

1 **EVALUATION OF FEMALE SEXUAL FUNCTION IN PERSONS WITH TYPE 2**
2 **DIABETES MELLITUS SEEN IN A TERTIARY HOSPITAL IN SOUTH EAST**
3 **NIGERIA WITH EMPHASIS ON ITS FREQUENCY AND PREDICTORS**

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19

20 **Abstract**

21 **Background:** women with diabetes are at increased risk of sexual problems, however, this
22 problem is under reported hence the need for this study.

23 **Methods:** This was a cross sectional case-controlled study. Seventy-five consenting females
24 with type 2 DM were enrolled from the Diabetes Clinic of the Federal Medical Center,
25 Umuahia, while Seventy-five persons which included hospital workers and female companions
26 of subjects were recruited as control. Sexual dysfunction in both groups was diagnosed and
27 characterized using the female sexual function index (FSFI). Data obtained from this study was
28 presented as Mean±SD and analyzed using SPSS 17 software.

29 **Results:** The mean age of the T2DM group and control were 44.5 years and 38.9 years
30 respectively. The mean total female sexual score (TFSS) was 22.10±6.66 in the T2DM subjects,

31 while in the control subjects, it was 22.43 ± 5.29 . This was not statistically significant. The FSF
32 scores in the desire, lubrication and orgasm domains were all lower in the diabetic women and
33 this was statistically significant ($P < 0.05$). The domains of pain and arousal were also lower in
34 the diabetic women although this was not statistically significant ($P > 0.05$). The proportion of
35 diabetic females who reported problems in the arousal, lubrication, orgasm and pain domains
36 were higher (40.0, 36.4, 32.7, 29.1) than the controls (27.9, 16.2, 14.7, 19.1) $\{p < 0.05\}$.

37 **Conclusion:** The prevalence of female sexual dysfunction was high from our study. Similarly, the
38 Female Sexual Function Index (FSFI) score was low in women with diabetes when compared with
39 controls. The domains of arousal, pain, orgasm and satisfaction were the most affected domains in
40 subjects with DM Age, marital status, BMI, FBS and hypertension were predictive of sexual dysfunction
41 in the diabetic women.

42

43 **KEYWORDS:** Female Sexual function, Diabetes mellitus, Frequency, Predictors, South east Nigeria,
44 Dysfunction

45

46 **1. Introduction:**

47 Diabetes Mellitus occurs throughout the world. According to the International Diabetes
48 Federation (IDF) eighth atlas, about 425 million people worldwide, or 8.8% of adults 20-79
49 years, are estimated to be living with diabetes mellitus in 2017.¹ There is a relationship between
50 diabetes and sexual dysfunction (SD): this has been noticed in both male and female.^{2,3,4} Sexual
51 dysfunctions in women with diabetes mellitus are often under reported when compared with
52 men with diabetes. To the best of our knowledge, there are few studies in our environment that
53 have focused on female sexual dysfunction, even though more cases are seen in the outpatient
54 clinics than the number reported if any. Some probable reasons for this observation includes: 1.
55 Women are still viewed as sexual objects in some societies and as a result of this, they are
56 expected to accept sex and sexuality as a prelude for conception. Secondly, some societies view
57 women who raise the issue of their sexual dysfunctions as promiscuous, this inadvertently will
58 make them to conceal these challenges for fear of societal ridicule. In the early nineteenth

59 century, before the discovery of insulin, sexuality was not a common topic of discourse neither
60 was it an area that had benefited from extensive research. The initially conceived idea about
61 sexual dysfunction in both sexes was, “If you do not ask about it, it does not exist.” The
62 connection between diabetes and sexual function only began to be highlighted about a century
63 ago unfortunately; more attention was given to male dysfunction. Furthermore, most of the
64 publications placed emphasis on the effect of diabetes on male sexual function, not until the
65 famous reproductive endocrinologist: Robert Kolodny reported the relationship between
66 diabetes and female sexual dysfunction.⁵ There are several causes of female SD and these
67 includes: vascular, neurological, endocrine and psychogenic causes, all these factors have been
68 identified in the aetiology of female sexual dysfunction.⁶ Unlike male SD, female SD is majorly
69 influenced by psychogenic factors such as depression whose occurrence is more than double in
70 women when compared to their male counterparts.⁶

71 The probability of a woman with diabetes developing sexual dysfunction is higher when
72 compared with those without DM. Sexual problems in women with diabetes could present in
73 various ways. Some of these problems include dyspareunia, inadequate vaginal lubrication
74 reduced arousal and desire. Even though there are studies on this subject from other parts of the
75 world, literature on this subject from Nigeria is scarce, hence the need for this study.

