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Sexual function, menopause and hormone replacement therapy (HRT)

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Abstract

Objective: To assess the prevalence of female sexual dysfunction in premenopausal and postmenopausal women with and without hormone replacement therapy (HRT). To determine the relationship between menopause and sexual activity, and the impact of HRT on sexual function. *Methods:* A cross-sectional analysis of 231 Colombian-born women, aged 40–62 years. Sexual function was measured by self-questionnaire. The analysis was performed by using the χ^2-test and multivariate regression analysis. The sexual function was divided in five domains: desire, arousal, lubrication, orgasm and pain; in addition, questioning about sexual satisfaction was included in the research. *Results:* In the study 38.1% of women showed sexual dysfunction in the desire, and 25% in the arousal, these two being the most affected domains. Even though menopause marginally decreases all stages of sexual function, this association was statistically significant only for the lubrication and pain domains. HRT improves sexual function in the orgasm, lubrication and pain domains in a statistically significant manner. The level of sexual satisfaction was better on postmenopausal women with HRT than ones without HRT. Age negatively influences almost all sexual function domains in a significant manner. *Conclusions:* Menopause affects in a negative manner some domains of female sexual function. HRT improves some factors of the sexual function during menopause but it not improves desire and arousal which were the most affected domains. There is a negative association between age and female sexual response in middle-aged women.

Keywords: Menopause; Sexual function; Middle-aged

1. Introduction

In the last decade, special attention has been given to the development and accomplishments of the sexual function in human beings. This is an important aspect for quality of life, and reflects on the physical, psychological and mental well being of the individual. In general, different investigations report contradictory results. The National Health and Social Life survey carried out in the USA in 1992, including 1749 women and 1410 men, aged 18–59 years, found a prevalence of sexual dysfunction of 43% in women and 31% in

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men. Twenty percent of women reported no pleasure with sex, 20% of them had lubrication difficulties, and 25% of menopausal women were unable to experience orgasm [1]. However, these results differ from those of Dr. Bancroft's research [2,3]. In his national telephone survey, out of 1030 heterosexual women aged 20–65 years, 74% reported their current sexual relationship as good or excellent, and 23% of them reported some sexual problem causing at least moderate anxiety and preoccupation.

Research on sexual dysfunction of middle-aged women is more difficult, because they are in a particular physiological state: the menopause [4]; then, some questions arise. Does menopause influence sexual function? Are age and the ageing the only relevant factors? What is the role of hormone replacement therapy (HRT)? We should have in mind that the sexual function is the result of multiple bio-psychosocial variables such as race, cultural patterns, personal background, self-esteem, marital status, feelings and partner-relationship, plus, the physiological response [5,6]. All these situations make the interpretation of the available results very difficult, more so as we found contradictory results in different investigations.

In a descriptive study of 280 middle-aged, white, married women, Mansfield, from Pennsylvania State University, focused his research on the sexual response changes over the course of 1 year. Forty percent of them reported decrements in their sexual response. Most of the decrements were imputed to physical and emotional events related to menopause, and less frequent to the relationships with their partners [7]. It is important to notice that the measure of sexual arousal function may be subjective by self-report or objective physiological sexual arousal response by vaginal pulse amplitude (VPA) using vaginal photopletismography. Furthermore many studies have found there is not concordance between subjective sexual arousal and physiological sexual arousal in women with sexual disorders [8–13].

Hallstrom et al., in a cross-sectional study of 800 Swedish women, aged 38–54 years, randomly selected from the general population, found a dramatic decrease in sexual interest, capacity for orgasm and coital frequency associated with age and the menopausal status [14,15]. Similarly, McCoy reported a decrease of sexual function in the menopause [16].

Dennerstein's research is very interesting. In her first study she took a randomly selected population sample of 2000 Australian-born women, aged between 45 and 55 years. She found that 31% of the women reported reduction in sexual interest associated to natural menopause rather than to age [17]. Dennerstein et al., in a second study performed a cross-sectional analysis of a population based cohort of 201 Australian women, aged 48–58 years, with intact uteri, and not using HRT. After a 4 year follow up, and measurements of estradiol, FSH, inhibin, total testosterone and free androgens index (FAI) they were unable to confirm previous findings regarding the association between menopausal status and sexual function. However, they found that low estradiol levels were associated with vaginal dryness and pain with intercourse, while age was negatively associated with sexual response and there was no association between testosterone and any aspects of the sexual function assessed for these women [18].

