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Correlation between postpartum depression and premenstrual dysphoric disorder: Single center study

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Objective
To describe the prevalence and correlates of the postpartum depression and premenstrual dysphoric disorder.

Methods
One hundred sixty six women were assessed around 10th to 14th days after delivery in Gangneung Asan Hospital, Korea, from September 2011 to March 2012. We checked their risk factors for postpartum depressive disorders using the Beck Depression Inventory and the Edinburgh Postnatal Depression Scale. Premenstrual dysphoric disorder was evaluated retrospectively and was defined as having more than 5 of the following 10 symptoms: breast tenderness, bloating, headache, peripheral edema (hand and foot), depressive symptoms, anger, irritability, anxiety, oversensitivity, and exaggerated mood swings.

Results
The prevalence rate of postpartum depression using the Edinburgh Postnatal Depression Scale ≥10 and Beck Depression Inventory ≥10 was 13.9% (23/166). We found statistical differences (P<0.01) between the postpartum depression group and the postpartum non-depression group in smoking history, past history of psychiatric problems, and level of marital satisfaction. The prevalence rate of premenstrual syndrome (PMS) was 9% (15/166) and among 23 women in the postpartum depression group, eight were determined to have premenstrual dysphoric disorder, yielding a prevalence rate of 34.8% (8/23). Among 143 women in the postpartum non-depression group, seven were determined to have PMS, yielding a prevalence rate of 4.9% (7/143). A correlation between postpartum depression and PMS was thus found (P<0.01).

Conclusion
PMS appears to be associated with postpartum depression. This means that a hormone-related etiology appears to be one risk factor for postpartum depression.

Keywords: Depression, postpartum; Premenstrual dysphoric disorder; Premenstrual syndrome

Introduction

Interest in mood disorders among women has increased, and epidemiological studies suggest that the incidence of major depressive disorder is higher among women than men, even across different nations and cultures [1,2]. Women who present episodes of depression associated with reproductive events (i.e., premenstrual, postpartum, menopausal transition) may be particularly prone to experiencing depression because of a heightened sensitivity to intense hormonal fluctuations [3]. The hypothesis that sex hormone fluctuations that occur in female reproductive events could influence neurochemical pathways linked to depression is supported with existing animal and human studies, and with clinical data [4,5].

Frank [6] first reported "premenstrual tension" as a syndrome in 1931, describing it as a group of symptoms that would appear 7 to 10 days before menstruation. Symptoms included significant tension, irritability, strange behavior, dysphoric mood, and somatic complaints. There have been many reports of be-

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havioral changes in susceptible women during the premenstrual phase (premenstrual syndrome, PMS) [7-10]. These studies suggest variable symptoms and definitions of PMS, but until now, there is no agreement on a standard definition of PMS and the cause of PMS remains enigmatic. Premenstrual dysphoric disorder (PMDD) can be conceptualized as the most severe form of PMS and community-based studies indicate a 3% to 9% prevalence rate of PMDD in the general population [11,12]. Women with PMDD are more likely to develop psychiatric comorbidities, most commonly including dysthymia and depression [13].

The postpartum period is the most dangerous time for women to develop major depression disorder and postpartum depression (PPD) affects up to 15% of mothers. PPD is characterized by symptoms of depressed mood, loss of interest or pleasure in activities, disturbance of appetite or sleep, feelings of guilt or worthlessness, decreased concentration, and thoughts of suicide. Maternal depression during pregnancy or postpartum is important, as it adversely affects the newborn. These infants may suffer from impairments in emotional development, language development, attention, and cognitive skills. Though the cause of PPD is unknown, it seems to be multifactorial, including psychological and biological factors like hormonal changes, and social factors such as poor social support and stressful life events. In the postpartum period, the amount of circulating estrogen and progesterone abrupt decreases and these abrupt hormonal changes may play a key role in the heightened risk for depression during the postpartum period [5].

This study seeks a correlation between PPD and a possible hormone-related etiology like PMS (PMDD), while also investigating the prevalence and risk factors of PPD in Korean women.

