Prevalence of and Risk Factors for Depressive Symptoms in Korean Women throughout Pregnancy and in Postpartum Period

Jeong-hwan Park, PhD, RN, 1,* Wilfried Karmaus, MPH, MD, 2 Hongmei Zhang, PhD 2

1 Department of Nursing, Chosun University, Gwangju, South Korea
2 Division of Epidemiology, Biostatistics, and Environmental Health, School of Public Health, University of Memphis, Memphis, TN, USA

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Summary
Purpose: Prenatal depression is a significant predictor for postpartum depression. However, there is a lack of research on risk factors for Korean women related to prenatal depression and the relationship between prenatal depression during the three trimesters and postpartum depression. Therefore, aims of this study were (1) to identify the prevalence of depression during all three trimesters and the postpartum period, (2) to evaluate the relationship between prenatal depression in each trimester and postpartum depression, and (3) to identify the relationship and differences in prenatal depression based on sociodemographic factors in Korean women.

Methods: One hundred and fifty three Korean women were recruited from three maternity clinics in Korea. Prenatal and postpartum depressions were evaluated in the first, second (24–26 weeks), third (32–34 weeks) trimester and 4 weeks postpartum with the Edinburgh Postnatal Depression Scale–Korean.

Results: The prevalence of depression in the prenatal and postpartum period ranged from 40.5% to 61.4%. Depression in the second and the third trimester was significantly correlated with depression in the postpartum period. Unemployment and household income were risk factors for prenatal depression in the first and second trimesters.

Conclusions: To assist women suffering from postpartum depression and prevent its effects, women should be screened for prenatal depression during all three trimesters. For Korean women with high risk factors for prenatal depression, we suggest that the Korean government establish healthcare policies related to depression screening as routine prenatal care and mental health referral systems.

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Introduction

Pregnancy can increase the vulnerability of mental, physical, and psychological health of women and their fetuses [1]. It is well-known that maternal depression or depressive symptoms during pregnancy are a significant predictor of postpartum depression in women and has been shown to have increased negative effects on infant outcomes [2–4].

The timing of prenatal depression is also important for birth and infant outcomes. For example, the timing of maternal depression and depressive symptoms during pregnancy impacts the neurobehavioral development of the fetus and has been linked to developmental, behavioral, emotional, and cognitive problems in infants and children, including preterm delivery, low birth weight, increased negative reactivity, attention regulation, anxiety, and depression [2,3,5,6]. However, there is a lack of studies regarding the relationship between timing of prenatal depression and postpartum depression. One study with Chinese women showed that depression in the first trimester was a powerful predictor of postpartum depression [7]. We do not know at which point of prenatal depression healthcare providers or clinicians need to assess prenatal depression to prevent postpartum depression. A timely detection of prenatal depression should be investigated in a systematic way to prevent adverse outcomes for mothers and infants.

Many researchers have used the terms depression and depressive symptoms interchangeably. The concept of depression was used widely to mean depressive symptoms, even though depression criteria is defined in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM–IV) [2,3,7,8]. However, maternal depression and depressive symptoms during pregnancy have shown negative infant and maternal outcomes [2–4].
The prevalence and incidence of prenatal depression in each trimester must first be identified. However, an accurate estimate of the prevalence and incidence of prenatal depression is uncertain because assessment methods, the timing of assessment, and population characteristics vary widely [9]. In a systematic review with meta-analysis, the estimated prevalence of prenatal depression is 11.0% in the first trimester and 8.5% in the second and third trimesters in England, Scotland, Norway, Portugal, Netherlands, Australia, United States, Canada, Hong Kong, and Japan. Approximately 14.5% of pregnant women have a new episode of depression during pregnancy [9]. In a systematic review, prenatal studies with a clinical assessment or structured clinical interview were included to identify clinical depression. However, no studies investigating prenatal depression in Korean women were included in that review because no studies with a structured clinical interview have been done on that topic with Korean women.

