Evaluation of Female Sexual Function in Persons With Type 2 Diabetes Mellitus Seen in a Tertiary Hospital in Southeast Nigeria With Emphasis on its Frequency and Predictors

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ABSTRACT

Women with diabetes are at increased risk of sexual problems. However, this problem is underreported; hence, the need for this study. This was a cross-sectional case-controlled study. Seventy-five consenting females with type 2 diabetes mellitus (T2DM) were enrolled from the Diabetes Clinic of the Federal Medical Center, Umuahia, while 75 persons, which included hospital workers and female companions of subjects, were recruited as a control group. Sexual dysfunction in both groups was diagnosed and characterized using the female sexual function index (FSFI). Data obtained from this study was presented as Mean ± SD and analyzed using SPSS 17 software. The mean age of the T2DM group and control were 44.5 years and 38.9 years, respectively. The mean total female sexual score was 22.10 ± 6.66 in the T2DM subjects, while in the control subjects it was 22.43 ± 5.29. This was not statistically significant. The FSFI scores in the desire, lubrication, and orgasm domains were all lower in the diabetic women and this was statistically significant (p < 0.05). The domains of pain and arousal were also lower in the diabetic women, although this was not statistically significant (p > 0.05). The proportion of diabetic females who reported problems in the arousal, lubrication, orgasm, and pain domains was higher (40.0, 36.4, 32.7, 29.1) than the controls (27.9, 16.2, 14.7, 19.1; p < 0.05). The prevalence of female sexual dysfunction in our study was high. Similarly, the FSFI score was low in women with diabetes when compared with controls. The domains of arousal, pain, orgasm, and satisfaction were the most affected in subjects with DM. Age, marital status, body mass index, fasting blood sugar, and hypertension were predictive of sexual dysfunction in the diabetic women.

Introduction

Diabetes mellitus (DM) occurs throughout the world. According to the International Diabetes Federation’s eighth atlas, about 425 million people worldwide, or 8.8% of adults 20–79 years old, were estimated to be living with DM in 2017 (International Diabetes Federation Diabetes Atlas, 2017). There is a relationship between diabetes and sexual dysfunction; this has been noticed in both males and females (Feldman, Goldstein, Hatzichristo, Krane, & McKinlay, 1994; Lu et al., 2009; Penson et al., 2003). Sexual dysfunctions in women with DM are often underreported when compared with men with diabetes. To the best of our knowledge, there are few studies in our environment that have focused on female sexual dysfunction (FSD), even though more cases are seen in outpatient clinics than the number reported, if any. Some probable reasons for this observation are that, first, women are still viewed as sexual objects in some societies and as a result are
expected to accept sex and sexuality as a prelude for conception. Second, some societies view women who raise the issue of their sexual dysfunction as promiscuous, which will inadvertently make them conceal these challenges for fear of societal ridicule. In the early 19th century, before the discovery of insulin, sexuality was neither a common topic of discourse nor an area that had benefited from extensive research. The initially conceived idea about SD in both sexes was, “If you do not ask about it, it does not exist.” The connection between diabetes and sexual function only began to be highlighted about a century ago. Unfortunately, more attention was given to male dysfunction until the famous reproductive endocrinologist Robert Kolodny reported the relationship between diabetes and FSD (Kolodny, 1971). There are several causes of FSD, including vascular, neurological, endocrine, and psychogenic causes, all of which have been identified in the etiology of FSD (Griffith & Lustman, 1997). Unlike male SD, FSD is majorly influenced by psychogenic factors such as depression, which occurs more than twice as often in women as their male counterparts (Griffith & Lustman, 1997).

The probability of a woman with diabetes developing SD is higher when compared with those without DM. Sexual problems in women with diabetes could present in various ways. Some of these problems include dyspareunia, inadequate vaginal lubrication, and reduced arousal and desire. Even though there are studies on this subject from other parts of the world, literature on this subject from Nigeria is scarce; hence, the need for this study. The aim of this study is to examine the prevalence of SD in women with type 2 diabetes mellitus (T2DM), compare the prevalence of SD in women with diabetes to that of a control group, and describe its predictors in women with diabetes.

