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Original Article

Association Between Sleep Quality and Postpartum Depression in Primigravida

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ABSTRACT

Background: Postpartum depression and poor sleep quality are common concerns among first-time mothers and may negatively affect maternal recovery, emotional well-being, infant care, and mother–infant bonding. Sleep disturbance during the postpartum period may arise from infant-care demands, physical discomfort, fragmented nighttime rest, and psychosocial adjustment, while depressive symptoms may further worsen perceived sleep quality. **Objective:** To assess the association between sleep quality and postpartum depression among primigravida women and to compare sleep quality and depressive symptoms between vaginal and cesarean delivery groups. **Methods:** A cross-sectional observational study was conducted among 142 primigravida postpartum women, including 71 women after vaginal delivery and 71 after cesarean delivery. Sleep quality was assessed using the Pittsburgh Sleep Quality Index, and postpartum depressive symptoms were measured using the Edinburgh Postnatal Depression Scale. Data were analyzed using descriptive statistics, independent-samples t-tests, Pearson's correlation, and Spearman's correlation, with statistical significance set at $p < 0.05$. **Results:** Cesarean-delivery mothers had higher mean EPDS scores than vaginal-delivery mothers (15.96 ± 5.82 vs 10.65 ± 5.74) and higher mean PSQI scores (10.65 ± 3.77 vs 6.25 ± 4.26). Poorer sleep quality was moderately and positively associated with higher depressive symptom severity (Pearson's $r = 0.591$, $p < 0.001$; Spearman's rho = 0.615, $p < 0.001$). Pain during sleep showed the largest delivery-mode difference. **Conclusion:** Poor sleep quality was significantly associated with higher postpartum depressive symptoms among primigravida women, with cesarean-delivery mothers showing greater sleep and depression burden. Routine postpartum assessment of sleep disturbance, pain-related sleep disruption, and depressive symptoms may support early identification and timely maternal mental health care. **Keywords:** Postpartum depression; sleep quality; primigravida; Pittsburgh Sleep Quality Index; Edinburgh Postnatal Depression Scale; cesarean section; vaginal delivery.

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INTRODUCTION

Postpartum depression is a major maternal mental health concern that commonly emerges during the weeks and months after childbirth and can adversely affect maternal functioning, infant care, mother–infant bonding, family relationships, and long-term child development. Reported prevalence varies across populations, but international evidence suggests that a considerable proportion of otherwise healthy mothers experience clinically relevant depressive symptoms during the postpartum period (1). First-time mothers may be particularly vulnerable because the transition to motherhood introduces unfamiliar physical, emotional, and caregiving demands, often without prior experience of infant care or postpartum recovery. Symptoms such as persistent sadness, irritability, anxiety, fatigue, guilt, reduced interest, sleep difficulty, and impaired ability to care for oneself or the newborn may overlap with normal postpartum adjustment, making early identification clinically important (2).

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LINK MEDICAL INTERFACE

Sleep quality is one of the most relevant and modifiable factors in postpartum mental health. After childbirth, mothers frequently experience shortened sleep duration, fragmented sleep, delayed sleep onset, frequent nighttime awakenings, reduced sleep efficiency, and daytime fatigue because of infant feeding, infant sleep–wake cycles, physical discomfort, and psychosocial stressors (3). These sleep changes may be more pronounced in the early postpartum period, when maternal recovery and newborn care occur simultaneously. Poor sleep is not only a consequence of postpartum adjustment but may also contribute to emotional dysregulation, impaired coping, reduced daytime functioning, and increased vulnerability to depressive symptoms. Evidence from postpartum sleep research indicates that disturbed sleep and depressive symptoms often coexist, suggesting a clinically meaningful relationship between sleep quality and postpartum depression (4).

The relationship between sleep disturbance and postpartum depression appears to be bidirectional. Depressive symptoms can worsen sleep by increasing rumination, anxiety, emotional distress, and difficulty initiating or maintaining sleep, while poor sleep can increase depressive symptoms through fatigue, neuroendocrine disruption, impaired emotional regulation, and reduced resilience to caregiving stress. Previous studies have shown that postpartum women with depressive symptoms often report poorer subjective sleep quality, longer sleep latency, more frequent awakenings, and lower sleep efficiency than women without depressive symptoms (5). Population-based evidence has also demonstrated that poor sleep quality and nighttime awakenings remain associated with postpartum depressive symptoms even after adjustment for relevant psychosocial factors, supporting the independent clinical importance of sleep assessment during postpartum care (6).

