WOMEN'S SEXUAL HEALTH

Prevalence of Hypoactive Sexual Desire Disorder Among Sexually Active Postmenopausal Women With Metabolic Syndrome at a Public Hospital Clinic in Brazil: A Cross-sectional Study

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ABSTRACT

Aims: To evaluate the prevalence of hypoactive sexual desire disorder (HSDD) among postmenopausal women diagnosed with metabolic syndrome (MS) and to compare it to that of a control group without MS.

Methods: This is a cross-sectional study carried out in 2 public tertiary hospitals in the state of São Paulo, Brazil, with a sample of 291 postmenopausal women aged between 40 and 65 years. Sexual function was evaluated using the Female Sexual Function Index (FSFI) questionnaire and Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision, diagnostic criteria and was related to the diagnosis of MS, which was determined according to the guidelines defined by the Adult Treatment Panel.

Main outcome measures: Analysis of sexual function with emphasis on sexual desire (HSDD), the incidence of MS, and the components of MS.

Results: The prevalence of HSDD was significantly higher among women diagnosed with MS than among women without MS ($P = .01$). Women diagnosed with high blood pressure ($P < .01$) and increased triglycerides ($P = .03$) also had a higher prevalence of HSDD than did women without these conditions. The FSFI domain scores for desire, arousal, lubrication, orgasm, and satisfaction and the total FSFI score were significantly lower for postmenopausal women with MS, whereas the pain domain score was not significantly different between the groups ($P = .913$). The incidence of female sexual dysfunction was significantly higher among women with MS, regardless of the diagnostic criteria used ($P < .05$).

Conclusion: Postmenopausal women diagnosed with MS have higher rates of HSDD than do women without MS. Clinical Trial Registration: ID NCT02430987. **Dutra da Silva GM, Rolim Rosa Lima SM, Reis BF, et al. Prevalence of Hypoactive Sexual Desire Disorder Among Sexually Active Postmenopausal Women With Metabolic Syndrome at a Public Hospital Clinic in Brazil: A Cross-sectional Study. J Sex Med 2020;8:545–553.**

Key Words: Metabolic Syndrome; Menopause; Postmenopausal; Hypoactive Sexual Desire Disorder; Female Sexual Dysfunction

INTRODUCTION

Sexual dysfunctions comprise a heterogeneous group of disorders that are generally characterized by a clinically significant disturbance in a person's ability to respond sexually or to experience sexual pleasure, decreasing one or more phases of the sexual response cycle; however, in clinical practice, it is uncommon to see a disorder that is limited to a single phase.[1] Sexuality is a complex phenomenon that comprises both

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psychological and organic processes that vary over time. For this reason, the study of sexuality is complex. In addition to issues regarding the methodology used in different publications, there is also difficulty in interpreting and comparing study results.

Hypoactive sexual desire disorder (HSDD) is defined by the American Psychiatric Association as a persistent or recurrent deficiency or absence of sexual fantasies and desire for sexual activity, leading to marked distress or interpersonal difficulty. For an HSDD diagnosis, sexual desire issues cannot be caused exclusively by another psychiatric disorder, such as depression, by direct effects of a substance (including medication), or by a medical condition.[2] HSDD represents the most common female sexual dysfunction (FSD) and is frequently diagnosed by primary care providers and obstetrics and gynecology professionals.

The menopausal period may have a negative effect on sexual desire because of the influence of psychological, biological, and sociocultural factors.[3,4] Menopause also affects various components of metabolic syndrome (MS),[5] with an approximately 2-fold risk of cardiovascular disease and a 5-fold or higher risk of type 2 diabetes mellitus.[6]

MS is a multifactorial disease characterized by the co-occurrence of glucose intolerance/diabetes, central obesity, elevated serum triglyceride levels, low high-density lipoprotein (HDL) concentrations, and high blood pressure (HBP).[7] Its prevalence is higher during the postmenopausal period.[5] During this period, women often complain of HSDD. The hypothesis that women with MS have a higher risk of presenting with HSDD is an important issue and remains unaddressed in the literature. The high occurrence of HSDD during menopause, the prevalence of MS in this stage of life, the different components of MS that can affect the sexual response, and the low number of published studies on this subject were the motivations for undertaking this study.