76 **1.1 Aims:** The aim of this study is to examine the prevalence of sexual dysfunction in women
77 with type 2 diabetes mellitus, compare the prevalence of sexual dysfunction in women with
78 diabetes to that of a control group and describe the predictors of sexual dysfunction in women
79 with diabetes.

80 **2. Methodology:**

81 This was a cross sectional case-controlled study. Seventy-five consenting females with type 2
82 DM were enrolled from the Diabetes Clinic of the Federal Medical Center, Umuahia, Abia state.
83 The inclusion criteria include subjects married for atleast 1year and have had a stable marital
84 relationship. Patients who were on drugs like beta blockers and centrally acting drugs like alpha
85 methyldopa known to cause female SD were excluded. Seventy-five persons which included
86 hospital workers and female companions of subjects were recruited as control (these subjects
87 were screened for diabetes). The questionnaire was administered by both male and female
88 medical personnel in the diabetic unit who informed the subjects about the research and its
89 objectives and they were assured that confidentiality will be maintained during and after the
90 study. Information given was used only for the purpose of this study. All the staff working for
91 the study were trained and examined before the enrollment. Information obtained from study
92 and control subjects included age, marital status, educational status, employment history, drug
93 history, type and duration of DM, height, weight, body mass index, waist circumference, hip
94 circumference, and blood pressure. The weight obtained was recorded in kilograms (kg) to the
95 nearest 0.1kg and the height recorded in meters (m) to the nearest 0.01m. The body mass index
96 was calculated as the weight in kg divided by the square of the height in metres.⁷The waist
97 circumference was measured using a non-stretch metric tape and taken at the mid-point between
98 the rib cage and iliac crest while hip circumference was taken as the maximal circumference of
99 the buttocks.⁸

100 Sexual dysfunction in both groups was diagnosed and characterized using the female sexual
101 function index (FSFI)⁹ which is a specific, sensitive and standardized tool for diagnosing female
102 SD. The index is a 19-item questionnaire providing scores on six domains of sexual function
103 (desire, arousal, lubrication, orgasm, satisfaction, and pain) as well as a total score.^{9,10,11}In
104 women, the minimum and maximum scores are respectively 2 and 36. Women with a score

105 under 26 were classified as having sexual dysfunction. This cut-off point was the same figure
106 validated by other researchers. It is a well-accepted self-report instrument for assessing sexual
107 function of women world-wide. The data obtained from this study was presented as Mean±SD
108 and analyzed using SPSS 17 software.

109 **3. Results**

110 Between October 2016 and September 2017, 150 married women were studied (seventy-five
111 diabetic women and seventy-five controls), but one hundred and twenty three returned there
112 questionnaire. They were grouped into a diabetic group ($n=55$) and a non-diabetic group
113 ($n=68$). Women with diabetes mellitus were those attending the Diabetes and Endocrinology
114 clinics at the Federal Medical Center, Umuahia, Abia state and non-diabetic women were their
115 female companions and health workers at the medical center. The mean age of the T2DM group
116 and control were 44.5 years and 38.9 years respectively. This was statistically significant
117 ($p=0.04$, Table 2). The proportion of persons who had some form of education was higher in the
118 control subjects than in patients with T2DM and this was statistically significant ($p=0.02$). A
119 greater majority of the control subjects were either self-employed or civil servants compared
120 with the subjects with T2DM, although this was not statistically significant ($p=0.24$). A higher
121 proportion of the control subjects were either overweight or obese when compared with subjects
122 with T2DM, this was not statistically significant ($p=0.33$). The prevalence of SD in this study
123 was 79.2% and the mean age was 47.3 ± 7.9 . The proportion of diabetic females who reported
124 problems in the arousal, lubrication, orgasm and pain domains was 40.0, 36.4, 32.7 and 29.1
125 respectively. On the other hand the proportion in the control was 27.9, 16.2, 14.7 and 19.1
126 respectively. Age, marital status, BMI, FBS and hypertension are predictive of sexual
127 dysfunction in the diabetic women (OR: 1.80, 1.15, 1.67, 1.00, 8.51).