Mode of delivery may further influence postpartum sleep and psychological outcomes. Women who undergo cesarean section may experience postoperative pain, mobility limitations, delayed physical recovery, discomfort during infant care, and increased nighttime disturbance, all of which may compromise sleep quality and emotional well-being. Some studies suggest that cesarean delivery is associated with poorer early postpartum sleep and a higher likelihood of depressive symptoms compared with vaginal delivery, although findings are not uniform across all populations (7). Therefore, evaluating whether sleep quality and depressive symptoms differ between vaginal and cesarean delivery groups may help clarify whether delivery mode contributes meaningfully to postpartum mental health risk among first-time mothers.

Despite growing international evidence, limited data are available from South Asian settings, including Pakistan, regarding the association between sleep quality and postpartum depression among first-time mothers. Many previous studies have examined postpartum women as a broad group, combining primiparous and multiparous mothers, although first-time mothers may experience distinct psychological stress, uncertainty, and adaptation challenges. This creates an important knowledge gap, particularly in clinical settings where early postpartum screening for sleep disturbance and depressive symptoms is not routinely emphasized. Assessing sleep quality using the Pittsburgh Sleep Quality Index and depressive symptoms using the Edinburgh Postnatal Depression Scale provides a standardized approach to identifying women at increased risk and may support timely maternal mental health interventions (8,9).

Based on the PICO framework, the population of interest is primigravida or first-time postpartum women; the exposure is poor sleep quality; the comparison includes women with better sleep quality and, where relevant, vaginal versus cesarean delivery groups; and the outcome is postpartum depressive symptom severity. Therefore, the present study aims to assess sleep quality and postpartum depression among primigravida women, determine the association between sleep quality and postpartum depressive symptoms, and evaluate whether mode of delivery is related to differences in sleep quality and depression scores. The study hypothesizes that poorer sleep quality is positively associated with higher postpartum depression scores among primigravida women.

MATERIALS AND METHODS

A cross-sectional observational study was conducted to assess the association between sleep quality and postpartum depression among primigravida women during the postpartum period. The cross-sectional design was selected because both exposure and outcome variables—sleep quality and depressive symptoms—were measured at a single postpartum time point, allowing estimation of their relationship within the defined study population. The study population consisted of first-time postpartum mothers aged 18–35 years who were within the early postpartum period after either vaginal delivery or cesarean section. The study included a total sample of 142 primigravida women, with 71 participants in the vaginal delivery group and 71 participants in the cesarean delivery group (10).

Participants were selected using a non-probability convenience sampling technique. Eligible women were approached during routine postpartum contact, informed about the purpose and procedures of the study, and included after obtaining informed consent. Women were eligible if they were primigravida, aged between 18 and 35 years, and within the postpartum study window. Women were excluded if they had obstetric complications, comorbid medical illness, any current psychological problem, or a previous history of depression or anxiety. These criteria were applied to reduce the influence of pre-existing psychological or medical conditions on postpartum sleep quality and depressive symptoms (11).

Data were collected using a structured questionnaire approach. Sociodemographic and obstetric information included age and mode of delivery, categorized as vaginal delivery or cesarean section. Sleep quality was assessed using the Pittsburgh Sleep Quality Index, which evaluates sleep-related domains including subjective sleep quality, sleep latency, sleep duration, sleep disturbance, sleep efficiency, use of sleeping medication, and daytime dysfunction (10). A global PSQI score greater than 5 was considered indicative of poor sleep quality, while a score of 5 or below was considered good sleep quality. Postpartum depressive symptoms were assessed using the Edinburgh Postnatal Depression Scale, a 10-item screening tool designed to identify depressive symptoms in postnatal women (12). Higher EPDS scores indicated greater depressive symptom severity.

The primary exposure variable was sleep quality, measured through the PSQI global score. The primary outcome variable was postpartum depression symptom severity, measured through the EPDS total score. Mode of delivery was treated as a grouping variable for comparison between vaginal and cesarean delivery groups. Age was recorded as a continuous demographic variable. Operationally, primigravida was defined as a woman experiencing her first pregnancy or first postpartum period, and the postpartum period was defined as the early weeks following delivery within the study window. Poor sleep quality was defined as PSQI global score >5, and postpartum depressive symptoms were evaluated using the EPDS total score.