Study Objective

To evaluate the prevalence of HSDD among postmenopausal women diagnosed with MS.

MATERIAL AND METHODS

Study Location

Menopause Outpatient Clinic of the School of Medical Sciences of Santa Casa de São Paulo (FCMSCSP) and the "Leonor Mendes de Barros" Maternity Hospital (HMLMB).

Population

From 2015 to 2018, we invited 1,200 postmenopausal women who regularly visited these institutions to undergo routine climacteric screening. After applying the inclusion and exclusion criteria, 291 sexually active women were selected and invited to participate in the study. All participants signed informed consent forms.

Design

A cross-sectional study was conducted. After the women agreed to participate in the study, they were stratified into 2 groups: group 1 comprised patients with MS, and group 2 comprised patients without MS (control). The women in each group had diagnoses of HSDD and FSD. The results of group 1 were compared with those of group 2 (Figure 1).

Main Outcome Measures

Sexual function was assessed using the Female Sexual Function Index (FSFI) questionnaire[8] and validated for the Portuguese language[9] with 19 items that measure female sexual function. Cutoff points of ≥ 23[10] and ≥ 26.5[8] were adopted to define the presence of FSD. A score of 5 or less for the sum of the items that make up the desire domain of the FSFI questionnaire was used to define the presence of HSDD in postmenopausal women.[11]

The diagnosis of FSD was based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision by the American Psychiatric Association.[3]

The diagnosis of sexual dysfunction was established by an experienced sexologist (G.M.D.S.) trained in the diagnosis of FSD using the FSFI. The women provided their responses in a private room. We believe that having an experienced evaluator apply the questionnaires increases the reliability of the results. We did not evaluate sexual orientation or gender identity as a criterion for excluding participants. However, all surveyed women declared themselves as heterosexual with a female gender identity. The Beck Inventory[12] was used to rule out depression in patients with a history of the disease/distress (score > 14).

The diagnosis of MS was determined following the guidelines defined by the Adult Treatment Panel: (i) waist circumference (WC) > 88 cm; (ii) HDL cholesterol ≤ 50 mg/dL; (iii) triglycerides ≥ 150 mg/dL; (iv) blood pressure (BP) $\geq 130/$

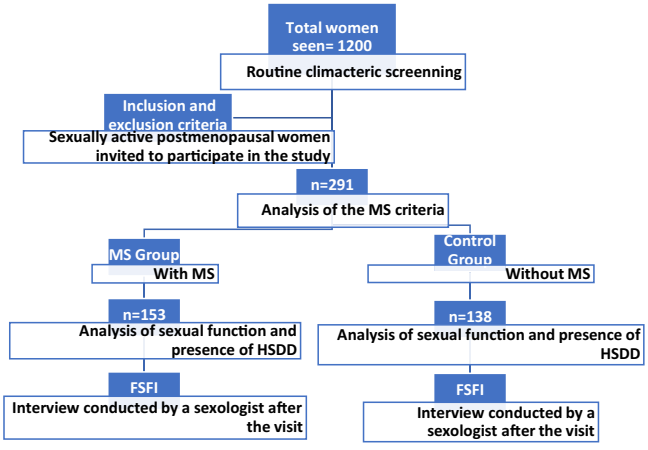

Figure 1. Flowchart of the study. Sexually active postmenopausal women were stratified into 2 groups, and their sexual function was evaluated through the FSFI questionnaire. FCMSCSP/2020. FSFI = Female Sexual Function Index; HSDD = hypoactive sexual desire disorder; MS = metabolic syndrome.

85 mmHg; and (v) fasting glucose level ≥ 110 mg/dL. We considered women with MS to be those with at least 3 of the components described. The use of medication and/or a previous diagnosis of the condition did not exclude the use of a component for the diagnosis of MS.[13]

A semistructured questionnaire was applied to each participant to collect demographic, socioeconomic, and clinical information. BP, WC, and body mass index (BMI) were measured. Then, a gynecological examination was performed, and a cytology sample was collected for a Pap smear.

