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ORIGINAL PAPER

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Premenstrual dysphoric symptoms amongst Brazilian college students: factor structure and methodological appraisal

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Abstract *Objectives* The present study aims to assess the factor structure of the DSM-IV Premenstrual Dysphoric Disorder (PMDD) symptoms and its relationship with depressive symptoms. *Methods* We evaluated retrospectively PMDD symptoms in 513 female college students, through a self-reporting questionnaire based on DSM-IV criteria, in addition to the Beck Depression Inventory (BDI). Principal component analysis on PMDD symptom data was performed to assess its dimensional structure. *Results* In this non-clinical sample, the analysis indicated a higher importance of the dysphoric dimension, but physical symptoms as well as "being out of control" or "overwhelmed" should also be viewed as major symptoms of PMDD. Behavioural symptoms are of secondary importance. The mean BDI score of PMDD group was significantly higher ($p < 0.05$) than non-PMDD group. *Conclusion* The factor structure of the total sample was similar to the symptom structure suggested by DSM-IV diagnostic criteria. Depressive symptoms should be viewed as a confounding variable in PMDD.

Key words premenstrual dysphoric disorder · dysphoria · depressive symptoms · factor analysis.

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Introduction

Premenstrual syndrome (PMS) is a broad diagnostic concept first proposed by Greene and Dalton (1953) as the "presence of recurrent symptoms during the premenstrual phase or the first few days of menses, and complete absence of these symptoms in the post-menstrual phase" (p. 1007). In 1987, the American Psychiatric Association (APA) proposed the diagnostic category of late luteal phase dysphoric disorder (LLPDD) to facilitate further systematic research. Later, LLPDD was renamed as premenstrual dysphoric disorder (PMDD) in DSM-IV, with the inclusion of "being out of control" or "overwhelmed" as a secondary symptom (Hurt et al. 1992; APA 1994).

Premenstrual dysphoric disorder is a premenstrual condition defined by a combination of severe mood, behavioural, cognitive and/or somatic symptoms that repeatedly occur only in the luteal phase of the menstrual cycle. According to DSM-IV, PMDD is distinguished from most definitions of PMS in several respects: 1) it requires at least one mood symptom to be among the five necessary for diagnosis; 2) these symptoms must be severe enough to cause functional impairment, 3) they must not be an exacerbation of another disorder, and 4) the symptom changes must be documented by prospective daily records in two menstrual cycles.

Over the past decade, premenstrual symptom patterns have been extensively studied, but methodological variability has yielded conflicting results, which preclude any conclusive comparison (e. g. Yuk et al. 1990; Cumming et al. 1991; Alvir and Thys-Jacobs 1991; Allen et al. 1991; Rivera-Tovar et al. 1992; Chaturvedi et al. 1993; Condom 1993; Freeman et al. 1996; Woods et al. 1999). It is estimated that at least 75 % of women report minor or isolated premenstrual changes (Barnhart et al. 1995). Limited studies have suggested an occurrence of PMS ranging from 20 % to 50 %, and that only 3 % to 5 % of women will experience symptoms that meet PMDD criteria (APA 1994). Systematic stud-

ies on the course and stability of PMDD condition are lacking.

The construct validity of PMDD has received little attention in recent literature. There are only two factor analytic studies that have evaluated the symptom pattern of APA's criteria (de la Gandara-Martin and de Diego-Herrero 1996; Gehlert et al. 1999). The purpose of the present study is to assess the factor structure of DSM-IV PMDD symptoms in a female non-clinical sample, using a new questionnaire to tackle the potential bias that might arise in retrospective studies. The relationship between depressive symptoms and PMDD is also addressed in this study.