Regarding this, we should take into account that testosterone levels decrease significantly only late in the course of menopause, and only in small percentage of postmenopausal women [19,20] and in this study only 6.7% of the women had 10 or more years of postmenopausal status.

In a study with 200 women from Massachusetts, Avis et al. measured estradiol, estrone and FSH levels. They reported that there was a relation between menopausal status and low sexual desire, but not with all the aspects of sexual function. Estradiol levels were related only to pain during intercourse. On the other hand, other factors such as physical health, marital status, mental health, and smoking had a greater impact on women's sexual function than menopausal status [21]. On the contrary, Borissova et al., in a multicentric study that included 332 Bulgarian pre, peri and postmenopausal women with and without HRT, and 295 normal menstruating women, found that all parameters of sexual life were significantly lower in the postmenopausal women without HRT as compared to both menstruating women and postmenopausal women with HRT. Additionally, significant correlations were observed between psychological factors and sexual response, depression and sexual aversion, depression and pain during the intercourse, self-esteem and sexual desire, and self-esteem and the partner's arousal [22].There is a

lack evidence of direct influences of estrogens status on sexual parameters and no differences in the psycho physiological studies about sexual responsiveness were found between pre and postmenopausal women [28].

In our culture, it is uncommon to give adequate attention to the different aspects of sexual function in women, even more in middle-aged women. There is only one study in South America [23] and none in our country (Colombia) addressing sexual function in middle-aged women and assessing the effect of HRT. We therefore lack a basic frame of reference to understand the magnitude of this problem. Moreover, there are no educational activities relating to sexuality with an integral focus on the menopausal women.

The objectives of this study are to assess the sexual function of middle-aged, premenopausal and postmenopausal women, and to determine if there is an association between menopausal status and sexual function, and if HRT impacts on it.

2. Subjects and methods

2.1. Methods

This study was a cross-sectional, descriptive analysis of the sexual function in a sample of 231 women, performed between January and June 2002. Women included were ages 40–62 years, and participated in educational and preventive activities addressed to the female population by Profamilia Menopausal Clinic in Cali, Colombia. The sample was constituted by three groups: The first one, by premenopausal women with regular menstrual cycles; the second, postmenopausal women without HRT; and the third group, postmenopausal women with HRT. All subjects met the requirements of inclusion criteria. The proposed study was reviewed and approved by our Institutional Review Board. The instrument used for collection of data was The female sexual function index (FSFI) [24]. This is an anonymous questionnaire developed by Rosen et al. who demonstrated its reliability and validity [25]. This new self-report instrument was proved for us previously on a similar population as the one currently studied. The questionnaire was handed out to each participant, including clear definitions and instructions for easy understanding. Additionally, all participants could ask questions to a fieldworker regarding doubts about the questionnaire.

Table 1
Principal components of the 19 questions of the FSFI

1	Desire: frequency
2	Desire: level
3	Arousal: frequency
4	Arousal: level
5	Arousal: confidence
6	Arousal: satisfaction
7	Lubrication: frequency
8	Lubrication: difficulty
9	Lubrication: frequency in maintaining
10	Lubrication: difficulty in maintaining
11	Orgasm: frequency
12	Orgasm: difficulty
13	Orgasm: satisfaction
14	Satisfaction: with amount of closeness with partner
15	Satisfaction: with sexual relationship
16	Satisfaction: with overall sex life
17	Pain: frequency *during* vaginal penetration
18	Pain: frequency *following* vaginal penetration
19	Pain: level during or following vaginal penetration

The questionnaire consisted of two parts: the first part contained socio-demographic characteristics, and the second part had 19 questions (Table 1) about sexual function in the last 4 weeks. These were clustered in five domains: desire, subjective arousal, lubrication, pain, and orgasm, as well as satisfaction. Clustering by domains allowed us to assess sexual function according to the Diagnostic and Statistical Manual (DSM-IV) classification from 1994 [26]. Each domain was assigned a minimum and maximum score, and the total score for sexual function was determined by including all the above domains (Table 2). The data obtained was codified and analyzed by the Stata 7.0 software. An exploratory analysis was performed to ensure the reliability of the data. A univariate analysis was done to describe the population in question in regards of central tendency measures, dispersion and amplitude. Afterwards, a bivariate dispersion analysis was done to evaluate the three different groups in the study with each demographic and sexual function variable. The χ^2-test was used for this purpose. Following this, a multivariate regression analysis was performed. After probabilistic and mathematical analyses, we determined for our study that scores ≤ 3 for each domain were compatible with disturbance in sexual function.