Laboratory tests were conducted (total cholesterol and fractions, triglycerides, and fasting glucose), along with bilateral mammography and transvaginal ultrasound examinations, according to the routine procedures of the department.

The study was conducted in accordance with the protocol and the principles established in the Declaration of Helsinki (1996), the International Conference on Harmonization Harmonized Tripartite Guideline: Good Clinical Practice Guidelines, and regulatory requirements. The protocol was approved by the Human Research Ethics Committee of the School of Medical Sciences of the Santa Casa de São Paulo Hospital and the "Leonor Mendes de Barros" Maternity Hospital (CAAE number 40594814.4.0000.5479) and registered as a clinical trial under ID NCT02430987.

The inclusion criteria were (i) 40-65 years of age, (ii) 1 year of amenorrhea and FSH ≥ 30 mIU/mL,[14] (iii) sexually active (women with regular sexual activity and having penetrative sex with a partner without a history of sexual dysfunction in the last 4 weeks), and (iv) the use of estrogen and progesterone orally or parenterally for over 6 months, to prevent hot flashes and vaginal dryness from interfering in sexual function. Among the sample, 30% used estradiol 1 mg/day, transdermal estradiol/day, and estriol vaginal cream 10 mg/g 3 × /week for more than 6 months and had stable hormonal levels, without hot flashes or vaginal atrophy.

The exclusion criteria were (i) premenopausal and/or with FSH < 30 mIU/mL; (ii) sexually inactive (partner with a history of sexual dysfunction, such as erectile dysfunction and/or premature ejaculation, any other form of sexual dysfunction or any other psychiatric disorder that may affect sexual function); (iii) diagnosis of depression, with a score of >14 on Beck's Depression Inventory or the use of selective serotonin reuptake inhibitors, (iv) oral or parenteral use of estrogen and progesterone, which were prescribed less than 6 months earlier; (v) the use of Mirena (Bayer, Leverkusen, Germany) or treatments prescribed for low sexual desire (tibolone and testosterone); (v) the use of drugs that, according to the examiner's evaluation, may affect sexual function; (vi) history of bilateral oophorectomy; or (vii) diagnosis of cancer (breast, cervical, endometrial, ovarian, or intestinal, among others).

Data analysis

To analyze the sample, the characteristics of the women participating in the study were described using absolute and relative frequencies for qualitative measures and summary measures (mean, standard deviation, median, minimum and maximum) for quantitative measurements.

Qualitative characteristics were described according to MS, and the association was verified with the use of chi-square tests or likelihood ratio test; quantitative characteristics were described according to metabolic syndrome and compared using Student *t*-tests.

With the objective of analyzing the relationships between the population characteristics and the FSFI questionnaire domains, generalized linear models with a gamma distribution and identity link function were created to compare the scores according to the categories of interest adjusted for age, educational level, race/color, marital status, and religion.

The FSFI questionnaire scores were described based on the presence or absence of MS and compared using the Mann-Whitney test. The analyses were performed using IBM-SPSS software for Windows version 20.0 (IBM, Chicago, IL). Microsoft Excel 2003 software was used to store the data and results, and the statistical package statistiXL (Statistical Power for MS Excel version 1.8, 2007) was used for the statistical analyses. The tests were performed with a significance level of 5%.

The sample size calculation was based on a confidence level (1-alpha) = 95, a power (% of probability of detection) = 80, a ratio of controls to cases = 1, a hypothetical proportion of controls with exposure = 40, a hypothetical proportion of cases with exposure = 57.14, and a least extreme odds ratio to be detected = 2.00, resulting in a sample size of 288 patients (144 cases and 144 controls).

RESULTS

To perform the present study, 1,200 postmenopausal women were screened, but only 291 met the inclusion criteria. We screened the women for MS and correlated the syndrome and its diagnostic components with the presence of HSDD, as evaluated using the FSFI questionnaire.