**Methodology**

This was a cross sectional case-controlled study. Seventy-five consenting females with T2DM were enrolled from the Diabetes Clinic of Federal Medical Center, Umuahia. The inclusion criteria include subjects being married for at least 1 year and having had a stable marital relationship. Patients who were on drugs like beta blockers and centrally acting drugs like alpha methyldopa known to cause FSD were excluded. Seventy-five persons, which included hospital workers and female companions of subjects, were recruited as a control group (these subjects were screened for diabetes). The questionnaire was administered by both male and female medical personnel in the diabetic unit who informed the subjects about the research and its objectives and they were assured that confidentiality would be maintained during and after the study. Information given was used only for the purpose of this study. All the staff working for the study were trained and examined before the enrollment. Information obtained from study and control subjects included age, marital status, educational status, employment history, drug history, type and duration of DM, height, weight, body mass index, waist circumference, hip circumference, and blood pressure. The weight obtained was recorded in kilograms (kg) to the nearest 0.1 kg and the height recorded in meters (m) to the nearest 0.01 m. The body mass index was calculated as the weight in kg divided by the square of the height in meters (Garrow & Webster, 1985). The waist circumference was measured using a non-stretch metric tape and taken at the midpoint between the rib cage and iliac crest, while hip circumference was taken as the maximal circumference of the buttocks (Bray, 1989).

Sexual dysfunction in both groups was diagnosed and characterized using the female sexual function index (FSFI) (Rosen et al., 2000) which is a specific, sensitive, and standardized tool for diagnosing FSD. The index is a 19-item questionnaire providing scores on six domains of sexual function (desire, arousal, lubrication, orgasm, satisfaction, and pain) as well as a total score (Meston, 2003; Rosen et al., 2000; Wiegel, Meston, & Rosen, 2005). In women, the minimum and maximum scores are, respectively, 2 and 36. Women with a score under 26 were classified as having SD. This cutoff point was the same figure validated by other researchers. It is a well-accepted
self-report instrument for assessing sexual function of women worldwide. The data obtained from this study were presented as Mean ± SD and analyzed using SPSS 17 software.

## Results

Between October 2016 and September 2017, 150 married women were studied (seventy-five diabetic women and seventy-five control subjects), but only 123 returned their questionnaire. They were grouped into a diabetic group (n = 55) and a nondiabetic group (n = 68). Women with DM were those attending the diabetes and endocrinology clinics at the Federal Medical Center, Umuahia, and nondiabetic women were their female companions and health workers at the medical center. The mean ages of the T2DM group and control were 44.5 years and 38.9 years, respectively. This was statistically significant (p = 0.04; Table 1). The proportion of persons who had some form of education was higher in the control subjects than in patients with T2DM and this was statistically significant (p = 0.02). A greater percentage of the control subjects were either self-employed or civil servants compared with the subjects with T2DM, although this was not statistically significant (p = .24). A higher proportion of the control subjects were either overweight or obese when compared with subjects with T2DM (see Table 2); this was not statistically significant (p = .33). The prevalence of SD in this study was 29.1% and the mean age was 47.3 ± 7.9. The mean total FSFI scores in T2DM subjects and the control group were 22.1 and 22.4, respectively (p > 0.05) (see Table 3). The proportions of diabetic females who reported problems in the arousal, lubrication, orgasm, and pain domains were 40.0, 36.4, 32.7 and 29.1, respectively (see Table 4). On the other hand, the proportion in the control was 27.9, 16.2, 14.7, and 19.1, respectively. Age, duration of DM, and hypertension are significantly predictive of sexual dysfunction in the diabetic women (OR: 1.80, 1.15, 1.67, 1.00, 8.51; see Table 5).

