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Severity of Premenstrual Syndrome in a Sample of Nigerian Females

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ABSTRACT: *The objective is to investigate and describe premenstrual syndrome severity (PMS) in a sample of Nigerian females and to explore the validity of an existing shortened premenstrual assessment form. A consecutive sample of 461 females was recruited to fill a daily premenstrual syndrome diary for 3 consecutive menstrual cycles. On the basis of these diaries, a physician made or ruled out a diagnosis of premenstrual syndrome. Those with premenstrual syndrome then filled a shortened premenstrual assessment form that employed a Likert-type scale. Data were used to calculate scores on a scale that ranged from 10 to 60. Descriptive statistics on the sample characteristics including means and standard deviation for questionnaire items were also computed. Varimax rotation with Kaiser normalization was employed in principal factor analysis. Student's t-test and one –way ANOVA were used for inferential statistics. The reliability of the shortened premenstrual assessment form was determined to be 0.769. The pain component contributed more to the severity of premenstrual syndrome ($p<0.0001$, $F = 36.030$). The severity of premenstrual syndrome in more than half of the subjects (84.6%) was either very mild or mild. Only 3% had severe premenstrual symptoms. Age was associated with premenstrual syndrome ($p = 0.035$, $F = 2.927$), while body mass index and monthly allowance of subjects were associated only with symptoms of affect.*
The pain symptoms were the most severe component of PMS in the sample studied. Majority of the participants had very mild/mild PMS. We further confirm the validity of the shortened premenstrual assessment form in a Nigerian setting.

Key words: premenstrual syndrome, female students, symptoms, severity, Nigeria

Introduction

Many women experience menses associated problems such as premenstrual syndrome (PMS).[1] PMS is characterized by cyclic changes, in the luteal phase of the menstrual cycle, in somatic, psychological and behavioral symptoms which remit upon onset or immediately after menstruation.[2,3] More than 100 symptoms of PMS have been described.[3] The common somatic or physical symptoms associated with PMS include weight gain, breast tenderness, abdominal bloating and headache. Affective symptoms include mood swing, irritability, confusion and feeling unable to cope with ordinary daily demands. In some women, the changes may be so severe as to interfere with normal activities and is referred to as premenstrual dysphoric disorder. Severe PMS is more common in women with young children and those aged 30 to 40 years.[4]

The cause of PMS is unknown though many potential etiologies have been discussed in the literatures. Hormonal causes that have been proposed include: decreased or increased circulating levels of progesterone, excessive estrogen, or the presence of an imbalance between circulating estrogen and progesterone.[5] This seems logical because PMS symptoms are temporally related to the menstrual cycle. However, previous studies did not find any difference in the levels of these two hormones in PMS and asymptomatic control patients. Furthermore, neither did the timing nor symptoms' severity correlate with changes in hormone levels in individual patients.[6,7] Though prolactin has been suspected to be responsible for breast tenderness, one of the symptoms of PMS, bromocriptine has not been consistent in producing relief.[8,9] Low zinc and copper concentrations,[10] abnormal serotonin function,[11] deficiency in some nutrients such as calcium, magnesium, manganese, vitamins E, and B,[2] have also been proposed as possible etiological factors. Adequate trials have not been able to establish any one of the many proposed biological mechanisms as a single cause of PMS, thus indicating a multi-causal origin.[12]

A diagnostic test for PMS does not exist. Consequently, the diagnosis is usually made on the basis of a patient-completed daily symptom calendar or diary and the exclusion of other medical disorders. Hormonal contraceptive side effects , dysmenorrhea, premenstrual exacerbation of affective disorder, substance abuse, eating disorders, chronic fatigue syndrome, endometriosis, diabetes and thyroid disorders could mimic some PMS symptoms and are commonly possible sources of confusion during diagnosis.[3,13,14] The use of rating instruments is also key to the diagnosis of PMS, because it is well known that the use of retrospective histories alone lead to overdiagnosis.[1,15] Specifically, more than 75% of patients presenting with the complaint of PMS had another condition that either could account for their symptom or that required correction before an accurate diagnosis of PMS could be made.[13]

