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**Original Research Article**

# Causes, Effects & Management of Post Dural Puncture Headache among Obstetric Patients in a Tertiary Care Hospital: An Observational Study

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**Abstract:** ***Background:*** Post-dural puncture headache (PDPH) is a complication of dura mater puncture. In order to reduce the burden and related morbidity, postpartum women who suffer from PDPH must be identified and treated as soon as possible utilizing highly effective, noninvasive approaches that are simple to apply in settings with limited resources. ***Objective:*** The aim of this study is to assess the causes, effects & management of post dural puncture headache among obstetric patients in a tertiary care hospital. ***Methods:*** The cross-sectional observational study was conducted in the department of Surgery, North Bengal Medical College Hospital, Sirajgonj, Bangladesh, from October 2022 to September 2023. A total of 300 patients were included in the study. The questionnaire was pretested, corrected and finalized. Data were collected by face-to-face interview and analyzed by appropriate computer based programmed software Statistical Package for the Social Sciences (SPSS), version 24. ***Results:*** In this study, most of the 104 (34.7%) patients were within the age group of 31 - 35 years. The mean±SD age of the patients was 32.6±1.3 years. BMI of most of the patients 137 (45.7%) were in the normal range (18.5 to <24.9), 103 (34.3%) had overweight (25-29.9), 37 (12.3%) were obese (≥30.0) and 23 (7.7%) had underweight (<18.5). Most of the patients 133 (44.3%) were multipara, among 300 patients 214 (71.3%) patients gestational age was >37 weeks and 86 (28.7%) patients gestational age was<37 weeks. About 49 (16.3%) had preexisting/ pregnancy-related medical conditions and emergency surgery was done in 217 (72.3%) patients. The majority of the participants 251 (83.7%) had only one attempt at the puncture, and all 300 (100.0%) were in a sitting position during the procedure, and a 25G-sized spinal needle was used in 296 (98.7%) of the patients. Most participants reported cerebrospinal fluid loss as minimal. Majority of the 231 (77.0%) patients had previous history of PDPH. All 300 (100.0%) patients experienced headaches before discharge. The severity of the headache at onset was mild 134 (44.6%), moderate 102 (34.0%) and severe 64 (21.3%). The associated symptoms were neck stiffness in 24(8.0%) women, tinnitus in 252 (84.0%), and nausea in 19 (6.3%). Majority of the patients 123 (41.0%) were given neostigmine/Atropine, Paracetamol and Caffeine, Caffeine injection and Diclofenac were given 43 (14.3%), 16 (5.3%) and 9 (3.0%) respectively. Majority of the patients 212 (70.7%) received the treatment. The interval between the onset of symptoms and relief of symptoms was < 1 hour in 32 (10.7%), 1-2 hours in 123 (41.0%), and >2 hours in 11 (3.7%) cases. The interval between intervention and relief of symptoms was <1 hour in 41 (13.7%), 1-2 hours in 117 (39.0%) cases, and >2 hours in 13 (4.3%) case. ***Conclusion:*** It is important to take action to reduce the severity and duration of postpartum hemorrhage (PDPH), as it is a well-known morbidity in this population. Proactive treatment, early diagnosis, identification, and prevention are preferred.

**Keywords:** Caesarean Section, Headache, Post-dural Puncture Headache, Postpartum headache.



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# INTRODUCTION

Dura mater puncture complications include post-dural puncture headache (PDPH), also known as meningeal puncture headache or post-lumbar puncture (LP). PDPH can occur after spinal anesthesia, diagnostic lumbar puncture, or—more frequently—an unintentional dural puncture after the installation of an epidural catheter. Usually, poor posture causes headaches, which are less severe when resting flat and less severe when standing or sitting upright.

As per the 2018 International Headache Society (IHS) Definition, post-dural puncture headache (PDPH) is defined as a headache that occurs five days after a lumbar puncture and is caused by low cerebrospinal fluid (CSF) pressure, which is caused by CSF leaking from the dural puncture. There is a clear correlation between it and the patient's posture [1]. Reduced CSF pressure has been linked to the pathophysiology of post-stroke headache (PDPH) by either causing traction on pain-sensitive intracranial structures or compensatory intracranial vasodilation [2].

Depending on the treatment and the patient, the incidence of PDPH varies greatly, with headaches occurring in 2-40% of all LP surgeries [3]. Among pregnant women receiving epidural anesthesia, 1%–1.5% experience an unintentional dural puncture [4]. On the other hand, 5% of patients can have an unusual headache that is unrelated to their posture.

