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## Analysis Of Various Factors Affecting 'Post Dural Puncture Headache' And 'Post Dural Puncture Backache' In Patients Undergoing Caesarean Section: An Observational Study.

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### ABSTRACT

Post dural puncture headache (PDPH) and post dural puncture backache (PDPB) are important causes of painful complication as well as morbidity in patients undergoing subarachnoid block. Higher incidence in young women population were reported by previous studies. Our aim of this study is to find out the incidence rate and to analyse patient's previous history related factors, intraoperative and post-operative factors which play major role in developing PDPH and PDPB. This observational study was carried out in patients who underwent caesarean section under subarachnoid block during period extending from 1st July 2021 to 31<sup>st</sup> Dec 2021 at a tertiary care hospital. Total 251 Patients of between age group of 18-40 years belonging to ASA I/II were included in the study. Proper history and investigations were carried out pre-operatively and patients were observed: intra-operatively and followed up post-operatively till 5 days for the complaint of PDPH and PDPB. Out of 251 patients 22 (8.7%) developed PDPH. We observed following significant factors which can cause PDPH: 1. BMI<30kg/m<sup>2</sup> (p=0.006), 2.Hypothyroidism (p=0.009), 3. Habitual tea/coffee drinker (p=0.00) 4.Needle 1<sup>st</sup> pass success (p=0.00) 5.Intra-operative hypotension (p=0.003) 5.Bloody CSF (p=0.007) and 6.Time of ambulation (p=0.01).While in case of PDPB, 12 (4.7%) patients developed PDPB. Significant factors which may be responsible PDPB were: 1. BMI >30 (p=0.014), 2.Good Landmark quality (p=0.020) 3.Needle 1<sup>st</sup> pass success (p=0.004) 5. Space level change (p=0.00) and 6.Time of ambulation (p=0.00). Incidence rate of PDPH was 8.7 % and for PDPB, it was 4.7% among the obstetric population. Among these factors though some of them cannot be controlled but some of them can be prevented with technical expertise and proper decision making.

**Keywords:** Post dural puncture headache (PDPH), Post dural puncture backache (PDPB), Subarachnoid block

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## INTRODUCTION

Spinal anaesthesia is preferred and desirable form of anaesthesia for patients undergoing caesarean section as it is easy to perform, provides good surgical relaxation, faster onset of action with very good maternal and foetal outcome.<sup>1</sup> Postdural puncture headache (PDPH) and Post Dural Puncture Backache (PDPB) is an important iatrogenic cause of patient morbidity in modern anaesthesia, especially after spinal anaesthesia [1-3].

Post dural puncture headache (PDPH) was defined as headache worsened by standing or sitting up, and alleviated by lying down [4]. The incidence is higher in obstetric patients because of pregnancy related increased cerebrospinal fluid (CSF) pressure, dehydration, blood loss, postpartum diuresis, high serum oestrogen levels, gender predisposition and younger age [2,3,5]. PDPH may result in increased morbidity, prolonged hospital stay, increased cost and patient dissatisfaction [6]. While in case of PDPB, it can regress spontaneously but sometimes become very troublesome for the patients as well as anaesthesiologist [7]. As both the above mentioned conditions are commonly encountered in parturient after caesarean section,<sup>1</sup> we decided to study incidence of PDPH and PDPB in patients undergoing caesarean section

### Aims and objectives

- To determine the incidence rate of Post Dural Puncture Headache (PDPH) and Post Dural Puncture Backache (PDPB) in patients who underwent caesarean section under subarachnoid block.
- To study various factors related to patient characteristics, their previous history, as well as intra and post-operative factors; which may be responsible for PDPH along with PDPB.

## MATERIAL AND METHODS

This is an observational study. It is carried out in a tertiary care hospital from 1st July 2021 to 31<sup>st</sup> Dec 2021. Total 251 patients who underwent caesarean section under subarachnoid block, are included in the study. The study was approved by institute ethical committee. Written informed consent was taken from patients.

### Inclusion Criteria

- Patients between age group of 18-40 years
- Patients belonging to ASA I/II.
- Those which are willing to participate in the study

### Exclusion Criteria

- Patients with previous history of headache or backache.
- Severe pregnancy induced hypertension (PIH) and eclampsia
- Increased intracranial pressure
- Hemodynamic instability
- Coagulopathy
- Chronic use of analgesics
- Any other contraindications to spinal anaesthesia.

### Intra-operative Procedure

Subarachnoid block was performed with 1.8–2 ml of heavy bupivacaine 0.5% (patient in sitting position, midline approach at the L3–L4 or L4–L5 inter-vertebral space using 25G Quincke needle). The number of attempts (skin punctures, needle passes) for successful dural puncture was noted. Successful identification of the subarachnoid space with one skin puncture of the spinal needle was considered as first pass success.

**Postoperatively**

Patients were assessed for PDPH and PDPB on days 1, 2 and 3 (personal visit) and on days 5 and 7 (telephone interview). The time to sitting and ambulation, was recorded. The presence, onset, severity and duration of headache and backache were recorded. Severity was assessed by visual analogue scale (VAS 1-10) score; 0 = no headache/ backache , 1–3 = mild headache/ backache, 4–7 = moderate headache /backache, >7 = severe headache /backache. Factors associated with PDPB were analysed. Statistical analysis was performed by the Statistical Package for the Social Sciences (SPSS) program A P value <0.05 was taken to indicate a significant difference.