Table 2
Scale for evaluation of domain scores and sexual function total score (FSFI)

Domain	Questions	Score range	Score	Factor	Minimum score	Maximum score
Desire	1, 2	1–5	2–10	0.6	1.2	6.0
Excitation	3, 4, 5, 6	0–5	0–20	0.3	0	6.0
Lubrication	7, 8, 9, 10	0–5	0–20	0.3	0	6.0
Orgasm	11, 12, 13	0–5	0–15	0.4	0	6.0
Satisfaction	14, 15, 16	0–5	0–15	0.4	0.8	6.0
Pain	17, 18, 19	0–5	0–5	0.4	0	6.0
Total score					2.0	36

The individual domain scores and full scale score the FSFI can be derived from the computational formula outlined in the table. For individual domain scores add the scores of the individual items that comprise the domain and multiply the sum by the domain factor. Add the six domain scores to obtain the full scale score. A domain score of zero indicates that the subject reported had no sexual activity during the past month. (It was taken of female sexual function index questionnaire) [24].

2.2. Sample

The subjects for this study were Colombian women, ages 40–62 years. The sample was clustered in 70 (30%) premenopausal women, 77 (33.3%) postmenopausal women without HRT and 84 (36.3%) postmenopausal women with HRT.

2.3. Inclusion criteria

Premenopausal women aged 40–52 years with regular menstrual cycles lasting 23–33 days; women with natural menopause with 12 months since last menstrual period; women on HRT for 3 months of continuous therapy. Additionally, women could have or not have a sexual partner. Women without difficult to read the questionnaire; women had intact uterus and both ovaries and whom were not undergoing psychiatric treatment or taking antidepressant or sedative medications. All women should be $\geq$40 years.

3. Results

Demographically the three groups were similar in race, education and civil status, but there were difference in the age between premenopausal an postmenopausal, which is hoped (Table 3). Out of the 231 women, 71 (30%) had no sexual activity in the previous 4 weeks. Out of this group without recent sexual activity, 57 (80.2%) had no sexual partner. Sexual activity was reported by 160 women (70%). The mean age was 49.6 years (range, 40–62 years). The analysis of the data about sexual function scores, in this paper were processed in basis of the women who reported sexual activity ($N = 160$) in the last 4 weeks. Some aspects of sexual function in women with and without sexual activity in this sample will be reviewed in a future paper.

No significant difference was found in the total score of the sexual function when race and marital status were analyzed. However, there was a statistically significant difference in sexual function index when analyzing levels of education. The FSFI was higher in women with a college/university education level, when compared to women with primary level studies($P = 0.005$). The FSFI was also higher in women with high-school degrees when compared to women with primary level studies ($P < 0.05$). however, no statistically significant difference was found between the FSFI of college/university and high-school levels of education ($P = 0.89$).The same association was found in this variable for each group of premenopausal, postmenopausal without and with TRH.

Sexual disturbance was reported by 50.3% of the subjects in one out of five domains of sexual function. Disturbances in two domains were reported by 33.7% of the subjects.

3.1. Desire domain

Disturbances in this area were reported by 38% of women (Fig. 1). In the multivariate regression analysis no statistically significant difference was observed

Table 3
Baseline characteristics

	Premenopausal ($N = 70$)	Postmenopausal without TRH ($N = 77$)	Postmenopausal total with TRH ($N = 84$)	Total 231
Age (n, %)				
Average 49.61 years				
Minimum 40 years				
Maximum 62 years				
40–45	25 (35.8)	15 (19.5)	19 (22.6)	59 (25.5)
46–50	33 (47.1)	26 (33.7)	21 (25.0)	80 (34.6)
51–55	12 (17.1)	21 (27.3)	25 (29.8)	58 (25.1)
56–60	0	12 (15.5)	12 (14.3)	24 (10.3)
61–65	0	3 (4.0)	7 (8.3)	10 (4.3)
Race				
Mestizo	54 (80.6)	58 (81.7)	40 (57.1)	152 (73)
White	8 (11.9)	8 (11.3)	23 (32.9)	39 (18.7)
Black	5 (7.5)	5 (7.0)	7 (10.0)	17 (8)
Education				
Primary	23 (32.9)	31 (44.9)	27 (34.6)	81 (37.3)
High school	38 (54.3)	31 (44.9)	43 (55.1)	112 (51.6)
College/university	9 (12.8)	7 (10.2)	8 (10.3)	24 (11.1)
Civil status				
Single	1 (1.4)	3 (4.4)	2 (2.7)	6 (2.8)
Married	26 (37.1)	37 (53.6)	40 (53.3)	103 (48.1)
Widow	9 (12.9)	2 (2.9)	3 (4.0)	14 (6.5)
Cohabiting	23 (32.9)	13 (18.8)	17 (22.7)	53 (24.7)
Separated	11 (15.7)	14 (20.3)	13 (17.3)	38 (17.7)