Due to factors like gender, age, and increased usage of epidural anesthesia and subarachnoid block for obstetric analgesia/anesthesia, together with the accompanying risk of an unintentional dural puncture during epidural anesthesia, obstetric patients are more likely to experience postpartum hemorrhage (PDPH) [3,4]. In the first week following childbirth, 25% of headaches in women are attributed to vascular origins or hypertensive illnesses, infections, space-occupying lesions, and dural punctures [5].

Even though PDPH is not a fatal illness, patients are frequently need to remain in bed and have limited physical activity. This could provide issues for new mothers taking care of their babies after giving birth [6]. Women under the age of 40, those with a low body mass index (BMI), and those who have previously experienced headaches are more likely to develop PDPH [7].

A number of failed attempts at spinal anesthesia, needle size, type-cutting needle, operator weariness, and competence level are among the risk variables for post-traumatic brain hemorrhage (PDPH) [8, 9].

A common headache symptom of post-stroke headache disorder (PDPH) is frontal, occipital, or generalized headaches. It could cause pain in the neck and shoulders and be linked to symptoms including tinnitus, partial hearing loss, nausea, and vomiting in addition to stiff neck. Severe symptoms could make it difficult for the new mother to care for her infant, sometimes incapacitating, or linked to extended hospital stays [3].

The degree of the headache and how it affects the patient's ability to function determine how PDPH is managed. Pharmacological, nonpharmacological, or a combination of both interventions may be used to treat PDPH. Acetaminophen, nonsteroidal anti-inflammatory medicines, rehydration, opioids, and antiemetics are a few of these [7]. Acupuncture, intramuscular adrenocorticotrophic hormone, sumatriptan, intravenous or intravenous caffeine, intravenous hydrocortisone, intravenous cosyntropin, intramuscular theophylline, pregabalin, and desmopressin acetate are some other pharmacological therapies. It is advised to use caffeine as a therapeutic alternative for post-stroke hypertension (PDPH). By inhibiting adenosine receptors, caffeine promotes cerebral vasoconstriction and stimulates sodium-potassium pumps, which increases the generation of CSF [10].

It has also been suggested that neostigmine-atropine is a useful medication for treating PDPH. Neostigmine and atropine in combination were shown to be particularly successful in treating Parkinson's disease parkinsonism (PDPH) by Abdaleel *et al.*, [11]. An epidural blood patch (EBP), which involves progressively injecting 30 mL of the patient's blood from their arm into the epidural space, is the recommended treatment for severe post-stroke hemoglobin poisoning (PDPH) if it is not contraindicated [12]. It is thought that the patient's posture, the number of attempts, the small needle size, and the anesthetists' level of skill prevent and lessen the risk of postpartum hemorrhage. Even with these conditions met, PDPH is rarely averted. Therefore, it's important to recognize and treat people who develop PDPH properly. The patient will be identified for timely intervention by postoperative surveillance.

# METHODOLOGY

The cross-sectional observational study was conducted in the department of Surgery, North Bengal Medical College Hospital, Sirajgonj, Bangladesh, from October 2022 to September 2023. A total of 300 patients were included in the study. Patients who matched the inclusion and exclusion criteria were approached for participation in the study. Patients who were not willing to give consent were excluded. Purposive sampling was done according to the availability of the patients who fulfilled the selection criteria. Face to face interview was done to collect data with a semi-structured questionnaire. After collection, the data were checked and cleaned, followed by editing, compiling, coding, and categorizing according to the objectives and variables to detect errors and to maintain consistency, relevancy and quality control. Statistical evaluation of the results used to be

obtained via the use of a window-based computer software program devised with Statistical Packages for Social Sciences (SPSS-24).

## RESULT

**Table I: Distribution of the patients according to age (n = 300)**

| Age group | Frequency | % |
|---|---|---|
| 21 - 25 years | 42 | 14.0 |
| 26 - 30 years | 95 | 31.7 |
| 31 - 35 years | 104 | 34.7 |
| 36 - 40 years | 38 | 12.7 |
| >40 years | 21 | 7.0 |
| Total | **300** | **100.0** |
| Mean±SD: 32.6±1.3 | | |

Table I shows that, most of the 104 (34.7%) patients were within the age group of 31 - 35 years. The mean±SD age of the patients was 32.6±1.3 years.