### Table 1. Demographic and clinical characteristics of the study population.

|                | Cases n (%) | Control n (%) | χ² | p value |
|----------------|-------------|---------------|----|---------|
| **Age**        |             |               |    |         |
| <40 years      | 16 (29.1)   | 32 (47.1)     |    |         |
| 41–50 years    | 15 (27.3)   | 19 (27.9)     | 9.84 | .04     |
| 51–60 years    | 12 (21.8)   | 12 (17.6)     |    |         |
| 61–70 years    | 7 (12.7)    | 5 (7.4)       |    |         |
| 71–80 years    | 5 (9.1)     | 0 (0.0)       |    |         |
| Mean ± SD      | 44.5 ± 7.4  | 38.9 ± 1.6    |    |         |
| **Marital Status** |          |               |    |         |
| Single         | 7 (12.7)    | 11 (16.2)     |    |         |
| Married        | 35 (63.6)   | 48 (70.6)     | 3.39 | .49     |
| Widowed        | 11 (20.0)   | 6 (8.8)       |    |         |
| Separated      | 1 (1.8)     | 1 (1.5)       |    |         |
| Divorced       | 1 (1.8)     | 2 (2.9)       |    |         |
| **Educational Status** |      |               |    |         |
| Primary        | 8 (14.5)    | 2 (2.9)       |    |         |
| Secondary      | 20 (36.4)   | 22 (32.4)     | 10.29 | .02     |
| Tertiary       | 27 (49.1)   | 38 (55.9)     |    |         |
| None           | 0 (0.0)     | 6 (8.8)       |    |         |
| **Employment Status** |    |               |    |         |
| Self-employed  | 21 (38.2)   | 30 (44.1)     |    |         |
| Civil Servant  | 21 (38.2)   | 31 (45.6)     | 4.25 | .24     |
| Unemployed     | 4 (7.3)     | 3 (4.4)       |    |         |
| Retired        | 9 (16.4)    | 4 (5.9)       |    |         |
| **BMI**        |             |               |    |         |
| Normal         | 17 (30.9)   | 14 (20.6)     | 2.22 | .33     |
| Overweight     | 28 (50.9)   | 36 (52.9)     |    |         |
| Obese          | 10 (18.2)   | 18 (26.5)     |    |         |

*Note. BMI = body mass index.*
Table 2. The mean of clinical characteristics between females with T2DM and the control group.

| Parameter       | T2DM (Mean ± SD) | Control (Mean ± SD) | t-test | p value |
|-----------------|------------------|---------------------|--------|---------|
| BMI             | 27.1 ± 4.7       | 28.0 ± 4.8          | 1.04   | 0.3     |
| WC (cm)         | 85.8 ± 10.6      | 87.5 ± 10.1         | 0.94   | 0.37    |
| HC (cm)         | 88.6 ± 18.6      | 100.0 ± 12.9        | 3.99   | <.001   |
| SBP (mmHg)      | 133.9 ± 17.5     | 128.9 ± 24.4        | 1.28   | .2      |
| DBP (mmHg)      | 82.0 ± 7.6       | 80.5 ± 11.5         | 0.73   | .47     |
| FBS (mg/dl)     | 156.1 ± 62.4     | 94.0 ± 14.6         | 7.96   | <.001   |

Note. BMI = body mass index; WC = waist circumference; HC = hip circumference; SBP = systolic blood pressure; DBP = diastolic blood pressure; FBS = fasting blood sugar.

Table 3. Difference in mean female sexual score and domains between type 2 DM patients and the control group

| FSFI score       | Cases (Mean ± SD) | Control (Mean ± SD) | t-test | p value |
|------------------|-------------------|---------------------|--------|---------|
| Total FSFI score| 22.10 ± 6.66      | 22.43 ± 5.29        | 1.24   | .22     |
| Desire           | 3.41 ± 1.15       | 4.12 ± 1.36         | 3.17   | <.01    |
| Arousal          | 3.44 ± 1.66       | 3.85 ± 1.33         | 1.52   | .13     |
| Lubrication      | 3.64 ± 1.75       | 4.44 ± 1.38         | 2.83   | .01     |
| Orgasm           | 3.65 ± 1.73       | 4.24 ± 1.41         | 2.06   | .04     |
| Satisfaction     | 3.00 ± 1.42       | 2.79 ± 1.23         | 0.88   | .38     |
| Pain             | 4.23 ± 2.01       | 4.70 ± 1.67         | 1.41   | .16     |

Note. TFSS = total female sexual score; FSFI = female sexual function index.