Although prenatal depression is more prevalent than postpartum depression [2,6], research on prenatal depression is more limited compared to postpartum research in Korea and other countries. Recently, prenatal depression has become a topic of interest among Korean researchers and clinicians because of its ability to predict postpartum depression, which has become an important social issue in Korea. Korean research on prenatal depression is in its early stages compared to that of other countries [10]. In addition, national data are not available in Korea regarding the prevalence and incidence of prenatal depression in each trimester or regarding the relationship between prenatal depression in each trimester and postpartum depression.

The reported prevalence of prenatal depression or depressive symptoms in Korea has varied broadly because of the use of different tools and the timing of the assessment. Published estimates of the prevalence of prenatal depression among Korean women ranged from 20.0% to 44.0% using either the Beck Depression Inventory (BDI) or Edinburgh Postnatal Depression Scale—Korean (EPDS-K) [10,11-15].

Korean researchers have measured depression once during the prenatal period [10,16-17] or evaluated depression once in the prenatal and once in the postnatal period [15]. However, no study has examined the relationship between prenatal depression during the three trimesters and postpartum depression in Korea. Therefore, we do not know the relationship between the timing of depression during pregnancy and postpartum depression. In addition, because of the scarcity of longitudinal studies that measure depression during the three trimesters and postpartum period in Korea, we do not know the prevalence of perinatal depression during each trimester and postpartum period or the change in patterns of perinatal depression during that time.

To identify women at high risk for prenatal depression, research studies investigating sociodemographic factors that influence prenatal depression are needed. In a systematic review regarding risk factors for depressive symptoms during pregnancy, a history of depression, lower income, lower education, smoking, and single status were related to prenatal depression in western countries including Australia, Canada, England, Finland, Germany, Netherlands, Norway, Sweden, and the United States [18]. In a review study of prenatal depression of women in East Asia including China, Japan, Korea and Taiwan, younger age, smoking, lower education, income and unemployment were risk factors of prenatal depression [19].

Limited and inconsistent information for risk factors of prenatal depression is available in Korea. Sociodemographic factors such as age, marital status, educational level, job, socioeconomic status, parity, number of children, smoking, and alcohol consumption are associated with prenatal depression [12]. However, the factors identified by Kim and Ryu [12] did not significantly correlate with prenatal depression in other Korean studies [10,11]. Another Korean study showed that income, health status, marriage satisfaction, family support and husband’s love were risk factors for prenatal depression [17]. Hence, more research is needed to adequately explore the factors that impact prenatal depression in Korean women to prevent women with risk factors for prenatal depression from developing postpartum depression. Therefore, the aims of the current study were (1) to identify the prevalence of depression during all three trimesters and the postpartum period, (2) to evaluate the relationship between prenatal depression in each trimester and postpartum depression, and (3) to identify the relationships and differences of prenatal depression based on sociodemographic factors in Korean women.

**Methods**

**Design**

This was a longitudinal design study [20]. It involved the same participants with a repeated measure survey of four data collection points during the three trimesters of pregnancy and the postpartum period.

**Setting and sample**

Based on the results from a previous study [16], the prevalence of depression among pregnant women is approximately 8.0% in Korea. Based on a sample size calculation with 8.0% as the null and to detect a minimum difference in prevalence of 4.0%, the study required 200 participants with a power of 82.3% and a significance level of 0.05. The pregnant women were recruited from three maternity clinics in Gwangju in Korea. The three maternity clinics were chosen because the directors of the clinics were willing to participate in the study and the clinics have good reputations in terms of quality of care. The three maternity clinics also had similar demographic characteristics. The inclusion criteria for the participants were as follows: (1) aged 18 years and older; (2) gestational age ≤ 14 weeks (first trimester); (3) able to speak, read, and write Korean; and (4) able to cooperate with data collection methods. The exclusion criteria included a gestational age > 14 weeks; a limited ability to read, speak, and write Korean; or those under 18 years of age.

**Ethical considerations**

Approval for the study was granted by the institutional review board of the Chosun University (IRB-10-014). Participation was voluntary. Participants’ responses were kept confidential by using a study identity number or participant code for each survey.

**Measurements**

The data collection methods included the following: (a) a sociodemographic questionnaire and (b) EPDS-K, 10-items.

