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Diabetology

EVALUATION OF FEMALE SEXUAL DYSFUNCTION IN THE DIABETIC WOMEN IN A TERTIARY CARE MEDICAL COLLEGE AND HOSPITAL IN EASTERN INDIA

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ABSTRACT

Background: In women, the evidences regarding the association between diabetes and sexual dysfunction are less conclusive as compared to males. Diabetes-induced vascular and nerve dysfunctions may impair the sexual response by producing structural and functional changes in the female genitalia. The present study is significant in this regard that it has been conducted among individuals hailing from urban, suburban and rural areas of the state of West Bengal making questionnaires in vernacular languages to reach maximum number of individuals possible. The data obtained was analysed statistically to derive conclusions. **Methods:** In this cross-sectional 100 female patients with type 2 diabetes mellitus attending the diabetes clinic in Endocrine OPD of Medical College and Hospital Kolkata were screened and included as the study population. Sexual dysfunctions in women was measured here using the standard questionnaire and the FSFI score <24 was taken as the criteria for accepting the presence of sexual dysfunction. The FSD score was compared against parameters like age, duration of diabetes, Body mass index (BMI), blood sugar (glycemic status) fasting and post-prandial , diabetes-related complications and addiction and prevalence was calculated. **Results :** Prevalence of sexual dysfunction in the study population is 51% showing association between diabetes and female sexual dysfunction.The prevalence of FSD was found to be maximum (75%) in the age group 41-50years. Strong association of FSD with age is found as p-value is 0.002. the prevalence of FSD was maximum (92.31%) in the participants whose Duration of diabetes more than equal to 11 years. Very Strong association of FSD with Duration of diabetes is found as p-value < 0.001. The prevalence of FSD was found to be maximum (94.74%) in the group (19% of the study population) who are on insulin. Extremely strong association of FSD with insulin usage is found as p-value is 0.000. The prevalence of FSD was found to be maximum (71.43%) in the group (42% of the study population) who do not have controlled ppbg (>180 mg/dl). Quite strong association of FSD with ppbg control is found as p-value is 0.001. The prevalence of FSD was found to be maximum (72.5%) in the participants who were overweight.11% of the population is obese and in them prevalence of FSD is 63.64. Very strong association of FSD with BMI of the participant is found as p-value is 0.000.Major association of FSD was seen absent with addiction, OHA intake, micro and macrovascular compications in the patients. Of all the six domains evaluated to reach FSFI score, majority of the patients had decreased desire. **Conclusion:** Prevalence of sexual dysfunction in the study population is 51%. Longer duration of diabetes, inadequate diabetes control, insulin intake, obesity (higher BMI) and higher age of the participant has a role to play in the development of FSD as per this study. The ability to diagnose and treat FSD in unsuspecting diabetics will result in long term improvement in quality of life.

KEYWORDS : Age, BMI, Diabetes, Female Sexual Dysfunction, Female Sexual Function Index, Indian scenario

BACKGROUND

India which has a population of about 1.3 billion people ,houses over 77 million diabetics. Diabetes has been associated with sexual dysfunction both in men and in women. It is an established risk factor for sexual dysfunction in men. But in women, the evidences regarding the association between diabetes and sexual dysfunction are less conclusive, although most studies have reported a higher prevalence of female sexual dysfunction (FSD) in diabetic women as compared to the nondiabetic women[1,2]. FSD has been associated with both type 1 and type 2 diabetes

Sexual disorders reported in women with diabetes include the reduction or loss of sexual interest or desire, arousal or lubrication difficulties, dyspareunia, and loss of the ability to reach orgasm[3,4].

With long-standing diabetes come micro and macrovascular complications. Diabetes-induced vascular and nerve dysfunctions may impair the sexual response by producing structural and functional changes in the female genitalia.Vascular abnormalities, including atherosclerotic damage and diabetes-induced endothelial dysfunction, may be responsible for reducing the engorgement of the clitoris and for reducing lubrication of the vagina, leading to decreased arousal and contribute to the pathogenesis of sexual dysfunctions by altering both the normal transduction of sexual stimuli and the triggered sexual response. It has been hypothesized that FSD may be the consequence of an imbalance in the hormonal levels of diabetic women, as indicated by epidemiological studies showing a correlation between alterations in the levels of androgens, estrogens, as well as sex hormone-binding globulin and sexual problems in diabetic women.