PMS research has been impeded by the lack of reliable and valid assessment techniques. An instrument, the shortened premenstrual assessment form (SPAF), that accurately reflects the severity of specific PMS features and is practical in terms of administration has been developed.[16] The instrument has 10 items or PMS symptoms that most frequently change during the week prior to menses. Summation of the severity scores of the individual items on the SPAF for a subject constitutes the PMS severity score. Thus, the range of the PMS severity scale is 10 to 60. The validity and reliability of the SPAF have been tested with white women in the context of a large smoking-cessation trial. This instrument is able to discriminate between nicotine withdrawal and PMS symptoms hence may be appropriate in studies where subjects are required to avoid stimulants such as coffee and alcohol which may confuse PMS diagnosis.[16] A survey of British women who reported premenstrual symptoms showed that 11% of them felt that medical professionals lack understanding in the area.[17] Most of the reports in professional literatures on PMS are based on works done in developed countries. It will be of interest to investigate the severity of PMS in a sample of females residing in Africa. The results may provide data for comparing PMS symptoms in black African females with women from other cultures, and could possibly form a basis for treatment decisions/modification in this group.
This article reports the first part of a study designed to evaluate the effectiveness of self-medication in PMS patients with the aid of the SPAF. It is therefore important to have a baseline assessment of PMS severity in recruited participants in the absence of any form of treatment.

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Hence, the objectives of this study were to investigate and describe the severity of PMS symptoms in a sample of Nigerian females (diagnosed with PMS) in the absence of therapy, and to generate data to further evaluate the validity of the SPAF developed by Allen et al.[16]

Materials and Methods

Setting

The study was undertaken at the Ugbowo campus of the University of Benin located in Benin City, an urban area with a population of over one million people, in the southern part of Nigeria. Apart from a faculty of pharmacy and a college of medicine, there are 7 faculties and several schools and institutes. On admission into the university, students are required to register at the university's health center from where patients may be referred to the nearby teaching hospital if the need arises. The university has over 36,000 students enrolled in all programs.

Subjects

A consecutive sample of 461 nulliparous female students residing in the university hostels was recruited for this study. The inclusion criteria were that the subjects must have experienced on a regular basis both somatic and psychological symptoms which occur in the luteal phase of the menstrual cycle, peak before menses, remit during or after the onset of menses, with a symptom-free period before ovulation every month. Subjects were requested to avoid chocolate, coffee, alcohol, and medications; and were to see the physician involved in this study should they become ill. As a result, those who reported, during the initial interview, use of medications, oral contraceptives, intrauterine device, coffee, and alcohol were therefore excluded. The basis for exclusion was to eliminate the confusion that these substances may have on the diagnosis of PMS by the physician.[3] Also excluded were those subjects who reported absence of regular menses, and those that the physician thought had conditions (anemia, dysmenorrhea, anorexia, and diabetes) whose symptoms could mimic those of PMS.