Methods

Subjects

The original pool included 865 Brazilian female students from the University of São Paulo in the city of São Paulo, attending courses with a high ratio of female to male students, mostly from Mathematics, Literature and Languages. Exclusion criteria were: (1) women in amenorrhea (non-menstruating, including pregnancy) and (2) menstrual cycles shorter than 25 days or longer than 35 days, or irregular menstrual cycles. Those who provided insufficient data to reach a PMDD diagnosis, even with evidence of regular menstruation, were excluded from the final analysis.

We excluded 352 women from the original sample because 16 (1.8%) of them were non-menstruating, 217 (25%) had irregular menstrual cycles, and 116 (13.4%) gave insufficient information to define PMDD diagnosis. The final sample comprised 513 fertile females, with a mean age of 23.5 years (SD = 5.5, ranging from 17 to 47). The majority (85%) of women were single, 14% of respondents were married and the remaining 1% included either separated women or widows. Most of the students (73%) also had a part-time job and 27% of them only studied. Almost one third of this sample (28%) was using oral contraceptives, and 12.2% had children.

Measures

Premenstrual Dysphoric Disorder (PMDD) symptoms were extracted from DSM-IV criteria A and listed separately as 20 individual items, in order to facilitate the understanding of those symptoms by the respondents. Item 3 was split as affective lability and sensitivity to rejection, item 4 as anger/irritability and interpersonal conflicts, item 10 as being overwhelmed and out of control, and item 11 as breast tenderness, swelling, headaches, joint pain, muscle pain, bloating and weight gain. For statistical purpose, these symptoms were merged again as original DSM-IV items. PMDD symptoms were scored literally as absent (0) or present (1). In order to detect changes between follicular and luteal phases and to avoid symptom over-reporting in the premenstrual phase, the respondent was told to indicate the menstrual cycle phase where each symptom occurred. This set of items covers the previous twelve months. To meet the diagnosis of PMDD, the respondents should have presented change in the symptom pattern from the follicular to the luteal phase, with the presence of at least 1 affective symptom among the 5 symptoms required by DSM-IV research criteria for PMDD. The change should also include a symptom-free period in the postmenstrual week. The self-reported social and interpersonal relationship impairment was mandatory for the diagnosis of PMDD.

The Beck Depression Inventory (BDI) (Beck et al. 1961) was designed to measure the severity of depressive symptoms regarding the two previous weeks. Normative and internal consistency data, as well as construct validity of the BDI in the Brazilian population were reported by Gorenstein et al. (1995, 1999). To control for the inclusion of probable cases of dysphoria and depression, we adopted the recommendation for non-clinical population in order to define those cases whose BDI scores were lower or equal to 15 as non-depressive subjects, between 16 and 20 as dysphoria, and higher than 20 as depression (Kendall et al. 1987).

Procedures

The present article is an observational cross-sectional study to describe PMDD symptoms in a non-clinical sample. In the planning phase, we designed a self-reporting retrospective questionnaire to evaluate PMDD symptoms. The pilot version was tested in 20 female students to check the suitability of the questions. To ensure the comprehension of the final version, many sentences were rephrased and some words that indicated symptom severity were underlined.

Blinding procedures were included in the questionnaire. To cancel the intention of the study, a generic introductory remark explained that the study aimed to evaluate the "physical and emotional changes related to some natural events". Questions concerning sociodemographic, gynaecologic and obstetric information were also included. The Seasonal Pattern Assessment Questionnaire (SPAQ) (Christensen et al. 2003) was included as an additional attempt to cover up the real research purpose. At the end point of the questionnaire, an open question was added to check the blindness of the probands on the research purpose. To be considered as a correct guess of the research intent, the respondents should have mentioned in their answer "menstruation", "menstrual cycle" and/or "premenstrual". Furthermore, to avoid any additional hint about the study purpose, we decided to apply the questionnaires in evening classrooms attended by both female and male students. The participants were asked to voluntarily answer a set of questions in their classrooms at the beginning of their regular classes. There was no refusal.