Compared to the international status of research regarding relationship of FSD with diabetes very little attention has been paid in Indian scenario. The social structure of our country is one of the major barriers in such kind of study. Talking about sexual function is still considered a taboo by many. Issues surrounding female sexual dysfunction are usually complex, as emotional or social factors are simultaneously involved.

" It's not about what you see , it's about what you don't."

The present study is significant in this regard that it has been conducted among individuals hailing from urban, suburban and rural areas of the state of West Bengal making questionnaires in vernacular languages to reach maximum number of individuals possible. The data obtained was analysed statistically to derive conclusions.

OBJECTIVES

In this study ,we aim to calculate the female sexual function index of the participants using the aggregate domain scores of the 6 domains in the standard questionnaire[6], i.e., desire, arousal, lubrication, orgasm, satisfaction and pain. We then aim to categorise the study population into 2 groups : with female sexual dysfunction (FSD) and not having female sexual dysfunction (FSD).The study aims to determine the prevalence of FSD among Diabetic females, to assess the association of FSD with age, duration of diabetes, body mass index and glycemic status (blood sugar control); to see the association of FSD with addiction, presence of microvascular or macrovascular complications. Association of FSD was also seen with respect to insulin usage, intake of oral hypoglycemic agents and economic background of the subject. This study also aims to correlate the findings of Female Sexual Function Index with all the above mentioned factors and draw conclusion for the same.

MATERIALS AND METHODS

It is an epidemiological descriptive type of observational hospital based cross sectional study done in Medical College Kolkata, Department of Endocrinology, Diabetic clinic and OPD. The Duration of study was 2 months 100 female patients with type 2 diabetes mellitus attending the diabetes clinic in Endocrine OPD of Medical College and Hospital Kolkata were screened and included as the study population.

Women with diabetes registered for a year or longer and aged between

18-50 years (who have not yet attained menopause, and are sexually active) were included in the study. Subjects with any record of mastectomy or breast cancer[5], or any other cancer; history of irradiation(therapeutic);cases with total hysterectomy; record of pelvic surgeries, patients with ovarian and uterine cancer, existence of sexual disorders in patients' spouse; anemia and presence of sexual disorders before getting diabetes; patients with hypogonadism, untreated hyperthyroidism, pregnant ladies, patients with Chronic Kidney Disease (CKD)(stage 3),patients with creatinine level above 2.5 were excluded from the study.

The basic tool involved in the study was the standard questionnaire.

METHODOLOGY

Sexual dysfunctions in women was measured here using the standard questionnaire. The Female Sexual Function Index (FSFI) was determined. FSFI is a well- known instrument to assess sexual function in women with six domains viz: desire, arousal, lubrication, orgasm, satisfaction and pain during sexual intercourse[6]. Each item was rated on a 6-point (0-5) scale[7]. There are 19 questions. The standard questionnaire was applied in regional language, i.e., Bengali and Hindi after translating from English for better understanding. For the purpose of analysis, relative to responses, patients were divided into two groups: with sexual problems, and without sexual problems[8-9]. In women, the FSFI score <24 was taken as the criteria for accepting the presence of sexual dysfunction[10].

Prevalence is then calculated as the no. Of cases of female sexual dysfunction in type 2 diabetes mellitus females divided by the total no. Of females with type 2 diabetes mellitus.

Parameters like duration of diabetes, Body mass index (BMI), blood sugar (glycemic status) fasting and post-prandial and diabetes-related complications was recorded. Other parameters like body weight, height and waist circumference were recorded (using same instrument for all) to calculate BMI and degree of obesity. The history of micro-vascular and macrovascular complications were taken into consideration. In microvascular complications parameters like retinopathy, nephropathy, and neuropathy (peripheral, autonomic) will be considered and for macro-vascular complications [coronary artery disease (CAD); cerebrovascular disease (CVD); myocardial infarction (MI), peripheral arterial disease (PAD)]. Intake of oral hypoglycemic agents and insulin usage were noted.

Demographic data like patients' age, occupation and socio-economic status were recorded. Socio-economic status was estimated using the modified Kuppuswamy's scale[11].

Prevalence is then calculated as the no. Of cases of female sexual dysfunction in type 2 diabetes mellitus females divided by the total no. Of females with type 2 diabetes mellitus.

Data was analysed using Microsoft excel and SPSS in a descriptive and analytical fashion. While analysing the data, p-value <0.05 is taken as significant.