Procedures

Each of the recruited subjects was given an appointment by the physician for a preliminary screening. Where necessary, a confirmation of medical conditions was done from the case notes in the medical center. The 461 subjects that met the inclusion criteria were taught how to fill a diary of PMS symptoms. The diaries were designed such that a page represents a day. PMS symptoms consistent with those identified from literature[2-4,17,19] were printed on the left column with each symptom having its own row. Subjects were to write 'no change', 'mild', 'moderate' or 'severe' change on each row against each symptom that she experienced on each day of the study starting from the first day of her menstrual cycle. Subjects were also instructed to asterisk the upper right hand corner of the pages that represent the days on which they experienced limitation in the performance of their normal daily chores. Though the days of menstruation of the first registered cycle did not provide any premenstrual information (which can only appear in the next luteal phase), it provided a baseline for the physician to base his diagnosis. It also served as a training period for subjects to get used to the routine of filling a daily register of symptoms. An effort was made to visit subjects every two weeks by one of the authors to encourage adherence to the study protocol. Each participant presented her diary for inspection at the end of each menstrual cycle for 3 consecutive cycles. The diagnostic criteria adopted by the participating physician was that of the American College of Obstetricians and Gynecologists(ACOG):[18,19] the subjects must have reported one or more somatic or affective symptom during the 5 days before menses, relief of the symptoms within 4 days of the onset of menses without recurrence until at least cycle day 13. Also applied in this study was the presence of symptoms in the absence of medication, oral contraceptive, coffee, and alcohol use; reproducible occurrence of symptoms in the 3 cycles of prospective recording, and an identifiable dysfunction in social performance or seeking medical attention for a somatic symptom.[14, 19] On this basis, a diagnosis of PMS was either made or ruled out. Those with PMS were then requested to fill the SPAF the week before their next menses in order to capture the changes which they experienced during the week before the menses.

The SPAF was presented such that the first section was to collect sociodemographic data (age, weight, height, and monthly allowance). Subjects who did not report a regular source of monthly allowance or have more than one source such that their income can not be determined were grouped together and identified under income as "not fixed". The second section of the SPAF had 10 items which represent PMS symptoms that were reported most frequently to change during the week before menses.[16] Subjects were to rate the severity of the change that occurred for each of the symptoms (items) experienced during the week before menses on a six point scale. The response scale (that described the severity of the change) was anchored as follows: 1 = not present at all or no change, 2 = very mild, 3 = mild, 4 = moderate, 5 = severe and 6 = very severe. Consequently, higher summated scores indicated more severe PMS.

Data Analysis

The retrieved questionnaires were coded, entered into Microsoft Excel and crosschecked for accuracy before sorting after the calculation of body mass index (BMI) for all subjects; and loaded into SPSS version 11.0 (SPSS Inc. Chicago, IL) for descriptive statistics, calculations of means, factor loading and Cronbach's alpha. A likert-type summation of scores was employed.

The internal consistency of the SPAF was explored via computation of Cronbach's alpha. Principal component analysis employed Varimax rotation with Kaiser Normalization and list-wise deletion of missing data. None of the items had a factor loading less than 0.4 hence all items were included in summary scores.

The range of the PMS severity scale was 10 to 60. This method of summation was also adopted by the developers of the instrument.[16] Summation of the severity scores of the individual items for a subject constituted the PMS severity score which was used as a basis for the description of the severity of symptoms as either 'not present' or 'very mild' to 'very severe'. This interpretation was based on the following: 10-14 = not present, 15-24 = very mild, 25-34 = mild, 35-44 =moderate, 45-54 = severe, and 55-60 = very severe. The logical basis for this grouping is based on the fact that research has shown that the PAF from which the SPAF was scientifically derived[16] is useful in differentiating clinical populations from control samples.[20] Absence of change in a symptom's severity was assigned a score of 1 while a score of 2 represents 'very mild' change. On the SPAF; subjects who did not experience change in any of the 10 symptoms on the SPAF could only accumulate a maximum summated severity score of 10 (that is absence of PMS) and those with very mild PMS can accumulate 20 assuming that all symptoms were present with similar intensity. A psychometric instrument is like a ruler used in measuring the distance between two points, hence the SPAF should be able to discriminate between subjects that have different degrees of PMS symptoms. In other words; the SPAF enabled data measurement at interval level suited for quantitative analysis. The other groupings were similarly graduated with equal intervals to give a basis for comparison of subjects' symptoms' severity. Therefore, those whose PMS severity scores were ≤ 14 were not included in the final data analysis since they were identified on the basis of the above grouping not to have PMS. Percentage frequency distribution based on the described PMS severity was also computed. Possible associations between sociodemographic variables and the severity of PMS were explored using student t-test or One-Way ANOVA, as appropriate, with the aid of GraphPad InStat version 3.06 (GraphPad Software Inc. USA) which reports exact p-values, and $p \leq 0.05$ were interpreted as significant.

