

Association between sexual function and depression in sexually active, mid-aged, Peruvian women

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ABSTRACT

Objective To determine the association between sexual function and depression in sexually active, mid-aged women while controlling for sociodemographical and clinical factors.

Methods Data were analyzed from 335 healthy, sexually active, Peruvian women (40–59 years) who simultaneously filled out the Female Sexual Function Index (FSFI), the Menopause Rating Scale (MRS), the Beck Depression Inventory (BDI) and a general questionnaire containing female/partner data. Correlations between the measures of all tools were analyzed.

Results The median age of studied women was 49 years; 76.7% had low schooling, 40% were postmenopausal and 15.2% used hormone therapy. Regarding the partner, 11% and 10.5% presented erectile dysfunction and premature ejaculation, respectively. FSFI total scores displayed significant correlations with BDI and MRS scores (total, psychological and urogenital). Multiple linear regression analysis was used to obtain an association model between sexual function and depression, explaining 88% of the variance. In this model, sexual function was inversely associated with depression, yet confounded by MRS urogenital scores. In addition, sexual function was inversely correlated to partner sexual function and to female MRS psychological scorings and positively to premenopausal status.

Conclusion In this mid-aged series, sexual function was significantly associated with depression, in addition to hormonal status and partner sexual function.

INTRODUCTION

Sexuality is a central aspect of women's quality of life, reflecting their biological, emotional and social well-being^{1,2}. Sexually dissatisfied women display impaired psychological well-being³. Lower sexual function in mid-aged women relates to aging, the menopause, attitudes towards the menopause and aging, body image, chronic diseases, stress, fatigue, drug use

and abuse, psychological well-being, partner sexuality, and female sexual activity^{4–8}. Depression is a recurrent illness that produces physical disability, increases morbidity and mortality, and is, in many cases, unrecognized and untreated^{9,10}. Men and women suffering from depression^{11,12}, as well as those depressed under treatment^{13,14}, display higher sexual dysfunction rates. Depressive status and anxiety are highly prevalent during the female climacteric; some 45% of women

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attending menopausal clinics are clinically depressed, and 80% of these have a history of depression¹⁵. Sexual function is lower in postmenopausal women as compared to premenopausal ones, regardless of whether they have significant depression^{16,17}. The menopausal transition, on the other hand, seems a time of increased vulnerability to depression^{7,15-18}, which may impair sexual function. In addition, partner sexual dysfunction may lead women to withdraw from sexual activity^{6,8,18}.

Despite the aforementioned, links between depression and sexual function are not clearly defined^{7,18-20}. The aim of the present research was to determine the association between sexual function and depression in mid-aged, sexually active, Peruvian women while controlling for sociodemographical and clinical factors.

METHODS

Study design and participants

From November 2006 to February 2007, a cross-sectional study was carried out by the Collaborative Group for Research of the Climacteric in Latin America (REDLINC) in 19 health-care centers of cities in 11 Latin American countries. This study (REDLINC III) aimed at assessing sexual function using the Female Sexual Function Index (FSFI). Otherwise healthy women (40–59 years old) accompanying or visiting inpatients at the different health-care centers, were invited to participate. This paper specifically presents data from one of the participating centers of the REDLINC III study (Hospital III EsSalud Cayetano Heredia, Piura, Peru) in order to determine the association between sexual function and depression in those sexually active. Hence, in addition to filling out the FSFI, the Menopause Rating Scale (MRS) and an itemized questionnaire containing female/partner sociodemographic data, subjects were also requested to complete the Beck Depression Inventory (BDI). Women were excluded if they were unable to understand the survey, did not consent to participate or had psychological or physical incapacity that imposed difficulties during the interview. Other methodological aspects and details of the original study have been previously published elsewhere⁶.

Sample size calculation

For the development of the REDLINC III study⁶, a sample size of 380 subjects per center was calculated, considering that each one covered an estimated population of 50 000 women and assuming that 50% of the surveyed women would present increased risk for sexual dysfunction²¹, with a 5% desired precision and a 95% confidence interval. In the specific case of the Piura center, an 85% sexual activity prevalence was estimated and, assuming a 10% refusal rate, the sample size was increased to 497 healthy women.