between the three study groups, although the scores did declined with menopausal status, but these were not statistically significant ($P = 0.817$). There was no significant difference between women with or without HRT ($P = 0.165$) (Table 4, Fig. 2), but there was a significant association between age and sexual desire (older age women reported lower desire scores) ($P < 0.005$).

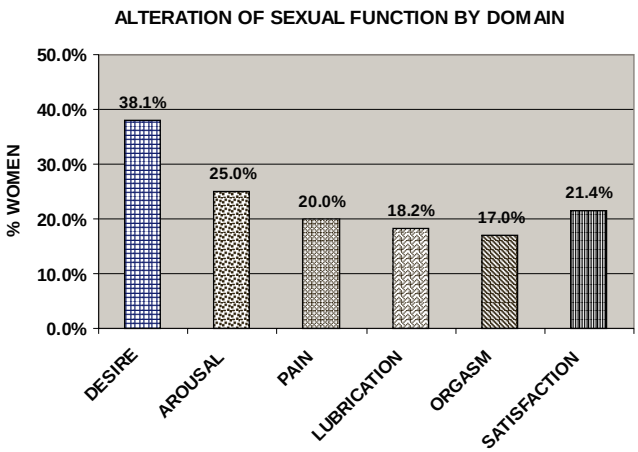

Fig. 1. Prevalence of alterations of sexual function in premenopausal and postmenopausal women with and without HRT. Women aged 40–62 years.

Table 4
Female sexual function index for each domain

Score	Desire		Arousal		Lubrication		Orgasm		Pain		Satisfaction	
	Fr	%	Fr	%	Fr	%	Fr	%	Fr	%	Fr	%
Premenopausal ($n = 50$)												
≤1.5	1	2							3	6.1	3	6.1
1.6–3	16	32	12	24	7	14.3	1	2	4	8.1	6	12.2
3.1–4.5	22	44	22	44	13	26.5	6	12	17	34.7	9	18.3
4.6–6	11	22	16	32	29	59.2	14	28	25	51	31	63.2
Menopausal without HRT ($n = 50$)												
≤1.5	3	6	6	12	2	4	1	2	8	16	6	12
1.6–3	19	38	8	16	13	26	10	20	9	18	9	18
3.1–4.5	18	36	22	44	17	34	21	42	14	28	9	18
4.6–6	10	20	14	28	18	36	18	36	19	38	26	52
Menopausal with HRT ($n = 60$)												
≤1.5	8	13.3	5	8.3	1	1.7	1	1.7	4	6.7	4	6.7
1.6–3	14	23.3	9	15	6	10	8	13.5	4	6.7	6	10
3.1–4.5	15	25	19	31.7	16	26.7	13	22	5	8.3	3	5
4.6–6	23	38.3	27	45.0	37	61.6	37	62.7	47	78.3	47	78.3

The postmenopausal group with HRT reported better scores than group without HRT in pain, lubrication, orgasm, and satisfaction domains. The menopause affected the pain and lubrication domain compared with premenopausal group.

3.2. Arousal domain

Twenty-five percent of all women reported disturbances in this domain (Fig. 1). In the multivariate regression analysis there was no significant difference between premenopausal and postmenopausal women without HRT ($P = 0.680$). There was no significant difference between postmenopausal women with or without HRT ($P = 0.202$) (Fig. 3, Table 4). We found a statistically significant negative association between age and arousal. Older women reported lower arousal score ($P < 0.05$) (Fig. 4).