Materials and methods

A total of 166 women were assessed for PPD at 10 to 14 days after childbirth in GangneungAsan Hospital, Korea, between September 2011 and March 2012. We checked risk factors for PPD using the Edinburgh Postnatal Depression Scale (EPDS) and the Beck Depression Inventory (BDI). All patients provided written informed consent. We assessed potential differences between the PPD group and the postpartum non-depression group in sociodemographic characteristics (i.e., marital status, level of marital satisfaction, education, socioeconomic status, occupational history, religion), lifestyle behaviors (i.e., drinking history, smoking history), risk factors for mental disorders (i.e., family history and past history of psychiatric problems), obstetric characteristics (i.e., parity, breast feeding, scheduled pregnancy, mode of delivery, gestational age at delivery), and past medical history.

The EPDS is the most widely used and researched screening tool for PPD [14]. It is a 10-item self-report questionnaire designed to measure emotional and cognitive symptoms of PPD, and excludes the somatic symptoms of depression, which might be confused with normal changes of puerperium. Women were asked to choose the statement that most closely described how they had been feeling during the past 10 to 14 days, with each item ranging from 0 to 3 according to severity. Cut-off scores can differ between cultures and studies; this study used a cut-off of ≥10 to detect probable depression in postnatal women.

We used the Korean version of the BDI, a widely used 21-item standardized self-administered questionnaire that measures various symptoms of depression and describes the somatic and cognitive-affective symptoms on a four-point scale that ranges from 0 to 3 [15]. A summed single score, a higher score indicating more severe depression and in this study score ≥10 was used to detect probable depression.

To identify patients who had PMS, we asked whether they had experienced any of the American College of Obstetricians and Gynecologists' (ACOG) diagnostic criteria's ten premenstrual symptoms (i.e., breast tenderness, bloating, headache, peripheral edema (hand and foot), depression symptoms, anger, irritability, anxiety, oversensitivity, and exaggerated mood swings) during premenstrual period before pregnancy, and applied the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria's diagnostic method (presence of five or more symptoms to PMDD definition) [16]. ACOG recommendations for a diagnosis of PMDD specify that one or more disturbing affective or somatic symptoms must have occurred during the 5 days before menses in each of the three previous menstrual cycles. These symptoms must be relieved within 4 days of menses onset without recurrence until at least cycle day 13. In addition, a woman who experiences these symptoms must suffer from an identifiable dysfunction in social or economic performance. Furthermore, her symptoms must occur reproducibly during two cycles of prospective recording and in the absence of any pharmacotherapy, hormone ingestion, or drug or alcohol abuse. DSM-IV PMDD criteria presume a person to have at least five premenstrual symptoms (including at least one major dysphoric symptom: irritability, depressed mood, affective lability, or anxiety) that seriously interfere with work, social activities, and relationships. Also, one of these symptoms

must be a mood-related symptom and the symptoms should be present in most cycles in the previous 12 months [17].

Ideally, these criteria are applied to prospectively documented daily records for at least two menstrual cycles, however our study participants were at puerperium, so we had to use retrospective self-report questionnaires instead of prospective daily records. As noted above, we also simplified our diagnostic method to determine if there was a correlation between PPD and PMDD.

Statistical analysis was performed using Student's t-test and Mann-Whitney test, with statistical significance defined as $P \leq 0.05$. All statistical analyses were performed using SPSS ver. 17 (SPSS Inc., Chicago, IL, USA).

Results

The study population had a mean age of 30.86 years in the PPD group (n=23) and 32.52 years in the postpartum non-depression group (n=143). We assessed the potential differences between the groups in sociodemographic characteristics, lifestyle behaviors, risk factors for mental disorders, obstetric characteristics, and past medical history (Table 1). In comparing groups, we found no statistical differences in many characteristics, including marital status, education, socioeconomic status, religion, family history of psychiatric problems, drinking history, past medical history, occupational history, parity, breast feeding, planned pregnancy or not, mode of delivery (vaginal delivery or cesarean section), and gestational age at delivery (preterm or full). However, we did find that PPD group have more smoking history (P=0.03), past history of psychiatric problems (P=0.023) and lower level of marital satisfaction (P=0.002).

Fig. 1. shows the criteria used to identify PPD and PMDD in the index population. All 23 women with EPDS ≥10 also had a BDI score of over 10. Consequently, 23 women were determined to have PPD by the EPDS and BDI, making the prevalence rate of PPD 13.9% (23/166). The mean EPDS score was 11.86 in the EPDS ≥10 group and 3.35 in the EPDS <10 group. The mean BDI score was 19.00 in the BDI ≥10 group and 5.69 in the BDI <10 group.