Instruments

General questionnaire

Female data included age (years), parity, menopausal status (pre-, peri- or postmenopausal), body mass index, educational level (total number of years), marital status, and sexual status in the previous 4 weeks (active or inactive). 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 oral contraceptives, psychotropic drugs and hormone therapy (HT)/alternative treatments for the menopause. Menopausal status was defined using the criteria of the Stages of Reproductive Aging Workshop: premenopausal (women having regular menses), perimenopausal (irregularities >7 days from their normal cycle) and postmenopausal (no menses in the last 12 months)²². Those with bilateral oophorectomy were considered as postmenopausal.

Women provided data about their partner: age, educational level, healthiness, faithfulness, alcoholism, or sexual dysfunction (erectile dysfunction or premature ejaculation). Several definitions regarding the partner were used as previously described²³. In brief, alcoholism was defined as a chronic conduct disorder manifested by repeated and excessive alcohol consumption that interferes with health, economic or social relationships. Erectile dysfunction was defined as the persistent or recurrent incapacity to achieve or maintain an erection to allow satisfactory sexual intercourse, and premature ejaculation as the persistent or recurrent ejaculation after minimal sexual stimulation before, during or shortly after penetration or before the individual's desire to do so. Women or men capable of performing daily routine activities were defined as healthy²³.

The Female Sexual Function Index

This instrument is composed of 19 questions grouped into six domains: desire, arousal, lubrication, orgasm, satisfaction and dyspareunia²⁴⁻²⁶. It is used to evaluate female sexual function in the previous 4 weeks. Each question can provide a score varying from 0 to 5. Scores obtained for questions in each domain are summed up and multiplied by a constant factor to provide individual domain scores. The total FSFI score is the sum of scores obtained for each domain. Lower total FSFI scores are indicative of lower sexual function. As proposed by Wiegel and colleagues²⁶, a FSFI total score of 26.55 or less is suggestive of sexual dysfunction (lower sexual function).

The Beck Depression Inventory

The Spanish version of the Beck Depression Inventory (BDI) is a widely used, 21-item, self-reported inventory with at least four possible answer choices in each item. The tool measures how individuals have been feeling during the last week in

cognitive, emotional and motivational areas²⁷. Women obtaining BDI total scores of 17 or more were defined as having depressed mood¹⁶.

The Menopause Rating Scale

The Menopause Rating Scale (MRS) is a health-related quality-of-life instrument composed of 11 items that assess menopausal symptoms and which are grouped into three subscales: somatic, psychological and 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. The total MRS score is the sum of scores obtained for each subscale^{28,29}. Higher MRS scores are indicative of quality-of-life impairment. Values equal to or above 9 (somatic), 7 (psychological), 4 (urogenital) and 17 (total) were used to define severe scorings.

Statistical analysis

Statistical analysis was performed using STATA version 9.0 (Stata Corp, Texas, USA). Data are presented as medians, interquartile ranges, minimum/maximum values, β coefficients and confidence intervals. The Shapiro–Wilk test was used to determine the normality of data distribution.

Bivariate analysis

Rho Spearman coefficients were calculated to determine correlations between FSFI total scores and studied numeric variables. The Kruskal–Wallis test was used to compare FSFI total scores among qualitative variables, prior to data normality and variance homogeneity assessment with the Shapiro–Wilk test and Levene's test, respectively.

Multivariate analysis

Multiple linear regression analysis was used to construct an association model considering FSFI total scores as the outcome measure and total BDI scores as the exposure variable. A complete initial model was obtained which included all control variables found to be significant during bivariate analysis. All potential interaction variables (between exposure and control variables) were included. Variables were considered to produce modification of the association effect between FSFI and BDI total scores if the *p* value for this complete model was <0.10 ; if this were the case, a linear regression model was generated for each category. If none of the generated interaction variables fulfilled this criterion, they were excluded from the model. Then, a reduced model was constructed in which confounding variables were evaluated. As proposed by Rothman and colleagues³⁰, confounding variables were determined through a direct acyclic graphic or by estimating whether the percentage change in regression coefficients for BDI total scores in the presence of the variable was higher than 10%. A final best-fit

model was obtained after validating the reduced model. For this, a scatter graph model was designed with studentized residuals and predictive values obtained within this model. In addition, Cook's test was used to measure distances among influencing data³⁰. Hamilton's criterion was used for the inclusion of variables into the final model^{31,32}. Statistical significance of the final reduced model was set at <0.05 .