128 **4. Discussion**

129 Sexual dysfunction (SD) is known to be common in male and females with DM, although it is
130 grossly under reported in females with DM. The prevalence of female sexual dysfunction (FSD)
131 in this study was 29.1%. This is much higher than the 6.6% reported by Unadike et al¹² though
132 it is almost same as the prevalence reported by Enzlin et al¹³ in the population they studied.
133 Although the study by Unadike et al was performed in a region with a the same financial
134 and educational background as ours, the low prevalence he reported may be as a result of
135 changing perceptions by women (as a result of increasing modernization) on issues bordering on
136 sexual challenges considering the fact that his study was carried out almost a decade ago.
137 Women are becoming increasingly more informed and confident in expressing their opinions:
138 this could be responsible for obvious increase in prevalence. Other studies reported even higher
139 prevalence compared to findings in this study.^{14,15}The complications of diabetes seem to have a
140 much bigger influence on sexual problems as noted in our study.

141 The mean (SD) ages of subjects with T2DM were higher than that of the controls and this was
142 statistically significant: increasing age was associated with the development of FSD. In studies
143 from other countries, the age of the study population may have affected the FSD prevalence in
144 such climes; a Nigerian study had much older subjects¹⁶ while a Belgium study
145 enrolled the youngest participants.¹³ In our study, both the prevalence and age were
146 moderate, similar to what was reported in a US study. Age has a significant impact on the
147 sexual function of a woman as increasing age may be associated with declining sexual interest.
148 With aging, women tend to experience hormonal changes such as estrogen/androgen reduction,
149 which frequently cause significant bodily and emotional unpleasant effects on sexual function.¹⁷

150 This could explain the reason behind the varying prevalence rates of FSD noted in different
151 studies.

152 The mean total female sexual function index (FSFI) score in T2DM subjects and their control
153 were 22.1 and 22.4 respectively ($p > 0.05$): this is in keeping with reports from other
154 studies.^{18,19,20} The FSF scores in the desire, lubrication and orgasm domains were all lower in the
155 diabetic women and this was statistically significant ($P < 0.05$). The domains of pain and arousal
156 were also lower in the diabetic women although this was not statistically significant ($P > 0.05$). In
157 the diabetic women, majority of subjects reported problems in the domains of arousal,
158 lubrication, orgasm, satisfaction and pain when compared to the control group. This finding is in
159 keeping with results from a study by Olarinoye et al²¹ who in a study involving fifty one type 2
160 DM women, noted arousal, pain, orgasm and satisfaction as the most affected domains.

161 In absolute percentage, the proportion of diabetic females who reported problems in the arousal,
162 lubrication, orgasm and pain domains were higher than the controls. These differences were
163 statistically significant in the two domains of orgasm and lubrication ($p < 0.05$). This value is
164 higher than results of a Malaysian study.²² This difference could be attributed to the difference
165 in culture, ideologies and religion: system of secularism in South East Nigeria with large
166 inhabitants of Christians as compared with a predominantly Muslim population in the Malaysian
167 study. This will influence expression of sexual opinions and thoughts and inexorably, cause the
168 women to suppress topics relating to their sexuality for fear of its negative perception from the
169 society. Thus, these sexual problems may go unreported.

170 Age, marital status, BMI, FBS and hypertension are predictive of sexual dysfunction in the
171 diabetic women. Higher BMI class is predictive of sexual dysfunction in the diabetic women:
172 this finding is similar to reports from a New York study.²³ In a study done in China, similar trend

173 was reported although this was not seen in the non diabetic control group. Although study
174 comparison between nations is problematic because varying definition and research methods
175 were employed in these various studies. Another interesting finding from this study is the lower
176 BMI and difference in HC and WC in patients with diabetes when compared to the control
177 group. A possible explanation could be that in a patient with diabetes, a vital aspect of
178 management is lifestyle intervention with one goal being weight reduction. Therefore, it may not
179 be uncommon to see patients with T2DM having a lower BMI, difference in HC and WC. We
180 feel that there is need for more studies to further investigate the mechanisms of obesity and
181 sexual dysfunction in diabetic women.