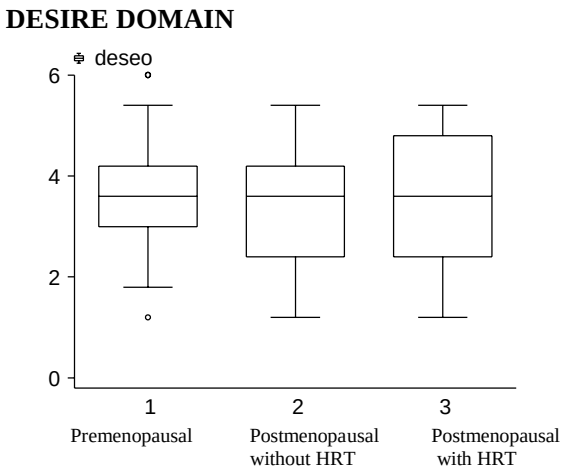

Fig. 2. *Box plot*: The medians were the same for all groups. There was no significant difference in the individual desire domain score.

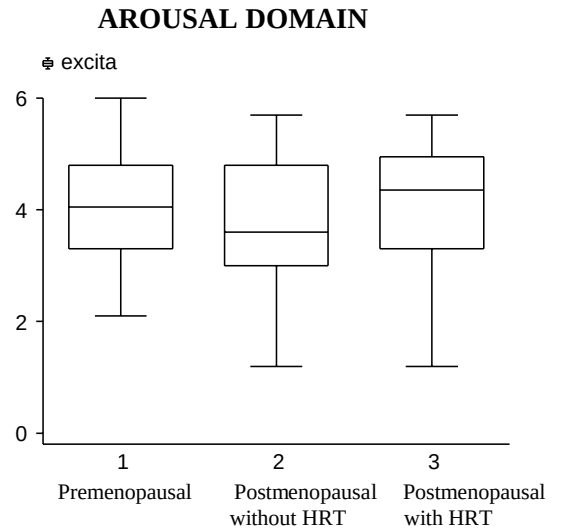

Fig. 3. *Box plot*: The median of women with HRT was higher than the other groups but there was not a significant difference when multiple regression analysis was applied.

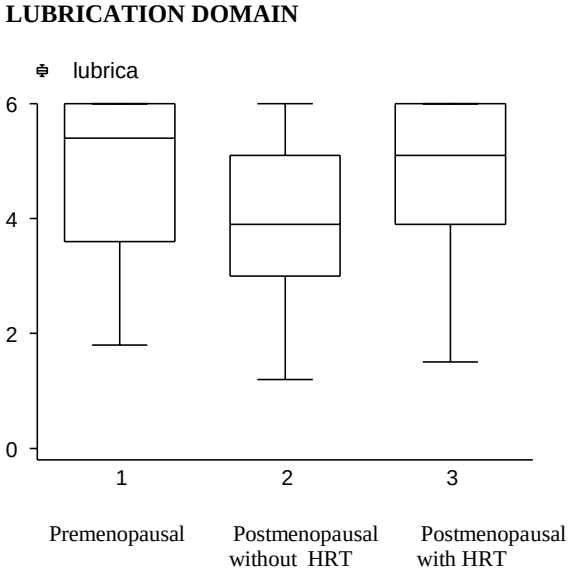

Fig. 4. *Box plot*: There was a significant difference in the three groups in this domain. It observed better scores in postmenopausal with HRT than ones without HRT and it was observed lower scores in the natural menopausal woman than premenopausal group.

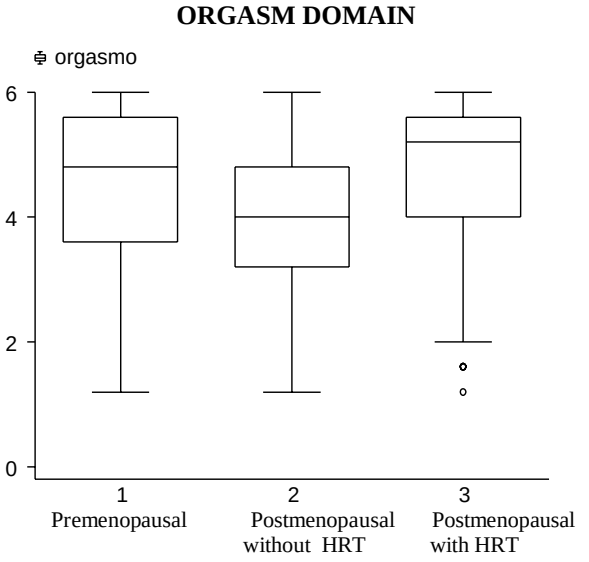

Fig. 5. *Box plot*: Women with HRT had significant better orgasm score than women without HRT. There was not significant difference, in the scores in this individual domain between premenopausal and postmenopausal without HRT.