Results

Of the 670 female students approached, 533 agreed to be screened for possible inclusion in the study. Four hundred and sixty-one (461) subjects were found eligible to participate, of which 47 dropped out before completion of the study. Reasons for nonparticipation included lack of time and or interest, pregnancy, and absence from the university for work site experience in a different city before completion of the investigation. Thus only 414 females completed the study giving a response rate of 61.8%. Following a review of the diaries and necessary clarifications, the physician diagnosed PMS in 235 subjects who then filled the SPAF. The responses of 59 of these females were eliminated from the final analysis because their PMS severity scores based on the SPAF were ≤14. Thus data presented was for 176 subjects. Therefore, the crude prevalence of PMS from this study based on the use of a daily register of symptoms was found to be 56.8% (235/414) of which only 74.9% (176/235) were confirmed to have PMS by the SPAF.

The mean menstrual cycle of this sample was 28 days with a range of 22 to31 days. Characteristics of the subjects studied are presented in Table 1. The mean age was 23.2 ± 3.9 years while the BMI had a range of 12.4 to 43.9kg/m^2. The instruments' reliability as determined by Cronbach's alpha was found to be 0.762 for the 10 PMS symptoms. Cronbach's alpha for the subscales were: affect = 0.769, water retention = 0.581 and pain = 0.601.This implies high reliability. None of the items had factor loading below 0.4. Factor loading ranged from 0.435 to 0.878 as shown in Table 2. Half of the total variance obtained was accounted for by 2 of the 10 items on the instrument. The first and second factors yielded 37.1% and 15.2% respectively. Three of the items were extracted in components different from that obtained from the original SPAF. However, the items in the components as presented by Allen et al who developed the SPAF were retained.Principal component analysis extracted three subscales. Component 1 consisting of four items was identified as 'affective' while components 2 and 3 had three items each and were identified as 'water retention' and 'pain' respectively. The affective component had a mean PMS severity score of 2.49 ± 1.41. The lowest severity score of 1.99 ± 1.27 was for the water retention component while the pain component had the highest PMS severity mean score of 3.23 ± 1.45. The total mean severity scores were significantly different among the three components extracted ($p<0.0001$, $F = 36.030$).

Presented in Table 3 is the frequency distribution of the groupings of the subjects based on PMS severity. Only about 3% of the females had severe PMS. None was classified as very severe. A majority of the subjects (84.6%) had either very mild or mild PMS. The rest had PMS of moderate severity. For those with very mild/mild PMS, the contribution of the pain component to PMS severity was significantly different from that of affect ($p<0.0001$, $t = 5.081$). No difference existed between the contributions of the pain and affective components ($p = 0.829$, $t = 0.217$) to the severity of PMS for subjects that have moderate to severe PMS.

An assessment of the influence of sociodemographic factors of subjects on the mean PMS severity scores was carried out as shown in Table 4. The severity of PMS was only significantly associated with age ($p = 0.035$, $F = 2.927$). Body mass index ($p = 0.048$, $F = 3.084$) and monthly income ($p = 0.005$, $F = 4.439$) were significantly associated with the severity of affective symptoms. Only income was associated with symptoms that bother on water retention ($p = 0.045$, $F = 2.74$).