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

189 **5. Conclusion**

190 The prevalence of female sexual dysfunction was high from our study. Similarly, the Female Sexual
191 Function Index (FSFI) score was low in women with diabetes when compared with controls. The
192 domains of arousal, pain, orgasm and satisfaction were the most affected domains in subjects with DM
193 Age, marital status, BMI, FBS and hypertension were predictive of sexual dysfunction in the diabetic
194 women. There may be need for more research to look at the influence of diabetes type on sexual
195 function in order to explore various treatment strategies for this group of women.

196

197 **Consent statement**

198 Written informed consent was obtained from the patient for publication of this research article.

199 A copy of the written consent is available for review by the Editor-in-Chief of this journal.

200 **Declarations**

201 Ethical approval: The Ethics and Research committee of the Federal Medical Center, Umuahia
202 gave the ethical approval. The patients interviewed in this study did it voluntarily, and wrote an
203 informed consent.

204 Source of funding: none

205 **Authors contribution**

206 EI conceived of the study, carried out the sequence alignment and drafted the manuscript. OU
207 and TU participated in the sequence alignment, design of the study and helped to draft the
208 manuscript. All authors read and approved the final manuscript.

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211 who contributed towards the article by making substantial contributions to conception and
212 revision of manuscript for important intellectual content.

213 **Conflict of Interest:** we declare that the submitted work was carried out in the absence of any
214 personal, professional or financial relationships that could potentially be construed as a conflict
215 of interest.

216

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283

284

Appendix I

285

Female Sexual Function Index (FSFI)

286

287

288

289 SubjectIdentifier _____ 291 Date _____

292

293

294 INSTRUCTIONS: These questions ask about your sexual feelings and responses during
295 the past 4weeks. Please answer the following questions as honestly and clearly as
296 possible. Your responses will be kept completely confidential. In answering these
297 questions the following definitions apply:

298

299 Sexual activity can include caressing, foreplay, masturbation and vaginal intercourse.

300

301 Sexual intercourse is defined as penile penetration (entry) of the vagina.

302

303 Sexual stimulation includes situations like foreplay with a partner, self-stimulation
304 (masturbation), or sexual fantasy.

305

306 **CHECK ONLY ONE BOX PER QUESTION.**

307

308

309 Sexual desire or interest is a feeling that includes wanting to have a sexual
310 experience, feeling receptive to a partner's sexual initiation, and thinking or
311 fantasizing about having sex.

312

313

314 1. Over the past 4weeks, how **often** did you feel sexual desire or interest?

315

- 316 Almost always or always
317 Most times (more than half the time)
318 Sometimes (about half the time)
319 A few times (less than half the time)
320 Almost never or never

321

322 2. Over the past 4weeks, how would you rate your **level** (degree) of sexual desire or
323 interest?

324

325 Very high

326	High
327	Moderate
328	Low
329	Very low
330	or none

331 Sexual arousal is a feeling that includes both physical and mental aspects of sexual
332 excitement. It may include feelings of warmth or tingling in the genitals, lubrication
333 (wetness), or muscle contractions.
334
335

336 3. Over the past 4 weeks, how **often** did you feel sexually aroused ("turned on")
337 During sexual activity or intercourse?
338

- 339 No sexual activity
340 Almost always or always
341 Most times (more than half the time)
342 Sometimes (about half the time)
343 A few times (less than half the time)
344 Almost never or never
345

346 4. Over the past 4 weeks, how would you rate your **level** of sexual arousal ("turn on")
347 during sexual activity or intercourse?
348

- 349 No sexual activity
350 Very high
351 High
352 Moderate
353 Low
354 Very low or none at all
355

356 5. Over the past 4 weeks, how **confident** were you about becoming sexually aroused
357 during sexual activity or intercourse?
358

- 359 No sexual activity Very
360 High confidence
361 Moderate Confidence
362 Low Confidence
363 Very low or no confidence
364

365 6. Over the past 4 weeks, how **often** have you been satisfied with your arousal
366 (excitement) during sexual activity or intercourse?
367

- 368 No sexual activity
369 Almost always or always
370 Most times (more than half the time)
371 Sometimes (about half the time)
372 A few times (less than half the time)
373 Almost never or never