Statistical analysis

First, we checked the difference of symptom frequency between the PMDD group and the non-PMDD group through Pearson's chi-square test. We performed discriminant function analysis to estimate the discriminant ability of each variable. In the stepwise discriminant model we tested whether the PMDD and non-PMDD group membership could be predicted according to all individual items. To compare the effect of depressive symptoms between PMDD and non-PMDD groups, we performed a chi-square analysis according to each BDI severity stratum.

The internal consistency for the PMDD symptom scale was calculated through the alpha coefficient of Cronbach and item-total correlation. The factorability was checked through internal consistency, correlation matrix inspection, value of Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity. The total sample presented data suitable for factor analysis (KMO = 0.84; Bartlett's test $p < 0.0001$). Its factor structure was estimated from correlation matrix, using the principal component analysis (PCA), with varimax rotation and scree test for retention criterion (Johnson and Wichern 2002). Data concerning the PMDD group were unsuitable for factor analysis due to its unstable structure (KMO = 0.46; Bartlett's test $p > 0.05$). Data were analysed by the SPSS software.

Results

Symptom profile and PMDD factor structure

The estimate of provisional PMDD diagnosis was 17.9% ($n = 92$). For the total sample, 91% of the respondents were not aware of the intent of the study at the end of assessment. For the total sample, the presence of affective symptoms (1–4) and physical symptoms (11) were the most endorsed by respondents (Table 1). Although a

similar endorsement pattern could be observed across the PMDD and non-PMDD groups, PMDD respondents significantly complained of more symptoms ($p < 0.0005$) for all items. The importance of symptom 10 "sense of out of control" in 65 % of PMDD respondents stands out.

Item analysis was carried out for the raw scale. Item scale consistency was evaluated by correlating item scores with total scale score. The item-total correlation coefficient for the total sample ranged from 0.29 to 0.60. In Table 1, item-total correlations were higher (> 0.5) for affective items 4, 3, 2, and 1 (by decreasing order). In contrast, item 10, 5, 7, 6, 11, 9 and 8, correlated below 0.5 with the total scale. Only item 8, appetite change, did not reach the 0.3 level. In addition, inter-item consistency values (Cronbach's alpha coefficient) of 0.79, 0.70, and 0.48 were obtained for the total sample, non-PMDD and PMDD groups, respectively.

The discriminant function analysis considering all PMDD items showed 88 % of correct classification for non-PMDD subjects, 78.3 % for PMDD subjects and 86.3 % for the total sample. The most powerful discriminating items, with higher correlation between items and the standardised canonical discriminant function, were: 5, 10, 6, 7, 8, 3, 9, and 1, in decreasing order.

The PCA of the total sample revealed the presence of two components with eigenvalues exceeding 1.0, and Cattell's scree test also suggested extracting only two components. The two factor solution explained a total of 45.2 % of the variance, with the first factor accounting for 32.3 % and the second for an additional 12.9 % of data variability. Factor loadings greater than 0.40 were retained in a factor. To assist the interpretation of these two components, varimax rotation was performed. The rotated component matrix (Table 2) revealed the presence of a simple structure, with both components showing a number of salient loadings, and variables loaded substantially on only one of the components. On factor 1 the following items presented high loadings: 1, 2, 3, 4, 10, and 11; and items 5, 6, 7, 8, and 9 on factor 2. Four mood symptoms (depressive mood, affective lability, anxiety, and anger) as well as the physical symptoms and the sensation of "being out of control" or "being overwhelmed" were included in the first general factor. Factor 1 represented the dysphoric-somatic symptom dimension, while factor 2 contained items related more to behavioural symptoms (Table 2). Cronbach's alpha coefficients for the sub-scales based on the items related to factor 1 and 2 were 0.78 and 0.64, respectively.