Ethical aspects

The original REDLINC III study was reviewed and approved by the Bioethics Committee of the PROSAM Foundation, Santiago de Chile, Chile. All subjects were voluntarily requested to participate, informed of the study (objectives, used tools and secondary analysis) and written consent was obtained.

RESULTS

During the study period, a total of 500 women were invited to participate. There was a 5% refusal rate, with 475 subjects finally entering the research. Of these, 380 (80%) were sexually active; 335 of these simultaneously filled out all instruments, the FSFI, the MRS and the BDI.

The median age of the studied sample ($n = 335$) was 49 years; 76.7% of women had less than 12 years of education, 40% were postmenopausal, 15.2% used HT, and 95.2% were sure that they had a faithful partner. All women were catholic and attended church regularly. None of the surveyed women gave a history of sexual abuse, received psychiatric consultation or used psychotropic drugs or alternative treatments for the menopause. Regarding the partner, the median age was 51 years, 1.7% abused alcohol, and 11% and 10.5% presented erectile dysfunction and premature ejaculation, respectively (Table 1). A descriptive analysis of the FSFI, MRS and BDI scores is given in Table 2. The median scores for the total FSFI, MRS and BDI were 27.2, 9 and 14, respectively; 35.2% of the women displayed FSFI total scores suggestive of impaired sexual function (≤ 26.55). In 5.7% of cases, MRS total scores were found to be severe and, in 37.6%, depressed mood was identified with the BDI (total BDI scores ≥ 17).

Rho Spearman's coefficient correlations between FSFI total scores and numeric variables (MRS and BDI scores included) are shown in Table 3. FSFI total scores displayed moderate correlations with BDI and MRS scores (total, psychological and urogenital). Correlation with female age was not high. The FSFI total score distribution according to several categorical variables (bivariate analysis) is presented in Table 4. Women who smoked, were postmenopausal and had a partner with sexual dysfunction (erectile dysfunction and premature ejaculation) displayed significantly lower FSFI total scores (lower sexual function).

Multiple linear regression analysis was used to obtain a final reduced and validated association model between sexual

Table 1 Profile of surveyed women and their partners ($n=335$). Data are given as *medians (interquartile ranges) [minimum/maximum values] or n (%)

| Female data | |
|---|------------------|
| Age (years) | 49 (8) [40/59]* |
| 40–44 | 106 (31.6) |
| 45–49 | 88 (26.3) |
| 50–54 | 101 (30.2) |
| 54–59 | 40 (11.9) |
| Educational level* | 11 (3) [1/18]* |
| 0–6 years | 72 (21.5) |
| 7–11 years | 185 (55.2) |
| ≥ 12 years | 78 (23.3) |
| Marital status | |
| married/cohabiting | 332 (99.1) |
| single/divorced/widowed | 3 (0.9) |
| Parity* | 3 (2) [0/7]* |
| 0 | 3 (0.9) |
| 1–5 | 296 (88.4) |
| >5 | 36 (10.7) |
| Premenopausal | 93 (27.8) |
| contraceptive use | 22 (23.7) |
| hormone therapy use | 2 (2.2) |
| hysterectomy | 1 (1.1) |
| Perimenopausal | 108 (32.2) |
| hormone therapy use | 11 (10.2) |
| Postmenopausal | 134 (40.0) |
| surgical menopause | 14 (10.5) |
| hormone therapy use | 38 (28.4) |
| hysterectomy | 17 (12.7) |
| time since menopause onset (years) | 4 (2) [1/11]* |
| Current smoking | 21 (6.3) |
| Marital faithfulness | |
| sure partner is faithful | 319 (95.2) |
| not sure | 6 (1.8) |
| partner is unfaithful | 10 (3.0) |
| <i>Partner</i> | |
| Age (years) | 51 (10) [38/67]* |
| Age difference (partner age – female age) | 2 (3) [–7/–13]* |
| Educational level | 11 (3) [2/20]* |
| Alcohol abuse | 6 (1.7) |
| Healthiness | 270 (80.6) |
| Erectile dysfunction | 37 (11.0) |
| Premature ejaculation | 35 (10.5) |

