

The Zurich Study

XIX. Patterns of menstrual disturbances in the community: results of the Zurich Cohort Study

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Received January 8, 1992

Summary. This paper reports on the prevalence of emotional and somatic symptoms of the pre- and peri-menstrual phases of the female reproductive cycle among women who participated in a 10-year prospective epidemiologic cohort study of young adults in Zurich, Switzerland. The association between menstrual syndrome and sociodemographic features, personal habits, and psychopathology is investigated. The findings confirm those of previous studies, which have shown that symptoms of menstrual syndrome are quite common in non-clinical samples in the community, and increase with age. Women with menstrual problems could be distinguished from other women in a number of domains, including demographic characteristics such as nulliparity, higher educational level, distressing life events, lack of oral contraceptive use, psychiatric disorders, and personality traits. The combined evidence for a strong association between menstrual syndrome and anxiety, both in the subjects and their relatives, suggests that menstrual problems may represent a manifestation of underlying anxiety disorders rather than strictly affective disorders as traditionally believed.

Key words: Menstrual syndrome – Epidemiology – Menstrual problems

Introduction

Most females report mild physical and emotional symptoms associated with specific phases of the menstrual cycle. However, in most women these changes are assumed to be transient and time-limited (Dennerstein et al. 1984). Whether more serious manifestations of emotional problems that are specifically associated with the follicular phase of the menstrual cycle should be con-

sidered as a distinct syndrome within the psychiatric nomenclature has been controversial.

There is an absence of consensus regarding the etiology and treatment of this condition. Rubinow and Roy-Byrne (1984) concluded that no etiological hypothesis for pre-menstrual syndrome has been substantiated. Nevertheless, the major focus of most studies is on alterations in endocrine activity, which involves complex measurement issues. By systemic alteration of the timing of menses with a progesterone antagonist, Schmidt et al. (1991) recently demonstrated that pre-menstrual symptoms could not be attributed to psychological factors arising from anticipation of menstruation among women. The frequency of pre-menstrual symptoms was equal in the placebo and progesterone-antagonist groups, with the latter group being unable to predict the onset of menses. To date, no agent has proven efficacy in the treatment of pre-menstrual syndrome (Rubinow and Roy-Byrne 1984). In order to develop appropriate treatment strategies, there is a clear need for better understanding of the factors involved in this condition.

The most frequent symptoms associated with the pre-menstrual phase of the menstrual cycle are irritability, restlessness, anxiety, tension, sleep disorder, and depression (Dennerstein and Burrows 1979). Somatic symptoms generally reported during this phase include breast tenderness, headaches, and a sensation of bloating. Because of the overlap between many of these symptoms and the affective disorders, numerous investigators have examined whether menstrual disturbances represent exacerbations of affective disorders, or whether this condition occurs in the absence of pre-existing psychopathology (Coppin 1965; Diamond et al. 1976; Kashiwagi et al. 1976; Endicott et al. 1981; Hurt et al. 1992).

The prevalence of pre-menstrual syndrome has been investigated among patients who have sought treatment for psychiatric disorders (e.g., Coppin 1965; Endicott et al. 1981), pre-menstrual syndrome (e.g., Stout et al.

1986; Harrison et al. 1989; Pearlstein et al. 1990) and gynecologic problems (Wood et al. 1979; Hargrove and Abraham 1982). Although there is wide variation in the rates depending upon the methodology and the source of the sample, the findings suggest that the majority of women experience transient impairment from the manifestation of the above-cited psychologic and somatic symptoms on a regular basis (Dennerstein and Burrows 1979). The rates of affective disorders are significantly elevated in clinical settings for pre-menstrual syndrome, in which an average of 70% experience affective disorders compared to less than 20% of controls (Halbreich and Endicott 1985; Harrison et al. 1989; Pearlstein et al. 1990). Similarly, studies have consistently demonstrated that the rates of pre-menstrual syndrome are greater among patients with affective disorders compared to controls (Diamond et al. 1976; Kashiwagi et al. 1976; Endicott et al. 1981; Hurt et al. 1992).

The prevalence of menstrual disturbances has also been examined in unselected or community samples (Coppen 1965; Stout et al. 1986), systematic samples of educational or occupational facilities, and surveys through magazines (Logue and Moos 1986; Bancroft and Backstrom 1989; Warner and Bancroft 1990). The rates of menstrual symptoms in these range from 8% (Stout et al. 1986) to 50% (Warner and Bancroft 1990), with variation according to the definition of impairment and frequency and severity of the symptoms. However, most of these studies employed symptom checklists at a single time, in order to examine the frequency of symptoms and associated features of menstrual problems in the target sample. Moreover, because of the lack of prospective daily ratings in these large-scale surveys, the rates should be considered over-estimates because of the increased false-positive rates derived from retrospective data (Halbreich et al. 1982).

The chief obstacle to the elucidation of the prevalence and risk factors, and course of menstrual disturbances has been the lack of a widely accepted definition of the syndrome, the necessity of obtaining prospective daily ratings over an extended time period, and the lack of accuracy of establishing the specific timing of the "pre-menstrual" phase.