A sociodemographic questionnaire was used to describe the sample characteristics. It asks basic sociodemographic questions including the following: nationality, gestational age, estimated delivery date, age, educational level, marital status, number of children, nulliparous or multiparous status, employment status, household income level, history of depression, existing disease, present smoking status, and alcohol consumption.

The EPDS was developed to measure depressive symptoms in women in the postpartum period [21]. The self-reported questionnaire comprises 10 items rated on a 4-point scale, from 0 to 3, with a higher score indicating a higher level of depression. It
includes cognitive and affective symptoms of depression. A score of 10 is regarded as high risk for depression [22]. The questionnaire has been used worldwide in both the prenatal and postpartum periods [23]. There is a significant correlation \((r = .59)\) between the EPDS and the structured clinical interview for DSM-IV [24]. In this study, depression was not considered a disease with a medical diagnosis, and the concept of depression was employed broadly to mean depressive symptoms.

The EPDS-K has been widely used for Korean women in the prenatal and postpartum periods [10, 16, 17, 25, 26]. For example, the validity of the EPDS-K was supported by a significant difference \((p < .001)\) between depressed and nondepressed groups and by a significant correlation \((p < .01)\) with the BDI \((r = .80)\) and Hamilton Depression Scale \((r = .89)\). The evidence on the reliability of the EPDS-K showed that split-half reliability was .85 [27] and the internal consistency (Cronbach \(z\)) ranged from .84 to .87 [28]. The Cronbach \(z\) in the present study ranged from .79 to .84. The validation studies with the EPDS-K showed that using 9 or 10 as a cut-off point is optimal to detect minor or major depression in Korean women [27, 28].

**Data collection**

Before data collection, a researcher contacted the three maternity clinics for sampling in Gwangju, and all agreed to join the study. The data were collected between September 2010 and October 2011 in Korea. After institutional review board approval, the researcher trained research assistants (RAs) regarding the data collection procedures. The training included how to obtain informed consent and other topics such as patient confidentiality. The researcher visited the clinics with the RAs and explained the study to staff nurses. The nurses informed the researcher or RAs of potential participants for this research. The researcher or RAs contacted each participant and explained the purpose and procedures of the study. If a participant was willing to participate in the study, a consent form was provided. The RAs or researcher informed the participants that they could withdraw from the study at any time.

Following participant consent, data were collected using a demographic questionnaire and EPDS-Korean (EPDS-K) in the first trimester. The participants completed the questionnaire in approximately 5 minutes. The RAs or researcher informed participants that they would be contacted once in the second trimester, once in the third trimester, and once in the postpartum period by phone. The RAs or researcher contacted the participants in the second (24–26 weeks) and third (32–34 weeks) trimesters and at 4 weeks postpartum to administer the 10 items in the EPDS-K. All participants received a gift card in appreciation for their time. Data records were stored in a file cabinet in a locked office. The computerized database was in password-protected computers accessible only to the research staff.

**Data analysis**

Statistical analyses were conducted using SPSS version 19.0 (IBM Corp, Armonk, NY, USA). Descriptive statistics were used to describe the sample characteristics including frequencies, percentages, means, and standard deviations and to identify the prevalence of prenatal and postpartum depression. To identify the relationship between prenatal depression in each trimester and postpartum depression, Pearson correlation tests were utilized. Point-biserial or Pearson correlations were used to examine the relationship between sociodemographic variables and prenatal depression. Additionally, \(t\) test, or analysis of variance (ANOVA) was used to identify the differences of prenatal depression based on sociodemographic factors. For further analysis of sociodemographic variables, which influence prenatal depression, chi-square was also utilized. Statistical tests were considered significant if the \(p\) value was less than .05.