In order to control for the effect of depressive symptoms, the sample was classified according to Kendall's criteria for non-clinical samples. The sample distribution according to the PMDD status and BDI score is displayed on Table 3. The mean BDI score for the total group was 11.1 (SD = 7.8). The mean BDI score of the PMDD group (mean = 14.0, SD = 9.5) was significantly higher ($p < 0.05$), when compared with the non-PMDD group (mean = 9.7, SD = 6.8). For the total sample, the non-depressive group who scored low (BDI ≤ 15) repre-

Table 2 Rotated component matrix of DSM-IV premenstrual dysphoric disorder (PMDD) symptoms for the total sample

	Total sample ($n = 513$)	
DSM-IV PMDD symptom	Dysphoric-somatic	Behavioural
1. Depressive mood	**0.71**	
2. Anxiety or tension	**0.76**	
3. Anger or irritability	**0.78**	
4. Affect lability	**0.73**	
5. Decreased interest		**0.69**
6. Concentration difficulties		**0.67**
7. Fatigability		**0.66**
8. Appetite change		**0.52**
9. Hypersomnia/insomnia		**0.55**
10. Sense of out of control	**0.53**	
11. Physical symptoms	**0.42**	
% of variance explanation*	32.3 %	12.9 %
Coefficient alpha Cronbach	0.78	0.64

The factor loadings that were lower than 0.3 were omitted for better visualisation.
* percentage of variance explanation for non-rotated solution

Table 1 Frequency of PMDD symptoms for total sample, non-PMDD and PMDD groups, Cronbach's alpha coefficient of internal consistency and item-total correlation

DSM-IV PMDD symptom	Total (%) $n = 513$	Non-PMDD (%) $n = 421$	PMDD (%) $n = 92$	Item-total correlation
1. Depressive mood	45.7	38.4	81.3*	0.50
2. Anxiety or tension	56.2	49.9	86.8*	0.51
3. Anger or irritability	56.4	48.7	92.3*	0.55
4. Affect lability	59.8	51.5	98.9*	0.60
5. Decreased interest	19.5	11.0	59.3*	0.41
6. Concentration difficulties	16.9	9.4	52.7*	0.36
7. Fatigability	18.0	11.0	50.5*	0.41
8. Appetite change	17.3	12.2	41.8*	0.29
9. Hypersomnia/insomnia	13.5	8.5	37.4*	0.33
10. Sense of out of control	26.0	17.7	64.8*	0.48
11. Physical symptoms	75.9	72.2	93.4*	0.35
Cronbach's alpha coefficient	0.79	0.70	0.48	–

* Pearson's chi-square test (df = 1, $p < 0.0005$)

Table 3 Sample distribution of depressive symptoms for the total sample, non-PMDD and PMDD group

n	Total sample (%) 513	Non-PMDD(%) 421	PMDD (%) 92*
BDI ≤ 15	385 (75 %)	333 (79.1 %)	52 (56.5 %)**
15 < BDI ≤ 20	108 (21.1 %)	76 (18.1 %)	32 (34.8 %)
BDI > 20	20 (3.9 %)	12 (2.9 %)	8 (8.7 %)
Mean BDI (SD)	11.1 (7.8)	9.7 (6.8)	14.0 (8.7)

PMDD premenstrual dysphoric disorder; *BDI* Beck Depression Inventory
* $\chi^2 = 28.94$, df = 2, p < 0.0001; ** $\chi^2 = 28.44$, df = 1, p < 0.0001

sented 75 % of the total sample; 21 % were dysphoric (15 < BDI ≤ 20); and 4 % were considered depressed (BDI > 20). According to the classification of depressive severity level on the BDI scale, the PMDD group differed significantly from the non-PMDD group ($\chi^2 = 28.94$, df = 2, $p < 0.0001$). Further examination with the depressive severity level showed the difference was more confined between the non-depressive and dysphoric level ($\chi^2 = 28.44$, df = 1, $p < 0.0001$), than between the dysphoric and depressive level ($\chi^2 = 0.5$, df = 1, $p = 0.48$). A separate analysis of BDI scores and factorial structure on this sample had been reported elsewhere (Gorenstein et al., 1999).