function (FSFI total scores) and depression (BDI total scores) adjusted for several female and partner factors (Table 5). Total FSFI and BDI scores were significantly associated (inverse correlation), yet confounded by MRS urogenital scores. In addition, sexual function (total FSFI scores) was inversely correlated with partner sexual function and female MRS psychological scorings and positively correlated with premenopausal status. This reduced best-fit association model explained 88% of the variance ($r^2 = 0.88$).

Table 2 Descriptive analysis of the scores in the Female Sexual Function Index (FSFI), Menopause Rating Scale (MRS) and Beck Depression Inventory

| | n (%) | Median (IQR) | Minimum/maximum value |
|--|------------|--------------|-----------------------|
| <i>Total FSFI</i> | | 27.2 (4.9) | 16.4/32.9 |
| Desire domain | | 3.6 (1.2) | 1.2/6 |
| Arousal domain | | 4.8 (0.6) | 2.7/6 |
| Lubrication domain | | 4.8 (0.9) | 2.4/6 |
| Orgasm domain | | 3.6 (1.2) | 2/5.2 |
| Satisfaction domain | | 4.4 (0.8) | 2.4/6 |
| Pain domain | | 5.2 (1.6) | 1.2/6 |
| Increased risk for impaired sexual function (FSFI ≤ 26.55) | 118 (35.2) | | |
| <i>Total MRS</i> | | 9 (6) | 1/27 |
| Severe total MRS (score ≥ 17) | 19 (5.7) | | |
| <i>MRS somatic subscale</i> | | 3 (3) | 0/12 |
| Severe somatic (score ≥ 9) | 4 (1.2) | | |
| <i>MRS psychological subscale</i> | | 4 (3) | 0/11 |
| Severe MRS psychological (score ≥ 7) | 18 (5.4) | | |
| <i>MRS urogenital subscale</i> | | 2 (2) | 0/8 |
| Severe MRS urogenital (score ≥ 4) | 56 (16.7) | | |
| <i>Beck Depression Inventory</i> | | 14 (14) | 3/55 |
| Depressed mood (Beck total ≥ 17) | 126 (37.6) | | |

IQR, interquartile range

DISCUSSION

The present study found that 35.2% of women displayed total FSFI scores below 26.55, the cut-off value proposed by Wiegel and colleagues²⁶, hence suggesting an increased risk

Table 3 Rho Spearman coefficient correlations between Female Sexual Function Index (FSFI) total scores and several quantitative variables (other tools included)

| Variables | Coefficients | p Value |
|--|--------------|-----------|
| Beck Depression Inventory total score | –0.679 | <0.001 |
| MRS total score | –0.547 | <0.001 |
| MRS somatic score | –0.121 | 0.0265 |
| MRS psychological score | –0.445 | <0.001 |
| MRS urogenital score | –0.721 | <0.001 |
| Female age | –0.165 | 0.0022 |
| Female educational level | 0.044 | 0.4181 |
| Parity | –0.098 | 0.07 |
| Time since couple relationship (years) | –0.149 | 0.0064 |
| Partner age | –0.130 | 0.013 |
| Partner educational level | 0.092 | 0.0926 |