Ethical issues -Informed consent from the Subjects was taken before the process. Approval by Institutional Ethics Committee was obtained before the study.There are no conflicts of interest in this study.

RESULT

Prevalence:

After careful analysis of the data collected during the study period ,based on the female sexual dysfunction index, it was determined that out of the 100 diabetic females, 51 have FSD, i.e., 51%.(fsfi<=23)

Descriptive:

One hundred women with type 2 diabetes mellitus (DM) were studied. Most cases were between 31-40 years of age. The mean age of the distribution 37.66±5.966. The mean duration of DM was 4.979±3.41 years, the mean of the body mass index (BMI) was 24.813±2.625. The subjects were classified into different socio-economic groups using the modified Kuppswamy's scale. Originally this scale is divided into 5 groups-upper,upper middle,lower middle,upper lower and lower. For ease of analysis, in this study,they were clubbed into three- L(lower), M (lower middle and upper lower), U (upper and upper middle). 43% individuals are there in the lower category-while 45% in upper lower and lower middle (M). Rest of the participants are in upper or upper middle category.The mean of the current fasting blood glucose (fbg) was 124.57±35.459 and the mean of the current post-prandial blood glucose(ppbg) was 187.24±54.975. 96% of the females are on OHA, 4% are not. Out of all the participants, 19% of the females take insulin.Diabetes related complications: Microvascular- 23% are with neuropathy, 3% with retinopathy and 2% have both. Macrovascular- 2% have documented coronary artery disease.11% of the females have some kind of addiction (alcohol and or tobacco)

Table 1: The association of FSD with the demographic and clinical variables in the study

		FSD present	%	NORMAL	%		P-value
Age groups (years)	21-30	5	27.78	13	72.22	18	
	31-40	22	44	28	56	50	
	41-50	24	75	8	25	32	
Total		51	51	49	49	100	0.002
Duration of diabetes mellitus (years)	<1	16	27.59	42	72.41	58	
	1-10	23	79.31	6	20.69	29	
	>=10	12	92.31	1	7.69	13	
Total	51	51	49	49	100	0.000	
Socio-economic status	lower	18	41.87	25	58.13	43	
	upper lower+lower	27	60	18	40	45	
	upper+upper	6	50	6	50	12	
Total	51	51	49	49	100	0.234	
Medication	Not on medicatio	1	25	3	75	4	
	On medicatio	50	52.08	46	47.92	96	
Total	51	51	49	49	100	0.288	
Insulin	Not on insulin	33	40.74	48	59.26	81	
	On insulin	18	94.74	1	5.26	19	
	51	51	49	49	100	0.000	
Fasting blood glucose	controlled (<=100 mg/dl)	10	37.04	17	62.96	27	
	uncontrolled(>100 mg/dl)	41	56.16	32	43.84	73	
Total	51	51	49	49	100	0.089	
Post prandial blood glucose	controlled (<=180 mg/dl)	21	36.2	37	63.8	58	
	uncontrolled(>180 mg/dl)	30	71.43	12	28.57	42	
Total	51	51	49	49	100	0.001	
BMI groups	normal(<=24.9)	15	30.61	34	69.39	49	
	Overweight(25.0-29.9)	29	72.5	11	27.5		
	obese(>=30)	7	63.64	4	36.36	11	
Total	51	51	49	49	100	0.000	
Macrovascular complications	absent	50	51.02	48	48.98	98	
	present	1	50	1	50	2	
Total	51	51	49	49	100	0.368	
Microvascular Complications	absent	29	40.28	43	59.72	72	
	neuropathy	18	78.26	5	21.74	23	
	retinopathy	3	100	0	0	3	
	retinopath	1	50	1	50	2	
Total	51	51	49	49	100	0.005	

Addiction	absent	46	51.69	43	48.31	89	
	present	5	45.46	6	54.54	11	
Total		51	51	49	49	100	0.697

FSD vs Age of the participant:
It is seen that majority (50%) of the study population belonged to the age group of 31-40 years and prevalence of FSD was seen in 44% of the patients belonging to this age group. However, the prevalence of FSD was found to be maximum (75%) in the age group 41-50years. Strong association of FSD with age is found as p-value is 0.002. With age of the participants there is small positive correlation.