The sexually active postmenopausal women with MS had, on average, statistically greater weight, BMI ($P < .001$), and frequency of changes in abdominal circumference, CT, HDL, triglycerides, and blood glucose. The presence of HPB was statistically higher in patients with MS ($P < .05$) (Table 1).

Based on the FSFI questionnaire scores for 5 domains, namely, desire, arousal, lubrication, orgasm, and satisfaction, and the total score, the incidence of FSD based on the 2 cutoff points was significantly lower for postmenopausal women with MS (N = 153) ($P < .05$) than for those without MS (N = 138), but the pain score was not significantly different between the 2 groups ($P = .913$). The incidence of FSD was significantly higher among women with MS, regardless of the diagnostic criteria used ($P < .05$) (Table 2).

The incidence of HSDD was significantly higher among women with hypertriglyceridemia diagnosed with HBP and MS

Table 1. Qualitative and quantitative demographic/clinical characteristics of the sexually active postmenopausal women described according to the diagnosis of MS and the association with the characteristics of the control group without this diagnosis were verified, FCMSCSP, 2020

	MS diagnosis			
	No	Yes		
Variable	(N = 138)	(N = 153)	Total (N = 291)	*P*
Age (years), average ± SD	53.4 ± 4.8	54.4 ± 6	53.9 ± 5.5	.118*
Weight (Kg), average ± SD	66.1 ± 9.6	73.6 ± 13.2	70.1 ± 12.2	**<.001***
Height (m), average ± SD	1.57 ± 0.15	1.57 ± 0.07	1.57 ± 0.12	.726*
BMI (Kg/m^2), average ± SD	26.5 ± 4.4	30.2 ± 5.8	28.4 ± 5.5	**<.001***
AC (altered > 88 cm)	85 (61.6)	140 (91.5)	225 (77.3)	**<.001**
TC (altered > 200 mg/dL)	55 (39.9)	100 (65.4)	155 (53.3)	**<.001**
HDL (altered < 50 mg/dL)	4 (2.9)	17 (11.1)	21 (7.2)	**.007**
Triglycerides (altered > 150 mg/dL)	15 (10.9)	100 (65.4)	115 (39.5)	**<.001**
Blood glucose (altered > 110 mg/dL)	5 (3.6)	38 (24.8)	43 (14.8)	**<.001**
HPB, n (%)	31 (22.5)	115 (75.2)	146 (50.2)	**<.001**
Education level, n (%)				.347†
Illiterate	1 (0.7)	1 (0.7)	2 (0.7)	
Elementary/middle school	43 (31.2)	63 (41.2)	106 (36.4)	
High school	63 (45.7)	62 (40.5)	125 (43)	
College	31 (22.5)	27 (17.6)	58 (19.9)	
Religion, n (%)				.330†
Catholic	81 (58.7)	76 (49.7)	157 (54)	
Evangelical/protestant	41 (29.7)	49 (32)	90 (30.9)	
Espiritism	3 (2.2)	10 (6.5)	13 (4.5)	
Umbanda/Candomblé	3 (2.2)	2 (1.3)	5 (1.7)	
Jehovah	2 (1.4)	4 (2.6)	6 (2.1)	
Agnostic	8 (5.8)	12 (7.8)	20 (6.9)	
Race, n (%)				.908
White	80 (58)	89 (58.2)	169 (58.1)	
Brown	34 (24.6)	40 (26.1)	74 (25.4)	
Black	24 (17.4)	24 (15.7)	48 (16.5)	
Marital status, n (%)				.393†
Married	86 (62.3)	107 (69.9)	193 (66.3)	
Single	36 (26.1)	29 (19)	65 (22.3)	
Divorce	14 (10.1)	13 (8.5)	27 (9.3)	
Widow	2 (1.4)	4 (2.6)	6 (2.1)	

Bold indicates statistically significant.
AC = abdominal circumference; BMI = body mass index; HBP = high blood pressure; HDL = high-density cholesterol; MS = metabolic syndrome; SD = standard deviation; TC = total cholesterol.
*P<.01.
†Regression analysis.