In the most recent version of the Diagnostic and Statistical Manual of the American Psychiatric Association, DSM-III-R (American Psychiatric Association 1987), a diagnostic entity called late luteal phase dysphoric disorder (LLPD) was proposed as a category requiring further study (Spitzer et al. 1989). This disorder was defined according to the presence of five of nine emotional and physical symptoms which occur exclusively during the late luteal phase, and remit within a few days after the onset of menses. Impairment in daily functioning is required, and the manifestation of symptoms cannot be merely the exacerbation of a co-existing syndrome.

An especially important criterion for the disorder is based on the method of collection of the symptom data. Prospective daily ratings have been found to be critical in identifying the symptoms of this condition because of the large number of false-positives that result from retrospective assessments of this condition. It has been esti-

mated that the false-positive rate obtained via retrospective assessments is as high as 50% (Rubinow and Roy-Byrne 1984).

Epidemiologic studies or studies of systematic samples in which the prevalence of the DSM-III-R category of LLPD was assessed generally report low rates of this syndrome, with average rates of 3–4% of women in the reproductive era (Rivera-Tovar and Frank 1990). Because the data were collected prospectively in the former study, the estimates are likely to be reliable approximations of the population prevalence of this syndrome.

Although several risk factors for pre-menstrual syndrome have been identified, the findings are inconsistent. In general, the following factors exhibit a positive association with pre-menstrual problems (Reid and Yen 1981): age above 30 (Hargrove and Abraham 1982), no children (Woods et al. 1979; Hallman 1986), lack of oral contraceptive use (Moos et al. 1969; Warner and Bancroft 1988), employment (Logue and Moos 1986), marital discord and other life stress (Warner and Bancroft 1990), sexual dissatisfaction (Coppen 1965; Warner and Bancroft 1988), and neuroticism (Coppen and Kessel 1963). The contradictory findings that have emerged regarding the association between many of these factors and menstrual syndromes may be attributed to differences in sampling and methodology that render many of the studies incomparable.

The present study reports the data from a community sample on the prevalence of emotional and somatic symptoms of the pre- and peri-menstrual phases, and associated sociodemographic features, degree of personal distress, social and occupational impairment, treatment history, and associated somatic and psychiatric syndromes. The data were collected prospectively over 10 years in order to investigate the longitudinal stability and age-specific risk of menstrual disturbances.

Subjects and methods

The subjects are those of the Zurich Study, a longitudinal cohort study of young adults in Zurich, Switzerland (Angst et al. 1984). The 90-item Hopkins Symptoms Checklist (SCL-90-R; Derogatis 1977) was administered to a sample of 2201 19-year-old men and 2346 20-year old women from the canton of Zurich in Switzerland. A cohort of 292 males and 299 females aged 19–20 years were selected from the total cohort according to their scores on the SCL-90-R in 1978. In order to maximize the probability that a sufficient proportion of the subjects would develop somatic and psychiatric syndromes, two-thirds of the sample was selected at random from the original sample with scores above the 85th percentile, and a comparison group was selected at random from those who scored below the 85th percentile on the SCL-90-R. All 591 subjects were interviewed in 1979. There were three subsequent interviews in 1981, 1986 and 1988. The dropout rate after the fourth interview wave, 10 years after the first interview, was 30%. There was no difference between the dropouts and study participants in the proportion of subjects who derived from high- and low-risk groups based on their SCL-90-R scores in 1978. An overview of the design of the study and the participation rates are depicted in Fig. 1. The sample for most of the analyses of this paper is comprised of the females who participated in the 1988

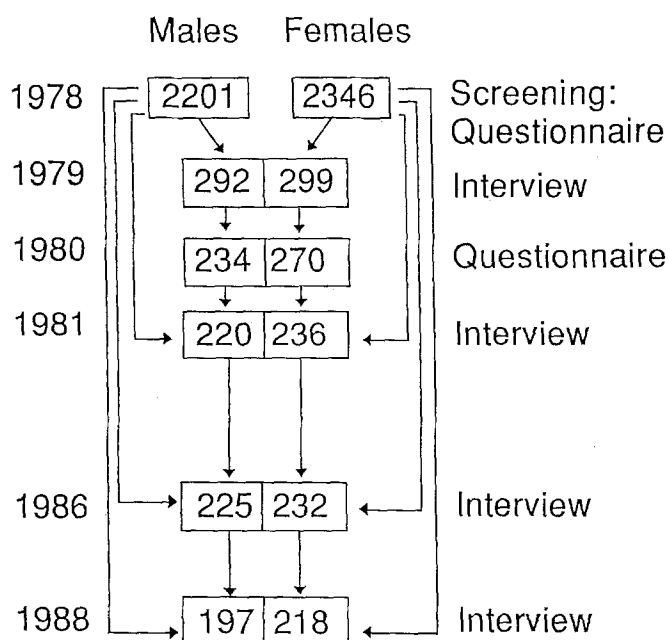


Fig. 1. Design of the Zurich Study

interview. Proband was interviewed in their homes by trained clinical psychologists and psychiatric residents.