MRS, Menopause Rating Scale

Table 4 Distribution of Female Sexual Function Index (FSFI) total score according to several categorical variables: bivariate analysis**

| | Median (IQR) | Mean \pm SD | p Value* |
|--------------------------------------|-----------------|----------------|----------|
| <i>Current smoking</i> | | | |
| Yes | 23.9 (4.7) | 26.0 \pm 3.5 | 0.012 |
| No | 27.2 (5.9) | 24.0 \pm 3.6 | |
| <i>Menopausal status</i> | | | |
| Premenopausal | 27.9 (2.5) | 27.5 \pm 3.0 | <0.001 |
| Perimenopausal | 27.3 (5.2) | 25.9 \pm 3.5 | |
| Postmenopausal | 26.7 (5.8) | 27.6 \pm 3.6 | |
| <i>Partner erectile dysfunction</i> | | | |
| Yes | 21.5 (3.4) | 26.5 \pm 3.3 | <0.001 |
| No | 27.3 (3.7) | 22.0 \pm 2.9 | |
| <i>Partner premature ejaculation</i> | | | |
| Yes | 22 (6.8) | 26.4 \pm 3.4 | <0.001 |
| No | 27.3 (4.3) | 22.6 \pm 3.6 | |

*, Kruskal–Wallis test; **, only those values that are significant are displayed; IQR, interquartile range; SD, standard deviation

for sexual dysfunction. This rate is high yet similar to that reported by others for Latin American series^{6,21,24,33,34}. The studied women were those living in Piura in northern Peru (1035 km from Lima, the capital city), close to the Ecuadorian border, mainly mestizo (blend of indigenous with Spaniard) and with a high percentage having low education. Subjects displayed significantly lower FSFI total scores in relation to smoking habit, postmenopausal status and partner sexual dysfunction. These figures are consistent with those previously reported by others^{6,8,18,21,24}.

HT was used by 15.2% of the women and 95.2% of women were sure of their partner's marital faithfulness. The latter rate was higher than that reported for mid-aged, mestizo women from Guayaquil (Ecuador), with a similar sociodemographical profile (low income and education). A major justification for this difference may rely on geographical as well as other cultural factors not identified in the present study. Guayaquil is a cosmopolitan city with more than 3.5 million inhabitants, located on the coast, whereas Piura has 350 000 inhabitants and an interior location. Another fact worth mentioning is that partner sexual disorders were lower in men in the present

study compared with those from Guayaquil. In correlation to this was the lower alcohol abuse rate observed among Peruvian men as compared to Ecuadorians males. These differences highlight the importance of including social, partner sexuality and relationship aspects when it comes to assessing sexuality during the menopause. All these aspects also suggest how lifestyle and sociodemographic characteristics of metropolitan cities may exert different influences on two populations (only 435 km apart) with similar ethnical and cultural backgrounds. Furthermore, the discussed differences show how general is the 'Hispanic' denomination, which refers to an individual who shares a common language and some culture references, but in many cases quite different inputs, values, lifestyle and clinical complaints. This fact is consistent with the findings of a recent analysis of the Study of Women's Health Across the Nation (SWAN), which determined that, among 'Hispanic' women, menopause-associated symptoms differed by country of origin³⁵.

The rates of women presenting severe MRS scores (total and subscales) in the present series were lower than those reported in mid-aged Ecuadorian women. Higher rates found among Ecuadorian women were basically related to male issues (age, education and sexual dysfunction)³⁶. Differences in partner aspects found between Peruvian and Ecuadorian women, as already discussed, seem to support these menopause-associated differences.

The rate of depressed mood in the present series was also found to be high (37.6%). Using the Hamilton Depressive Rating Scale, low-income, mid-aged Ecuadorian women presented moderate to severe depressive scorings in 46.5%, once again in relation to partner issues¹⁸. Observations found among Peruvian and Ecuadorian, mid-aged women highlight the need for performing more research to better define the exact role that partner issues and geographical factors may have in mid-aged, Latin American female health.

The FSFI has widely been used among several populations and recommended as a useful sexual function screening tool^{26,34}. Despite this, no specific evaluation has been performed to further evaluate sexual dysfunction in our Peruvian women. As for sexual function in this Peruvian series, the FSFI total scores displayed significant moderate-to-high inverse correlations with several numeric parameters, basically with BDI and MRS scores (total, psychological and urogenital).

