Short communication

Assessing predictors of sexual function in mid-aged sexually active women

Peter Chedraui^{a,*}, Faustino R. Pérez-López^b, Edward Mezones-Holguin^c, Glenda San Miguel^d, Carlos Avila^d, Collaborative Group for Research of the Climacteric in Latin America (REDLINC)¹

^a Instituto Para la Salud de la Mujer, Vélez 616 y García Avilés, Guayaquil, PO Box 09-02000-70-A, Ecuador

^b Department of Obstetrics and Gynecology, Universidad de Zaragoza, Facultad de Medicina, Hospital Clínico, Zaragoza, Spain

^c Centro Nacional de Salud Pública, Instituto Nacional de Salud, and Escuela de Medicina, Universidad Peruana de Ciencias Aplicadas, Lima, Peru

^d Unidad Materno-Infantil, Hospital Dr. Teodoro Maldonado Carbo, Facultad de Ciencias Médicas, Universidad Católica de Santiago de Guayaquil, Ecuador

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ABSTRACT

Objective: To assess predictors of sexual function in mid-aged women.

Methods: We analyzed data of 262 healthy sexually active women (40–59 years) who filled out the Female Sexual Functioning Index (FSFI), the Menopause Rating Scale (MRS) and a general questionnaire containing female/partner data. Correlations between these two measures were also analyzed.

Results: Significant inverse correlations were found between all FSFI and MRS scores. This was most evident for the MRS urogenital score in relation to FSFI total, pain and lubrication scores. Multiple linear regression analysis determined best model predicting total FSFI index scores that explained a 66% of the variance. In this model, MRS urogenital score was an important predictor of female sexual function (total FSFI scores) with a significant inverse relation. Additionally total FSFI scores displayed a significant positive correlation with female educational level and HT use and an inverse relation with partner age and female parity.

Conclusion: Several female/partner factors predicted female sexual function in this mid-aged series. MRS urogenital scores significantly correlated with total FSFI scores.

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1. Introduction

Sexuality is a central aspect of female quality of life reflecting their bio-psycho and social well being [1,2]. Several personal and partner factors may negatively impact sexuality of mid-aged women. Various reports seem to indicate that during the climacteric there is a link between general quality of life, menopausal symptoms and sexual function [3–5]. Sexual dysfunction relates to health status, emotional/stress problems and menopausal quality of life. Climacteric symptoms can be disabling and their alleviation may reduce fatigue and improve self-esteem and social confidence. Women with hypoactive sexual desire disorder have reported poorer health status and worse health-related quality of life than women without the disorder [6].

Although the Menopause Rating Scale (MRS) and the Female Sexual Function Index (FSFI) are useful tools to assess menopausal symptom severity [7,8] and sexual function [9,10], correlates

between their scores have not been completely addressed in climacteric women [11]. The aim of the present communication was to assess predictors of sexual function in mid-aged sexually active women who simultaneously filled out the MRS and the FSFI. Secondly correlations between both measures were analyzed.

2. Methods

2.1. Participants

From November 2006 to February 2007 a cross-sectional study was carried out at the Maternal-Infant Unit of the Teodoro Maldonado Carbo Hospital, Guayaquil, Ecuador, aiming at assessing sexuality and quality of life among healthy, Hispanic women (40–59 years) visiting inpatients of the mentioned Unit. Participants were requested to fill out the FSFI, the MRS and an itemized questionnaire containing female/partner socio-demographic data. Women unable to understand the survey, not consenting participation or with psychological or physical incapacity imposing difficulties during the interview were excluded. Other methodological aspects and details of the original study have been previously published elsewhere [12,13]. Predictors of female sexual function are specifically addressed in the present manuscript. The original research protocol was reviewed and approved by the Bioethics

* Corresponding author at: Instituto Para la Salud de la Mujer, Vélez 616 y García Avilés, Guayaquil, PO Box 09-02000-70-A, Ecuador. Tel.: +593 4 252 6825; fax: +593 4 252 6825.