Table 1: Characteristics of subjects (N = 176)

Variable	mean ± SD	range
Age (years)	23.2 ± 3.9	16 – 35
Weight (kg)	60.7 ± 9.2	40 – 85
Height (m)	1.6 ± 0.1	1.4 – 2.0
Body mass index (kg/m^2)	24.6 ± 3.8	12.4 – 43.9

Table 2: Component distribution of PMS symptoms and their mean severity scores (N = 176)

Items	Factor loading	Mean severity score ± SD
Component 1: affect		
Unable to cope or overwhelmed by ordinary demands(1)	0.713	1.98 ± 1.28
Feel under stress(2)	0.749	2.98 ± 1.33
Outburst of irritability or bad temper(3)	0.703	2.63 ± 1.52
Feeling sad or blue(4)	0.804	2.28 ± 1.49
Subscale total mean severity score		2.49 ± 1.41
Component 2: water retention		
Weight gain(5)	0.742	2.31 ± 1.49
Edema, swelling, puffiness or water retention(6)	0.878	1.67 ± 1.12
Feel bloated(7)	0.869	1.99 ± 1.19
Subscale total mean severity score		1.99 ± 1.27
Component 3: pain		
Pain, tenderness, enlargement or swelling of breasts(8)	0.814	3.34 ± 1.39
Backaches, joint or muscle pains or stiffness(9)	0.439	3.50 ± 1.31
relatively steady abdominal heaviness, discomfort or pain(10)	0.749	2.84 ± 1.65
Subscale total mean score		3.23 ± 1.45

Table 3: Frequency distribution of PMS severity and their mean scores

Variable	number reporting	component mean severity score** affect	water retention	pain	mean total severity score**
Age (yrs)					
<20	35	2.98 ± 1.14	1.99 ± 0.82	3.95 ± 0.88	2.97 ± 0.95
20 – 24	80	2.85 ± 1.09	1.99 ± 1.00	3.32 ± 0.92	2.72 ± 1.00
25 – 29	51	2.25 ± 1.00	1.88 ± 0.95	3.00 ± 0.79	2.38 ± 0.91
≥30	10	2.20 ± 1.20	1.87 ± 1.19	3.20 ± 0.77	2.42 ± 1.05
F		4.894	0.179	8.459	2.927
P-value		0.003‡	0.912	<0.0001‡	0.035†
Body mass index (kg/m^2)					
<18.5	14	2.38 ± 1.05	1.50 ± 0.58	2.92 ± 0.42	2.30 ± 0.68
18.5 – 24.9	99	2.58 ± 1.19	1.97 ± 1.00	3.16 ± 0.88	2.57 ± 1.02
25.0 – 29.9	63	2.15 ± 0.87	1.80 ± 0.90	3.10 ± 0.87	2.35 ± 0.88
F		3.084	1.822	0.514	1.276
P-value		0.048†	0.165	0.599	0.282
Monthly allowance (Naira)*					
<2,500	45	2.26 ± 0.91	1.82 ± 0.87	3.08 ± 0.63	2.39 ± 0.80
2,500-4,500	30	1.97 ± 1.50	1.40 ± 0.98	2.91 ± 1.55	2.09 ± 1.19
>4,500	26	3.09 ± 1.42	1.76 ± 0.75	2.94 ± 1.03	2.60 ± 1.07
Not fixed	75	2.42 ± 1.11	1.98 ± 1.02	3.18 ± 0.93	2.53 ± 1.02
F		4.439	2.742	0.684	1.653
P-value		0.005‡	0.045†	0.563	0.179

*165 Naira = US$1. †Significant at $p \leq 0.05$ ‡Significant at $p \leq 0.01$
**Values are Mean ± SD

Table 4: Socio-demographic variables and components' mean severity scores

Description of PMS severity	Frequency (%) (N = 176)	Total mean severity score**	Components' severity scores** Affect	Water retention	Pain	F	P-value
Very mild	106(60.2)	19.53±11.18	17.41±7.86	14.23±5.42	27.65±12.52	63.083	<0.0001*
Mild	43(24.4)	28.95±15.24	29.42±13.01	23.61±11.78	33.49±14.79	6.038	0.0031*
Moderate	22(12.5)	37.96±17.03	41.71±14.06	29.09±13.38	41.82±13.18	6.422	0.0029*
Severe	5(2.8)	48.67±11.26	50.83±12.53	42.22±10.27	52.22±10.89	1.155	0.3477