($P < .05$). There was no statistical significance as a function of population characteristics, WC, serum glucose, or HDL cholesterol concentrations (Table 3).

Regardless of the characteristics evaluated in the study, women with HBP had 2.78-fold higher odds of exhibiting HSDD than did women without HBP ($P < .001$). Single women were 88% more likely to have HSDD than married women ($P = .048$) (Table 4).

Table 5 shows that only the satisfaction score was statistically different among the BMI categories ($P = .005$ and $P = .008$ before and after adjustment, respectively).

DISCUSSION

During the menopausal period, women often complain of decreased sexual desire, which is a characteristic of HSDD. The hypothesis that women with MS have a higher risk of presenting with HSDD remains an important and relevant issue.

In our study, we demonstrated that the incidence of HSDD was significantly higher among postmenopausal women with MS ($P < .05$). Serum triglyceride levels and the presence of HBP were the MS diagnostic components that most negatively affected the sexual function of postmenopausal women. There

Table 2. Domains of the Female Sexual Function Index (FSFI) questionnaire and the presence of sexual dysfunction in the groups with (group 1) and without (group 2) metabolic syndrome and the results of adjusted and unadjusted statistical tests, FCMSCSP, 2020

	MS diagnosis			
	No	Yes		
Variable	(N = 138)	(N = 153)	*P*	*P**
Desire, median (min; max)	3,6 (0.9; 90)	3 (0.9; 6)	**.001**	**<.001**
Arousal, median (min; max)	3,9 (1.8; 6)	3,6 (0.6; 6)	**<.001**	**<.001**
Lubrication, median (min; max)	4,8 (1.2; 6)	3,6 (1.2; 6)	**<.001**	**<.001**
Orgasm, median (min; max)	4,4 (1.2; 6)	4 (1.2; 6)	**<.001**	**<.001**
Satisfaction, median (min; max)	4,8 (2; 6)	4,4 (2; 6)	**.002**	**.001**
Pain, median (min; max)	6 (2; 6)	6 (1; 6)	.913	.925
Total FSFI score, median (min; max)	26,8 (13.9; 34,8)	23,1 (4.2; 34,8)	**<.001**	**<.001**
FSFI cutoff ≤ 23, n (%)	34 (24.6)	76 (49.7)	**<.001**†	**<.001**
FSFI cutoff ≤ 26.5, n (%)	68 (49.3)	114 (74.5)	**<.001**†	**<.001**

Bold indicates statistically significant.
Mann-Whitney test.
*Adjusted for age, marital status, education, religion, and race.
†Chi-square test.

was no statistical significance in terms of population characteristics, WC, serum glucose, and HDL cholesterol concentrations.

The biological mechanisms linking MS to the development of FSD are still unclear.[15–17] The first phase of the female sexual response is mediated by a combination of events, including neuromuscular vasocongestion, increased diameter and length of the clitoris, increased vaginal lubrication, and engorgement of the vaginal wall.[18,19] Atherosclerosis of the arterial bed impairs the blood supply to the female pelvis, leading to a decrease in vaginal congestion and clitoral insufficiency syndrome, resulting in vasculogenic FSD.[20] These alterations, originating from MS, can have an impact on tissue oxygenation and subsequently adversely affect the structure and function of the female genital tract.[21]

When we analyzed the scores for the FSFI questionnaire domains, namely, desire, arousal, lubrication, orgasm, and satisfaction, and the total score, we found that the FSFI domains score were lower leading to a higher incidence of FSD among postmenopausal women with MS (N = 153) ($P < .05$) than among women without MS (N = 138), but the pain score was not significantly different between the 2 groups ($P = .913$). The incidence of FSD was significantly higher among women with MS, regardless of the diagnostic criteria used ($P < .05$).