The samples for the analyses herein include the following numbers of females: 218 who were interviewed in 1988, 299 who were interviewed at least once between 1979 and 1988, and 197 who were interviewed at all four interviews over the 10-year period. The groups for the analyses reported herein were comprised of the 82 women who reported the presence of both emotional and somatic symptoms ($n = 76$) or emotional symptoms only ($n = 6$) associated with menses [$N = 82$; (MP) menstrual problems group], and the 136 women who did not exhibit menstrual disturbances. The subjects with somatic symptoms only ($n = 21$) were combined with the controls, because of the similarity of the two groups on all of the dimensions assessed.

Diagnostic assessment

The diagnostic instrument employed in this study was the SPIKE, a semi-structured instrument which was developed for epidemiologic studies (Angst et al. 1984). The SPIKE was designed for administration by trained psychiatric residents and clinical psychologists. Information is collected on childhood characteristics, treatment history, psychiatric and somatic syndromes, and on use and abuse of various substances. Symptoms, duration and frequency, subjective degree of suffering, treatment, social consequences, previous history and family history are assessed for each syndrome. The SPIKE is comprised of both open- and closed-ended questions regarding specific symptoms, frequency, duration, treatment, and impairment. The time period of assessment is the last year prior to the interview plus a history on the years prior to the interview. The instrument is not based on a particular diagnostic system. Therefore, diagnostic algorithms from multiple systems can be applied to the data for each syndrome.

Diagnostic criteria

The diagnoses from the 1986 and 1988 interviews were made according to the DSM-III criteria for most of the major diagnostic categories including major depression, dysthymia, general anxiety, panic disorder, agoraphobia, simple and social phobia, alcohol abuse, and substance abuse. The criteria for the diagnosis of recur-

rent brief depression (RBD) are identical to the diagnostic criteria for major depression concerning mood and number of symptoms. As in the Research Diagnostic Criteria (RDC) (Spitzer et al. 1978), the definition of RBD also requires occupational impairment. However, the requirement for the length of depressive episodes has been reduced to less than 2 weeks, but such episodes must recur monthly over a 1-year period (Angst et al. 1990).

Collection of menstrual symptoms

Menstrual symptoms were included in a separate section of the SPIKE in 1988, in which females were first probed regarding the presence of any emotional or somatic symptom associated with the pre- or peri-menstrual phase of their cycle. Somatic symptoms were assessed separately from emotional symptoms, and the latter symptoms were assessed separately for the premenstrual phase and for the days after the onset of menses. The degree of personal distress was measured on a continuum from 1 to 99. Data on professional treatment and use of medications to treat menstrual symptoms, both self and professionally prescribed, were also obtained at each interview in 1979, 1981, 1986, and 1988.

In the present study, no attempt was made to assess the proportion of subjects with pre-menstrual syndrome or the DSM-III-R category of LLPD. Because the data were not collected prospectively during several menstrual cycles within a 6-month interval, the consistency of symptom expression and the relationship to other psychiatric syndromes during the short term could not be assessed. Rather, the goal of the study was to investigate the manifestation of emotional and somatic symptoms associated with the menstrual cycle assessed by direct interview in an epidemiologic sample. However, the longer-term follow-up of these subjects enabled us to examine the longitudinal stability of MP and the association of menstrual disturbances and age.

Family history

The family history of each syndrome was routinely obtained separately for fathers, mothers, and siblings, irrespective of the subjects' response to the symptom probes for each syndrome. Although specific diagnostic criteria were not systematically assessed for each of the relatives, the presence or absence of the general syndrome was assessed. Moreover, the treatment history, if any, for each syndrome was also obtained for all first-degree relatives. The purpose and methodology of the study are presented in further detail by Angst et al. (1984).

Somatic syndromes

Data on somatic syndromes were collected at each interview by inquiring about general dysfunction in each bodily system, and specific symptoms, impairment, frequency and duration, when the general probe was endorsed. Migraine was defined according to the newly introduced system of the International Headache Society Classification Committee on Headache (1988).

Life events and social supports

A modified form of the Life Events Inventory developed by Tennant and Andrews (1976, 1977) was administered at each interview. Items that were inappropriate for young people (i.e., retirement) were deleted; accordingly, several items which were relevant to the young Swiss population from the Holmes and Rahe (1967) scale were added to the assessment.

Personality

The Freiburg Personality Inventory (FPI) (Fahrenberg et al. 1970), a self-report inventory, which is the most widely used per-

sonality inventory in German-speaking countries, was administered to the subjects in 1988. The specific form used was the half form B. Nine primary factors can be derived from the instrument, as well as three secondary factors: extraversion, emotional lability (neuroticism) and masculinity. Three alternative secondary factors – aggression, extraversion, and neuroticism (including autonomic lability) – were derived at this site based on the stability of the solutions through factor analytic techniques (Angst and Clayton 1986).