**Results**

**Demographic characteristics**

Two hundred women were initially recruited in their first trimester; 47 women (23.5%), 44 women in the second trimester and an additional 3 women during their third trimester dropped out or were lost to follow-up during the data collection period. The remaining 153 women completed the final postpartum depression survey, resulting in a retention rate of 76.5%. The reason 47 women were lost to follow-up or dropped out from this study was because they changed their phone number or did not answer the phone. We understood this as the way of withdrawal from the study in Korean culture. Final statistical analysis included only the 153 women who completed the depression survey in each trimester and the postpartum period. Participants lost to follow-up or who dropped out were not included in statistical analysis, including sociodemographic characteristics and perinatal depression analysis. Our data (Table 1) indicated that the minimum prevalence is 40.5% among the three trimesters and the postnatal period. The analysis was based on the same method and null hypothesis as in our \(a \ priori\) power calculation, that is, \(z\) tests on proportions and prevalence of 8.0% for the null. At a significance level of 0.05, our finding based on information from 153 participants embraces a statistical power > 99.9%, close to 100.0%.

The study participants ranged in age from 19 to 44 years. The mean gestational age in the first trimester was 10.6 weeks (SD = 1.89), and the mean age of women was 31 years (SD = 3.99). Most participants were college graduates (74.5%) and married (92.8%). The sample comprised 54.2% nulliparous and 45.8% multiparous women. Approximately 52.3% of women were employed (n = 80). Most did not have any acute illness in the first and second trimester (96.1%) or during the third trimester (98.0%). Most women (96.7%) did not have a history of depression. In the first trimester, only one participant smoked, and no participants smoked in the second or third trimester. In addition, no participants reported alcohol use during pregnancy. The analyses for the 47 participants who withdrew showed that 4 of these 47 women had a history of depression (8.5% vs. 3.3% for the remaining sample), 28 were nulliparous, and 11 had a high school diploma or less (23.4% vs. 19.7% for the remaining sample). For universal understanding, Korean household income has been converted to American dollars. Sociodemographic characteristics are shown in Table 2.

**Prevalence and relationship between prenatal and postpartum depression**

Table 1 shows that more than half of the participants (61.4%) experienced prenatal depression during the third trimester \((M = 10.37)\). The prevalence of depression in the first and second trimesters and postpartum period ranged from 40.5% to 42.5%. Pearson correlation was utilized with total depression scores in each trimester and postpartum period. The correlations between the timing of perinatal depression showed that depression in the first trimester was significantly associated with depression during the second \((r = .50)\) and third \((r = .30)\) trimesters but not with depression during the postpartum period \((r = .15)\). Depression in the second trimester correlated with depression in the third trimester \((r = .51)\) and the postpartum period \((r = .23)\). Depression
in the third trimester was correlated with depression in the postpartum period \((r = .23)\).

**Relationships between sociodemographic variables and prenatal depression**

To examine the relationships between sociodemographic variables and the timing of prenatal depression, point-biserial and Pearson correlations were performed (Table 3). The timing of prenatal depression was calculated from the total depression scores in the first, second, and third trimesters. To use point-biserial correlations, education levels were divided into two categories (high school diploma or less and university or graduate school). As shown in Table 3, there was no significant correlation between sociodemographic variables and the timing of prenatal depression, except for employment status. Only unemployment significantly correlated with prenatal depression in the first \((r = -.18, p = .030)\) and second \((r = -.23, p = .004)\) trimesters.

To identify the differences of prenatal depression based on sociodemographic factors, t test or ANOVA were used (Table 4). Income level was divided into three categories \((< \$2,000, \$2,000–\$3,000, > \$3,000 monthly income)\) based on average monthly income in Korean, \$3,000 \([29]\), and two lower categories of average income consistent with the study by Kwon and Bang [13]. The means of depression scores in the first \((p = .030)\) and second \((p = .049)\) trimesters were significantly different by household income. In particular, women with \$2,000–\$3,000 in monthly income were significantly more depressed in the first and second trimesters than women in the other two monthly income groups.

Employed women were significantly less depressed in the first \((p = .030)\) and second \((p = .004)\) trimesters than unemployed women. A majority of employed women were primipara, whereas most unemployed women were multipara \((p < .001)\). In addition, there was an association between employment status and income level \((p = .046)\). In the \$2,000–\$3,000 monthly income range, most women were unemployed whereas in the less than \$2,000 or more than \$3,000 monthly income range, most women were employed. Unemployed women with high school diploma or less consisted of 12.4% of the total participants, while the 7.2% of employed women had the same educational background. However, there was no significant association between employment status and educational level \((p = .060)\). We performed post-hoc power calculations on statistically significant findings listed in Table 4. At a significance level of 0.05, our findings based on information gives a power of 88.7% and 85.1% for household income and employment status, respectively. Previous history of depression, age and marital status were not significantly associated with employment status. No significant difference was found in the total prenatal depression scores by other sociodemographic variables.