3.3. Lubrication domain

Disturbance in lubrication was reported in 18.2% of all subjects with sexual activity (Fig. 1). In the premenopausal group, 14.3% reported a disturbance in lubrication, 30% in the postmenopausal women without HRT and 11.7% in the postmenopausal group with HRT. In the multivariate regression analysis we found that menopause affects the lubrication in a significant way ($P < 0.05$); and it was observed better scores in postmenopausal group with HRT than postmenopausal women without HRT in a significant manner ($P = 0.002$) (Fig. 4, Table 4). We were unable to demonstrate an association between age and lubrication probably due to the fact that only 4.3% of the sample was constituted by women of 60 years.

3.4. Orgasm domain

A disturbance in this aspect was reported by 17% of women with sexual activity (Fig. 1). The frequency of this disturbance was as follows: 14% in premenopausal women, 15.2% in the postmenopausal women with HRT, and 22% in postmenopausal women without HRT. In the multivariate regression analysis we observed that postmenopausal women with HRT had better scores in this domain than women without HRT ($P = 0.005$), a statistically significant difference. However, there was no a significant difference between premenopausal and postmenopausal women ($P = 0.164$) (Fig. 5, Table 4). We found a negative association between age and orgasm ($P < 0.05$).

3.5. Pain domain

Twenty-one percent of sexually active women in the study who documented intercourse ($n = 145$) reported disturbance in this domain (Fig. 1). The postmenopausal women without HRT were the group with higher rates of disturbance, 34%, compared to 14.3% in premenopausal and 13.3% in postmenopausal women with HRT. In the multivariate regression analysis we found a significant difference between women without HRT, who reported more frequency and intensity of pain with lower scores, than women with HRT ($P < 0.001$). Postmenopausal women without HRT reported more dysfunction in this domain than premenopausal women ($P < 0.05$) (Fig. 6, Table 4).

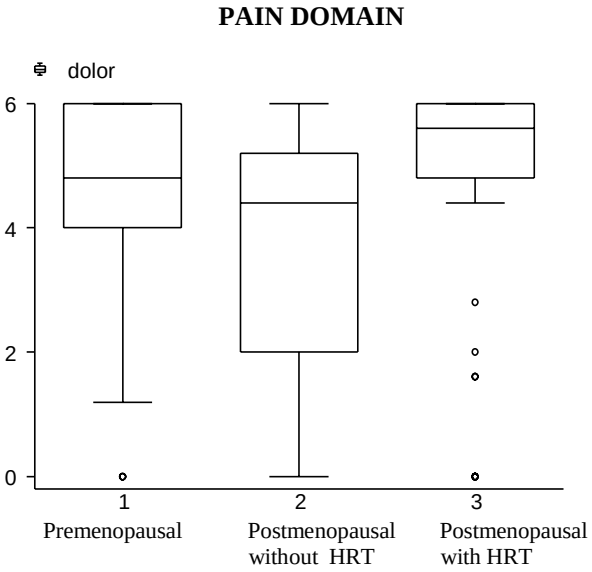

Fig. 6. *Box plot*: A significant difference between the three groups was observed. The postmenopausal group without HRT showed lower scores than postmenopausal group with HRT. In the postmenopausal women was observed lower scores than premenopausal group.

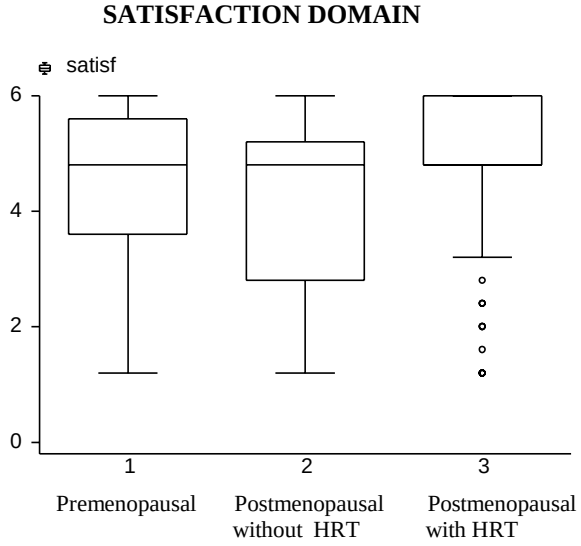

Fig. 7. *Box plot*: Women with HRT presented better satisfaction scores than women without HRT. There was not difference between premenopausal and postmenopausal women without HRT.