Statistical analysis

The statistical analyses that were conducted to test the significance of the differences for comparisons of the categorical variables were chi-squares corrected for continuity. Analyses of variance were applied to the continuous variables using the general linear models procedure of the Statistical Analysis System (Reinhardt 1980). Group mean differences were compared with the Duncan Multiple Range Test, which corrects for chance (Duncan, 1975).

Results

The 1-year frequencies of emotional and somatic symptoms associated with the menstrual period among women in 1988 are presented in Table 1. Forty-seven percent of women reported the presence of physical or emotional problems associated with either the pre-menstrual or early menstruation phase. The most frequent pre-menstrual symptoms were irritability (which was reported by nearly 33% of all women), depressed mood, tension and nervousness. The frequencies of emotional symptoms decreased by nearly 50% during the first few days (i.e., days 1–3) of menses. Not all of the symptoms reported had a negative valence; some of the symptoms were associated with an enhancement in functioning. However, as Table 1 demonstrates, the latter symptoms were quite rare.

Table 1. Frequency of emotional and somatic symptoms associated with menstruation in 1988 ($N = 218$)

| Emotional symptoms | % of women | Somatic symptoms | % of women |
|----------------------------|------------|----------------------------|------------|
| <i>Pre-menstrual</i> | | <i>During menstruation</i> | |
| Irritability | 30.7 | Unspecific pain | 36.2 |
| Depressed mood | 18.8 | Lower back pain | 29.8 |
| Tension | 18.3 | Acne | 26.1 |
| Nervousness | 17.9 | Headache | 16.5 |
| Increased activity | 4.1 | Sweating | 14.7 |
| Anxiety | 3.2 | Weight gain | 12.8 |
| Better mood | 2.3 | Bloating | 7.8 |
| | | Dizziness | 5.0 |
| | | Vomiting | 2.3 |
| <i>During menstruation</i> | | | |
| Irritability | 19.7 | | |
| Depressed mood | 19.5 | | |
| Nervousness | 10.6 | | |
| Tension | 8.7 | | |
| Increased activity | 2.3 | | |
| Better mood | 2.3 | | |
| Anxiety | 1.0 | | |

A slightly larger proportion of women reported somatic symptoms associated with menses. These symptoms were only assessed for the menstrual phase of the cycle. About 33% of the women reported non-specific pain and lower back pain; 25% complained of acne; and another 15% reported headaches and sweating, and weight gain.

These findings show that somatic symptoms were more common in this sample than emotional symptoms, and that pre-menstrual symptoms exceeded those associated with the onset of menses. In addition, the proportion of women with exclusively emotional or somatic symptoms was very low; only 6 of the 218 women reported exclusive manifestation of emotional symptoms at the 1988 interview, and only 21 reported the sole occurrence of somatic symptoms associated with menses. The combination of symptoms occurred much more often than either domain alone ($N = 67$).

The number of symptoms in each domain at the 1988 interview are presented in Table 2. The greatest number of emotional symptoms was observed during the pre-menstrual phase: that is, 11% of the women reported four or more symptoms, and 25% reported between one and three symptoms. Emotional symptoms decreased slightly during menstruation: 7% of the women reported

Table 2. Patterns of emotional and somatic symptoms in 1988 ($N = 218$)

| Emotional symptoms | No. of symptoms | % |
|---------------------|-----------------|------|
| Pre-menstrual | 0 | 64.8 |
| | 1–3 | 24.5 |
| | >4 | 10.7 |
| During menstruation | 0 | 75.9 |
| | 1–3 | 17.6 |
| | >4 | 6.6 |
| Somatic symptoms | 0 | 55.1 |
| | 1–3 | 25.9 |
| | >4 | 19.1 |

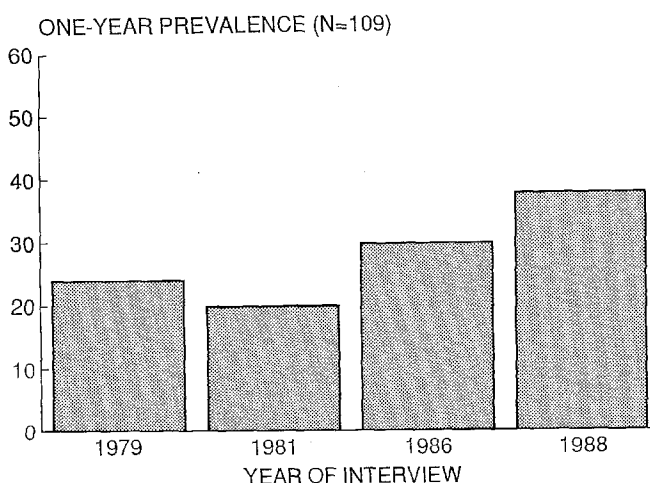


Fig. 2. One-year prevalence rates (%) of menstrual problems

Table 3. Social and demographic characteristics (%) by groups with menstrual problems in 1988