Discussion

Symptom profile and PMDD factor structure

More than 200 symptoms have been claimed as specific or typical of PMS (Rubinow and Roy-Byrne 1984), and there is no consensual agreement on the symptom constellation that comprises PMDD. If PMDD is a valid diagnostic category, its symptoms should accurately distinguish PMDD individuals from non-PMDD ones. Unfortunately, there is no gold standard for PMDD to compare with. Therefore, the relatively homogeneous symptoms should reliably elicit the construct of PMDD, as well as discriminate individuals with common demographic backgrounds, precipitating factors, biological and psychological test findings, course of symptoms, and family comorbidity.

The symptom profile of respondents revealed a higher frequency of affective symptoms and physical symptoms for PMDD, very similar to findings of Freeman et al. (1996). PMDD women significantly complained of more symptoms than the non-PMDD group. The item scale psychometric analysis demonstrated, through a high item-total correlation for the total sample, that the DSM-IV scale evaluated a same construct.

The discriminant function analysis of scale items demonstrated an acceptable ability of discriminating PMDD and non-PMDD groups, whereby the behavioural symptoms, sense of "out of control" as well as depressed mood emerged as the most powerful items. Gehlert et al. (1999) observed, by latent trait analysis (Rasch analysis), that the PMDD group experienced easy fatigability more severely than the non-PMDD group, while the symptoms that best distinguished the groups were irritability, anger, increased interpersonal conflicts, depressed mood and self-depreciating thoughts.

Regardless of the investigative methodology, sample characteristics or analysis techniques, all studies on premenstrual symptoms' dimensional structure invariably revealed a first general factor that included most of the four affective symptoms. For a stratified community sample ($n = 225$), de la Gándara-Martin and de Diego-Herrero (1996) extracted 2 factors from a 10-symptom retrospective questionnaire based on the DSM-III-R criteria for LLPDD. The author concluded that dysphoria (43.5 % variance explanation) was the first factor and physical exhaustion (11 %) was a secondary factor. More recently, Gehlert et al. (1999) evaluated prospectively confirmed PMDD symptoms in outpatient women ($n = 99$) recruited from a general hospital. In addition to the small sample size, there was possible over-factoring, by extracting five factors and affecting its interpretation. Indeed, their first factor was defined as anger/irritability, and contained most of the affective symptoms. Notwithstanding, the inclusion of the symptom of sense of being "out of control" or "overwhelmed" in their first factor is also observed in our study, suggesting a greater importance of this item. We did not find any study that evaluated these symptoms specifically in PMDD women. However, some symptoms that would be correlated such as anger, irritability, tension, and nervousness were suggested as core elements of premenstrual phase, irrespective of the presence of depressed mood (Angst et al. 2001; Hartlage and Arduino 2002). Landen and Eriksson (2003) stated that PMDD could be a distinct diagnostic entity, where irritability and affect lability rather than depressed mood and anxiety would be its most characteristic features.

The present study provided the factor structure for PMDD symptoms in young college women. The results obtained suggest that symptoms as "sense of out of control" and physical symptoms should also be viewed together with affective symptoms as main symptoms of PMDD.

Depressive symptoms in PMDD

Women with other concomitant psychiatric disorders could also be inflating the group of PMDD women. The transient mood changes (e. g. depression, anxiety, dysthymia) that many females experience around the time of their period may be viewed as a confounding variable, since it is an extraneous factor provoking a mixing effect in the PMDD symptom profile.

Previous studies reported mean BDI scores for women with PMS ranging from 11.7 to 16.9 in the luteal phase (Stout and Steege 1986; Mortola et al. 1989; Keenan et al. 1992; Christensen and Oei 1995; Morgan

et al. 1996). Most of these studies evaluated treatment-seeking women with premenstrual symptoms, showing significant differences between the follicular and luteal phases on BDI scores. The scores of our sample are comparable with the studies quoted above.

