Risk Factors of Postpartum Depression in Rural Areas of Isfahan Province, Iran

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Background: Postpartum depression is defined as a major depressive episode that occurs within four weeks after delivery. However, investigators describe a dramatic increase in the incidence of mood disorders after childbirth with the largest risk during 90 days after delivery. We aimed to study the risk factors of postpartum depression in women living in rural areas of Isfahan Province in Iran.

Methods: We assessed 6627 women, two to 12 months after delivery, for depression and putative risk factors.

Results: Unemployment, low education, mothers' young age, undesired gender of the child, unplanned pregnancy, and history of depression were the main risk factors of postpartum depression. History of depression, low education, primiparity, unplanned pregnancy, and undesired gender of the child had the highest risk score for postpartum depression in this group of Iranian women.

Conclusion: Risk factors of postpartum depression in Isfahan Province were very similar to other studies, but the negative impact of low level of education, unplanned pregnancy, and undesired gender of the child on postnatal depression seems to be characteristic of this population.

Introduction

Despite some debate about the time frame of the postpartum period, Diagnostic and Statistical Manual of Mental Disorders IV defined Postpartum depression (PPD) as a major depressive episode that occurs within four weeks after delivery. However, the incidence of mood disorders increase dramatically after childbirth; the first 90 days after delivery are with largest risk of PPD and this risk continues for approximately two years postpartum.

Based on a meta-analysis of community studies, the prevalence of PPD is about 13%.

Various putative psychosocial and obstetric factors have been studied and suggested as risk factors for the development of PPD, if these results are inconsistent and do not effectively help predict women at risk, knowledge of these factors may help identify those who are at higher risk and can benefit from early professional help.

Personal history of depression (prior to pregnancy, or postpartum) is the major risk factor for PPD. Family psychiatric history, lack of perceived social support for the pregnancy from family and friends, unemployment of mother or head of household, lack of emotional and financial support from the partner, marital conflict, stressful life events in the previous 12 months, living without a partner, unplanned...
pregnancy,14,15 having contemplated terminating the current pregnancy,16 poor relationship with one's own mother,18 not breastfeeding,13,15,19 a lifetime history of depression in the husband or partner, childcare-related stressors,20 sick leave during pregnancy related to hyperemesis, uterine irritability, psychiatric disorders, high number of visits to prenatal clinic,21 and a congenitally malformed infant22 are other risk factors of PPD.

Beck revealed thirteen significant predictors of PPD in another meta-analysis. In order of importance, low self-esteem, childcare stress, prenatal anxiety, and life stress had the greatest impact.23

In a comprehensive review, we found that risk factors associated with PPD in our society are the same as in other societies with some predictable controversies.24–27 However, we have no clear data on the distinguishing aspect of Iranian culture regarding PPD risk factors.

The aim of the present study was to identify the variables associated with the risk of PPD and to assess specific distinguishing aspect of Iranian women in this regard.

**Materials and Methods**

**Setting**

The study was conducted in rural areas of Isfahan Province (with varied geographical, cultural, and socioeconomical properties) in the central zone of Iran. The health centers in the area are responsible to provide healthcare services. They are supported by the Vice-Chancellor for Health, Isfahan University of Medical Sciences. Resident health workers (Behvarz) in the village health centers (Health Houses) provide comprehensive primary healthcare. They also assisted the visiting team of general practitioners and other mental health professionals to pay periodic visits to the area.

The primary medical care program covers all residents of these villages. The data collection system in Health Houses is based on non-computerized records of all family characteristics including pregnant and child-rearing women.

**Participants and design**

Participants were all rural women with different socioeconomic status from Isfahan who had a child of two to 12 months. Based on the primary information from the Vice-Chancellor for Health, Isfahan University of Medical Sciences, about 8000 eligible women were recruited for this study. Of those, 476 were excluded because of illiteracy and the rest were invited to participate. A total of 7300 agreed to complete self-report questionnaires. Of them, 673 were excluded because they were incomplete and our final analysis was done with 6627 samples.

This cross-sectional study was carried out as a joint project between the Behavioral Sciences Research Center (BSRC) and the office of Vice Chancellor for Health, Isfahan University of Medical Sciences. Mental health professionals of the local departments of the Vice Chancellor for Health supervised data collection as well as training the health workers in all aspects of the study including its objectives and design. Behvarzes were the persons who contacted all eligible women and requested them to go to Health Houses at pre-determined dates to complete self-report questionnaires. Participants who were unable to go to the rural health centers completed the questionnaires at their home. The completed questionnaires were collected and then sent to mental health professionals of the local departments by Behvarzes. Mental health workers followed up women who were found to be severely depressed or suicidal at the assessment to ascertain the need for further management.