| | Controls (N = 136) | Menstrual problems (N = 82) | P |
|--------------------------------------|-----------------------|-----------------------------------|----|
| <i>Education level</i> | | | |
| Low or medium | 70.4 | 60.3 | |
| High | 26.0 | 39.7 | * |
| <i>Marital status</i> | | | |
| Single | 37.4 | 43.9 | |
| Married | 56.4 | 50.0 | |
| Divorced/separated | 9.9 | 6.1 | NS |
| <i>Partner</i> | | | |
| Yes | 89.0 | 85.4 | NS |
| No | 11.0 | 14.6 | |
| <i>Children</i> | | | |
| Yes | 55.1 | 35.4 | ** |
| No | 44.8 | 64.6 | |
| <i>Employment</i> | | | |
| Full-time | 27.9 | 34.2 | |
| Part-time | 36.8 | 43.9 | |
| None | 35.5 | 22.0 | NS |
| <i>Recent life events (mean, SD)</i> | | | |
| Degree of distress | 125.7 (95.12) | 154.4 (107.23) | * |
| Number of events | 5.8 (3.75) | 6.9 (4.14) | * |

P values for Tables 3–7: *** $P < 0.001$; ** $P < 0.01$; * $P < 0.05$; + $P < 1.0$

four or more symptoms and 18% reported between one and three symptoms. Finally, somatic symptoms were even more frequent than emotional symptoms, both prior to and during menses. Nearly 50% of the women suffered from at least one somatic symptom and 20% reported more than four. The 1-year prevalence rates of menstrual problems among the women with both physical and emotional symptoms associated with menses (i.e., MP group) across 10 years are presented in Fig. 2.

In 1979, at age 21, 20% of the women reported MP. In 1981, the rates remained relatively stable, with a slight decrease in the proportion reporting MP. However, there was an increase in the prevalence rates of MP apparent as the cohort reached their late twenties, with

approximately a 1.5-fold increase in the rates to 38% at age 30 years.

The longitudinal expression of MP across the 10 years of the study was also assessed by examining the proportion of women with MP who completed all four interviews and reported MP at each interview. Approximately 50% of the latter group of women reported that they suffered from MP during the 10 years of follow-up, as the cohort of women progressed from age 21 to 30 years. However, the majority of the subjects with MP reported MP once or twice across the four interviews; 3% of the total sample consistently had MP at all of the interviews. For the entire group, the average age at onset of menstrual symptoms was 17.8 years, with a mean duration of menstrual symptoms of 3.8 days.

Further analysis of the pattern of reports of MP among women who participated in all four assessments indicated that there was a gradual increase in the prevalence of MP over time; whereas only 20% of the subjects with MP at two or three interviews reported them during the first two assessments of the study, 50% reported these problems at the latter interviews. This demonstrates that the incidence of MP increased with age, thereby confirming the results presented in Fig. 1.

Table 3 shows the demographic characteristics among the women with MP compared to controls. Marital status, living with a partner, and employment outside the home were equally distributed among the two groups; however, higher education and decreased nulliparity were significantly greater among the group with menstrual problems.

Stressful life events during the past year also distinguished the MP group from the control women. The former group reported both a greater number of recent stressful life events, as well as a significantly greater degree of distress associated with these events than that of the controls who reported negative life events during the previous year.

Table 4 presents the association between sexual problems and menstrual disturbances. Sexual dissatisfaction in general, and both psychologic and functional sexual problems, were reported more often among the group with MP than among the controls. There was nearly a three-fold increased frequency of sexual disturbances among the group who also reported peri-menstrual emotional and somatic symptoms than among the controls. The only specific sexual problems that were reported

Table 4. Association between menstrual problems and sexual problems in 1988

| | Controls (N = 136) | Menstrual problems (N = 82) | Odds ratio | 95% confidence limits | P |
|---------------------|-----------------------|-----------------------------------|---------------|--------------------------|----|
| Any sexual problems | 20.6 | 30.5 | 0.6 | (0.3–1.1) | ** |
| Functional problems | 8.1 | 19.5 | 2.8 | (1.2–6.3) | * |
| Decreased libido | 14.7 | 23.2 | 1.7 | (0.9–3.5) | NS |
| Orgasmic problems | 6.6 | 18.3 | 3.2 | (1.3–7.6) | ** |
| Dyspareunia | 2.9 | 4.9 | 1.7 | (0.4–7.0) | NS |
| Vaginismus | – | 2.4 | – | – | – |
| Emotional problems | 9.6 | 23.2 | 2.9 | (1.3–6.2) | ** |