To reduce measurement bias, standardized and previously validated instruments were used for assessment of both sleep quality and postpartum depressive symptoms. The same questionnaire format was applied to all participants, and responses were obtained through self-administered forms after consent. To reduce selection-related variability, the same eligibility criteria were applied across both delivery groups. Participants with prior psychological illness, depression, anxiety, major comorbidity, or obstetric complications were excluded to limit confounding from pre-existing clinical conditions. Data were anonymized and stored securely to maintain confidentiality. The sample size was calculated using a 95% confidence level, an estimated true proportion of 0.10, and a margin of error of 0.05. The required sample size was 139 participants, and after accounting for an anticipated 2% attrition or incomplete response rate, the final sample size was increased to 142 participants. The sample was divided equally between vaginal delivery and cesarean delivery groups, with 71 participants included in each group.

Data were analyzed using IBM SPSS Statistics version 25. Descriptive statistics were used to summarize participant characteristics and questionnaire responses. Continuous variables were presented as mean, standard deviation, minimum, and maximum values, while categorical variables were presented as

frequencies and percentages. Independent-samples t-tests were used to compare mean EPDS and PSQI scores between vaginal and cesarean delivery groups. Pearson's correlation coefficient was used to assess the relationship between PSQI total score and EPDS total score, while Spearman's correlation was also used to evaluate the ordinal association between sleep quality and depressive symptom measures. Statistical significance was set at $p < 0.05$.

All participants were informed about the study purpose before data collection, and informed consent was obtained. Participation was voluntary, and confidentiality was maintained by anonymizing participant responses and storing data securely. Data integrity was maintained through consistent questionnaire administration, complete scoring of PSQI and EPDS responses, structured data entry, and analysis using a defined statistical plan. The use of standardized instruments, prespecified eligibility criteria, equal group allocation by delivery mode, and clearly defined operational variables supported reproducibility of the study procedures.

RESULTS

A total of 142 primigravida postpartum women were included, with equal distribution between the two delivery groups: 71 women after vaginal delivery and 71 women after cesarean delivery. The mean age was higher in the cesarean group than in the vaginal delivery group (27.35 ± 3.13 vs 24.90 ± 3.12 years), with a mean difference of 2.45 years and a statistically significant between-group difference ($p < 0.001$) (Table 1).

Table 1. Participant Age by Mode of Delivery

Variable	Vaginal Delivery (n = 71), Mean ± SD	Cesarean Delivery (n = 71), Mean ± SD	Mean Difference	95% CI	Cohen's d	p-value
Age, years	24.90 ± 3.12	27.35 ± 3.13	2.45	1.41 to 3.49	0.78	<0.001

Depressive symptom scores were consistently higher among women who had cesarean delivery across all EPDS items. The largest between-group differences were observed for feeling sad or miserable and crying due to unhappiness, with mean differences of 0.87 and 0.86, respectively. Self-harm thoughts were also higher in the cesarean group (0.97 ± 1.07) compared with the vaginal delivery group (0.52 ± 0.84), with a mean difference of 0.45 ($p = 0.006$). The overall EPDS total score was substantially higher in the cesarean group (15.96 ± 5.82) than in the vaginal delivery group (10.65 ± 5.74), with a mean difference of 5.31 points (95% CI: 3.39 to 7.23; $p < 0.001$) (Table 2).

Table 2. Edinburgh Postnatal Depression Scale Scores by Mode of Delivery

EPDS Item / Score	Vaginal Delivery (n = 71), Mean ± SD	Cesarean Delivery (n = 71), Mean ± SD	Mean Difference	95% CI	Cohen's d	p-value
Able to laugh and see funny side of things	0.82 ± 0.93	1.32 ± 0.87	0.51	0.21 to 0.81	0.56	0.001
Looked forward with enjoyment	0.86 ± 0.82	1.31 ± 0.69	0.45	0.20 to 0.70	0.60	0.001
Blamed self unnecessarily	1.42 ± 0.86	1.85 ± 0.77	0.42	0.15 to 0.69	0.52	0.002
Anxious or worried for no good reason	1.18 ± 0.90	1.75 ± 0.95	0.56	0.26 to 0.87	0.61	<0.001
Things getting on top of me	1.18 ± 1.00	1.62 ± 1.06	0.44	0.09 to 0.78	0.42	0.013
Unhappy with difficulty sleeping	1.24 ± 1.03	1.87 ± 0.84	0.63	0.32 to 0.95	0.67	<0.001
Felt sad or miserable	0.94 ± 0.89	1.82 ± 0.78	0.87	0.59 to 1.15	1.04	<0.001
Unhappy and crying	1.04 ± 0.89	1.90 ± 0.91	0.86	0.56 to 1.16	0.96	<0.001
Thought of harming myself	0.52 ± 0.84	0.97 ± 1.07	0.45	0.13 to 0.77	0.47	0.006
EPDS total score	10.65 ± 5.74	15.96 ± 5.82	5.31	3.39 to 7.23	0.92	<0.001