Table 4. Difference in FSD between cases and the control group.

| FSD              | T2DM (%) 55 (100.0) | CONTROL (%) 68 (100.0) | t-test | p value |
|------------------|---------------------|------------------------|--------|---------|
| Normal           | 16 (29.1)           | 18 (26.5)              | 0.10   | .74     |
| FSD              | 39 (70.9)           | 50 (73.5)              |        |         |
| DESIRE           |                     |                        |        |         |
| Normal           | 40 (72.7)           | 35 (51.5)              | 5.77   | .2      |
| FSD              | 15 (27.3)           | 33 (48.5)              |        |         |
| AROUSAL          |                     |                        |        |         |
| Normal           | 33 (60.0)           | 49 (72.1)              | 1.99   | .15     |
| Arousal          | 22 (40.0)           | 19 (27.9)              |        |         |
| LUBRICATION      |                     |                        |        |         |
| Normal           | 35 (63.6)           | 57 (83.8)              | 6.57   | .01     |
| Lubrication      | 20 (36.4)           | 11 (16.2)              |        |         |
| ORGASM           |                     |                        |        |         |
| Normal           | 37 (67.3)           | 58 (85.3)              | 5.62   | .02     |
| Orgasm           | 18 (32.7)           | 10 (14.7)              |        |         |
| SATISFACTION     |                     |                        |        |         |
| Normal           | 19 (34.5)           | 20 (29.4)              | 0.37   | .54     |
| Satisfaction     | 36 (65.5)           | 48 (70.6)              |        |         |
| PAIN             |                     |                        |        |         |
| Normal           | 39 (70.9)           | 55 (80.9)              | 1.69   | .19     |
| Pain             | 16 (29.1)           | 13 (19.1)              |        |         |

Note. FSD = female sexual dysfunction; T2DM = type 2 diabetes mellitus.

Table 5. Predictors of female sexual dysfunction using logistic regression.

| p value | OR (95% CI) |
|---------|-------------|
| BMI Class         | 0.395       | 1.80 (0.46–6.99) |
| Age               | 0.049       | 1.15 (0.43–3.05) |
| Marital status    | 0.530       | 1.67 (0.34–8.14) |
| LOE               | 0.743       | 0.79 (0.20–3.19) |
| Employment        | 0.139       | 0.51 (0.21–1.25) |
| Duration of DM    | 0.014       | 0.03 (0.00–0.51) |
| FBS               | 0.457       | 1.00 (0.98–1.01) |
| HTN               | 0.044       | 8.51 (1.06–68.33) |
| Constant           | 0.493       | 10.218          |

Note. BMI = body mass index; LOE = level of education; FBS = fasting blood sugar, HTN = hypertension; OR = odds ratio.
Discussion

The prevalence of FSD in this study was 29.1%. This is much higher than the 6.6% reported by Unadike, Eregie, and Ohwovoriole (2009), though it is almost same as the prevalence reported by Enzlin, Mathieu, and Demytteanere (2003) in the population they studied. Although the study by Unadike et al. was performed in a region with the same financial and educational background as ours, the low prevalence he reported may be a result of changing perceptions by women (as a result of increasing modernization) on issues bordering on sexual challenges, considering the fact that his study was carried out almost a decade ago. This could be responsible for the obvious increase in prevalence; other studies reported even higher prevalence compared to findings in this study (Kashi et al., 2015; Shi et al., 2012). The complications of diabetes seem to have a much bigger influence on sexual problems, as noted in our study.