**Table II: Distribution of the patients according to BMI (n = 300)**

| BMI distribution | Frequency | % |
|---|---|---|
| <18.5 (underweight) | 23 | 7.7 |
| 18.5 to <24.9 (Normal) | 137 | 45.7 |
| 25-29.9 (Overweight) | 103 | 34.3 |
| ≥30.0 (Obese) | 37 | 12.3 |
| Total | **78** | **100.0** |

Table II shows that, BMI of most of the patients 137 (45.7%) were in the normal range (18.5 to <24.9), 103 (34.3%) had overweight (25-29.9), 37 (12.3%) were obese (≥30.0) and 23 (7.7%) had underweight (<18.5)

**Table III: Distribution of the patients according to clinical characteristics of participants (n = 300)**

| Variables | | Frequency | % |
|---|---|---|---|
| Parity | Nullipara | 71 | 23.6 |
| | Primipara | 96 | 32.0 |
| | Multipara | 133 | 44.3 |
| Gestational age | Preterm (<37 weeks) | 86 | 28.7 |
| | Term (≥37 weeks) | 214 | 71.3 |
| Medical/Pregnancy related conditions | Yes | 49 | 16.3 |
| | No | 251 | 83.7 |
| Type of surgery | Elective | 77 | 25.7 |
| | Urgent | 6 | 2.0 |
| | Emergency | 217 | 72.3 |

Table III shows that most of the patients 133 (44.3%) were multipara, among 300 patients 214 (71.3%) patients gestational age was >37 weeks and 86 (28.7%) patients gestational age was<37 weeks. About 49 (16.3%) had preexisting/ pregnancy-related medical conditions and emergency surgery was done in 217 (72.3%) patients

**Table IV: Distribution of the patients according to risk factors for post-dural puncture headache (n = 300)**

| Variables | | Frequency | % |
|---|---|---|---|
| Number of attempts at dural puncture | 1 | 251 | 83.7 |
| | 2 | 42 | 14.0 |
| | 3 | 7 | 2.3 |
| Position during procedure | Sitting | 300 | 100.0 |
| | Others | 0 | 0.0 |
| Size of the spinal needle | 24G | 4 | 1.3 |
| | 25G | 296 | 98.7 |
| Estimated CSF loss (number of drops) | 0 | 252 | 84.0 |
| | 1 | 24 | 8.0 |
| | 2 | 19 | 6.3 |
| | 3 | 5 | 1.7 |

Table IV shows that, the majority of the participants 251 (83.7%) had only one attempt at the puncture, and all 300 (100.0%) were in a sitting position during the procedure, and a 25G-sized spinal needle was used in 296 (98.7%) of the patients. Most participants reported cerebrospinal fluid loss as minimal.

**Table V: Distribution of the patients according to history, pattern of headache, and clinical symptoms (n=300)**

| Variables | | Frequency | % |
|---|---|---|---|
| Previous history of PDPH | Yes | 69 | 23.0 |
| | No | 231 | 77.0 |
| Headache at discharge | Yes | 300 | 100.0 |
| | No | 0 | 0.0 |
| Severity of headache at the onset | Mild | 134 | 44.6 |
| | Moderate | 102 | 34.0 |
| | Severe | 64 | 21.3 |
| Associated symptoms | Neck stiffness | 24 | 8.0 |
| | Tinnitus | 252 | 84.0 |
| | Nausea | 19 | 6.3 |

Table V shows that, majority of the 231 (77.0%) patients had previous history of PDPH. All 300 (100.0%) patients experienced headaches before discharge. The severity of the headache at onset was mild 134 (44.6%), moderate 102 (34.0%) and severe 64 (21.3%). The associated symptoms were neck stiffness in 24(8.0%) women, tinnitus in 252 (84.0%), and nausea in 19 (6.3%).

**Table VI: Distribution of the patients according to interventions given for the Treatment of Post dural puncture headache (n = 300)**

| Types of Treatment | Frequency | % |
|---|---|---|
| None | 109 | 36.3 |
| Paracetamol and Caffeine | 43 | 14.3 |
| Caffeine injection | 16 | 5.3 |
| Diclofenac | 9 | 3.0 |
| Neostigmine/Atropine | 123 | 41.0 |
| Total | **300** | **100.0** |

Table VI shows that, majority of the patients 123 (41.0%) were given neostigmine/Atropine, Paracetamol and Caffeine, Caffeine injection and Diclofenac were given 43 (14.3%), 16 (5.3%) and 9 (3.0%) respectively.