Sleep-related scores were also generally higher in the cesarean delivery group, indicating poorer sleep quality. The largest difference was observed for pain during sleep, with cesarean mothers scoring 2.39 ± 0.84 compared with 0.80 ± 1.05 in the vaginal delivery group, producing a mean difference of 1.59 and a large effect size (Cohen's d = 1.68; p < 0.001). Cesarean mothers also reported worse overall sleep quality rating, more trouble sleeping overall, more bad dreams, more nighttime awakenings, greater use of sleeping medication, and greater daytime dysfunction. Wake-up time, feeling too hot, actual sleep duration score, and leg twitching/jerking did not show statistically significant differences (Table 3).

Table 3. Pittsburgh Sleep Quality Index Item Scores by Mode of Delivery

PSQI Item / Score	Vaginal Delivery (n = 71), Mean ± SD	Cesarean Delivery (n = 71), Mean ± SD	Mean Difference	95% CI	Cohen's d	p-value
Usual bedtime score	1.11 ± 0.67	1.52 ± 0.84	0.41	0.16 to 0.66	0.54	0.002
Sleep latency time score	0.56 ± 0.71	0.83 ± 0.79	0.27	0.02 to 0.52	0.36	0.036
Usual wake-up time score	0.79 ± 0.79	0.76 ± 0.85	-0.03	-0.30 to 0.25	-0.03	0.839
Actual sleep duration score	1.35 ± 1.00	1.65 ± 0.96	0.30	-0.03 to 0.62	0.30	0.074
Cannot sleep within 30 minutes	0.34 ± 0.53	0.70 ± 0.82	0.37	0.14 to 0.60	0.53	0.002
Wake during night/early morning	1.63 ± 0.81	2.10 ± 0.88	0.46	0.18 to 0.75	0.55	0.001
Get up to use bathroom	1.38 ± 0.95	1.88 ± 0.87	0.50	0.20 to 0.81	0.55	0.001
Cannot breathe comfortably	0.34 ± 0.53	0.70 ± 0.82	0.37	0.14 to 0.60	0.53	0.002
Cough or snore loudly	0.62 ± 0.82	1.08 ± 0.98	0.46	0.16 to 0.77	0.51	0.003
Feel too cold	0.45 ± 0.77	0.97 ± 1.03	0.52	0.22 to 0.82	0.57	0.001
Feel too hot	0.48 ± 0.71	0.56 ± 0.94	0.08	-0.19 to 0.36	0.10	0.547
Bad dreams	0.73 ± 0.96	1.32 ± 1.18	0.59	0.24 to 0.95	0.55	0.001
Pain during sleep	0.80 ± 1.05	2.39 ± 0.84	1.59	1.28 to 1.91	1.68	<0.001
Trouble sleeping overall	0.38 ± 0.83	1.34 ± 1.19	0.96	0.62 to 1.30	0.93	<0.001
Overall sleep quality rating	0.99 ± 0.98	2.01 ± 0.98	1.03	0.70 to 1.35	1.05	<0.001
Use of sleeping medication	0.27 ± 0.58	0.72 ± 0.83	0.45	0.21 to 0.69	0.63	<0.001
Trouble staying awake	0.65 ± 0.97	1.23 ± 1.36	0.58	0.18 to 0.97	0.49	0.004
Lack of enthusiasm	0.92 ± 1.11	1.65 ± 0.94	0.73	0.39 to 1.07	0.71	<0.001
Bed partner/roommate score	2.38 ± 0.68	2.08 ± 0.94	-0.30	-0.57 to -0.02	-0.36	0.034
Loud snoring	0.42 ± 0.75	0.75 ± 0.87	0.32	0.05 to 0.59	0.40	0.019
Long pauses between breaths	0.35 ± 0.68	0.69 ± 0.84	0.34	0.09 to 0.59	0.44	0.009
Legs twitching/jerking	0.94 ± 0.77	1.18 ± 1.02	0.24	-0.06 to 0.54	0.26	0.117
Disorientation/confusion during sleep	0.45 ± 0.69	0.87 ± 0.83	0.42	0.17 to 0.68	0.55	0.001
Other restlessness	0.55 ± 0.77	1.17 ± 0.89	0.62	0.34 to 0.90	0.74	<0.001