In the present study, 75 % of the sample was classified as non-depressive (BDI ≤ 15). Although the PMDD group had significantly higher mean BDI scores ($p < 0.05$) when compared with the non-PMDD group, this difference was observed only for low BDI score stratum. This finding could reflect the diagnostic criteria adopted for PMDD, since depressive symptoms are one of the main symptoms required for its diagnosis. Given that this difference disappeared for dysphoric and depressive levels, the intensity of depressive symptoms unlikely might have affected the diagnosis of PMDD (Table 3).

Another explanation for the observed BDI scores could be the construct difference underlying measures tools. The construct evaluated by BDI (Beck and Steer 1984) is more representative of depression cognitive dimension and could be different from the one assessed by our questionnaire.

Some recent findings also suggested that depressive and anxious moods would be less relevant components in core PMDD sufferers' complaints. For a well-defined longitudinal community-based sample, Angst et al. (2001) found that irritability and tension may form the core components of perimenstrual symptom syndrome, irrespective of the presence of depressed or anxious mood. Hartlage and Arduino (2002) also observed that depressed mood was less frequent than irritability or anger in the luteal phase when other psychiatric disorders such as major depression were taken into account. Two twin-based studies showed that genetic and environmental risk factors for lifetime major depression contributed only modestly to the aetiology of premenstrual syndrome (Kendler et al. 1998; Treloar et al. 2002).

Limitations

One major limitation of our tool was the menstrual cycle phase at the time of response, which was not controlled for, generating a potential bias – e. g. BDI scores of PMDD women collected at the follicular phase might be lower. Exclusion of women with affective disorders also would be necessary to control the effect of depressive symptoms in PMDD. However, our data suggest that depressive symptoms should be viewed as a confounding variable in PMDD.

Our final sample is a representative random sample of fertile women attending a university, selected after sequential exclusion. This non-clinical sample may not be representative of the general population. Moreover, a participation bias of non-cooperative respondents ($n = 116$ or 12 %) by returning incomplete questionnaires could also emerge in our study, due to the chance of excluding a sizeable number of potential PMDD participants. However, after controlling for their sociodemographic variables (t test and chi-square), we did not observe any significant difference between this group and the selected sample.

The potential of bias in retrospective self-report studies is enormous, because the investigators may tend to select a participant with a specific symptom pattern and rely on the participant's memory to recall the past event. Women with a particular event, as PMDD, are likely to remember their experiences differently from those who are not similarly affected. In a retrospective design of PMDD, women are more likely to recall the worst episode in the past. Recording PMDD symptoms by retrospective techniques might select a broader group of women with a specific symptom pattern. Indeed, Hart et al. (1987) showed that retrospective data were better than prospective ones to predict premenstrual symptoms in a longitudinal follow-up.

The knowledge of the research intent also would induce biased answers (Rivera-Tovar et al. 1992; Freeman et al. 1996), regardless of the investigative methodology (retrospective or prospective design) (Tucker and Whalen 1991). To prevent recall bias to emerge in our study, our blinding strategies combined distorting the intention of research in the introductory remark, including a new discordant questionnaire (SPAQ) to disguise the actual purpose, and applying the questionnaire in a classroom attended by students of both genders. In fact, our effort could successfully prevent the participants from guessing the intent in 91 %, minimising the possibility of recall bias in our selected sample.

Our questionnaire may have overestimated PMDD frequency. However, the rigorous application of the full APA prospective criteria for PMDD is difficult for large samples and, to some extent, in clinical settings (Steiner et al. 2003), justifying the development of screening tools for premenstrual symptoms.

Conclusions

Premenstrual dysphoric disorder is a controversial diagnostic concept that may co-occur frequently with depressive, behavioural and somatic symptoms. In spite of the large sample size, our sample is not representative of the general population; therefore a definite conclusion should not be made. Our factor analysis reflects retrospectively self-reported premenstrual symptom structure in a non-clinical population. Although our results were similar to DSM-IV research criteria structure, further improvement should include sense of being overwhelmed or out of control as main symptoms of PMDD.

