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Neck Disability and Depression in Postpartum Women with Epidural Anesthesia

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ABSTRACT

***Background**: Postpartum women who undergo cesarean delivery with epidural anesthesia may experience both musculoskeletal discomfort and psychological distress during the early recovery period, potentially affecting maternal functioning and well-being.* ***Objective**: To determine the prevalence of neck disability and depression in postpartum females who underwent cesarean section with epidural anesthesia and to assess the association between neck disability and depression.* ***Materials** and Methods: A cross-sectional study was conducted from March to September 2024 in selected hospitals of Sialkot using a non-probability convenience sampling technique (Ref # USKT/FAHS/RECLetter-00093). Females aged 20–40 years who had undergone cesarean delivery with epidural anesthesia within six weeks postpartum were included. Women with pre-existing musculoskeletal disorders, chronic neck pain, migraine, diagnosed anxiety or depression, neurological or spinal disorders, high-risk pregnancies, or use of anesthesia other than epidural were excluded. Neck disability was assessed using the Neck Disability Index (NDI), while postpartum depression was measured using the Edinburgh Postnatal Depression Scale (EPDS). Data were analyzed using SPSS version 26.0, applying descriptive statistics and chi-square tests to determine associations.* ***Results**: Among 260 participants, the mean age was 28.43 ± 4.47 years. The mean NDI score was 24.46 ± 15.96, and the mean EPDS score was 15.18 ± 5.33. Nearly one-third of participants (28.8%) reported complete neck disability, while probable postpartum depression was observed in 70.4% of participants. A statistically significant association was found between neck disability and depression (p = 0.001), with higher depression rates observed as disability severity increased.* ***Conclusion**: A high prevalence of neck disability and postpartum depression was observed among females following cesarean delivery with epidural anesthesia, with a significant positive association between the two conditions.*

Keywords
Epidural anesthesia, cesarean section, neck disability, postpartum depression, Neck Disability Index, Edinburgh Postnatal Depression Scale

INTRODUCTION

Cesarean section (C-section) is one of the most frequently performed surgical procedures worldwide and is often essential for ensuring maternal and neonatal safety. Despite its benefits, cesarean delivery is associated with postoperative physical discomfort and psychological challenges, including postpartum depression (PPD), which may arise due to surgical stress, hormonal fluctuations, and delayed recovery (1). Globally, postpartum depression affects approximately 10–15% of women, while postpartum anxiety has been reported in 9–13% of new mothers (2). Untreated PPD can negatively influence maternal functioning, infant bonding, and long-term child development (3). Postpartum depression is characterized by persistent low mood, fatigue, feelings of worthlessness, and emotional withdrawal, typically emerging during pregnancy or within the first few weeks after childbirth (4). Risk factors include inadequate social support, obstetric complications, sleep deprivation, and pain during the perinatal period (5). Screening tools such as the Edinburgh Postnatal Depression Scale (EPDS) are widely used for early identification, as a substantial proportion of cases remain undiagnosed in routine clinical practice (2). Management strategies range from psychotherapy and social support to pharmacological interventions in severe cases (6,7). Musculoskeletal pain is another common yet often overlooked postpartum complication. Neck pain, in particular, affects approximately 22–61% of postpartum women and is the second most common musculoskeletal complaint after low back pain (8). Postpartum neck pain may result from prolonged static postures, muscle overuse during infant care, breastfeeding ergonomics, and compensatory postural adaptations following cesarean delivery (9–11). In women receiving epidural anesthesia, additional factors such as post-dural puncture headache, cervical muscle guarding, and altered spinal mechanics may contribute indirectly to neck discomfort during recovery (14).

Neck pain and disability can significantly impair daily functioning, reduce caregiving capacity, and lower quality of life, while also increasing healthcare utilization and economic burden (12,13). Emerging evidence suggests a bidirectional relationship between musculoskeletal pain and depressive symptoms, where persistent pain may exacerbate psychological distress and vice versa (18,19). However, limited research has explored this relationship specifically in postpartum women following cesarean delivery with epidural anesthesia, particularly in low- and middle-income settings such as Pakistan. Therefore, this study aimed to determine the prevalence of neck disability and postpartum depression among females

who underwent cesarean section with epidural anesthesia and to examine the association between these two conditions. Understanding this relationship is essential for developing integrated postpartum care strategies that address both physical and psychological health.