**Discussion**

Initially, 200 Korean women were recruited from the maternity clinics in Gwangju in the first trimester, and 153 women completed the perinatal depression survey. The prevalence of perinatal depression in this study increased over the trimesters and then dropped in the postpartum period. In the examination of the

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**Table 1** Correlations and Prevalence between Timing of Perinatal Depression.

<table>
<thead>
<tr>
<th>Timings</th>
<th>1st trimester</th>
<th>2nd trimester</th>
<th>3rd trimester</th>
<th>Postpartum</th>
<th>Frequency of depression (n) (%)</th>
<th>(M \pm SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st trimester</td>
<td>.50*</td>
<td>.30*</td>
<td>.15</td>
<td>62 (40.5%)</td>
<td>8.87 ± 4.27</td>
<td></td>
</tr>
<tr>
<td>2nd trimester</td>
<td>.50*</td>
<td>.23*</td>
<td>.23*</td>
<td>65 (42.5%)</td>
<td>8.50 ± 4.60</td>
<td></td>
</tr>
<tr>
<td>3rd trimester</td>
<td>.30*</td>
<td>.15</td>
<td>.14</td>
<td>65 (42.5%)</td>
<td>10.37 ± 4.31</td>
<td></td>
</tr>
<tr>
<td>Postpartum</td>
<td>.23*</td>
<td>.14</td>
<td>.14</td>
<td>65 (42.5%)</td>
<td>8.65 ± 4.69</td>
<td></td>
</tr>
</tbody>
</table>

*Note. *\(p < .01\).*

---

**Table 2** Sociodemographic Characteristics.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>(n)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational level ((n = 153))</td>
<td>≤ High school graduates</td>
<td>30</td>
<td>19.6</td>
</tr>
<tr>
<td></td>
<td>College/university</td>
<td>114</td>
<td>74.5</td>
</tr>
<tr>
<td></td>
<td>Graduate school</td>
<td>9</td>
<td>5.9</td>
</tr>
<tr>
<td>Marital status ((n = 153))</td>
<td>Married</td>
<td>142</td>
<td>92.8</td>
</tr>
<tr>
<td></td>
<td>Unmarried</td>
<td>11</td>
<td>7.2</td>
</tr>
<tr>
<td>Parity ((n = 153))</td>
<td>Nulliparous</td>
<td>83</td>
<td>54.2</td>
</tr>
<tr>
<td></td>
<td>Multiparous</td>
<td>70</td>
<td>45.8</td>
</tr>
<tr>
<td>Household</td>
<td>(&lt; $1,000)</td>
<td>2</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>$1,000–$1,999</td>
<td>51</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>$2,000–$2,999</td>
<td>51</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>$3,000–$3,999</td>
<td>22</td>
<td>14.4</td>
</tr>
<tr>
<td></td>
<td>(\geq $4,000)</td>
<td>20</td>
<td>13.1</td>
</tr>
<tr>
<td>Income (monthly)((n = 146))</td>
<td>Yes</td>
<td>80</td>
<td>52.3</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>73</td>
<td>47.7</td>
</tr>
<tr>
<td>History of Depression ((n = 153))</td>
<td>Yes</td>
<td>5</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>148</td>
<td>96.7</td>
</tr>
<tr>
<td>Age((n = 152))</td>
<td>M ± SD, range</td>
<td>31.0 ± 3.99</td>
<td>19–44 yrs</td>
</tr>
</tbody>
</table>

*Sample number is fewer than 153 due to missing data for these variables.*

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**Table 3** Correlations between Sociodemographic Variables and Timing of Prenatal Depression.