Table 5. Association between psychiatric syndromes and menstrual problems in 1988 and across longitudinal course (%)

| a. 1988 | Controls (N = 136) | Menstrual problems (N = 82) | Odds ratio | 95% confidence limits | P |
|------------------------------|-----------------------|------------------------------------|---------------|-----------------------------|----|
| <i>Affective disorders</i> | | | | | |
| Major depression | 7.4 | 17.1 | 2.6 | (1.1–6.2) | * |
| Recurrent brief depression | 5.9 | 6.1 | 1.0 | (0.3–3.3) | NS |
| <i>Anxiety disorders</i> | | | | | |
| Panic disorder | 2.9 | 6.1 | 2.1 | (0.6–8.0) | NS |
| Generalized anxiety disorder | 1.5 | 6.1 | 4.4 | (0.8–23.0) | NS |
| Agoraphobia | 0.7 | 7.3 | 10.7 | (1.3–90.2) | ** |
| Social phobia | 4.4 | 7.3 | 1.7 | (0.5–5.4) | NS |
| Simple phobia | 8.1 | 15.9 | 2.1 | (0.9–5.0) | NS |
| b. Longitudinal | Controls (N = 152) | Menstrual problems (N = 147) | Odds ratio | 95% confidence limits | P |
| <i>Affective disorders</i> | | | | | |
| Major depression | 23.7 | 40.1 | 2.2 | (1.3–3.6) | ** |
| Recurrent brief depression | 25.0 | 38.1 | 1.8 | (1.1–3.0) | ** |
| Dysthymia | 4.0 | 5.2 | 1.3 | (0.4–4.7) | NS |
| <i>Anxiety disorders</i> | | | | | |
| Panic disorder | 6.6 | 10.2 | 1.6 | (0.7–3.7) | NS |
| Generalized anxiety disorder | 4.0 | 9.0 | 2.4 | (0.7–7.6) | NS |
| Agoraphobia | 4.6 | 17.0 | 4.2 | (1.8–9.6) | ** |
| Simple phobia | 12.9 | 26.9 | 2.5 | (1.3–4.9) | ** |
| Social phobia | 17.0 | 4.6 | 4.2 | (1.8–10.2) | ** |
| Suicide attempts | 9.9 | 17.0 | 1.9 | (0.9–3.7) | + |
| Alcohol abuse | 1.0 | 2.2 | — | — | |
| Cannabis abuse | 8.6 | 5.4 | 0.6 | (0.2–1.5) | NS |

more frequently among the MP group were orgasmic disorders. Moreover, the latter group also had significantly more often been engaged in treatment for sexual problems than the controls. However, whether this results from the fact that women with both sexual and menstrual problems have a greater need for treatment than those with either set of problems alone could not be determined.

The associations between co-morbid psychiatric disorders and MP are presented in Table 5. The two components of the table divide the co-morbid disorders into cross-sectional associations in 1988 and longitudinal associations across the entire 10-year investigation of the cohort.

Cross-sectional associations with MP emerged for major depression, with an odds ratio of 2.6; and agoraphobia, with an odds ratio of 10.7. Longitudinal associations between MP and psychiatric syndromes across 10 years were more frequent, but generally weaker than the cross-sectional associations. Significant associations emerged for major depression (odds ratio = 2.2); RBD (odds ratio = 1.8); agoraphobia (odds ratio = 4.2); and social phobia (odds ratio = 4.2). Moreover, the lifetime history of suicide attempts was nearly twice as frequent among the MP group as among the controls.

In contrast, dysthymia, panic disorder, and generalized anxiety disorder did not discriminate between the

groups. The rates of alcohol abuse were too low among the women in the study to yield a meaningful analysis of the results; however, no consistent patterns were apparent for cannabis use or abuse. There was no direct relationship between the degree of severity of MP and the manifestation of psychopathology.

The family history of several of the psychiatric syndromes, as well as that of MP, was also systematically assessed for each disorder. The family history of depression, panic, and MP did not differ between the groups. However, the family history of anxiety disorders was significantly greater among the women with MP than among the controls.

The mean symptom scores on the SCL-90-R among those with MP at the 1988 interview are shown in Table 6. The SCL-90-R scores were significantly different for the MP group than for the controls on all of the scale scores in the expected direction. The only exceptions to this general trend were the factor scores of obsessive-compulsive and depression, which only marginally discriminated the two groups. As expected, the total score was also higher for the MP group than for the controls.

The scores of the FPI (Fahrenberg et al. 1970) according to the presence or absence of MP are presented in Table 7. All scales except sociability were significantly different among the MP group compared to controls. The MP group exhibited more nervousness, spontane-

Table 6. Symptom scores on the SCL-90 by menstrual problems in 1988

| Factor | Controls (<i>N</i> = 136) | Menstrual problems (<i>N</i> = 82) | <i>P</i> |
|---------------------------|-------------------------------|---|----------|
| | \bar{X} (SD) | \bar{X} (SD) | |
| Somatization | 1.4 (0.39) | 1.6 (0.45) | * |
| Obsessive-compulsive | 1.6 (0.55) | 1.7 (0.56) | + |
| Interpersonal sensitivity | 1.7 (0.65) | 1.9 (0.71) | ** |
| Depression | 1.8 (0.67) | 1.9 (0.67) | + |
| Anxiety | 1.5 (0.51) | 1.7 (0.63) | ** |
| Anger | 1.6 (0.64) | 1.7 (0.61) | * |
| Phobia | 1.2 (0.37) | 1.4 (0.69) | ** |
| Paranoid ideation | 1.6 (0.61) | 1.8 (0.62) | * |
| Psychoticism | 1.3 (0.57) | 1.4 (0.39) | *** |
| Total score | 1.5 (0.43) | 1.7 (0.47) | ** |