374 7. Over the past 4weeks, how **often** did you become lubricated ("wet") during sexual
375 activity or intercourse?
376

- 377 No sexual activity
378 Almost always or always
379 Most times (more than half the time)
380 Sometimes (about half the time)
381 A few times (less than half the time)
382 Almost never or never
383

384 8. Over the past4weeks, how **difficult** was it to become lubricated ("wet") during sexual
385 activity or intercourse?
386

- 387 No sexual activity
388 Extremely difficult or impossible
389 Very difficult
390 Difficult
391 Slightly difficult
392 Not difficult
393

394 9. Over the past 4weeks, how often did you **maintain** your lubrication ("wetness")
395 until completion of sexual activity or intercourse?
396

- 397 No sexual activity
398 Almost always or always
399 Most times (more than half the time)
400 Sometimes (about half the time)
401 A few times (less than half the time)
402 Almost never or never
403

404 10.Over the past 4weeks, how **difficult** was it to maintain your lubrication
405 ("wetness") until completion of sexual activity or intercourse?
406

- 407 No sexual activity
408 Extremely difficult or impossible
409 Very difficult
410 Difficult
411 Slightly difficult
412 Not difficult

413 11. Over the past 4weeks,when you had sexual stimulation or intercourse, how
414 **Often** did you reach orgasm (climax)?
415

- 416 No sexual activity
- 417 Almost always or always
- 418 Most times (more than half the time)
- 419 Sometimes (about half the time)
- 420 A few times (less than half the time)
- 421 Almost never or never

422
423 12. Over the past 4weeks,when you had sexual stimulation or intercourse, how
424 **difficult** was it for you to reach orgasm (climax)?
425

- 426 No sexual activity
- 427 Extremely difficult or impossible
- 428 Very difficult
- 429 Difficult
- 430 Slightly difficult
- 431 Not difficult

432
433 13.Over the past 4weeks, how **satisfied** were you with your ability to reach orgasm
434 (climax) during sexual activity or intercourse?
435

- 436 No sexual activity
- 437 Very satisfied
- 438 Moderately satisfied
- 439 About equally satisfied and dissatisfied
- 440 Moderately dissatisfied
- 441 Very dissatisfied

442
443 14.Over the past 4weeks,how **satisfied** have you been with the amount of emotional
444 closeness during sexual activity between you and your partner?
445

- 446 No sexual activity
- 447 Very satisfied
- 448 Moderately satisfied
- 449 About equally satisfied and dissatisfied
- 450 Moderately dissatisfied
- 451 Very dissatisfied

15. Over the past 4weeks, how **satisfied** have you been with your sexual relationship with your partner?

- Very satisfied
- Moderately satisfied
- About equally satisfied and dissatisfied
- Moderately dissatisfied
- Very dissatisfied

16. Over the past 4weeks, how **satisfied** have you been with your overall sexual life?

- Very satisfied
- Moderately satisfied
- About equally satisfied and dissatisfied
- Moderately dissatisfied
- Very dissatisfied

17. Over the past 4weeks, how **often** did you experience discomfort or pain during vaginal penetration?

- Did not attempt intercourse
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never

18. Over the past 4weeks, how **often** did you experience discomfort or pain following vaginal penetration?

- Did not attempt intercourse
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never

19. Over the past 4weeks, how would you rate your **level** (degree) of discomfort or pain during or following vaginal penetration?

- Did not attempt intercourse
- Very high
- High
- Moderate
- Low
- Very low or none at all

Thank you for completing this questionnaire
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Appendix II

CONSENTFORM

Serial number.....

Evaluation of female sexual function in type 2 diabetes mellitus patients in Umuahia with emphasis on its frequency and predictors

I,.....of.....
.....hereby
consent to participate in the study on Evaluation of female sexual function in type 2 diabetes mellitus patients in Umuahia with emphasis on its frequency and predictors

Dr.....has explained the nature of the study with its benefits and risks to me. I understand that the study is to be carried out solely for the purpose of Medical Research and I am willing to act as a volunteer for that purpose.

Date.....
Signature.....
Witness to signature.....

I confirm that I have explained to you the purpose and nature of the study and the risks involved, including the fact that any refusal to participate will not in any way affect your normal care by me or any other member of this institution. All information obtained in this study is strictly confidential.

Date.....

Signature.....