E-mail addresses: institutochedraui@gmail.com, peterchedraui@yahoo.com (P. Chedraui).

¹ Peter Chedraui, Edward Mezones-Holguin, Glenda San Miguel.

Table 1MRS and the FSFI scores (total and sub-scale/domain) among studied women ($n = 262$).

	Total FSFI Maximum score 36	Desire Maximum score 6	Arousal Maximum score 6	Lubrication Maximum score 6	Orgasm Maximum score 6	Satisfaction Maximum score 6	Pain Maximum score 6	MRS total Maximum score 44	Somatic Maximum score 16	Psychological Maximum score 16	Uro-genital Maximum score 12
Median	30	4.2	5.1	5.7	4.8	5.6	5.2	8	4	2	1
Mean	28.7	4.2	5	5.2	4.1	5.1	5	8.1	3.7	2.6	1.8
Range	10.6–36	1.2–6	1.5–6	0.9–6	1.2–6	1.2–6	1.2–6	0–27	0–11	0–13	0–10
p25–p75	25.4–33.6	3.6–4.8	4.5–6	4.8–6	3.2–5.2	4.8–6	4.4–6	3–12	2–6	0–4	0–3
IQR	8.2	1.2	1.5	1.2	2	1.2	1.6	9	4	4	3

IQR: interquartile range; MRS: Menopause Rating Scale; FSFI: Female Sexual Function Index.

Committee of the PROSAM Foundation, Santiago de Chile, Chile, as part of studies III and IV of the Collaborative Group for Research of the Climacteric in Latin America. All women were informed about the research (purposes and used tools) and written consent obtained.

2.2. General questionnaire

2.2.1. Female data

Female data included: age (years), parity, menopausal status (pre-, peri- or postmenopausal), partner status (yes/no), educational level (total years), marital status, sexual status in the past 4 weeks (active or inactive) and accessed healthcare system (free-minimal cost or paid). Lifestyle and other personal factors included: smoking habit, church attendance, and history of sexual abuse. Medical care and drug use included: psychiatric consultation (yes/no) and current use of psychotropic drugs and hormone therapy (HT)/alternative treatments for the menopause. Menopausal status was defined using criteria of the Stages of Reproductive Aging Workshop: premenopausal (women having regular menses), perimenopausal (irregularities > 7 days from their normal cycle) and postmenopausal (no more menses in the last 12 months) [14]. Those with bilateral oophorectomy were considered as postmenopausal.

2.2.2. Partner data

Women provided data related to partner: age, educational level, healthiness, faithfulness, alcoholism, or sexual dysfunction (erectile dysfunction or premature ejaculation). Definitions for insufficient education, alcoholism, erectile dysfunction, and premature ejaculation have been previously described [12]. Women or men capable of performing daily routine activities were defined as healthy.

2.3. Instruments

2.3.1. The Female Sexual Function Index (FSFI)

This instrument is composed of 19 questions grouped in 6 domains: desire, arousal, lubrication, orgasm, satisfaction and dyspareunia [9]. Each question can provide a score varying from 0 to 5. Scores obtained for each question are then summed up within each domain and then multiplied by a constant factor to provide

Table 2Rho Spearman's coefficient correlations between MRS scores (total and subscales) and FSFI scores (total and domains) $n = 262$.

	Somatic	Psychological	Urogenital	Total MRS
Total FSFI	−0.3593	−0.4485	−0.8019	−0.6327
Pain	−0.3457	−0.4255	−0.8194	−0.6136
Satisfaction	−0.2236	−0.3669	−0.6437	−0.4832
Orgasm	−0.3160	−0.3706	−0.6788	−0.5355
Lubrication	−0.3793	−0.4292	−0.7673	−0.6349
Arousal	−0.2759	−0.3677	−0.6603	−0.5180
Desire	−0.3407	−0.4146	−0.6870	−0.5686

individual domain scores. The total FSFI score is the sum of scores obtained for each domain [9,10,12].