The mean (SD) ages of subjects with T2DM were higher than that of the controls and this was statistically significant: increasing age was associated with the development of FSD. In studies from other countries, the age of the study population may have affected the FSD prevalence in such climes; a Nigerian study had much older subjects (Ogbera, Chinenye, Akinlade, Eregie, & Awobusuyi, 2009), while a Belgian study enrolled the youngest participants (Enzlin et al., 2003). In our study, both the prevalence and age were moderate, similar to what was reported in a U.S. study. Age has a significant impact on the sexual function of a woman because increasing age may be associated with declining sexual interest. With aging, women tend to experience hormonal changes, such as estrogen/androgen reduction, that frequently cause significant bodily and emotionally unpleasant effects on sexual function (Bachmann & Avci, 2004). This could explain the reason behind the varying prevalence rates of FSD noted in different studies.

The mean total FSFI scores in T2DM subjects and the control group were 22.1 and 22.4, respectively; this is in keeping with reports from other studies (Erol et al., 2002; Esposito et al., 2010; Fatemi & Taghavi, 2009). The FSF scores in the desire, lubrication, and orgasm domains were all lower in the diabetic women and this was statistically significant ($p < .05$). The domains of pain and arousal were also lower in the diabetic women, although this was not statistically significant ($p > .05$). In the diabetic women, the majority of subjects reported problems in the domains of arousal, lubrication, orgasm, satisfaction, and pain when compared to the control group. This finding is in keeping with results from a study by Olarinoye and Olarinoye (2008) who, in a study involving 51 type 2 DM women, noted arousal, pain, orgasm, and satisfaction as the most affected domains.

In absolute percentage, the proportion of diabetic females who reported problems in the arousal, lubrication, orgasm, and pain domains were higher than the controls. These differences were statistically significant in the two domains of orgasm and lubrication ($p < 0.05$). This value is higher than results of a Malaysian study (Ishak, Low, & Othman, 2010). This difference could be attributed to the difference in culture, ideologies, and religion: system of secularism in Southeast Nigeria with large inhabitants of Christians as compared with a predominantly Muslim population in the Malaysian study. This will influence expression of sexual opinions and thoughts and, inexorably, cause the women to suppress topics relating to their sexuality for fear of its negative perception from society. Thus, these sexual problems may go unreported.

Age, marital status, BMI, FBS, and hypertension are predictive of sexual dysfunction in the diabetic women. Higher BMI class is predictive of sexual dysfunction in the diabetic women: this finding is similar to reports from a New York study (Veronelli et al., 2009). In a study done in China, a similar trend was reported, although this was not seen in the nondiabetic control group, although study comparison between nations is problematic because varying definitions and research methods were employed in these various studies. Another interesting finding from this study is the lower BMI and difference in hip and waist circumference in patients with diabetes when compared to the control group. A possible explanation could be that in a patient with diabetes, a vital aspect of management is lifestyle intervention with one goal being weight reduction.
Therefore, it may not be uncommon to see patients with T2DM having a lower BMI and a difference in hip and waist circumference. We feel that there is a need for more studies to further investigate the mechanisms of obesity and sexual dysfunction in diabetic women.

The strength of our study lies in the use of the FSFI questionnaire, a validated instrument to assess female sexual function which has been extensively used in studies. Limitations that arose from this study include: This was a small study which should be considered exploratory, no multiple comparison adjustments were made in the analysis; therefore a larger and specifically designed study is needed to evaluate other clinical and metabolic abnormalities in patients with SD. Secondly, we did not consider sex hormones, history of reproductive system diseases and other factors in this study.

Conclusion

The prevalence of female sexual dysfunction was high from our study. Similarly, the FSFI score was low in women with diabetes when compared with the control group. The domains of arousal, pain, orgasm, and satisfaction were the most affected in subjects with DM. Age and hypertension were significantly predictive of sexual dysfunction in the diabetic women. There may be need for more research to look at the influence of diabetes type on sexual function in order to explore various treatment strategies for this group of women.

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