**Table VII: Distribution of the patients according to pattern of resolution of symptoms after treatment (n = 300)**

| Variables | | Frequency | % |
|---|---|---|---|
| Treatment given | Yes | 212 | 70.7 |
| | No | 88 | 23.3 |
| Duration of symptoms | <1 hour | 32 | 10.7 |
| | 1-2 hours | 123 | 41.0 |
| | >2 hours | 11 | 3.7 |
| | Not known | 134 | 44.7 |
| Interval between intervention and relief of symptoms | <1 hour | 41 | 13.7 |
| | 1-2 hours | 117 | 39.0 |
| | >2 hours | 13 | 4.3 |
| | Not known | 126 | 42.0 |

## DISCUSSION

The management of PDPH should be consulted with the patient's anaesthetic team. In moderate situations, supportive treatments are usually started together with time to allow the dural perforation to heal on its own. Bed rest may help with symptoms, but there is no proof that it changes the clinical course. Its advantages must be evaluated against the increased risk of venous thromboembolism that occurs throughout puberty. Uncertainty surrounds the function of increased fluid intake in replacing lost CSF, despite its frequent encouragement [13]. Simple analgesics such as paracetamol, non-steroidal anti-inflammatory drugs, and antiemetics are included in pharmacological treatment. When administered orally or intravenously, caffeine has been shown to increase cerebral vasoconstriction, lower

the incidence of chronic PDPH, and lessen the need for additional conservative measures [14].

The cross-sectional observational study was conducted in the department of Surgery, North Bengal Medical College Hospital, Sirajgonj, Bangladesh, from October 2022 to September 2023. A total of 300 patients were included in the study.

In this study, most of the 104 (34.7%) patients were within the age group of 31 - 35 years. The mean±SD age of the patients was 32.6±1.3 years. BMI of most of the patients 137 (45.7%) were in the normal range (18.5 to <24.9), 103 (34.3%) had overweight (25-29.9), 37 (12.3%) were obese (≥30.0) and 23 (7.7%) had underweight (<18.5). A few researches have advised an inverse relationship between BMI and PDPH following ADP. For example, Peralta *et al.,* reported a decrease incidence of PDPH in patients with BMI C 31.5 kgm-2 in contrast with patients with BMI \ 31.5 kgm-2 [15]. In another study, Among the participants, 8 (30.8%) women were aged 20-29, and 18 (69.2%) were 30 years and above. The majority were self-employed (14; 53.8%). All the participants were married and mainly of the Yoruba tribe (88.5%). Only 2 (7.7%) had a BMI less than 18.5kg/m2, 11 (42.3%) had an average weight, 10 (38.5%) were overweight, and 3 (11.5%) were obese with a mean BMI of 30kg/m2 and above [16]. Bendel *et al.,* in their 20-year review, also reported that age is a recognized risk factor with the highest risk in the 18 – 40 years group. The mean age in the present group fell into the reported age group with the highest risk [12].

Most of the patients 133 (44.3%) were multipara, among 300 patients 214 (71.3%) patients gestational age was >37 weeks and 86 (28.7%) patients gestational age was<37 weeks. About 49 (16.3%) had preexisting/ pregnancy-related medical conditions and emergency surgery was done in 217 (72.3%) patients. In another study, multiparity was once recognized as a hazard element for the improvement of PDPH after an ADP, with parturients with one or extra preceding births having a higher chance of PDPH (59.4%) in contrast with nulliparous parturients (40.6%). Their outcomes are in settlement with Orbach-Zinger *et al.,* in that multiparity is a danger element for the improvement of a PDPH [17].

The majority of the participants 251 (83.7%) had only one attempt at the puncture, and all 300 (100.0%) were in a sitting position during the procedure, and a 25G-sized spinal needle was used in 296 (98.7%) of the patients. Most participants reported cerebrospinal fluid loss as minimal. Majority of the 231 (77.0%) patients had previous history of PDPH. In another study, The American Society of Anesthesiologists (ASA) assessment was Grade II for most women (21; 80.8%). The majority of the women had pre-medication with intravenous dexamethasone. Subarachnoid block was performed by registrars in 24 (92.3%) of the participants, as shown in Table II. The majority of the participants (22; 84.6%) had only one attempt at the puncture, and all 26 (100.0%) were in a sitting position during the procedure, and a 25G-sized spinal needle was used in 25 (96.2%) of the patients. All patients with PDPH had no reinsertion of the stylet, and most participants reported cerebrospinal fluid loss as minimal [17]. This is in contrast with the report of Ferede *et al.,* [18] that the incidence of PDPH following a 24G Quincke needle use was 15.1% compared to a 12.2% incidence of PDPH following the use of 25G needle sizes. The small size of the present study may explain the observed difference. Previous studies have also suggested that the Quincke needle is more associated with PDPH than the Whitacre needle. [19,20] There was also no correlation between the number of dural puncture attempts and the occurrence of PDPH in the present study. In contrast, previous studies have reported a significant association between these two factors [21–23]. This finding also corroborates the report of Gupta *et al.,* [24], Ferede *et al.,* [18], and Gupta *et al.,* [24] also reported 95.1% and 82%, respectively, as the proportions of patients that had PDPH in the sitting position. The ideal position for dural puncture is the lateral recumbent position with the knees and the neck flexed or the seated position with the neck flexed. The opening pressure in the lateral recumbent posture is more reliable than that in the sitting position, and lowering the position of the head may reduce the risk of post-dural puncture headache (PDPH) [25].