2.3.2. The Menopause Rating Scale (MRS)

The Menopause Rating Scale (MRS) is a health related quality of life instrument composed of 11 items assessing menopausal symptoms and divided into three subscales: somatic, psychological and the urogenital. Each item can be graded by the subject from 0 (not present) to 4 (1 = mild; 2 = moderate; 3 = severe; 4 = very severe). For a particular individual, the total subscale score is the sum of each graded item contained in that subscale. Total MRS score is the sum of scores obtained for each subscale [7,8]. Higher MRS scores are indicative of quality of life impairment. The Spanish version of the MRS scale was used in this research [15,16].

2.4. Statistical analysis

Statistical analysis was performed using Stata version 9.0 (Stata Corp., TX, USA). Data are presented as medians, means (range), interquartile ranges and percentiles (p25–p75). The Shapiro Wilk test was used to determine the normality of data distribution (MRS and FSFI scores). Rho Spearman's correlation coefficients were used to determine linear relationships between scores of both scales (non parametric data). Multiple linear regression analysis was performed to obtain the best model predicting total FSFI scores (sexual function). Variables were entered into the model using a backward stepwise procedure with a significance level of p set at <0.05. A total of 409 women were surveyed in the original study. Basal characteristics of these participants and their partners are depicted elsewhere [12]. In the present study, FSFI and MRS scores were re-assessed for correlation and linearity prior to multiple linear regression analysis. While total FSFI scores ($n = 409$) displayed a bi-modal distribution (Fig. 1), total MRS scores did not. Hence to fulfill linearity assumption data of 262 participants with total FSFI

Fig. 1. Total FSFI score distribution ($n = 409$).

Table 3Final best model predicting total FSFI score: multiple linear regression analysis, $n = 262$.

	Beta coefficient	CI 95%	<i>t</i>	<i>p</i> value
Intercept	40.368	36.269 to 44.468	19.39	<0.001
MRS urogenital score	−1.685	−1.895 to −1.476	−15.85	<0.001
Female education (years)	1.1307	0.018 to 0.243	2.29	0.023
Partner age	−0.199	−0.276 to −0.124	−5.07	<0.001
HT use	2.724	1.236 to 4.211	3.61	<0.001
Parity	−0.392	−0.696 to −0.088	−2.54	0.012

 $r^2 = 0.676$; adjusted $r^2 = 0.669$, $p < 0.0001$; CI: confidence intervals; HT: hormone therapy.

scores 10 or more were taken into account for all calculations. All these women were sexually active.

3. Results

Median age of the studied sample ($n = 262$) was 45 years. Women were pre, peri and postmenopausal in 49.6%, 24% and 26.3% respectively. A 9.2% used HT, 23.3% had 12 or less years of education, and 68.7% were married. FSFI and MRS scores (total and domain/sub-scale) are depicted in Table 1. Median total MRS and FSFI scores were 8 and 30, respectively. Rho Spearman's coefficient correlations between MRS and FSFI scores are depicted in Table 2. All parameters displayed significant inverse correlations; however coefficients closer to 1 demonstrating better linearity. This was more evident for the MRS urogenital sub-scale score in relation to FSFI total, pain and lubrication scores.

Multiple linear regression analysis was used to obtain the best model predicting total FSFI scores and explaining a 66% of the variance (Table 3). In this model, urogenital MRS score was an important predictor displaying a significant inverse relation. During simple linear regression, urogenital MRS scores predicted 59% of total FSFI score variance. This was only 4% when women with FSFI total scores <10 were taken into account. This model also found a positive correlation between total FSFI scores and female educational level and HT use with an inverse significant correlation observed for partner age and female parity.

4. Discussion

During the climacteric menopausal symptoms [5,12,17] and sexual dysfunction [18–20] exert a negative impact over female quality of life. The FSFI has been used to assess sexual function according to menopausal status, anxiety, depression, urinary symptoms, eating disorders, hormone levels and partner factors [12,13,21–23].