Table 5 Final best-fit multiple linear regression model explaining the association between sexual function (Female Sexual Function Index (FSFI) total scores) and depression (Beck Depression Inventory (BDI) total score) adjusted for several female and partner factors*

| | β Coefficient | Standard error | 95% confidence interval | T | p Value |
|-------------------------------|---------------------|----------------|-------------------------|--------|---------|
| BDI total score | -0.151 | 0.011 | -0.173 to -0.129 | -13.64 | <0.001 |
| MRS urogenital score | -0.817 | 0.074 | -0.964 to -0.670 | -10.96 | <0.001 |
| Partner erectile dysfunction | -1.482 | 0.287 | -2.049 to -0.916 | -5.15 | <0.001 |
| Partner premature ejaculation | -1.306 | 0.322 | -1.940 to -0.672 | -4.05 | <0.001 |
| MRS psychological score | -0.134 | 0.043 | -0.220 to -0.049 | -3.10 | 0.002 |
| Premenopausal status | 0.581 | 0.198 | 0.189 to 0.972 | 2.92 | 0.004 |

MRS, Menopause Rating Scale

*, Final best-fit model after Cook test evaluation of influencing data; $r^2 = 0.882$; adjusted $r^2 = 0.819$, $p < 0.0001$

Indeed, women displaying higher BDI and MRS scores (depressed and more symptomatic) presented lower FSFI total scores and hence lower sexual function. Contrary to our study, reports have described the role of female age in relation to sexual function^{2,17,19,20,37,38}. In a recent report, women with more urogenital symptoms, as assessed with the MRS, presented lower sexual function⁸. A postmenopausal Peruvian series found that diabetes alters sexual function independent of depression³⁴.

Determination of the association between female sexual function and depressed mood, using multiple linear regression analysis, was the main aim of the present Peruvian series. Final best-fit association model explaining 88% of the variance found that sexual function was indeed associated with depression yet confounded by MRS urogenital scores. In addition, sexual function inversely correlated with partner sexual function and female MRS psychological scorings. Interestingly, a recent report found that MRS urogenital scores inversely and significantly correlated with total FSFI scores and hence sexual function⁸; however, as compared to our series, in that Ecuadorian series an association model was not constructed. Reports indicate that depressed mood significantly correlates with poorer sexuality in pre- and postmenopausal women^{17,18,39}. Moreover, depressive scores directly correlate with higher MRS psychological scores¹⁸. Recently, assessment of sexual function among postmenopausal Spanish women found an inverse correlation between sexual function and MRS scores (total, psychological and urogenital) and depressed mood³⁹. The latter observations seem to be supported by our current findings and highlight the fact that with depression, and increased menopausal symptoms, sexual function is significantly impaired. Despite finding an association between sexual function and depressed mood, an interesting research question not answered with

the present series is: which is first, sexual impairment causing depression or the contrary? In any case, more research is warranted in this regard in the near future. In low-income series, male sexual dysfunction has been identified as a factor relating to increased menopausal symptoms³⁶ and decreased female sexual function²³. The present data seem to confirm these previous reports^{24,36}. Finally, a positive significant correlation was found between FSFI total scores and premenopausal status, and hence better sexual function. This is consistent with results found by others^{6,24}.

As for the limitations of the present study, one should mention its cross-sectional design and its sub-analytic nature in which a causal relationship cannot be established. Not assessing body mass index can also be seen as a potential limitation, moreover, if increased body composition in mid-aged women has been related to increased menopausal symptoms, depression and impaired sexuality⁴⁰⁻⁴². The studied population was that from Piura located in Northern Peru. Peru is a country with wide cultural and geographical differences observed among its regions. Thus, the present results cannot be extrapolated to any other Peruvian or Latin American region with various ethnic, cultural and economic differences.

Despite the limitations of this study, it adds data to the few correlating various measures (the MRS, BDI and FSFI) among mid-aged women in which sexual function was significantly associated with depression, in addition to hormonal status and partner sexual function.

Conflicts of interest The authors report no conflict of interest. The authors alone are responsible for the content and writing of this paper.