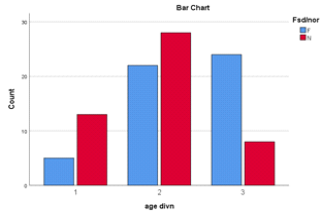


Figure 1: Bar diagram showing distribution of study population according to age and presence of FSD. (F=FSD, N=Normal, 1=21-30 yrs , 2=31-40yrs, 3=41-50yrs)

FSD vs Duration of diabetes in the participant:
The study population was analysed as per 3 groups-1st (DM<1yr), 2nd (DM for 1 - 10 yrs) and 3rd (DM>=10yrs). It is seen that majority (58%) of the study population had DM for less than 1year and prevalence of FSD was seen in 27.59% of the patients belonging to this age group. However, the prevalence of FSD was found to be maximum (92.31%) in the participants whose Duration of diabetes more than equal to 11 years. Very Strong association of FSD with Duration of diabetes is found as p-value < 0.001. Moreover, moderate negative correlation is found between FSFI score and duration of diabetes. Greater the duration of diabetes lesser the score. With duration of diabetes there is moderate negative correlation with fsfi score.

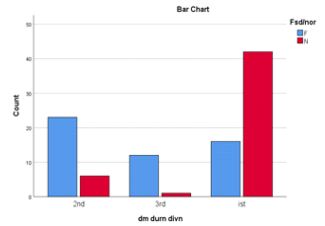


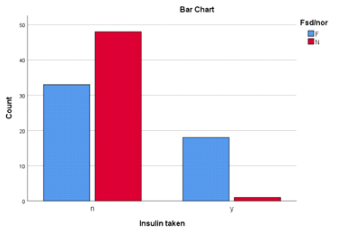
Figure 2: Bar diagram showing distribution of study population according to Duration of Diabetes and presence of FSD. (F=FSD, N=Normal ,1st =DM<1yr, 2nd=DM for 1-10yrs, 3rd= DM>=10 yrs)

FSD vs Socio- economic status of the participant:
It is seen that majority (45%) of the study population belonged to the M (upper lower+ lower middle) strata of the society and prevalence of FSD was seen in 60% of the patients belonging to this social group. The prevalence of FSD is maximum here. Major association between Socio economic status of the participant and FSD is not found. (p-value=0.234)

FSD vs OHA intake by the participant:
It is seen that majority (96%) of the study population are on oral hypoglycemic agents and prevalence of FSD was seen in 52.08% of the patients belonging to this group. The prevalence of FSD is maximum here. Major association between OHA intake by the participant and FSD is not found. (p-value=0.288)

FSD vs insulin usage by the participant:
It is seen that majority (81%) of the study population do not take insulin and prevalence of FSD was seen in 40.74% of the patients belonging to this age group. However, the prevalence of FSD was found to be maximum (94.74%) in the group (19% of the study population) who are on insulin. Extremely strong association of FSD with insulin usage is found as p-value is 0.000.

Figure 3: Bar diagram showing distribution of study population as per Insulin usage and presence of FSD. (F=FSD, N=Normal, n=not on insulin, y=on insulin)



FSD vs recent fasting blood glucose of the participant:
It is seen that majority (73%) of the study population do not have controlled fbg(<=100mg/dl) and prevalence of FSD was seen in 56.16% of the patients belonging to this group. The prevalence of FSD is maximum here. Major association between fbg control of the participant and FSD is not found. (p-value=0.089). With fbg value there is low negative correlation with fsfi score.

FSD vs recent post-prandial blood glucose of the participant:
It is seen that majority (58%) of the study population have controlled ppbg (<=180mg/dl) and prevalence of FSD was seen in 36.2% of the patients belonging to this group. However, the prevalence of FSD was found to be maximum (71.43%) in the group (42% of the study population) who do not have controlled ppbg (>180 mg/dl). Quite strong association of FSD with ppbg control is found as p-value is 0.001. With ppbg value there is low negative correlation with fsfi score.

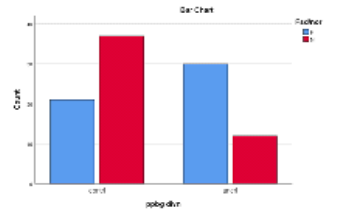


Figure 4: Bar diagram showing distribution of study population as per ppbg control and presence of FSD. (F=FSD, N=Normal, contrl= ppbg<=180 , uncrl= ppbg>180 mg/dl)

FSD vs BMI of the participant:
The study population was analysed as per 3 groups-normal(BMI<=24.9), overweight (BMI 25.0 to 29.9) and obese(BMI>=30). It is seen that majority (49%) of the study population had normal BMI and prevalence of FSD was seen in 30.61% of the patients belonging to this group. However, the prevalence of FSD was found to be maximum (72.5%) in the participants who were overweight.11% of the population is obese and in them prevalence of FSD is 63.64. Very strong association of FSD with BMI of the participant is found as p-value is 0.000. With BMI of participant there is moderate negative correlation with fsfi score.