The present analysis aimed at correlating MRS and FSFI scores and obtaining the best model predicting total FSFI scores, and hence female sexuality. In general all scores were significantly and inversely correlated. This was most evident for the MRS urogenital sub-scale score in relation to FSFI total, pain and lubrication scores. Determinants of sexual dysfunction for this series have been previously reported in relation to female and partner issues [12]. Multiple regression analysis of the present series obtained the best model predicting total FSFI scores and 66% of its variance. MRS urogenital score was an important factor predicting female sexuality in this model. During simple linear regression, urogenital MRS scores predicted 59% of total FSFI score variance. This was only 4% when women with FSFI total scores <10 were taken into account. A possible explanation relies on the fact that women in this lower score segment are mainly sexually inactive, contrary to the analyzed in this series which were all active. Additionally total FSFI scores among sexually active women positively correlated with female education and HT use. Although this is in agreement with previous reports [22,24], the present series, however seems to suggest that sexual function was highly dependent on the urogenital

function. Although the urogenital MRS scores are the sum of three items: sexual problems, bladder problems and vaginal dryness, in clinical practice the score reflects poor vaginal lubrication. Low estrogen levels can cause decreased vaginal blood supply which affects lubrication and increases dyspareunia. Women with urogenital discomfort are usually reluctant to be involved in sex. On the other hand HT is an effective option to improve vaginal lubrication and mood, and hence reduce painful intercourse [25,26]. Female education predicts a positive attitude toward sex and HT use [22,27]. In a previous large study vaginal lubrication was the most important risk factor for sexual dysfunction [22].

Partner age and health status may affect female sexual life and satisfaction [21]. Aged males have more erectile and ejaculatory disorders, life frustration, and work stress that may deteriorate both sexual desire and performance. Decreased sexual intercourse (quality and frequency) may reduce urovaginal status creating a vicious circle with negative sexual feelings and impaired vaginal trophism. Increased parity may alter vulvovaginal anatomy and sensitivity. Indeed, reports have highlighted the role of pudendal nerve integrity and genital-sensory alterations in relation to female sexual dysfunction [28,29]. Our regression model seems to support the findings of others in terms of partner age and female parity.

Studies reporting correlates between MRS and FSFI scores are scarce. In this sense, Jara et al. [11] have previously reported that the MRS, specifically item 8 (sexual problems), was moderately accurate for diagnosing sexual function among mid-aged women. The present study found that combining both measures (MRS and FSFI) the urogenital score of the MRS significantly predicted female sexual function. Although the FSFI tool has been used to assess sexual function among menopausal women, it is not, *per se*, a menopausal tool. The present study seems to support the utility of the MRS urogenital sub-scale (a part of the complete menopausal tool) as a screening tool for female sexual dysfunction. The search of a specific tool to assess menopausal sexuality is needed. More research is warranted in this regard.

Despite the limitations of this study (cross sectional design and sample size) it adds to the few correlating MRS and FSFI scores in mid-aged women in which several female/partner factors were found to predict sexual function. As MRS urogenital scores significantly correlated with total FSFI scores, we recognize the need of constructing a sexual function tool to be specifically used among menopausal women.

Contributors

Peter Chedraui contributed to the study design (the original version and this re-analysis), aided in statistics (analysis and interpretation) and formatting and editing the final version of this paper. Faustino Pérez-López contributed to the design of this re-analysis, performing literature review, providing intellectual input and formatting of the final document. Edward Mezones-Holguin contributed to the study design (original study and this re-analysis), performed statistics of this version (analysis and interpretation). Glenda San Miguel contributed to literature review, data collection and providing intellectual input to final manuscript. Carlos

Avila contributed to literature review, data collection and providing intellectual input to final manuscript. All authors have seen and approved the final version.

Competing interest

All authors declared that they have no conflict of interest.

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