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References

- Ojaniatva A, Makinen J, Helenius H, Korkeila K, Sundell J, Rautava P. Sexual activity and perceived health among Finnish middle-aged women. *Health Qual Life Outcomes* 2006;4:29
- Graziottin A, Leiblum SR. Biological and psychosocial pathophysiology of female sexual dysfunction during the menopausal transition. *J Sex Med* 2005;2(Suppl 3):133-45
- Davison SL, Bell RJ, LaChina M, Holden SL, Davis SR. The relationship between self-reported sexual satisfaction and general well-being in women. *J Sex Med* 2009;6:2690-7
- Sarrel PM. Sexuality and menopause. *Obstet Gynecol* 1995;75(Suppl 4):265-305
- Dennerstein L, Alexander JL, Kotz K. The menopause and sexual functioning: a review of the population-based studies. *Annu Rev Sex Res* 2003;14:64-82
- Blümel JE, Chedraui P, Baron G, et al; Collaborative Group for Research of the Climacteric in Latin America (REDLINC). Sexual dysfunction in middle-aged women: a multicenter Latin American study using the Female Sexual Function Index. *Menopause* 2009;16:1139-48
- Freeman EW. Associations of depression with the transition to menopause. *Menopause* 2010;17:823-7
- Chedraui P, Pérez-López FR, Mezones-Holguín E, San Miguel G, Avila C. Assessing predictors of sexual function in mid-aged sexually active women. *Maturitas* 2011;68:387-90
- Maddux RE, Delrhim KK, Rapaport MH. Quality of life in geriatric patients with mood and anxiety disorders. *CNS Spectr* 2003;8(12 Suppl 3):35-47
- Andrews G, Cuijpers P, Craske MG, McEvoy P, Titov N. Computer therapy for the anxiety and depressive disorders is effective, acceptable and practical health care: a meta-analysis. *PLoS One* 2010;5:e13196
- Butler AC, Chapman JE, Forman EM, Beck AT. The empirical status of cognitive-behavioral therapy: a review of meta-analyses. *Clin Psychol Rev* 2006;26:17-31
- Clayton A, Kornstein S, Prakash A, Mallinckrodt C, Wohlreich M. Changes in sexual functioning associated with duloxetine, escitalopram, and placebo in the treatment of patients with major depressive disorder. *J Sex Med* 2007;4:917-29