There are few studies in the literature that relate female HSDD and MS, and related to FSD and MS, we find more scientific evidence. Esposito et al[22] evaluated the sexual function of premenopausal women using the FSFI questionnaire and observed that women with MS (n = 120) had a total score that was lower than that of the control group (n = 80) (23.2 vs 30.1 $P < .001$). There was also an inverse relationship between C-reactive protein levels and total FSFI score. However, the authors did not consider interpersonal issues. In our study, we excluded women who complained of dyadic difficulties and partners who had sexual dysfunction that could prevent sexual activity. These data reinforce the correlation between MS and FSD; however, the menopausal period of the population in the abovementioned study was different.

Ponholzer et al[21] studied postmenopausal women with MS and, using a questionnaire developed by the author, observed that this condition constituted an independent risk factor for the desire component ($P = .03$, with a relative risk adjustment for age of 3.3). Notably, the questionnaire used in the Ponholzer study differed from ours.

On the other hand, Ponholzer et al[21] found a relationship between FSD and MS only in premenopausal women and not in postmenopausal women. In that study, the questionnaire used had not yet been validated, and MS was diagnosed using the International Diabetes Federation criteria.[23]

Martelli et al[24] found a 33% overall prevalence of FSD in postmenopausal women with MS, in contrast to 19% in their control group. The evaluation of the relationship between MS and female sexual function indicated that in an Italian population, the prevalence of FSD was higher among women with MS than among healthy controls (39/103 [37.9%] vs 20/105 [19%], $P = .003$). In the present study, sexual function was evaluated using the FSFI questionnaire and the Female Sexual Disorder Scale.[24]

In a study conducted in Brazil by Silva et al,[25] who also used the FSFI, the authors observed a higher prevalence of FSD among postmenopausal women with MS. The mean age was 54.0 ± 4.7 years. The prevalence of FSD was higher in the group with MS than in the control group when the cutoff point was ≥23 (score proposed for Latin American women) and ≥26.5 (original score of the FSFI questionnaire): 57.4% vs 18.4% and 83.3% vs 48.2%, respectively. The scores for the desire, arousal,

Table 3. Diagnosis of hypoactive sexual desire disorder in the sexually active postmenopausal women with and without MS-related diagnostic components and the results of associated tests, FCMSCSP, 2020

	Hypoactive sexual desire disorder			
Variable	No	Yes	Total	*P*
AC				.299
Normal	35 (53)	31 (47)	66	
Altered	103 (45.8)	122 (54.2)	225	
HDL				.637
Normal	127 (47)	143 (53)	270	
Altered	11 (52.4)	10 (47.6)	21	
Triglycerides				**.003**
Normal	96 (54.5)	80 (45.5)	176	
Altered	42 (36.5)	73 (63.5)	115	
Blood glucose				.262
Normal	121 (48.8)	127 (51.2)	248	
Altered	17 (39.5)	26 (60.5)	43	
HBP				**<.001**
No	86 (59.3)	59 (40.7)	145	
Yes	52 (35.6)	94 (64.4)	146	
MS				**.001**
No	79 (57.2)	59 (42.8)	138	
Yes	59 (38.6)	94 (61.4)	153	
Education level, n (%)				.105*
None	0 (0)	2 (100)	2	
Elementary/ middle school	50 (47.2)	56 (52.8)	106	
High school	66 (52.8)	59 (47.2)	125	
College	22 (37.9)	36 (62.1)	58	
Religion, n (%)				.407*
Catholic	74 (47.1)	83 (52.9)	157	
Protestant	46 (51.1)	44 (48.9)	90	
Spiritism	4 (30.8)	9 (69.2)	13	
Umbanda/ Candomblé	2 (40)	3 (60)	5	
Jehovah's Witness	1 (16.7)	5 (83.3)	6	
Agnostic	11 (55)	9 (45)	20	
Race, n (%)				.190
White	84 (49.7)	85 (50.3)	169	
Brown	37 (50)	37 (50)	74	
Black	17 (35.4)	31 (64.6)	48	
Marital status, n (%)				.697*
Married	96 (49.7)	97 (50.3)	193	
Single	27 (41.5)	38 (58.5)	65	
Divorced	12 (44.4)	15 (55.6)	27	
Widow	3 (50)	3 (50)	6	