Methodological difficulties of PMDD research, like prospective vs. retrospective design, contain many inescapable bias-prone pitfalls. Retrospective methods of PMDD research should be considered as a useful technique to screen PMDD women (Steiner et al. 2003). Our retrospectively self-reported tool needs to be evaluated in its specificity and sensitivity as a screening tool. Con-

structing bias-free strategies in PMDD research, like our new questionnaire, can improve methodological validity of clinical investigations, by avoiding potential bias to arise.

Studies comparing symptom patterns of women with and without prospectively confirmed PMDD, as well as samples recruited from the community, student or clinical settings, will bring out many illuminating explanations for inconsistencies observed in previous investigations. Ethnic similarities and differences of premenstrual symptom patterns are also another area of interest, given different ethnic and cultural backgrounds may need different diagnostic criteria thresholds. The differential severity of depressive symptoms among PMDD women should deserve further studies, because of the possible clinical heterogeneity of this condition.

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References

1. Allen SS, McBride CM, Pirie PL (1991) The shortened premenstrual assessment form. J Reprod Medicine 38(11):769–772
2. Alvir JM, Thys-Jacobs S (1991) Premenstrual and menstrual symptom clusters and response to calcium treatment. Psychopharmacol Bull 27(2):145–148
3. American Psychiatric Association (1994) Diagnostic and statistical manual of mental disorder, fourth edition, appendix B, Washington DC, American Psychiatry Press
4. Angst J, Sellaro R, Stolar M, Merikangas KR, Endicott J (2001) The epidemiology of perimenstrual psychological symptoms. Acta Psychiatr Scand 104:110–116
5. Barnhart KT, Freeman EW, Sondheimer SJ (1995) A clinician guide to the premenstrual syndrome. Med Clin North Am 79: 1457–1472
6. Beck AT, Ward CH, Mendelsson M, Mock J, Erbaugh J (1961) An inventory to measure depression. Arch Gen Psychiatry 4:561–571
7. Beck AT, Steer RA (1984) Internal consistencies of the original and revised Beck Depression Inventory. J Clin Psychol 40: 1365–1367
8. Chaturvedi SK, Chandra PS, Issac MK, Sudarshan CY, Beena MB, Sarmukkadam SB, Rao S, Kaliaperumal VG (1993) Premenstrual experiences: the four profiles and factorial patterns. J Psychosom Obstet Gynaecol 14:223–235
9. Christensen AP, Oei TPS (1995) Correlates of premenstrual dysphoria in help-seeking women. J Affect Dis 33:47–55
10. Christensen EM, Larsen JK, Gjerris A (2003) The stability of the Seasonal Pattern Assessment Questionnaire score index over time and the validity compared to classification according to DSM-III-RJ Affect Disord 74:167–172
11. Condom JT (1993) Investigation of the reliability and factor structure of a questionnaire for assessment of the premenstrual syndrome. J Psychosom Res 37(5):543–551
12. Cumming DC, Cumming CE, Krausher RJ, Fox EE (1991) Towards a definition of PMS.II: a factor analytic evaluation of premenstrual change in women with symptomatic premenstrual change. J Psychosom Res 35(6):713–720
13. De la Gándara-Martín JJ, de Diego-Herrero E (1996) Transtorno disfórico premenstrual: un estudio epidemiológico. Actas Luso-Esp Neurol Psiq 24:111–117
14. Freeman EW, DeRubeis RJ, Rickels K (1996) Reliability and validity of daily diary for premenstrual syndrome. Psychiatr Res 65:97–106