MATERIALS AND METHODS

This observational cross-sectional study was conducted to assess the prevalence of neck disability and postpartum depression among women who had undergone cesarean delivery with epidural anesthesia. Data were collected from March to September 2024 in multiple hospitals located in Sialkot, Pakistan. A non-probability convenience sampling technique was employed, whereby eligible participants who were available and consented during the data collection period were recruited.

Women aged 20–40 years who had undergone cesarean delivery with epidural anesthesia and were within six weeks postpartum were included in the study (14). Exclusion criteria comprised a history of chronic neck pain, pre-existing musculoskeletal disorders, migraine, diagnosed anxiety or depression, neurological or spinal conditions, high-risk pregnancies, or receipt of anesthesia other than epidural (10). Data collection involved a structured demographic questionnaire that recorded variables including age, parity, postpartum duration, mode of infant feeding, daily caregiving activities, and self-reported posture during breastfeeding and infant handling.

Neck disability was assessed using the Neck Disability Index (NDI), a validated instrument measuring the impact of neck pain on daily activities. Postpartum depression was evaluated using the Edinburgh Postnatal Depression Scale (EPDS), a standardized screening tool for depressive symptoms in the postpartum period. Written informed consent was obtained from all participants prior to data collection. Ethical approval was granted by the relevant institutional review committee, and confidentiality was maintained by anonymizing all participant data. Statistical analysis was performed using SPSS version 26.0. Descriptive statistics were used to summarize demographic variables and scale scores, while the chi-square test was applied to assess the association between neck disability categories and depression levels. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 260 postpartum females (20–40 years) who underwent cesarean delivery with epidural anesthesia were included. The mean age was 28.43 ± 4.47 years (Table 1). The average neck disability score (NDI) was 24.46 ± 15.96, indicating overall mild-to-moderate disability with substantial variability across participants. The mean EPDS score was 15.18 ± 5.33, reflecting a generally elevated level of depressive symptoms in this sample (Table 1). Regarding neck disability severity, nearly one-third of participants fell into the complete disability category (28.8%), followed by moderate disability (24.6%), severe disability (18.5%), mild disability (13.8%), and no disability (14.2%) (Table 2).

Table 1: Descriptive Statistics of Age, Neck Disability Index, and Depression Scores

Variable	Minimum	Maximum	Mean	Standard Deviation
Age (years)	20.00	40.00	28.43	4.47
NDI Score (%)	0.00	100.00	24.46	15.96
EPDS Score	3.00	28.00	15.18	5.33

NDI scores were calculated using the standard 10-item Neck Disability Index and converted to percentage values (0–100), where higher scores indicate greater disability.

Table 2: Frequency Distribution of Neck Disability Levels (NDI Categories)

NDI Category	Frequency (n)	Percentage (%)
No Disability	37	14.2
Mild Disability	36	13.8
Moderate Disability	64	24.6
Severe Disability	48	18.5
Complete Disability	75	28.8
Total	260	100.0

Table 3. Distribution of Participants According to Depression Severity (EPDS)

EPDS Category	Frequency (n)	Percentage (%)
No Depression	30	11.5
Possible Depression	47	18.1
Probable Depression	183	70.4
Total	260	100.0

Table 4. Cross-Tabulation of NDI Categories and EPDS Categories (n = 260)

NDI Category	No Depression	Possible Depression	Probable Depression	Total
No Disability	7	8	22	37
Mild Disability	10	5	21	36
Moderate Disability	9	16	39	64
Severe Disability	3	9	36	48
Complete Disability	1	9	65	75
Total	30	47	183	260

Depression screening showed that probable depression was highly prevalent (70.4%), while possible depression and no depression were observed in 18.1% and 11.5% of participants, respectively (Table 3). Cross-tabulation demonstrated a clear trend: increasing neck disability severity corresponded to higher frequencies of probable depression. This pattern was most pronounced in the complete disability group, where the majority of participants were classified as having probable depression (Table 4). The chi-square analysis confirmed a statistically significant association between neck disability category and depression category (Pearson $\chi^2 = 27.26$, df = 8, $p = 0.001$). The linear-by-linear association was also significant ($p < 0.001$), supporting a dose-response relationship between disability severity and depression level (Table 5).

Table 5. Chi-Square Test Results for Association Between NDI and EPDS Categories

Test	Value	df	p-value
Pearson Chi-Square	27.260	8	0.001
Likelihood Ratio	29.022	8	<0.001
Linear-by-Linear Association	19.516	1	<0.001
Number of Valid Cases	260	—	—

Data quality note: The NDI maximum value reported as 100 reflects scoring in percentage terms (NDI total score converted to a 0–100 scale). Because a score of 100 represents total disability, the dataset should be rechecked for potential outliers and correct computation (i.e., confirming whether the scale was summed out of 50 and then converted to percentage) before final submission.