Data are expressed as n (%); chi-square test.
Bold indicates statistically significant.
AC = abdominal circumference; HBP = high blood pressure; HDL = high-density cholesterol; MS = metabolic syndrome.
*Likelihood ratio test.

lubrication, orgasm ($P < .001$), and satisfaction ($P = .002$) domains were lower for women with MS. There was no significant difference in the pain score ($P = .57$).[25]

In the Rancho Bernardo Study,[26] WC, diabetes mellitus, and HBP were associated with decreased sexual activity, while increased serum triglyceride concentrations showed a close association with low sexual desire. In the cohort of postmenopausal women, coronary artery disease was an important factor. Cardiovascular outcomes were more prevalent among women with low sexual activity.

In our study, women with HBP, regardless of the population characteristics evaluated in the study, had a 2.78-fold higher chance of exhibiting HSDD than did women without HBP ($P < .001$). Single women were 88% more likely to have HSDD than married women ($P = .048$). Evidence on the relationship between HSDD and HBP is very limited, and prospective trials are needed to better understand the effects of antihypertensive treatments on female sexual function.

The first study to actively investigate the prevalence of sexual dysfunction in women with HBP vs controls using the FSFI questionnaire was published in 2006 by Doumas et al.[17] The study showed that FSD was significantly more common in women with HBP (42.1% vs 19.4%). Furthermore, increased systolic BP, age, and use of beta-blockers were significant predictors of FSD, while adequate control of BP was related to a lower prevalence.

Other studies further corroborate Doumas' study, demonstrating that hypertensive women reported FSD more than nonhypertensive women and those recently diagnosed with HBP.[27–29] Studies involving the treatment of HBP and other chronic diseases usually disregard women and their sexual history. It would be interesting to evaluate the sexual history that preceded the use of antihypertensive medication or to evaluate other problems that could be exacerbated with the use of these drugs.

However, the association between MS and FSD is controversial; in fact, several other studies have failed to find a close link between MS and FSD.[26,30] In particular, Politano et al[30] reported that the presence of sexual dysfunction in the male partner was the only sexual factor associated with MS.

Veronelli et al[31] used the FSFI questionnaire to evaluate the prevalence of FSD in 91 women with diabetes mellitus, obesity, or hypothyroidism and in 36 healthy women, all aged 22–51 years and in a premenopausal state. Reduced FSFI scores were more frequent in women with diabetes, obesity, and hypothyroidism vs healthy women ($P < .01$). In the different groups of women, the FSFI scores were inversely correlated (pairwise correlation) with at least one of the following factors—glycated hemoglobin, thyroid stimulation hormone, low-density lipoprotein cholesterol, plasminogen activator inhibitor-1, diastolic BP, and the presence of a thyroid Ab—and directly correlated with HDL cholesterol (always $P < .05$ or less). A

Table 4. Results of the joint model relating the diagnosis of hypoactive sexual desire disorder in sexually active postmenopausal women to the population characteristics of the women studied, FCMSCSP, 2020

		95% CI		
Variable	OR	Lower	Upper	*P*
Age (years)	0.97	0.93	1.02	.214
Triglycerides (altered)	1.80	1.05	3.08	.033
HBP	2.77	1.61	4.78	**<.001**
Religion, n (%)				
Catholic	(ref.)			
Protestant	0.88	0.50	1.53	.644
Spiritism	1.65	0.45	6.11	.455
Umbanda/ Candomblé	1.10	0.15	8.02	.922
Jehovah's Witness	7.16	0.73	69.83	.090
Agnostic	0.60	0.22	1.66	.326
Race, n (%)				
White	(ref.)			
Brown	0.89	0.49	1.61	.695
Black	1.63	0.79	3.35	.186
Marital status, n (%)				
Married	(ref.)			
Single	1.88	1.01	3.52	**.048**
Divorced	1.47	0.62	3.53	.384
Widow	0.94	0.15	5.80	.942

Multiple logistic regression model.
Bold indicates statistically significant.
HPB = high blood pressure; OR = odds ratio.