15. Gehlert S, Chang CH, Hartlage S (1999) Symptom patterns of premenstrual dysphoric disorder as defined in the Diagnostic and Statistical Manual of Mental Disorders-IV. J Women Health 8:75–85
16. Gorenstein C, Andrade L, Vieira Filho AHG, Tung TC, Artes R (1999) Psychometric properties of the Portuguese version of the Beck Depression Inventory on Brazilian college students. J Clin Psychol 55:553–562
17. Gorenstein C, Pompéia S, Andrade L (1995) Scores of Brazilian university students on the Beck Depression and the State-trait Anxiety Inventories. Psychol Rep 77:635–641
18. Greene R, Dalton K (1953) The premenstrual syndrome. Br Med J 1:1007–1014
19. Hart WG, Coleman GJ, Russel JW (1987) Assessment of premenstrual symptomatology: a re-evaluation of the predictive validity of self-report. J Psychosom Res 30:185–190
20. Hartlage SA, Arduino KE (2002) Toward the content validity of premenstrual dysphoric disorder: do anger and irritability more than depressed mood represent treatment-seekers' experiences? Psychol Rep 90:189–202
21. Hurt SW, Schnurr PP, Severino SK, Freeman EW, Gise LH, Rivera-Tovar A, Steege JF (1992) Late luteal phase dysphoric disorder in 670 women evaluated for premenstrual complaints. Am J Psychiatry 149:525–530
22. Johnson RA, Wichern DW (2002) Applied Multivariate Statistical Analysis. 5th ed., Upper Saddle River, NJ, Prentice Hall
23. Keenan PA, Lindamer LA, Jong SKK (1992) Psychological aspects of premenstrual syndrome. II: utility of standardized measures. Psychoneuroendocrinology 17:189–194
24. Kendall PC, Hollon SD, Beck AT, Hammen CL, Ingram RE (1987) Issues and recommendations regarding use of the Beck Depression Inventory. Cogn Ther Res 11:289–299
25. Kendler KS, Karkowski LM, Corey LA, Neale MC (1998) Longitudinal population-based twin study of retrospectively reported premenstrual symptoms and lifetime major depression. Am J Psychiatry 155:1234–1240
26. Landen M, Eriksson E (2003) How does premenstrual dysphoric disorder relate to depression and anxiety disorders? Depress Anxiety 17(3):122–129
27. Morgan M, Rapkin AJ, D'Eliam L, Reading A, Goldman L (1996) Cognitive function in premenstrual syndrome. Obstet Gynecol 88:961–966
28. Mortola JF, Girton L, Yen SC (1989) Depressive episodes in premenstrual syndrome. Am J Obstet Gynecol 161:1682–1687
29. Rivera-Tovar AD, Pilkonis P, Frank E (1992) Symptom patterns in late luteal-phase dysphoric disorder. J Psychopathol Psychol Assess 34:189–199
30. Rubinow DR, Roy-Byrne P (1984) Premenstrual syndromes: overview from a methodological perspective. Am J Psychiatry 141:163–172
31. Steiner M, MacDougall M, Brown E (2003) The premenstrual symptoms screening tool (PSST) for clinicians. Arch Women Ment Health 6:203–209
32. Stout AL, Steege JF (1985) Psychological assessment of women seeking treatment for premenstrual syndrome. J Psychosom Res 6:621–629
33. Treloar SA, Heath AC, Martin NG (2002) Genetic and environmental influences on premenstrual symptoms in an Australian twin sample. Psychol Med 32:25–38
34. Tucker JS, Whalen RE (1991) Premenstrual syndrome. Int J Psychiatr Med 21:311–314
35. Woods NF, Mitchell ES, Lentz M (1999) Premenstrual symptoms: delineating symptom clusters. J Women Health Gend Med 8: 1053–1062
36. Yuk VJ, Jugdutt AV, Cumming CE, Fox EE, Cumming DC (1990) Towards a definition of PMS: analytic evaluation of premenstrual change in non-complaining women. J Psychosom Res 34: 439–446