DISCUSSION

This study assessed the prevalence of neck disability and postpartum depression among women following cesarean delivery with epidural anesthesia and examined the association between these two outcomes. The key findings were: (1) neck disability was common in the early postpartum period, with a notably high proportion categorized as complete disability; (2) probable postpartum depression was highly prevalent; and (3) there was a statistically significant association between increasing neck disability severity and higher depression categories.

The mean NDI score (24.46) suggests an overall mild-to-moderate degree of disability, which is broadly consistent with evidence that postpartum women frequently experience neck and upper extremity symptoms that interfere with daily activities (9,12). Postpartum neck pain is commonly attributed to repetitive infant handling, sustained forward-head posture, breastfeeding ergonomics, sleep deprivation, and reduced physical conditioning in the early recovery period (9–11). In the present cohort, the high proportion of severe and complete disability may plausibly reflect the short postpartum window (within six weeks), during which mothers are simultaneously recovering from surgery and adapting to prolonged feeding and caregiving postures. In Pakistan, limited postpartum physiotherapy access and low awareness of ergonomic strategies may further intensify symptom severity and functional restriction, potentially contributing to the unexpectedly high “complete disability” proportion.

The study also identified a high prevalence of probable postpartum depression (mean EPDS 15.18). This aligns with prior literature indicating that depressive symptoms may be elevated in postpartum women and may vary by context, social support, and healthcare access (2,3,15). While some studies suggest a relationship between anesthesia exposure and postpartum depression (15), other evidence indicates no direct association between epidural analgesia and postpartum depression (16,17). In the present study, the focus is not a causal anesthesia–depression link but rather the association between neck disability and depressive symptom severity, which was statistically significant and showed a graded trend ($p = 0.001$; linear-by-linear $p < 0.001$).

A clinically meaningful interpretation is that postpartum pain-related disability and depressive symptoms may reinforce one another. Persistent pain can impair sleep, reduce perceived self-efficacy in infant care, and limit functional independence, all of which are recognized contributors to depressive symptoms. Conversely, depression may amplify pain perception, reduce pain tolerance, and negatively affect recovery behaviors (18,19). This bidirectional relationship has been reported in postpartum and other musculoskeletal populations, supporting the need for integrated assessment and management rather than treating these conditions in isolation.

Importantly, epidural anesthesia may contribute indirectly to neck symptoms in a subset of women. Post-dural puncture headache (PDPH), though not measured directly in this study, is a recognized post-epidural complication and can be accompanied by neck stiffness or cervical discomfort due to meningeal irritation and protective muscle guarding (14). Additionally, postoperative recovery and avoidance postures after C-section may lead to compensatory cervical strain, particularly when combined with breastfeeding postures and prolonged infant care activities. Because this study did not distinguish PDPH-related symptoms from primary mechanical neck strain, the observed neck disability likely represents a combination of postpartum mechanical factors and potential anesthesia-related sequelae in some participants.

LIMITATIONS

Several limitations should be considered. First, the use of non-probability convenience sampling limits generalizability beyond the sampled hospitals. Second, the cross-sectional design prevents causal inference; the association between disability and depression cannot establish directionality. Third, key confounders (e.g., breastfeeding frequency, infant weight, sleep quality, social support, postoperative pain severity, and presence of PDPH) were not measured in sufficient clinical detail to adjust analytically. Finally, because the NDI maximum reached 100, verification of scoring and outliers is recommended to ensure accurate classification, as extreme disability scores are uncommon and may reflect calculation or entry issues.

CONCLUSION

This study demonstrates a high prevalence of neck disability and probable postpartum depression among females within six weeks after cesarean delivery with epidural anesthesia in Sialkot. A significant positive association was observed between increasing neck disability severity and higher depression levels, indicating that postpartum physical impairment and psychological distress frequently coexist.

Recommendation: Routine postpartum care in Sialkot hospitals should incorporate early screening for both neck disability (NDI) and depressive symptoms (EPDS), followed by standard referral pathways for postpartum physiotherapy (posture and breastfeeding ergonomics training, graded strengthening, and pain management) alongside appropriate psychological support or counseling. Integrating musculoskeletal rehabilitation with mental health screening may improve maternal functioning, caregiving capacity, and overall postpartum recovery.

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