The overall sleep quality score was poorer in the cesarean group. The mean PSQI total score was 10.65 ± 3.77 among cesarean mothers compared with 6.25 ± 4.26 among vaginal delivery mothers. The between-group mean difference was 4.39 points, with a large effect size (Cohen's d = 1.09) and a statistically significant difference (p < 0.001). Similarly, the total EPDS score was higher in the cesarean group, with a large effect size (Cohen's d = 0.92) (Table 4).

Table 4. Total Depression and Sleep Quality Scores by Mode of Delivery

Outcome Variable	Vaginal Delivery (n = 71), Mean ± SD	Cesarean Delivery (n = 71), Mean ± SD	Mean Difference	95% CI	Cohen's d	p-value
EPDS total score	10.65 ± 5.74	15.96 ± 5.82	5.31	3.39 to 7.23	0.92	<0.001
PSQI total score	6.25 ± 4.26	10.65 ± 3.77	4.39	3.06 to 5.73	1.09	<0.001

A moderate positive association was observed between poor sleep quality and postpartum depressive symptoms. Pearson's correlation showed r = 0.591, indicating that higher PSQI scores were associated with higher EPDS scores. This association was statistically significant ($p < 0.001$) with a 95% confidence interval of 0.47 to 0.69. Spearman's correlation produced a similar result (rho = 0.615, $p < 0.001$), supporting a consistent positive relationship between sleep disturbance and depressive symptom severity across the full sample (Table 5).

Table 5. Association Between Sleep Quality and Postpartum Depression Scores

Association Tested	Correlation Statistic	Value	Standard Error	Test Statistic	95% CI	p-value
PSQI total score with EPDS total score	Pearson's r	0.591	0.062	t = 8.66	0.47 to 0.69	<0.001
PSQI total score with EPDS total score	Spearman's rho	0.615	0.059	t = 9.23	—	<0.001

Overall, the results show that cesarean delivery mothers had higher mean depression and poorer sleep-quality scores than vaginal delivery mothers. The most clinically prominent sleep-related difference was pain during sleep, while the strongest depressive symptom differences were sadness, crying, anxiety, and unhappiness-related sleep difficulty. Across the total sample, poorer sleep quality was significantly associated with greater postpartum depressive symptom severity.

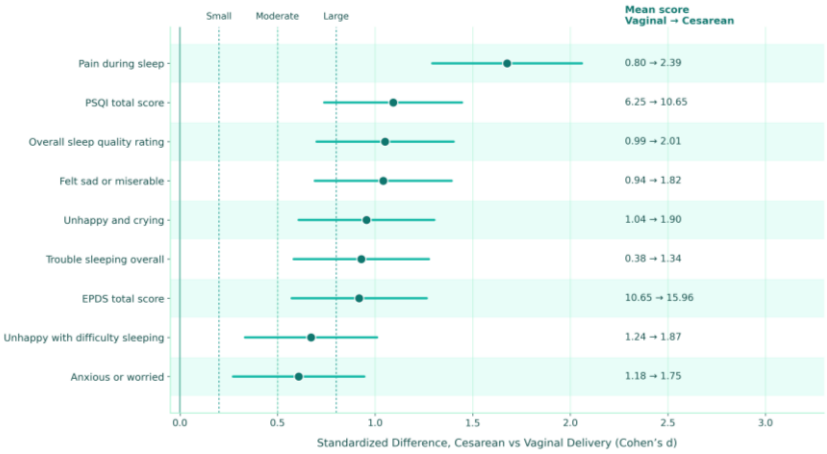

Figure 1. Magnitude of Cesarean-Associated Sleep and Depression Burden in Primigravida Women

The figure demonstrates a consistent adverse outcome gradient among cesarean-delivery mothers compared with vaginal-delivery mothers, with the largest standardized difference observed for pain during sleep (Cohen's d = 1.68; mean score 0.80 vs 2.39), followed by PSQI total score (d = 1.09; 6.25 vs 10.65) and overall sleep quality rating (d = 1.05; 0.99 vs 2.01).