stepwise regression analysis showed that HDL cholesterol (protective) and glycated hemoglobin, LDL cholesterol, plasminogen activator inhibitor-1, and diastolic BP (negative) predicted a reduced FSFI score. These data indicate an increased prevalence of sexual dysfunction in women with diabetes, obesity, and hypothyroidism, in association with markers of cardiovascular risk.[31] In our study, the satisfaction score was statistically different between the women with a normal BMI and those overweight and obese ($P = .005$ and $P = .008$ before and after adjustment, respectively). The other parameters of a sexual response, assessed by the FSFI score, were not statistically related to BMI.

The esthetic standards directly or indirectly promoted by the media are unfair for individuals who fall outside this so-called model of beauty. Obesity is reported in terms of esthetics and a body image. It is difficult to convey the numerous psychological factors related to obesity. In general, individuals who are above their ideal weight have problems engaging in sexual relationships. Marked obesity can lead to immobilization of the individual. Obese individuals may feel sexually undesirable and may therefore be more likely to avoid new experiences. If a woman is dissatisfied with her body, she feels neither beautiful nor attractive. Self-esteem becomes low, leading to the avoidance of contact with others, thus reducing chances of a healthy sex life.[32]

Some limitations of our study should be noted. Its cross-sectional nature does not allow us to infer a cause-effect relationship; the study included a small number of women, and as in most epidemiological studies, there is potential for confusion due to the presence of uncontrolled covariates. In addition, the women were recruited from a cohort who were treated at our outpatient clinic through the Public Health System and did not represent the general population.

Despite the growing attention to this subject, HSDD remains a condition that is poorly studied and underdiagnosed, including

Table 5. FSFI scores and dysfunctions according to BMI categories and results of unadjusted and adjusted statistical tests

	BMI				
	Normal	Overweight	Obese	*P*	*P**
Variable	(N = 64)	(N = 126)	(N = 101)		
Desire, median (min; max)	3.6 (1.2; 6)	3 (0.9; 6)	3 (0.9; 90)	.073	.265
Arousal, median (min; max)	3.6 (1.8; 5.7)	3.6 (1.8; 5.4)	3.6 (0.6; 6)	.190	.298
Lubrication, median (min; max)	4.2 (1.2; 6)	4.2 (1.2; 6)	3.9 (1.2; 6)	.555	.581
Orgasm, median (min; max)	4.4 (1.2; 6)	4.1 (1.2; 6)	4 (1.2; 6)	.358	.409
Satisfaction, median (min; max)	4.8 (3.2; 6)	4.6 (2; 6)	4.4 (2; 6)	**.005**	**.008**
Pain, median (min; max)	6 (2; 6)	6 (1; 6)	6 (2; 6)	.903	.789
Total FSFI score, median (min; max)	25 (15.1; 34.8)	25 (13.6; 32.5)	24.9 (4.2; 34.1)	.193	.133
FSFI cutoff $\leq$ 23, n (%)	22 (34.4)	46 (36.5)	42 (41.6)	.599†	.520
FSFI cutoff $\leq$ 26.5, n (%)	36 (56.2)	81 (64.3)	65 (64.4)	.500†	.596

Kruskal-Wallis test.
Bold indicates statistically significant.
BMI = body mass index; FSFI = Female Sexual Function Index.
*Adjusted for age, marital status, education, religion, and race.
†Chi-squared test.

in women during the menopausal period, a population that has grown considerably in recent years. Further studies are needed on the relationship between MS and sexual function before and after menopause to establish preventive strategies that are capable of minimizing distress and increasing the quality of life of large numbers of women.

CONCLUSIONS

The incidence of HSDD was significantly higher among postmenopausal women diagnosed with MS and significantly higher among postmenopausal women with hypertriglyceridemia and HBP than among women in the same age range without those conditions. There was no significant relationship between the presence of HSDD and abdominal circumference $\geq$ 88 cm or serum concentrations of glucose or HDL cholesterol. These findings open new opportunities for female sexual response research, evaluation, and management.

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