The first questionnaire covered socio-demographic information (such as the number of children, attitude of parents to the sex of the last child, age, occupation, level of education of participant, and whether the pregnancy was planned or unplanned) and the second one was the Persian version of Beck Depression Inventory-II (BDI-II).

The BSRC's Ethics Committee approved the design of the study.

**Assessment of depression**

The severity of depression was assessed using the Persian version of BDI-II28,29 since the Persian version of Edinburgh Postnatal Depression Scale (EPDS) was not available at that time. The BDI is a 21-item scale with a four-point scale that ranges from 0 to 3 scores. It is a self-administered scale that takes five to ten minutes to complete. The severity of depression of a respondent is the sum of the score of each item, ranging from 0 to 63 scores. The average internal-consistency of the total scores is 0.86 for psychiatric patients and 0.81 for normal adults. The average correlation between BDI total scores and clinical ratings of depression was
greater than 0.90 for both psychiatric patients and normal adults. Based on the score obtained, the severity of possible depression was assigned as follows: 0 – 9 (no depression), 10 – 16 (mild depression), 17 – 29 (moderate depression), and 30 – 63 (severe depression). The cut-off for depression screening in the general population is 21+ for a clinical depression score.30–32

Assessment of risk factors
We constructed a questionnaire for the assessment of risk factors for PPD. This questionnaire was given to each participant. The questionnaire covered the following areas:

a. Past history of depression;
b. Number of children, attitude of parents to the sex of the last child;
c. Age, occupation, and level of education of the participants;
d. Last child’s sex, age (months), inborn malformations, and method of feeding; and
e. Planned or unplanned pregnancy.

Data analysis
The data were analyzed using Stata version 9.0.33 A logistic regression model was used to compute the odds ratios (ORs) for dependent risk factors associated with possible PPD in this study. To demonstrate the initial results, univariate ORs with 95% confidence intervals (CIs) for demographic variables and psychologic risk factors of PPD were conducted. A multiple logistic regression analysis was executed to detect PPD as the dependent variable and risk factors as independent variables based on the ORs with 95% CIs.

Results
In this study, 6,627 women in their postpartum period were identified and screened for possible depression using BDI. The participants in this study had an age range of 13 to 50 years with a mean (SD) of 26.03 (5.1) years. Of these, 57.1% were screened possible cases of depression and based on BDI scores, 20% (1324) fell within the mild range of scores, 18.3% (1211) within the moderate range, and 18.9% (1251) within the severe range. Table 1 shows the available number of women who responded to each question and the proportion of cases with severe or moderate depression in each category. Logistic regression model was used for each variable and univariate ORs with 95% CIs and P values in both severely/moderately depressed versus mildly/nondepressed and severely depressed versus moderately, mildly, or nondepressed were obtained (Table 1). Some variable showed a statistically significant effect on depression in the direction expected from previous studies.

Based on the likelihood ratio test, we were allowed to keep variables such as education, occupation, parental attitude to child gender, attitude to pregnancy, history of depression, and age in the final multilogistic regression model. Predicted correct values in the fitting final models for severely/ moderately depressed versus mildly/nondepressed and severely depressed versus moderately, mildly, or nondepressed dependent variables were 64.7% and 81.3%, respectively. The ORs and 95% CIs of the ORs and probability of the significant level for the risk variables in the study are shown in Table 2. All reference categories have ORs=1.

Discussion
This study was the first of its kind on Iranian women. Our findings revealed that risk factors of PPD in this study were very similar to studies in other countries, but the negative impact of low level of education, unplanned pregnancy, and undesired gender of the child on postnatal depression seemed to be a distinguishing aspect of this study that may be related to cultural or other aspects of the studied population.

However, EPDS is preferred to BDI for detection of probable PPD but since the Persian version of EPDS was not available at that time, the severity of depression was assessed using the Persian version of BDI-II.28,29 Since BDI may overestimate the prevalence of PPD,34 we could not have an accurate judgment about the exact prevalence of PPD in this population; therefore, we divided the study population to nondepressed, mildly depressed, moderately depressed, and severely depressed based on the BDI score and the data were analyzed categorically as severely/moderately depressed versus mildly/nondepressed and severely depressed versus moderately/mildly/nondepressed.

Previous history of an affective disorder offers 30% chance of developing PPD35 and history of depression is consistently a strong risk factor for PPD.23,36 We also found a 35.8% prevalence rate of severe depression (based on BDI score) in women
with a past history of depression, a figure that is significantly greater than that in women without such a history. In addition, Steiner reported that 78.3% of the women with PPD had a past and/or family psychiatric history. These data reveal that a past history of depression is very important in screening women who may be at risk of postnatal depression.