Depression-related outcomes also showed clinically meaningful elevations in the cesarean group, including feeling sad or miserable (d = 1.04; 0.94 vs 1.82), crying due to unhappiness (d = 0.96; 1.04 vs 1.90), and EPDS total score (d = 0.92; 10.65 vs 15.96). The pattern indicates that the strongest cesarean-associated burden was concentrated in sleep disruption particularly pain-related sleep disturbance—while depressive symptom differences remained large and directionally aligned with poorer sleep quality, supporting the clinical relevance of sleep-focused postpartum assessment.

DISCUSSION

The present study evaluated the association between sleep quality and postpartum depression among primigravida women and compared these outcomes according to mode of delivery. The findings showed that poorer sleep quality was positively associated with higher postpartum depressive symptom scores, indicating that women with greater sleep disturbance also experienced more severe depressive symptoms. This relationship was supported by both Pearson and Spearman correlation results, suggesting a consistent moderate positive association between PSQI and EPDS scores. These findings align with previous evidence showing that disturbed postpartum sleep is closely related to depressive symptoms and may represent an important clinical marker of maternal psychological vulnerability during the early postpartum period (12,13).

The observed association between poor sleep quality and postpartum depressive symptoms is biologically and clinically plausible. The postpartum period is characterized by frequent nighttime awakenings, infant feeding demands, physical recovery, hormonal changes, fatigue, and psychosocial adjustment. These factors may reduce total sleep time and fragment sleep continuity, thereby weakening emotional regulation and coping capacity. In first-time mothers, this burden may be amplified by unfamiliar caregiving responsibilities, uncertainty about newborn care, and lack of previous maternal experience. Poor sleep may therefore contribute to depressive symptoms through persistent fatigue, irritability, reduced resilience, impaired concentration, and increased emotional sensitivity. At the same time, depressive symptoms may worsen perceived sleep quality through anxiety, rumination, low mood, and reduced ability to rest effectively, supporting a bidirectional relationship between postpartum sleep disturbance and depression (14).

The comparison between delivery groups showed that cesarean-delivery mothers had higher mean PSQI and EPDS scores than vaginal-delivery mothers. This pattern suggests that cesarean delivery may be associated with greater sleep and emotional burden during postpartum recovery. Pain during sleep showed the largest between-group difference, indicating that postoperative discomfort may be a major contributor to poor sleep among cesarean mothers. Restricted mobility, wound discomfort, difficulty changing position, and increased dependence during infant care may also increase sleep fragmentation and daytime fatigue. These findings are consistent with previous studies reporting poorer early postpartum sleep and greater fatigue among mothers after cesarean delivery compared with vaginal delivery (15). The clinically meaningful elevation in depressive symptom scores among cesarean mothers may partly reflect the combined effects of pain, delayed recovery, sleep disruption, and emotional stress after surgical birth.

Among individual depressive symptoms, sadness, crying, anxiety, reduced enjoyment, and unhappiness-related sleep difficulty were more pronounced in cesarean-delivery mothers. These findings suggest that depressive symptom burden was not limited to a single emotional domain but involved affective, cognitive, anxiety-related, and functional components. The higher score for the EPDS self-harm item in the cesarean group is clinically important, even when mean scores remain low, because any endorsement of self-harm thoughts in the postpartum period requires careful clinical attention. This emphasizes the importance of routine screening for postpartum depression using validated tools such as the EPDS, particularly when mothers report poor sleep, persistent sadness, crying episodes, or difficulty coping (16,17).

The sleep-quality findings provide additional insight into the mechanisms linking postpartum recovery and depressive symptoms. Cesarean mothers reported poorer overall sleep quality, more trouble sleeping, longer sleep latency, more nighttime awakenings, greater pain during sleep, greater restlessness, more daytime dysfunction, and greater use of sleeping medication. These patterns indicate that sleep disturbance after cesarean delivery may be multidimensional rather than limited to sleep duration alone. Although sleep duration was slightly poorer in the cesarean group, the broader PSQI

pattern suggests that subjective sleep quality, pain, awakenings, sleep disturbance, and daytime impairment may be more clinically informative than hours of sleep alone. This is important because postpartum women may spend time in bed but still experience nonrestorative sleep because of repeated interruptions and caregiving demands (18).