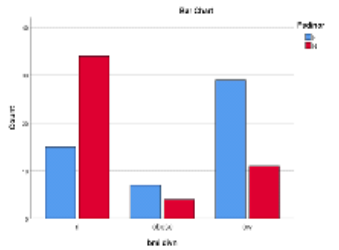


Figure 5: Bar diagram showing distribution of study population as per BMI division and presence of FSD. (F=FSD, N=Normal, n= normal BMI, ow= overweight)

FSD vs presence of macrovascular complications in the participants:
It is seen that majority (98%) of the study population do not have any macrcovascular complications and prevalence of FSD was seen in 51.02% of the patients belonging to this group, while the prevalence of FSD is 50% in the group who have macrovascular complications present (2%). Major association between presence of macrovascular complications in the participant and FSD is not found. (p-value=0.368)

FSD vs presence of microvascular complications in the participants:
It is seen that majority (72%) of the study population do not have any micrcovascular complications and prevalence of FSD was seen in

40.28% of the patients belonging to this group, while the prevalence of FSD is 100% in the group who have retinopathy (3% of participants) and 78.26% in the participants with neuropathy (23% of participants). While 50% in the patients with both retinopathy and neuropathy (2% of participants). Major association between presence of microvascular complications in the participant and FSD is found. (p-value=0.005) but due very less number of participants in each group adequate conclusions can't be drawn.

FSD vs presence of addiction in the participants:
It is seen that majority (89%) of the study population do not have any kind of addiction and prevalence of FSD was seen in 51.69% of the patients belonging to this group, while the prevalence of FSD is 45.46% in the group who have some addiction like tobacco and or alcohol (11%). Major association between presence of addiction in the participant and FSD is not found. (p-value=0.697)

Table 2: Statistical analysis of the six domains evaluated to arrive at fsfi score

	DESIRE	AROUSAL	LUBRICATION	ORGASM	SATISFACTION	PAIN
Mean	3.238	3.600	3.822	3.964	4.244	3.832
Median	3.600	3.600	4.350	4.400	4.400	4.000
Std. Deviation	1.3975	1.4013	1.6791	1.4585	1.3762	1.5706
Range	4.8	6.0	6.0	6.0	6.0	6.0
Minimum	1.2	.0	.0	.0	.0	.0
Maximum	6.0	6.0	6.0	6.0	6.0	6.0

Scores are lowest on the Desire subscale (mean= 3.238±1.3975) and highest on the Satisfaction subscale (mean= 4.244±1.5706). 49% of participants had satisfaction score 4.8 and above, i.e., on the higher side while only 26% reported a desire score of 4.8 and above. Subscale-specific item-total correlations ranged from 0.849 to 0.939. Lubrication items had comparatively weak correlation, whereas Orgasm and Arousal items had the strongest (both sets of items had a mean subscale item total correlation of 0.939 and 0.925 respectively.

The mean ± standard deviation FSFI total score was 22.7±8.09— the scores ranged from a low of 1.5 to a high of 35.2

DISCUSSION

Female sexual dysfunction can pose as a threat in a woman's life and hamper her living, family life and inter personal relationships. It can break her confidence and self-esteem.

Though not as widely studied as erectile dysfunction, several investigators have studied female sexual dysfunction against a number of covariates but there is no fixed or defined investigation that can throw light into the presence or absence of female sexual dysfunction. Results from a national survey of people[12] aged 18–59 years indicated that sexual dysfunction was common among women in 43% of cases.

In a poulation based study carried out in Iran13, of the 2626 women (aged 20-60 yrs) interviewed, 31.5% (759) reported FSD. The prevalence increased with age, from 26% in women aged 20-39 years to 39% in those >50 years (tested for trend P<0.001). No significant differences were detected in smoking history (P=0.18), the presence of previous pelvic surgery (P=0.08) and contraception methods used (P=0.42). A history of psychological problems (P=0.04), married status (P=0.03), low physical activity (P=0.012), chronic disease (P<0.01), multiparity (P<0.05) menopause status (P<or=0.01) and spousal erectile dysfunction (P=0.01) were significantly associated with FSD.