Studies looking at the possible effect of number of parities on PPD are controversial. Kendel reported no difference in PPD between primipara and multipara women, but a two-fold increase in the incidence of postpartum psychosis, with no age correlation. Some studies have shown a possible association between the first childbirth and PPD. Other studies have not found an association between the first childbirth and PPD. In our study, we found that high parity and PPD. In our study, we found that high parity and PPD. The possibility that women with history of PPD are less desired to become pregnant again after experiencing depression, and thus women with multiple pregnancies may represent a group of women with a relatively lower vulnerability for PPD. Alternatively, it is possible that multiple

Table 1. Univariate odd ratios (ORs) with 95% confidence intervals (CIs) for demographic variables and psychologic risk factors of postpartum depression.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Responses (N)</th>
<th>Severe or moderate OR (95%CI)</th>
<th>P value</th>
<th>Severe OR (95%CI)</th>
<th>P value</th>
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<td>Child's sex</td>
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<td></td>
<td></td>
<td></td>
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<td>Boy</td>
<td>1264/3435</td>
<td>1.00</td>
<td>&lt;0.01</td>
<td>630/3435</td>
<td>1.00</td>
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<td>Girl</td>
<td>1158/3099</td>
<td>1.03 (0.97–1.13)</td>
<td>0.63</td>
<td>607/3099</td>
<td>1.08 (0.96–1.23)</td>
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<td>Breastfeeding</td>
<td>6477</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Yes</td>
<td>2239/6084</td>
<td>1.00</td>
<td>&lt;0.01</td>
<td>1131/6084</td>
<td>1.00</td>
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<tr>
<td>No</td>
<td>163/393</td>
<td>1.22 (0.99–1.50)</td>
<td>0.06</td>
<td>88/393</td>
<td>1.26 (0.99–1.62)</td>
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<td>Inborn malformations</td>
<td>6516</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>2382/6426</td>
<td>1.00</td>
<td>&lt;0.01</td>
<td>1206/6426</td>
<td>1.00</td>
</tr>
<tr>
<td>Yes</td>
<td>42/90</td>
<td>1.49 (0.98–2.25)</td>
<td>0.06</td>
<td>25/90</td>
<td>1.67 (1.04–2.65)</td>
</tr>
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<td>Number of children</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1163/3239</td>
<td>1.00</td>
<td>&lt;0.01</td>
<td>571/3239</td>
<td>1.00</td>
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<tr>
<td>≥3</td>
<td>814/2154</td>
<td>1.08 (0.97–1.21)</td>
<td>0.16</td>
<td>425/2154</td>
<td>1.15 (1.00–1.32)</td>
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<td></td>
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<tr>
<td>Only reading and writing</td>
<td>1237/3114</td>
<td>2.17 (1.57–2.99)</td>
<td>&lt;0.01</td>
<td>669/3114</td>
<td>2.45 (1.56–3.84)</td>
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<tr>
<td>University</td>
<td>1166/2727</td>
<td>1.82 (1.32–2.50)</td>
<td>&lt;0.01</td>
<td>555/2727</td>
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<td>Mother's occupation</td>
<td>6591</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Employee</td>
<td>88/299</td>
<td>1.00</td>
<td>&lt;0.01</td>
<td>36/299</td>
<td>1.00</td>
</tr>
<tr>
<td>Housewife</td>
<td>2361/6292</td>
<td>1.44 (1.12–1.86)</td>
<td>&lt;0.01</td>
<td>1206/6292</td>
<td>1.73 (1.22–2.47)</td>
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<td>Parental attitude to child's sex</td>
<td>6604</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Yes</td>
<td>998/2592</td>
<td>1.22 (1.09–1.35)</td>
<td>&lt;0.01</td>
<td>518/2592</td>
<td>1.27 (1.12–1.46)</td>
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<tr>
<td>No</td>
<td>336/717</td>
<td>1.72 (1.46–2.02)</td>
<td>&lt;0.01</td>
<td>189/717</td>
<td>1.83 (1.51–2.21)</td>
</tr>
<tr>
<td>No difference</td>
<td>1119/3295</td>
<td>1.00</td>
<td>&lt;0.01</td>
<td>540/3295</td>
<td>1.00</td>
</tr>
<tr>
<td>Attitude to pregnancy</td>
<td>6466</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desired</td>
<td>1740/5042</td>
<td>1.00</td>
<td>&lt;0.01</td>
<td>859/5042</td>
<td>1.00</td>
</tr>
<tr>
<td>Desired but bad timing</td>
<td>377/807</td>
<td>1.66 (1.43–1.93)</td>
<td>&lt;0.01</td>
<td>201/807</td>
<td>1.62 (1.35–1.92)</td>
</tr>
<tr>
<td>Undesired</td>
<td>290/617</td>
<td>1.68 (1.42–1.99)</td>
<td>&lt;0.01</td>
<td>164/617</td>
<td>1.76 (1.45–2.14)</td>
</tr>
<tr>
<td>History of depression</td>
<td>6576</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>458/798</td>
<td>2.58 (2.22–2.99)</td>
<td>&lt;0.01</td>
<td>289/798</td>
<td>2.87 (2.45–3.37)</td>
</tr>
<tr>
<td>No</td>
<td>1984/5778</td>
<td>1.00</td>
<td></td>
<td>954/5778</td>
<td>1.00</td>
</tr>
<tr>
<td>Mother's age (year)</td>
<td>6593</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;25</td>
<td>1093/2967</td>
<td>0.97 (0.87–1.08)</td>
<td>0.36</td>
<td>534/2967</td>
<td>0.88 (0.78–1.01)</td>
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<tr>
<td>25–34</td>
<td>1190/3170</td>
<td>1.00</td>
<td></td>
<td>630/3170</td>
<td>1.00</td>
</tr>
<tr>
<td>&gt;34</td>
<td>161/456</td>
<td>0.91 (0.74–1.12)</td>
<td>0.57</td>
<td>78/456</td>
<td>0.83 (0.64–1.08)</td>
</tr>
<tr>
<td>Child's age (month)</td>
<td>6491</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2–3</td>
<td>376/1051</td>
<td>1.00</td>
<td></td>
<td>191/1051</td>
<td>1.00</td>
</tr>
<tr>
<td>4–6</td>
<td>738/2006</td>
<td>1.04 (0.89–1.22)</td>
<td>0.58</td>
<td>381/2006</td>
<td>1.06 (0.87–1.28)</td>
</tr>
<tr>
<td>7–9</td>
<td>603/1608</td>
<td>1.08 (0.92–1.27)</td>
<td>0.37</td>
<td>299/1608</td>
<td>1.03 (0.84–1.26)</td>
</tr>
<tr>
<td>10–12</td>
<td>697/1826</td>
<td>1.11 (0.95–1.30)</td>
<td>0.20</td>
<td>352/1826</td>
<td>1.07 (0.88–1.31)</td>
</tr>
</tbody>
</table>