PMDD was found in 15 women, and the prevalence rate of PMDD was thus 9% (15/166). Among 23 women in the PPD group, eight were determined to have PMDD and the prevalence rate was thus 34.8% (8/23). Among 143 women in the non-depression group, seven were determined to have PMDD

Table 1. Demographic and clinical characteristics of participants

	Depression (n= 23)	Non-depression (n=143)	*P*-value
Maternal age (yr)	30.86	32.52	0.837
Marital status			0.703
Unmarried	0	1	
Married	23	142	
Education (yr)			0.223
≤12	10	38	
>12	13	105	
Socioeconomic status			0.508
Low	5	26	
Middle	18	110	
High	0	7	
Religion			0.092
No	14	82	
Yes	8	61	
FHx of psychiatric problems			0.452
No	22	140	
Yes	1	3	
Drinking history			0.316
No	18	121	
Yes	5	22	
Smoking history			0.03
No	20	138	
Yes	3	5	
PHx of psychiatric problems			0.023
No	21	141	
Yes	2	2	
Past medical History			0.722
No	19	119	
Yes	4	23	
Occupational history			0.867
No	16	96	
Yes	7	51	
Level of marital satisfaction			0.002
Low	1	0	
Medium	17	67	
High	5	76	
Parity			0.150
0	18	76	
1	5	66	
≥2	0	1	
Breast feeding			0.64
No	1	11	
Yes	22	132	
Scheduled pregnancy			0.95
No	13	75	
Yes	10	68	
Mode of delivery			0.959
Vaginal delivery	14	80	
Cesarean section	9	63	
Gestational age at delivery (wk)			0.664
<37	2	10	
≥37	21	133	

FHx, family history; PHx, past history.

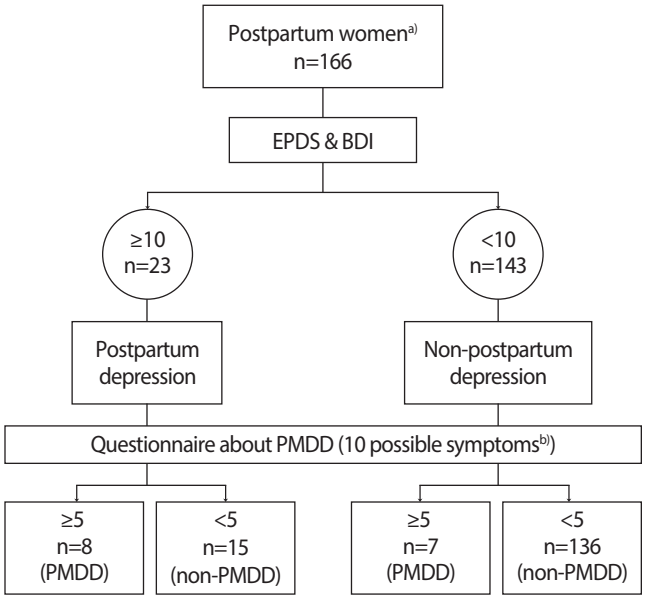

Fig. 1. Diagram for the classification of women with postpartum depression and premenstrual dysphoric disorder (PMDD). [a]Ten to fourteen days after delivery; [b]Breast tenderness, bloating, headache, peripheral edema (hand and foot), depression symptoms, anger, irritability, anxiety, oversensitivity, and exaggerated mood swings; In 5-7 days premenstruation, before pregnancy. EPDS, Edinburgh Postnatal Depression Scale; BDI, Beck Depression Inventory.

Table 2. Comparison of EPDS, BDI, and premenstrual syndrome results

	Postpartum depression (n)	Non-depression (n)	*P*-value
EPDS and BDI	23	143	
Premenstrual syndrome			
Yes	8	7	
No	15	136	<0.01

EPDS, Edinburgh Postnatal Depression Scale; BDI, Beck Depression Inventory.

and the prevalence rate was thus 4.9% (7/143). We therefore found a correlation between PPD and PMDD (P<0.01) (Table 2).

Discussion

To our knowledge, this is first study about Korean women's vulnerability to depression at reproductive cycle events. In Korea, there is a lack of studies on PMDD, PPD, and the correlation between reproductive events and depression.