<table>
<thead>
<tr>
<th>Variables</th>
<th>1st trimester</th>
<th>2nd trimester</th>
<th>3rd trimester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational level</td>
<td>.05</td>
<td>.03</td>
<td>.04</td>
</tr>
<tr>
<td>Marital status</td>
<td>-.09</td>
<td>.003</td>
<td>.01</td>
</tr>
<tr>
<td>Parity</td>
<td>.04</td>
<td>-.01</td>
<td>.05</td>
</tr>
<tr>
<td>Household Income*</td>
<td>.09</td>
<td>.04</td>
<td>.06</td>
</tr>
<tr>
<td>Employment Status</td>
<td>-.18*</td>
<td>-.23**</td>
<td>.01</td>
</tr>
<tr>
<td>Age*</td>
<td>.09</td>
<td>.03</td>
<td>.04</td>
</tr>
<tr>
<td>History of Depression</td>
<td>.09</td>
<td>.14</td>
<td>.15</td>
</tr>
</tbody>
</table>

*Note.* \(p < .05, **p < .01\).*

\*Pearson correlation, no symbols: point-biserial correlations.

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**Table 4** Difference of Prenatal Depression by Trimester based on Sociodemographic Variables and Timing.

<table>
<thead>
<tr>
<th>Variables</th>
<th>1st trimester</th>
<th>2nd trimester</th>
<th>3rd trimester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational level</td>
<td>-.58</td>
<td>.566</td>
<td>-.39</td>
</tr>
<tr>
<td>Marital status</td>
<td>1.13</td>
<td>.259</td>
<td>-.03</td>
</tr>
<tr>
<td>Parity</td>
<td>-.46</td>
<td>.646</td>
<td>-.17</td>
</tr>
<tr>
<td>Household Income</td>
<td>1.50</td>
<td>.030*</td>
<td>3.08</td>
</tr>
<tr>
<td>Employment Status</td>
<td>2.25</td>
<td>.026*</td>
<td>2.95</td>
</tr>
<tr>
<td>Age(&lt;30) yrs vs. (&gt;30) yrs</td>
<td>-.09</td>
<td>.695</td>
<td>-.07</td>
</tr>
<tr>
<td>History of depression</td>
<td>-.11</td>
<td>.258</td>
<td>-.17</td>
</tr>
</tbody>
</table>

*Note.* \(p < .05, **p < .01\).*


relationship between sociodemographic variables and the timing of prenatal depression, employment status, and household income were significantly related to the depression in the first and second trimesters. We compared our study results with those of other studies and then discussed the directions of future research and the clinical implications of perinatal depression.

The prevalence of prenatal depression in the current study increased over the trimesters, from 40.5% in the first trimester to 61.4% in the third trimester. The results cannot be compared to other Korean studies due to the lack of longitudinal research regarding prenatal depression. However, compared with the results of other cross-sectional studies in Korea, the prevalence of prenatal depression ranged from 20.0% to 42.0%. This broad range of prenatal depression might be due to mixing the women in different trimesters, risk factors, and the tools used. One study with 357 pregnant women in Hong Kong demonstrated that the rates of depression in the prenatal period were 22.1%, 18.9%, and 21.6% in consecutive trimesters [7]. The results of these studies had substantially lower prevalence rates than that of the present study. Compared with the findings of these studies, the results of the current study with Korean women are striking because of the high prevalence of prenatal depression and the increasing rate of depression across trimesters.

One of the reasons for a higher rate of prenatal depression in Korea might be women’s role in Korean culture, which is dominated by Confucian values and beliefs plus Western values [19,30]. Confucian values dictate that the family as a unit is more important than individuals. Thus, it becomes the role of each family member to maintain the family within their assigned role. In Korean culture, individuals identify themselves strongly through family; discrete but clearly defined roles are assigned based on Confucian values [31]. Confucianism calls for women to be dutiful daughters-in-law, attentive wives, and caring mothers. Korean women see themselves especially as mothers and caregivers in the family. For example, Korean women take full responsibilities for childcare and child-rearing, and husbands are not expected to share the childcare workload [32,33]. Korean women are also expected to take care of their mother-in-law and father-in-law, in addition to childcare and household duties.