Table 7. *t*-Transformed mean scores on Freiburg Personality Inventory: scales and factors by menstrual problems in 1988

| | Controls (<i>N</i> = 136) | Menstrual problems (<i>N</i> = 82) | <i>P</i> |
|-----------------------------|-------------------------------|---|----------|
| | \bar{X} (SD) | \bar{X} (SD) | |
| <i>Scale scores</i> | | | |
| 1. Nervousness | 16.9 (6.27) | 20.8 (7.32) | *** |
| 2. Spontaneous aggression | 14.2 (6.31) | 16.9 (6.67) | ** |
| 3. Depressiveness | 13.4 (7.26) | 16.2 (7.40) | ** |
| 4. Excitability | 21.8 (8.57) | 24.4 (8.11) | * |
| 5. Sociability | 20.4 (7.04) | 20.2 (7.07) | NS |
| 6. Resilience | 15.3 (8.14) | 12.5 (7.90) | * |
| 7. Reactive aggression | 14.1 (6.71) | 17.5 (6.83) | *** |
| 8. Inhibition | 19.9 (8.30) | 23.4 (8.77) | ** |
| 9. Frankness | 15.7 (8.50) | 17.7 (7.86) | NS |
| <i>Factor scores Zurich</i> | | | |
| Extraversion | 18.1 (7.43) | 16.9 (7.54) | NS |
| Neuroticism | 16.4 (6.88) | 19.4 (7.26) | ** |
| Aggressivity | 16.9 (7.17) | 19.6 (7.15) | ** |

ous and reactive aggression, depressive tendencies, and excitability than the controls. In contrast, resilience was greater among the latter group than among the subjects with MP. These differences were also reflected in the factor scores, which showed greater neuroticism and aggressivity among the MP group than among controls.

Discussion

The findings reported herein confirm those of other studies (Andersch et al. 1986), which have shown that MP are quite common in the general population. Although we did not attempt to derive a case definition of MP, the distinction between those women with both somatic and emotional symptoms or emotional symp-

toms only over several menstrual cycles was apparent in a number of domains, particularly in psychiatric syndromes and symptoms, personality factors, and life disruption.

The association between MP and psychopathology was quite consistent across all domains of assessment including symptoms, diagnoses, and personality traits. The finding that the association between psychiatric syndromes and menstrual disturbances was broader across the longitudinal course than during the year prior to the most recent interview, taken together with the finding that the frequency of menstrual symptoms increased with age, suggests that psychopathology may pre-dispose women to the development of menstrual symptoms, particularly those in the emotional domain. The lack of an association with a positive family history for depression, plus the equally strong associations between the anxiety disorders and affective disorders would belie the commonly held view that emotional changes associated with the pre-menstrual phase of the cycle are merely an exacerbation of underlying affective disorders. Rather, a more complex relationship between these different emotional and somatic domains is required to account for the findings reported herein and in other studies.

This work replicates a number of previous studies of risk factors for pre-menstrual syndrome. The increase in the frequency of menstrual syndrome with age, particularly after age 30 years, has been frequently observed (Greene and Dalton 1953; Reid and Yen 1981). As demonstrated in Fig. 2 of the present study, the rates of MP increased with age both in the cross-sectional data and in the prospective longitudinal data on women who were followed from age 20–30 years. It will be interesting to examine whether the rate of MP continues to increase at the next interview of the sample at age 35 years. However, whether this is a true increase in prevalence or heightened sensitivity to the symptoms over time could not be discriminated in these data.

Although some previous studies have reported that pre-menstrual symptoms are more common among single women and those with employment outside the home (i.e., Endo et al. 1978; Woods et al. 1979; Felthous et al. 1980), the results of this study did not find significant associations between menstrual syndrome and marital status, co-habitation status, or employment outside the home. The increase in the prevalence and degree of distress associated with life events during the past year among the group of women with MP was previously reported by Woods et al. (1979).

Similarly, greater rates of MP were observed among those women with no children as compared to those with at least one child. Previous findings regarding parity and MP have been contradictory; whereas, Woods et al. (1979) showed a positive association between pre-menstrual syndrome and no children, Dennerstein et al. (1984) found no association between increased parity and MP.

The lower rate of MP among women taking oral contraceptives confirms previous findings that pre-menstrual moodiness and irritability were less common among women using oral contraceptives (Kutner and

Brown 1972; Woods et al. 1979; Warner and Bancroft 1988). Kutner and Brown (1972) suggested that oral contraceptive use may prevent pre-menstrual emotional symptoms by shortening the time of low levels of progesterin among those with pre-menstrual syndrome. Aside from oral contraceptives, other personal habits including smoking and drinking were not associated with MP.

Problems in sexual functioning also characterized the MP group. This was previously noted by Coppen (1965), Woods et al. (1979), and Warner and Bancroft (1988), who showed a significant correlation between sexual maladjustment and pre-menstrual syndrome. Coppen (1965) further demonstrated that the increased sexual dysfunction in this group could be attributed to neuroticism, rather than to affective syndromes concomitant to MP.