Choi et al. [18] examined a population-based, online survey regarding premenstrual symptoms that included 1000 Korean women. The approximate prevalence rate of PMS/PMDD using the World Health Organisation's International Classification of Disease (ICD-10), ACOG, and DSM-IV criteria was 98.6%, 32.1%, and 2.8%, respectively. Physical symptoms were more prevalent than mental symptoms. There was a high correlation between the duration and severity of symptoms. The proportion of women consulting physicians increased with the severity of PMS from 2% and 2.3%, for ICD-10- and ACOG-diagnosed PMS, to 10.7% for DSM-IV-diagnosed PMDD, respectively. Most of the women (91.5%) had no knowledge regarding terminology pertaining to PMS and PMDD. Hong et al. [19] examined 2,499 women about the prevalence, correlates, comorbidities, and suicidal tendencies of PMDD using DSM-IV criteria. They found that PMDD was frequently associated with other psychiatric disorders, insomnia, and suicidality, suggesting the need to detect and treat women who experience PMDD. Gregory et al. [20] asked 72 American women in treatment for major depression to complete a questionnaire assessing mood at four different reproductive cycle events (premenstrual, taking oral contraceptives, postpartum, and perimenopausal). They found significant correlations between premenstrual and perimenopausal mood ratings (r=0.41, P=0.04) and postpartum and perimenopausal mood ratings (r=0.64, P=0.001). These findings suggest that there may be a unique subgroup of women who are vulnerable to depression at reproductive cycle events. Chung et al. [21] examined PMS and PMDD in perimenopausal women. They emphasized to educate and inform perimenopausal women of PMS and PMDD.

This study found a PMDD prevalence rate of 9% (15/166), which coincides with approximately 3% to 9% prevalence rates found in previous studies [11,13]. Among 23 women in the PPD and 143 women in the non-depression groups, the prevalence rates for PMDD were 34.8% (8/23) and 4.9% (7/143), respectively. We therefore found a correlation between PPD and PMDD (P<0.01). This result points to the hypothesis that there may be a unique subgroup of women who are vulnerable to depression around the time of reproductive cycle events due to a heightened sensitivity to the accompanying sex hormone fluctuations. Those hormonal fluctuations could influence neurochemical pathways linked to depression. Between both groups, there were two women in each that had a history of psychiatric problems. Excluding these four women from the study population, the prevalence rate of newly-developed psychiatric problems in the postpartum period is 13% (21/162). This rate clearly indicates the need for social attention towards support and care during postpartum.

Our results suggest an association between smoking history and the prevalence of PPD. A strong correlation between cigarette smoking and lifetime prevalence of depression has been noted in previous studies [22,23].

The correlation between a history of psychiatric problems and PPD may be explained by postpartum magnification (like menstrual magnification) due to the influence of intense hormonal fluctuations after delivery, profound changes in living environment, and changes to or stopping medication use during the perinatal and breast feeding period. However, since only four women had a history of psychiatric problems, more research is required.

Correlations between PPD and level of marital satisfaction can be explained by differences in accessibility and quality of medical support, and the burden of infant care and housework at postpartum.

This study has several limitations. First, we could not use daily records for PMDD diagnosis because the study participants are in puerperium. The time for restarting menstruation is different for each woman according to breast feeding status and our clinical follow-up time was short. Practically speaking, we could not get daily records about premenstrual symptoms for the participating women. To be included in the PMDD group, five or more symptoms must occur in the five to seven days before two consecutive symptomatic cycles, and must remit following the onset of menses. Since these symptoms occurred about ten to twelve months prior to our study, we had to rely on the participants' memory. Also, we used ACOG's diagnostic criteria for symptoms and the DSM-IV-TR diagnostic method (presence of five or more symptoms to PMDD definition), but there are no standardized instruments for defining PMDD, and the definition is controversial among psychiatrists and obstetricians.

In conclusion, our study found a correlation between PPD and PMDD ($P<0.01$), which supports the hypothesis that there may be a unique subgroup of women who are vulnerable to depression during specific reproductive cycle events. In spite of increasing evidence for an association between reproductive events (premenstrual, postpartum, and menopausal transition) and the development of depressive episodes, the impact and burden of PMDD and PPD is still underrecognized in public health fields. Enhanced recognition and greater attention to developing effective screening strategies, non-controversial diagnostic criteria, and adequate treatment guidelines for reproductive mood disorders are required, and that could provide relief to many women and their families. For clinicians, it is necessary to focus on not only physical symptoms but also psychological signs in reproductive events.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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