In addition, due to the influences of Western values, Korean women have been increasingly employed [34,35]. Role conflict based on multiple responsibilities caused by two forces, Confucian and Western values, and little support from spouses may influence Korean women to be more depressed and have lower self-esteem than women in other countries do [30,36]. Moreover, family issues such as role conflict are not openly discussed in public because Koreans consider that disgraceful [31]. The suppression of women’s expression and emotional control tied to the culture might aggravate depression [37,38].

As well, Korean culture tends to believe that depression is a normal part of life or a natural phenomenon, and mental illness is regarded as shameful to the whole family [38]. These social and cultural factors in Korea lead to reluctance to seek mental health care services. For example, the probable estimate of Korean women suffering from postpartum depression is about 48,000 women annually, but only 0.6% of women received medical treatment [39]. Healthcare providers for the Korean population should be considered when maximizing the effectiveness of mental health care delivery programs [38,40]. Future research is needed to examine the relationship between role conflict related to cultural factors and prenatal depression.

The current study showed that the prevalence of prenatal depression was the highest in the third trimester. This finding was consistent with the results of another study, which found the level of prenatal depression in the third trimester to be significantly higher than that in the second trimester [12]. In other words, the timing of gestational period was a significant factor in prenatal depression [3,10]. Prenatal depression was found to be at a higher level in the first and third trimester in one study [3] and in the second and third trimester in another study [9]. Stress is significantly correlated to depression or depressive symptoms [13]. It is conceivable that a higher level of stress such as the burden of delivery, expected burden of childrearing, and role conflict in Korean culture might cause a higher rate of depression in the third trimester [41].

The time points during each trimester significantly correlated with each other, which is consistent with the results of another study [7,42]. However, the correlation between each trimester and postpartum depression was quite different. Prenatal depression in the first trimester did not significantly correlate with postpartum depression, whereas the rates of depression in the second and third trimesters did significantly correlate with postpartum depression. Specifically, prenatal depression in the first trimester did not predict postpartum depression in the current study, which is in contrast to the results of the study conducted by Lee and colleagues [7], in which depression in the first trimester was a powerful predictor of postpartum depression. Our result of a significant correlation between the second and third trimester and postpartum depression is especially important because it demonstrates that healthcare providers should provide interventions to prevent postpartum depression to women with prenatal depression in the second trimester.

A study of prenatal depression in Chinese women showed that single or divorced women and those with a history of drinking in the first trimester, younger age at second trimester, and drinking during the third trimester were risk factors for prenatal depression [7]. As found by Lee and colleagues [7], the risk factors slightly changed in different trimesters in the current study. Employment status was the only risk factor related to depression in the first and second trimesters in Korean women, which was a consistent risk factor also in a previous Korean study [12]. Employment status is significantly associated with parity and income level in the current study: unemployed pregnant women with $2,000–$3,000 in monthly income who have one or more children are more likely to be depressed in the first and second trimester.

We did not investigate infant outcomes related to the timing of prenatal depression in the current study. Little is known regarding the relationship between the timing of prenatal depression and maternal or infant outcomes in Korean women and children. Because the timing of prenatal depression influences developmental, behavioral, emotional, cognitive problems in infants and children in western countries [2,3], future research should utilize a large sample of Korean women and infants. To facilitate early detection and intervention, Korean research must establish at which gestational time point prenatal depression correlates with infant developmental outcomes.

There is a Korean cultural belief that all thoughts, behaviors, and feelings of a pregnant woman influence the cognitive, affective, and behavioral development of a fetus [43,44]. Because of this cultural belief, most Korean pregnant women practice Taegyo, a Korean traditional maternal-fetal interaction, and avoid smoking and alcohol use during pregnancy [44,45]. This is consistent with the results of the current study in which almost no participant smoked or consumed alcohol during pregnancy. Maternal-fetal interaction was negatively correlated with prenatal depression at some degree in Korean women [13]. Research with a large sample of Korean women is needed to examine the relationship between the quantity and quality of Taegyo and prenatal depression. Fetal programming, in which prenatal depression and depressive symptoms have been shown to increase the production of cortisol and eventually
impact neurobehavioral development of the fetus [2,46], is closely related to Taegyo in Korea. Culturally appropriate nursing interventions, such as educational programs that integrate fetal programming into Taegyo, may decrease prenatal depression in women and enhance infant outcomes.