§All reference categories have OR=1.00; *Number of participants, who responses to the question, are available; †Number of cases in the category with severe or moderate depression/number of cases in the category; ‡Number of cases in the category with severe depression/number of cases in the category.
deliveries diminish the vulnerability to PPD due to a nonspecific decrease in stress associated with the pregnancy and delivery, or for other yet unexplained reasons.

Gender of the infant and parental attitude to it are two controversial and interacting risk factors of PPD. Based on one study, gender of the infant was a risk factor of PPD. In a study by Patel et al., being unhappy with the infant's gender was a significant risk factor but birth of a daughter when her mother already had a female child was more important. Chandran et al. also claimed that birth of a daughter when a son was desired was a more important risk factor for depression.

In the current study, child's gender was not initially correlated with the prevalence of PPD but an undesired gender was an important risk factor of PPD with a relatively high-risk score. Review of the literature related to PPD and infant's gender shows that it may be a culture-bound risk factor of PPD.

Many studies have reported unemployment and low education as the risk factors of PPD, but this is not identified in some other studies. On the other hand, some other studies have reported that high education and employment are protective against PPD. Unemployment and low education were identified in this study to be significantly associated with PPD. These factors, in turn, may be related to poverty. However, further studies are required to prove this relationship.

As in other studies, this study also identified an unplanned pregnancy or unwanted pregnancy as another risk factor of PPD. While an unplanned pregnancy does not necessarily indicate an unacceptable one, the women still has to cope with the long-term ramifications such as financial demands that are likely to occur.

Regarding the reliability of positively correlated factors of PPD in this study and other similar cross-sectional studies, recall bias and especially negative bias due to the negative attitude of the depressed individuals (as a rule in depressed patients) towards issues such as previous history of depression, pregnancy, and child's sex are important limiting factors that necessitate prospective cohort studies.

In summary, our findings revealed that risk factors of PPD in the studied population were very similar to other studies, but the negative impact of low level of education, unplanned pregnancy, and undesired gender of the child on postnatal depression seems to be distinguishing aspects of the Iranian culture.
Acknowledgment

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References

33. Stata User's Guide. Stata Press (College Station, Tex); 2003.