All 300 (100.0%) patients experienced headaches before discharge. The severity of the headache at onset was mild 134 (44.6%), moderate 102 (34.0%) and severe 64 (21.3%). The associated symptoms were neck stiffness in 24(8.0%) women, tinnitus in 252 (84.0%), and nausea in 19 (6.3%). In another study, seven (26.9%) of the women with PDPH have had a history of PDPH headache; 26 (100%) women experienced the headache before discharge. The location of the headache was described as frontal, occipital, or both frontal and occipital headache (Figure 1). The nature of the headache was described as either dull in 8(30.8%), throbbing in 2(7.7%), and a form of pressure in 16(61.5%) of the participants. The severity of the headache at onset was measured with a pain score using the box numeric scale (BNS). Among the participants, the headache was incapacitating - 9(34.6%) participants were unable to get out of bed, while 17(65.4%) were still able to get out of bed; the headache worsened in 23(88.5%) of the women while in an upright position and 3(11.5%) while in the recumbent position. The associated symptoms were neck stiffness in 3(11.5%) women, tinnitus in 21(80.8%), and nausea in 2(7.7%). Hypoacusis and photophobia were not seen in any woman. The interventions given for treating PDPH among the participants.

Majority of the patients 123 (41.0%) were given neostigmine/Atropine, Paracetamol and Caffeine, Caffeine injection and Diclofenac were given 43 (14.3%), 16 (5.3%) and 9 (3.0%) respectively. Majority

of the patients 212 (70.7%) received the treatment. In another study, the interval between the onset of symptoms and relief of symptoms was < 1 hour in 32 (10.7%), 1-2 hours in 123 (41.0%), and >2 hours in 11 (3.7%) cases. The interval between intervention and relief of symptoms was <1 hour in 41 (13.7%), 1-2 hours in 117 (39.0%) cases, and >2 hours in 13 (4.3%) case. The interval between the onset of symptoms and relief of symptoms was < 1 hour in 3 (23.1%), 1-2 hours in 8 (61.5%), and >2 hours in 2 (15.4%) cases. The interval between intervention and relief of symptoms was <1 hour in 4 (28.6%), 1-2 hours in 9 (64.3%) cases, and >2 hours in 1 (7.1%) case. The proportion of women without headaches using a Box Numerical Scale assessment method. A randomised, double-blind study by Ahmadzade *et al.*, [26] reported that 40 μg/kg neostigmine plus atropine 20 μg/kg was proved to be safe and effective and should be considered in the early treatment of mild PDPH. The increased CSF secretion and opposition to cerebral vasodilation are suggested mechanisms by which neostigmine relieves PDPH. [27] Other drugs used in this study included caffeine, paracetamol, and cocodamol®. Caffeine sodium benzoate, as an intravenous bolus or an infusion, can be used to treat PDPH. [10] However, a Cochrane Review of 2015 concluded there was evidence that caffeine confers a temporary benefit in PDPH compared to placebo, although the quality of evidence was poor [6]. About a third of the women in the present study had relief of symptoms 1-2 hours after intervention, and the majority (more than 4 out of 5 women) were cured of symptoms within 24 hours. These findings are also similar to the reports by Mahmoud *et al.*, [25] which showed that all patients in the neostigmine/atropine group achieved a Visual Analogue Scale (VAS) ≤ 3 after two doses at 24 hours postintervention, and none experienced a recurrence.

## CONCLUSION

For the pregnant women, headaches following a spinal puncture may be difficult. In order to identify and manage afflicted individuals correctly, it is necessary to assess and follow up with patients who have subarachnoid blocks or dura punctures.

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