Currently, Korean government has set up the direction of the maternal childcare plan, including prenatal and postnatal depression. However, there are no specific guidelines for the screening and treatment of perinatal depression [14]. Approximately 12.4% of the women had depression from the first trimester to the postpartum period in the current study, while 43.8% of those had depression episodes at one or more time points only in the prenatal period. Persistent depression of Korean women in prenatal and postnatal period from the current study are quite astonishing compared to that of another study, which found that 1.4% of the women were depressed both during the prenatal and postnatal period, and 14.1% of the women were depressed at least once in the prenatal period [5]. In particular, Korean government needs to set up a national linking system to refer women with persistent depression through pregnancy to a clinical psychologist or psychiatrist. Because of the negative effects of prenatal depression on infant and maternal outcomes, prenatal depression should be treated in a timely manner. However, due to low participation of education regarding perinatal depression [47] and low awareness of perinatal depression, a national campaign or advertisement through mass media should be implemented in Korea to increase public awareness about perinatal depression.

In addition, the Korean government should expand the utilization of Sanhoodowoomi, a home visit helper who takes care of a woman and a newborn baby in Korea, from financially vulnerable women to all pregnant women with high risks for depression to screen for depressive symptoms using a self-report or observer scale. Nurses could educate Sanhoodowoomi about basic care for a woman and baby including perinatal depression. In addition, the government should consider the extension of timing of service for Sanhoodowoomi from prenatal to postpartum period.

Considering the high prevalence of prenatal depression in Korean women, Korean healthcare providers, researchers, and policymakers should consider nationwide routine screening for prenatal depression in each trimester and develop a mental health referral system. In addition, prenatal and postpartum depression should be included in prenatal education program to increase knowledge or awareness of perinatal depression. To promote early detection and treatment of perinatal depression, family should be involved in the prenatal education program.

Limitations

This study has a few limitations. First, the participants in this study were a convenience sample recruited from three clinics in Gwangju in Korea; therefore, we cannot generalize the findings. A large, nationwide sample is required in future Korean studies to identify significant prevalence or incidence of prenatal depression. Second, our findings cannot be compared to other Korean studies concerning prenatal depression because most studies used a cross-sectional design. Third, we measured depressive symptoms with self-report measure, the EPDS-K, and did not medically diagnose depression. Because of Confucian values and saving face culture in Korea, women might be more likely to respond with socially acceptable answers rather than stating their true feelings. Fourth, we should consider errors in the measurement tool, which was developed in Western culture. Considering that Koreans tend to complain about more socially acceptable somatic symptoms of depression rather than affective ones [37,38], the EPDS, a tool developed in Western culture, may not be appropriate for measuring depression in the Korean population. Future research should examine whether the EPDS-K is culturally sensitive enough to measure depression in the Korean population. Fifth, we did not measure social support, life stress, or marital satisfaction in the current study, which are factors that have impacted prenatal depression in other studies [12,14,17,18,48]. Future studies with Korean women should consider these factors and identify how much they impact prenatal depression.

Conclusion

To assist women suffering from postpartum depression and prevent its effects, women should be screened for prenatal depression during each trimester when they visit prenatal clinics. For Korean women with high risk factors for prenatal depression, we suggest that the Korean government establish healthcare policies related to depression screening as routine prenatal care and mental health referral systems.

Education regarding perinatal depression should be included in prenatal care. Furthermore, family involvement in prenatal education is one strategy to increase awareness of perinatal depression. In particular, healthcare providers who provide care to the Korean population should address the social and cultural stigma of mental illness that exists in Korea, which leads to a reluctance to seek mental health care services. Because mental illness may be related to cultural expectations and constraints, healthcare providers should have cultural training to understand the meaning of illness within the culture and address those challenges effectively.

Conflicts of interest

The authors declare no conflict of interest.

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