*Significant at p<0.01 **Values are expressed in Mean ± SD

Discussion

Prevalence of PMS among female students in this report is comparable to previous studies that put the prevalence at between 40 to 95%.[3, 21, 24, 25] While the use of the SPAF can possibly provide an easy to use tool for the diagnosis and subsequent treatment monitoring of PMS patients in clinical practice, one of the purposes of this study was restricted to the investigation of PMS severity in diagnosed subjects. Diagnosis was performed with the aid of a diary of symptoms. The value of a register of symptoms is conditioned on the specific diagnostic criteria, as validated and accepted by the relevant medical discipline. In the case of PMS there are no such criteria available, just suggestions, indications and proposals.[26] The more than 30 symptoms' registers available for PMS does not necessarily result in a reliable basis for diagnosis.[27] Hence it was not surprising that despite the strict exclusion criteria that was employed, the SPAF identified 25.1% (59/235) of the subjects diagnosed by the physician as not having PMS. This seems to provide further evidence that PMS is overdiagnosed.[1,13] The severity of symptoms of a greater proportion of the subjects was either very mild or mild which is in agreement with the fact that PMS is a minor problem for most women.[10,23]

The most severe cluster of PMS symptoms was the pain component of which item #9 was found to be most severe. Weight gain is the most severe symptom amongst the items extracted in component 2 (water retention) while 'feeling under stress' contributed the most to the severity of the affect component. Though results of the Cronbach's alpha calculated for the SPAF and its subscales showed high internal consistency and reliability comparable to that obtained by the developers of the instrument,[16] three of the items were loaded in components that were different from that in which they were presented in the original instrument. Items #5 and #10 were both loaded in the first component while item #1 was loaded in the third component. This indicates that principal factor analysis of PMS symptoms (items) should be reinforced with intuitive grouping.

It appears that the pain component contributed the most to PMS severity while water retention consistently had the lowest influence. It is logical to assume that analgesics will be useful in those with very mild/mild PMS because the pain component contributed more to PMS severity. However, this was not the case for those with severe PMS where there was no significant difference between the three extracted components. Since psychological symptoms have been linked to pain,[24] it was therefore not surprising to observe that those with higher PMS pain severity have a higher PMS affect severity; such that no difference was detected between the pain and affect components for subjects that have moderate to severe PMS. This seems to

imply that in the management of moderate or severe PMS, antidepressants and anti-anxiety medications have a potential role in ameliorating symptoms. Results of several studies on the management of PMS appear to support this.[1, 14]

About 3% of the subjects studied had severe PMS. This is consistent with several studies done elsewhere that reported a prevalence of 3 to 13%.[2, 4, 25] It has been reported that PMS severity is greater in those who are 16 to 18 years old.[23] This supports our finding that PMS severity is greatest in those less than 20 years. In general, those less than 24 years appear to have more severe symptoms. An association between weight and severity of low abdominal pain has been documented.[21] With the aid of the SPAF, an American study that investigated the relationship between BMI and PMS concluded that a strong relationship exists.[28] In this study, an association was found between BMI and the severity of affective symptoms only. Those with normal BMI appear to have more severe symptoms of affect, compared to those who are either under weight or over weight. Monthly allowance had a relationship with the severity scores of the affect, and water retention components. It seems that subjects with the highest income are more likely to experience severe symptoms of affect while those whose monthly allowance are 'not fixed' are more prone to have more severe symptoms of water retention. Whether these relationships are due to stress, hormonal and or dietary variations are open for further investigation.

Conclusion

Pain symptoms are the most significant clusters of PMS symptoms in the sample studied.

Majority of the subjects (about 85%) had very mild/mild PMS while only about 3% had severe PMS. It appears that PMS is prone to over diagnosis. Symptoms' severity is associated with age. While only symptoms of affect have a relationship with BMI and monthly allowance. The later is also associated with symptoms of water retention. We further confirm the validity of the SPAF developed by Allen et al in a Nigerian setting.

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