In our study, the overall prevalence of FSD in diabetic females is 51%. Although, recognised as a rampant health problem, wide variations exist in the data obtained as FSD is studied against various medical, surgical and psychological factors.

FSD in this study is measured using the internationally accepted FSD questionnaires. The FSFI is currently the most frequently used6 FSD questionnaire, and the measure presents acceptable test–retest reliability, internal consistency and validity.The major advantage of our study is the fact that, in contrast to mailed surveys, co-morbidities and other variables involved in the study were assessed and verified in person. The original FSFI questionnaire was translated to regional languages viz. Bengali and Hindi keeping in mind the patients visiting the diabetic clinic.

In a similar study, a total of 595 women with type 2 diabetes completed a questionnaire of self-report measures of sexual dysfunction14 and were analyzed. Their age was 57.9+/-6.9 (mean and s.d.), duration of diabetes was 5.2+/-1.5 years and mean hemoglobin A1c (HbA1c) level was 8.3+/-1.3%. Female sexual dysfunction (FSD) was assessed by the Female Sexual Function Index instrument with a cut-off score of 23. The overall prevalence of FSD among the diabetic women was 53.4%, significantly higher in menopausal women (63.9%), as compared with nonmenopausal women (41.0%, P<0.001). There was no association between HbA1c, duration of diabetes, hypertension, or cigarette smoking status and FSD; on the contrary, age, metabolic syndrome and atherogenic dyslipidemia were significantly associated with FSD.

In a previous study frequency of FSD was higher in type 1 (OR [95%CI] 2.27 [1.23, 4.16]), in type 2 diabetes (2.49 [1.55, 3.99]), and in "any diabetes" (type 1 and 2) women (2.02 [1.49, 2.72]) than in controls for any duration of diabetes. FSFI was lower in type 1 (-0.27 [-0.41, -0.12]), in type 2 diabetes (-0.65 [-0.75, -0.54]), and in "any diabetes" women (-0.80 [-0.88, -0.71]) than in controls[15]

In yet another study, the prevalence of FSD (total score ≤ 19) was significantly higher in the type 1 DM group than in the control group (12/33, 36.4% and 2/39, 5.2%, respectively; p = 0.010). No statistically significant differences were found regarding FSD according to the presence of complications, method of insulin administration or previous pregnancies[16].

In this study, association of FSD is compared against 11 clinical and demographic variables. Strong association of FSD with age of participant, duration of diabetes, BMI, insulin intake and post prandial glucose control is found. As, with increasing age in the diabetic female there is increased incidence of FSD, so inference can be drawn that with approaching menopause sexual dysfunction develops. Moreover, higher the BMI, increased risk of sexual dysfunction is present taking into account diabetes of the participant. With better diabetes control (both fasting and post-prandial blood glucose) less incidence of dysfunction is seen in the study, while with poor diabetes control sexual dysfunction is noted. With long standing diabetes, sexual dysfunction is rampant. Hence, diabetes can be considered as an established metabolic causal factor for FSD. No major association could be seen with presence or absence of addiction in the patient.

As the questionnaire, was filled by the participant herself, she became more aware about her body functioning. It would help her in seeking help. Intervention can be requested with pressure from partner, distress, deviation from normal sexual function.

One of the limitations of this study is that the assessment of female sexual function is done only by using a questionnaire and the hormonal parameters and clitoral ecolorDoppler ultrasound could not be assessed or used. Further studies on a larger population involving hormonal and clinical parameters will help in understanding the role of these factors on sexual function of women with long standing diabetes.

CONCLUSION

It is already established that the metabolic disorder diabetes causes erectile dysfunction in males. This study indicates that diabetes in females causes sexual dysfunction.

Prevalence of sexual dysfunction in the study population is 51%.

Longer duration of diabetes, inadequate diabetes control, insulin intake, obesity (higher BMI) and higher age of the participant has a role to play in the development of FSD as per this study.

Sexual dysfunction in females develop secondary to diabetes, so the consulting physician and the patient concerned is to be made aware of this and screening test (using the FSD questionnaire) can be employed. Adopting a healthy lifestyle and proper medication intake is advised to keep the diabetes in control.

The ability to diagnose and treat FSD in unsuspecting diabetics will result in long term improvement in quality of life.

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