3.6. Sexual satisfaction

Sexually dissatisfaction was reported by 21.4% of all sexually active women (Fig. 1). Sexual dissatisfaction in postmenopausal women without HRT was 30%, in premenopausal women it was 18.4% and in postmenopausal subjects with HRT it was 16.7%. When we applied a multivariate regression analysis we found significantly higher scores in women with HRT than without HRT ($P < 0.05$) (Fig. 7, Table 4). We found a significantly negative association between age and sexual satisfaction ($P < 0.05$).

3.7. Conclusions

In our study 50.3% of sexually active premenopausal and postmenopausal population revealed some disturbances in any of the sexual response domains. The most affected domains were desire and arousal (prevalence of 38% and 25%, respectively). These results are in agreement with other studies [1,7,14]. Although menopause negatively influenced female sexual response, this was only statistically significant for lubrication and pain. In this study HRT for menopausal women showed a positive influence with better indexes regarding sexual function in the orgasm, lubrication, and pain domains, and sexual satisfaction. We found a significant decline in sexual function associated with age in desire, arousal, orgasm and satisfaction. There were not significant difference in the FSFI when we analyzed the race and the marital status. The FSFI was better in women with high educational level than women with low educational level.

4. Discussion

Our findings revealed an important prevalence of sexual dysfunction in middle-aged, premenopausal and postmenopausal women, being this a relevant health problem for women. Similar findings have been reported in other countries [1,7,14,21,22].

Although the women in this sample were not patients; they attended to the educational activities, but they were related with a menopausal clinic and therefore not constituted a general population sample; this aspect should have in mind for the analysis, beside the

evaluation of sexual arousal was subjective, nevertheless we found interesting information.

There is much controversy in the literature about the influence of the menopausal state on sexual function, or if there are other multiple important factors. In our study we found a significant decline in sexual function related to menopause only in the pain and lubrication domains. This finding is similar to previous reports in the literature [18,21].

Thirty-four percent of menopausal women in this study without HRT had dysfunction in the pain domain, and 30% in the lubrication domain. HRT could help improve these parameters as there are some studies that have shown the association between pain, vaginal dryness and decreased sexual interest [27].

Similarly with other aspects of sexual function in the women there are contradictory results, thus in a study with 42 natural postmenopausal women whom measured sexual arousal response by VPA and sexual subjective response by self-report; found that the estrogens were related with vaginal atrophy but not with dyspareunia and vaginal dryness and these women had lower VPA with erotic stimulation (film, fantasy) than premenopausal, this difference disappeared with subsequent erotic stimulation [28]. Then surge these questions, disorders in arousal domain produce disturbances in the lubrication? The low estrogens level produce atrophy and decreasing blood bed with reduction in lubrication? Or both situation coexist in the postmenopausal women?

Our data also has clinical management implications. Keeping in mind the controversy for HRT duration and its limited use due to its systemic side effects, it would be important to evaluate the benefits of topical vaginal estrogens. These might improve the vaginal mucosa's lubrication, thickness and vascularity with few side effects, permitting its use during long periods of time. Longitudinal analyses are needed to identify those factors associated with maintenance of sexual functioning and the use of topical vaginal estrogens.

Taking into account that we found an important prevalence of sexual dysfunction in premenopausal and postmenopausal women, it is necessary to offer specialized and accessible institutional services. Results obtained for the satisfaction aspect in this study are noteworthy. This is due to the fact that satisfaction was not associated with the grade of severity of sexual dysfunction in the different sexual domains.

Seventy-eight percent of women reported to be satisfied with their sexual life. This might the consequence of cultural patterns associated with gender behavior, where females play the sexual role in the context of an obligatory compromise, and pleasure and enjoyment take secondary importance. (*Note*: This work has not been financed by any pharmaceutical company, or private or government institution.)

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