pearson's Coefficient (r) | P Value  |         | Pearson's Coefficient (r) | P Value  |           |
| Age                        | -0.14                     | (0.22)   |         | -0.12                     | (0.29)   |           |
| Fasting blood glucose      | -0.24                     | (0.04)*  |         | -0.29                     | (0.01)*  |           |
| Anxiety                    | -0.45                     | (0.001)* |         | -0.37                     | (0.001)* |           |
| Duration of diabetes       | -0.11                     | (0.33)   |         | -0.11                     | (0.33)   |           |
| Depression                 | -0.9                      | (0.001)* |         | -0.23                     | (0.001)* |           |
|                            | Eta Coefficient           | Anova F  | P Value | Eta Coefficient           | Anova F  | P Value   |
| Sex                        | 0.11                      | 1.03     | 0.31    | 0.04                      | 0.12     | 0.75      |
| Type of diabetes           | 0.15                      | 1.88     | 0.17    | 0.16                      | 2.01     | 0.16      |
| Comorbid medical condition |                           | 0.15     | 1.74    | 0.19                      | 0.13     | 1.42 0.24 |

\*Significant at <0.05

**Table 5. Regression of significant variables on general well-being**

| Variables                  | Coefficient (β) | t    | P Value |
|----------------------------|-----------------|------|---------|
| Depression score           | 0.67            | 6.27 | 0.001*  |
| Comorbid conditions        | 0.21            | 2.60 | 0.01*   |
| Age (years)                | 0.41            | 1.45 | 0.32    |
| Fasting blood sugar        | 0.02            | 0.27 | 0.79    |
| Anxiety score              | 0.67            | 0.29 | 0.77    |
| Age of onset of DM (years) | 0.55            | 1.25 | 0.21    |

Significant at <0.05; DM: diabetes mellitus

Another limitation is the limited range of the quality of life index used, diabetes impact on a wide range of functioning such as activities of daily living, social functioning and relationships, this were not covered by the instrument used in this study. The use of asthmatics and hospital workers as controls may also affect the generalization of the results to the community. However no study of this nature has been done in this environment before now, it is hoped that this study will provide data for comparison in the future.

In conclusion, this study shows that psychological symptoms are quite common among diabetic patients compared to healthy controls and that the presence of these symptoms significantly impairs patients' well-being.

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