13. Fournier JC, DeRubeis RJ, Hollon SD, *et al.* Antidepressant drug effects and depression severity: a patient-level meta-analysis. *JAMA* 2010;303:47–53
14. Montejo AL, Perahia DG, Spann ME, *et al.* Sexual function during long-term duloxetine treatment in patients with recurrent major depressive disorder. *J Sex Med* 2011;8:773–82
15. Hay AG, Bancroft J, Johnstone EC. Affective symptoms in women attending a menopause clinic. *Br J Psychiatry* 1994;164: 513–16
16. Yangin HB, Sozer GA, Sengun N, Kukulcu K. The relationship between depression and sexual function in menopause period. *Maturitas* 2008;61:233–7
17. Verit FF, Verit A, Billurcu N. Low sexual function and its associated risk factors in pre- and postmenopausal women without clinically significant depression. *Maturitas* 2009;64:38–42
18. Chedraui P, Pérez-López FR, Morales B, Hidalgo L. Depressive symptoms in climacteric women are related to menopausal symptom intensity and partner factors. *Climacteric* 2009;12:395–403
19. Dennerstein L, Guthrie JR, Hayes RD, DeRogatis LR, Leher P. Sexual function, dysfunction, and sexual distress in a prospective, population-based sample of mid-aged, Australian-born women. *J Sex Med* 2008;5:2291–9
20. Hayes RD, Dennerstein L, Bennett CM, Sidat M, Gurrin LC, Fairley CK. Risk factors for female sexual dysfunction in the general population: exploring factors associated with low sexual function and sexual distress. *J Sex Med* 2008;5:1681–93
21. Blumel JE, Araya H, Riquelme R, Castro G, Sanchez F, Gramegna G. [Prevalence of sexual dysfunction in climacteric women. Influence of menopause and hormone replace therapy]. *Rev Med Chil* 2002;130:1131–8
22. Soules MR, Sherman S, Parrott E, *et al.* Executive summary: Stages of Reproductive Aging Workshop (STRAW). *Climacteric* 2001;4:267–72
23. Brett KM, Chong Y. Hormone replacement therapy: knowledge and use in the United States. Hyattsville, Maryland: National Center for Health Statistics, 2001
24. Chedraui P, Pérez-López FR, San Miguel G, Avila C. Assessment of sexuality among middle-aged women using the Female Sexual Function Index. *Climacteric* 2009;12:213–21
25. Rosen R, Brown C, Heiman J, *et al.* The Female Sexual Function Index (FSFI): a multidimensional self-report instrument for the assessment of female sexual function. *J Sex Marital Ther* 2000; 26:191–208
26. Wiegel M, Meston C, Rosen R. The female sexual function index (FSFI): cross-validation and development of clinical cutoff scores. *J Sex Marital Ther* 2005;31:1–20
27. Beck AT. Internal consistencies of the original and revised BDI. *J Clin Psychol* 1984;40:1365–7
28. Heinemann LA, DoMinh T, Strelow F, Gerbsch S, Schnitker J, Schneider HP. The Menopause Rating Scale (MRS) as outcome measure for hormone treatment? A validation study. *Health Qual Life Outcomes* 2004;2:67
29. MRS. The menopause rating scale. <http://www.menopause-rating-scale.info/> Last accessed 02/12/2010
30. Rothman KJ, Greenland S, Lash TL. Design strategies to improve study accuracy. In Rothman KJ, Greenland S, Lash TL, eds. *Modern Epidemiology*, 3rd edn. Philadelphia: Lippincott Williams & Wilkins, 2008:168–82
31. Cook D, Weisberg S. *Residuals and Influence in Regression*. University of Minnesota; 1982 by Chapman & Hall. <http://www.stat.umn.edu/rit/> Last accessed 9/01/2011
32. Hamilton LC. Statistics with Stata: updated for version 10. Stata Textbook Examples. Regression with Graphics. Chapter 5: Fitting Curves. Belmont, California: Cole, 2008
33. Echeverry MC, Arango A, Castro B, Raigosa G. Study of the prevalence of female sexual dysfunction in sexually active women 18 to 40 years of age in Medellín, Colombia. *J Sex Med* 2010;7: 2663–9
34. Mezones-Holguin E, Blümel JE, Huezco M, *et al.* Impact of diabetes mellitus on the sexuality of Peruvian postmenopausal women. *Gynecol Endocrinol* 2008;24:470–4
35. Green R, Polotsky AJ, Wildman RP, *et al.* Menopausal symptoms within a Hispanic cohort: SWAN, the Study of Women's Health Across the Nation. *Climacteric* 2010;13:376–84
36. Chedraui P, Pérez-López FR, Mendoza M, *et al.* Severe menopausal symptoms in middle-aged women are associated to female and male factors. *Arch Gynecol Obstet* 2010;281:879–85
37. Pérez-López FR. Sexuality and menopause. In *La menopausia*. Madrid: Temas de Hoy, 1992:169–85
38. Avis NE, Brockwell S, Randolph JF Jr, *et al.* Longitudinal changes in sexual functioning as women transition through menopause: results from the Study of Women's Health Across the Nation (SWAN). *Menopause* 2009;16:442–52
39. Llanaez P, Fernández-Iñarrea JM, Arnott B, García-Portilla MP, Chedraui P, Pérez-López FR. Sexual function assessment in postmenopausal women with the 14-item Changes in Sexual Functioning Questionnaire. *J Sex Med* 2011;8:2144–51
40. Li C, Samsioe G, Borgfeldt C, *et al.* Menopause-related symptoms: what are the background factors? A prospective population-based cohort study of Swedish women (The Women's Health in Lund Area study). *Am J Obstet Gynecol* 2003;189: 1646–53
41. Thurston RC, Sowers MR, Sternfeld B, *et al.* Gains in body fat and vasomotor symptom reporting over the menopausal transition: the Study of Women's Health Across the Nation. *Am J Epidemiol* 2009;170:766–74
42. Fernández-Alonso AM, Cuadros JL, Chedraui P, Mendoza M, Cuadros AM, Pérez-López FR. Obesity is related to increased menopausal symptoms among Spanish women. *Menopause Int* 2010;16:105–10