The associations between MP and somatic and psychiatric conditions have been examined in numerous studies (Wetzel et al. 1975; Diamond et al. 1976; Kashiwagi et al. 1976). The majority of investigations has focused on the association between menstrual syndromes and affective disorders (Wetzel et al. 1975; Diamond et al. 1976; Endicott et al. 1981). A few others have reported associations between psychosis and suicide and pre-menstrual syndrome (Williams and Weekes 1952; Birtchnell and Floyd 1974; Endo et al. 1978). The rates of psychiatric disorders were highly variable depending upon the source of the sample. Samples of patients with pre-menstrual syndrome exhibit an average prevalence of affective disorders of 70% compared to 20% in controls. However, Stout et al. (1986) did not find a significant increase in major depression in a clinical sample of women with pre-menstrual syndrome when compared to the population base rates. Instead, they found strong associations between pre-menstrual syndrome and numerous other syndromes including drug and alcohol abuse, phobia, somatization disorder and dysthymia. They attributed the lack of an association with depression to the failure of the patients to meet the DSM-III duration criterion for major depression. Similarly, Pearlstein et al. (1990) found stronger associations between pre-menstrual syndrome and current intermittent depressive disorder as defined by the RDC (Spitzer et al. 1978), than with major depressive disorder. In the present study, strong associations emerged between MP and major depression, all of the phobic disorders, and, to a lesser extent, RBD.

The high frequency of anxiety symptoms in women with MP should not be over-looked. Numerous studies have shown that more than 50% of women report tension and anxiety associated with the pre-menstrual phase (Dennerstein and Burrows 1979; Clare 1983; Hallman 1986; Warner and Bancroft 1990). In the present study, tension and nervousness were equally as common as depressed mood among the entire cohort of women. The finding of an increased family history of anxiety disorders in the mothers of the women with MP in the present study compared to that of affective disorder was also quite interesting. If one considers the most frequent symptoms of pre-menstrual syndrome, however, it is apparent that the frequency of anxiety symptoms often ex-

ceeds that of affective symptoms (Dennerstein et al. 1984). Thus, pre-menstrual syndrome may be a manifestation of underlying anxiety syndromes rather than of affective disorders, as is often believed.

Finally, our findings support numerous previous studies in which neurotic personality features have been associated with pre-menstrual syndrome (Rees 1953; Coppen and Kessel 1963; Levitt and Lubin 1967; Taylor 1979; Watts et al. 1980). Indeed, Coppen and Kessel (1963) found that pre-menstrual syndrome was more strongly associated with neuroticism than with affective disorders *per se*. Because neuroticism is comprised of manifestations of anxiety and depression, these data are concordant with those reported in the present study for both psychopathology and personality traits. Previous investigations have assessed neuroticism and extraversion via self-report checklists such as the Maudsley Personality Inventory (Eysenck 1959).

There was a lack of association between the majority of somatic syndromes and menstrual problems in the present study, with the exception of headaches and intestinal problems. This suggests that somatization is not a general characteristic of women with MP. Moreover, the lack of association with migraine was surprising, given the generally strong tendency in clinical samples for migraine to occur more frequently during the pre-menstrual phase of the cycle (Epstein et al. 1975).

Although there was a high frequency of somatic and emotional symptoms associated with the peri-menstrual phase of the menstrual cycle, there is still no valid evidence regarding a threshold of severity or duration with which to define cases of this disturbance. The women in this study generally reported a significant degree of distress associated with these symptoms, widespread attempts to self-medicate their symptoms, and a substantial proportion had actually sought professional treatment for these problems. Moreover, the high frequency of suicide attempts in this group was also notable. Although these data cannot assess the timing of suicide attempts and the expression of episodes of psychiatric syndromes with respect to the menstrual cycle, information from the next follow-up of this sample may elucidate these issues.

The findings of this study must be interpreted in the context of its limitations. Despite the prospective design of the study, the symptoms associated with menses were collected retrospectively for the 1-year period prior to the interview. Therefore, the well-established biases associated with retrospective reporting of these symptoms were likely to pertain to this study as well (Halbreich et al. 1982; Rubinow and Roy-Byrne 1984; Steiner et al. 1980). Moreover, the sampling method and high attrition rate in this study may also have led to unknown bias in the results.

Despite the lack of appropriate data to ascertain the DSM-III-R criteria for LLPD, this study comprises the longest longitudinal study of menstrual syndromes in a non-clinical community sample. The findings suggest the pre-menstrual disturbances are quite prevalent, are associated with a significant degree of personal distress, leading to both impairment and treatment-seeking among

affected women, and are strongly associated with psychiatric morbidity. There is clearly a need for further research to unravel the complex relationship between disturbances of the peri-menstrual phase of the female reproductive cycle and the corresponding phenomena described in this study.

Acknowledgements. This work was supported in part by Research Scientist Development Award MH00499, AA07080, and DA53478 from Alcohol, Drug Abuse and Mental Health Administration of the United States Public Health Service to Dr. Merikangas; and Grant 3.873.0.88 from the Swiss National Science Foundation to Prof. Angst.

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