The moderate positive correlation between PSQI and EPDS scores supports the central hypothesis that poorer sleep quality is associated with greater postpartum depressive symptom severity among primigravida women. This finding is consistent with international evidence showing that poor sleep quality predicts or accompanies postpartum depressive symptoms (19,20). However, because the study design was cross-sectional, the direction of association cannot be established. It cannot be concluded whether poor sleep led to depressive symptoms, depressive symptoms worsened sleep quality, or both occurred simultaneously through shared postpartum stressors. Nevertheless, the strength and consistency of the association indicate that sleep quality should be considered an important component of postpartum mental health assessment.

The findings also highlight the need to interpret mode of delivery carefully. Cesarean delivery was associated with higher mean sleep disturbance and depressive symptom scores, but mode of delivery alone may not fully explain postpartum psychological outcomes. Several unmeasured or partially controlled factors may influence both sleep and depression, including postoperative pain severity, breastfeeding pattern, infant sleep behavior, family support, socioeconomic stress, marital support, maternal nutrition, anemia, and previous subclinical anxiety or mood symptoms. For example, pain may directly impair sleep and indirectly increase depressive symptoms through exhaustion and reduced functioning. Similarly, limited social support may intensify both nighttime caregiving burden and emotional distress. Therefore, the relationship among delivery mode, sleep quality, and postpartum depression is likely multifactorial rather than purely obstetric.

The study has several strengths. It focused specifically on primigravida postpartum women, a clinically relevant group that may face unique adaptation challenges during the transition to motherhood. The equal distribution of vaginal and cesarean delivery groups allowed direct comparison by delivery mode. The use of validated instruments, PSQI for sleep quality and EPDS for postpartum depressive symptoms, strengthened measurement consistency and allowed comparison with previous literature (10,11). In addition, the analysis examined both total scores and individual symptom patterns, providing a broader understanding of how sleep and depressive symptoms differed across delivery groups.

The study also has limitations that should be considered when interpreting the findings. The cross-sectional design prevents causal inference between poor sleep quality and postpartum depression. The use of self-reported questionnaires may introduce recall bias, social desirability bias, or misclassification, particularly for sensitive symptoms such as self-harm thoughts. Convenience sampling and a single study population may limit generalizability to broader postpartum populations. Important confounding variables, including pain severity, breastfeeding status, infant sleep patterns, social support, socioeconomic status, anemia, and postpartum week, were not included in adjusted analysis. In addition, EPDS is a screening tool rather than a diagnostic interview, so elevated scores indicate depressive symptom burden rather than confirmed clinical diagnosis.

Overall, the findings suggest that poor sleep quality is meaningfully associated with postpartum depressive symptoms among primigravida women, and that cesarean-delivery mothers may experience a greater combined burden of sleep disturbance and depressive symptoms. The results support the clinical value of assessing sleep quality alongside depressive symptoms during postpartum care. Screening first-time mothers for poor sleep, pain-related sleep disturbance, and depressive symptoms may help identify women who require early counseling, sleep-support strategies, pain management, family support, or referral for mental health evaluation. In particular, postpartum care should not focus only on physical recovery after childbirth but should integrate sleep and emotional well-being as core components of maternal health.

CONCLUSION

This study concluded that poor sleep quality was significantly associated with higher postpartum depressive symptom severity among primigravida women, indicating that sleep disturbance is an important marker of maternal psychological vulnerability during the early postpartum period. Cesarean-delivery mothers showed higher mean PSQI and EPDS scores than vaginal-delivery mothers, suggesting a greater burden of disturbed sleep and depressive symptoms, particularly in relation to pain during sleep, poor overall sleep quality, sadness, crying, anxiety, and unhappiness-related sleep difficulty. Although the cross-sectional design does not establish causality, the findings emphasize that postpartum care for first-time mothers should include routine assessment of sleep quality and depressive symptoms, with particular attention to mothers recovering from cesarean section. Early identification of poor sleep, pain-related sleep disruption, and emotional distress may support timely counseling, sleep-focused guidance, pain management, family support, and referral for mental health care when needed.

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