**RESULTS**

Out of 251 patients who were included in study 22 patients developed PDPH Therefore, incidence rate of PDPH is 8.7 % on the other hand; in case of PDPB, out of 251 patients, twelve developed PDPB i.e. the incidence rate of PDPB in our study is 4.7%.

Significant factors which may be responsible PDPH are (Table No.1, 2)

- BMI less than 30 (p=0.0069),
- Hypothyroidism (p=0.009)
- Habitual tea/ coffee drinker (p=0.000)
- Skin puncture (p= 0.009)
- Needle 1<sup>st</sup> pass success (p=0.004)
- Intra-operative hypotension (p=0.003)
- CSF tap (p=0.007)

We have observed following significant factors which may be responsible PDPB: (Table No. 3, 4)

- BMI >30 (p=0.014),
- Good Landmark quality (p=0.020)
- Needle 1<sup>st</sup> pass success (p=0.004)
- Space level change (p=0.00)

**Table 1: Post Dural Puncture Headache (PDPH): Factors related to Patient Characteristics and previous history.**

Sr. No.	Factors	PDPH	No PDPH	P value	Significant/ Not significant
1	Age	Less than 25 yrs	10	0.61	Not significant
		More than 25 yrs	12		
2	BMI	Less than 30	17	0.0069	Significant
		More than 30	5		
3	Hypertension	No	11	0.74	Not significant
		Yes	11		
4	Diabetes			0.64	Not significant
	Non Diabetic	10	116		
	Diabetic	12	113		
5	Hypothyroidism			0.009	Significant
	Absence of Hypothyroidism	6	129		
	Presence of Hypothyroidism	16	100		
6	Habitual tea/ coffee drinker			0.000	Significant
	Non Habitual tea/ coffee drinker	17	67		
	Tea/ Coffee drinker	5	162		
7	Previous History of Spinal Anaesthesia			0.47	Not significant
	No such Previous History	12	117		
	Previous History Present	9	112		
8	Previous caesarean delivery			0.92	Not significant
	No	11	117		
	Yes	11	112		

**Table 2: Post Dural Puncture Headache (PDPH): Factors related to Intra-operative and Post-operative events.**

Sr. No.	Factors		PDPH	No PDPH	P value	Significant/ Not significant
1	<b>Skin puncture</b>					
		One Attempt	8	148	0.009	Significant
		More than one attempt	14	81		
2	<b>1<sup>st</sup> Pass success</b>					
		Yes	5	152	0.000	Significant
		No	17	77		
3	<b>Intra-operative Hypotension</b>					
		No Hypotension	6	137	0.003	Significant
		Hypotension	16	92		
4	<b>Space level change</b>					
		No change	12	125	0.99	Not significant
		Changes in Space level	10	104		
5	<b>CSF</b>					
		Clear	7	140	0.007	Significant
		Bloody	15	89		
6	<b>Time of ambulation</b>					
		Less than 24 hrs	11	118	0.92	Not significant
		More than 24 hrs	11	111		

**Table no. 3: Post Dural Puncture Backache (PDPB): Factors related to Patient Characteristics and previous history.**

Sr. No.	Factors		PDPB	No PDPB	P value	Significant/ Not significant
1	<b>Age</b>	Less than 25 yrs	7	139	0.75	Not significant
		More than 25 yrs	6	100		
2		<b>BMI</b>	Less than 30	3	145	0.014
	More than 30		9	94		
3	<b>Previous spinal anaesthesia</b>		No	6	108	0.74
		Yes	6	131		

**Table 4: Post Dural Puncture Backache (PDPB): Factors related to Intra-operative and Post-operative events.**

Sr. No.	Factors		PDPB	No PDPB	P value	Significant/ Not significant
1	<b>Landmark quality</b>	Good	3	141	0.020	Significant
		Poor	9	98		
2		<b>1<sup>st</sup> Pass success</b>	Yes	2	139	0.004
	No		10	100		
3	<b>Space level changes</b>		Yes	2	146	0.00
		No	10	93		
4		<b>CSF</b>	Bloody	7	139	0.75
	Clear		6	100		
5	<b>Time to ambulation</b>		More than 24 Hrs	7	139	0.75
		Less than 24 Hrs	6	100		

**DISCUSSION**

Spinal anaesthesia is a rapidly effective and safe method of regional anaesthesia in obstetric patients [4, 8, 9]. Any breach in the duramater can result in PDPH. A breach can be spontaneous or iatrogenic [10]. Dural puncture resulting while performing spinal or epidural anaesthesia can produce

PDPH [11]. The incidence of PDPH ranges from 0.16% - 1.3% in experienced hands.<sup>12</sup> It can occur immediately or as long as 48 hours post procedure [11]. Incidence of PDPH in our study was 8.7% i.e. out of 251 patients twenty two had PDPH. In this study we observed, following factors were associated with PDPH were: 1. BMI <30kg/m<sup>2</sup> (p=0.006), 2. Hypothyroidism (p=0.009), 3. Habitual tea/coffee drinker (p=0.00) 4. Skin puncture: (p=0.009) 5. Needle 1<sup>st</sup> pass success (p=0.00) 6. Intra-operative hypotension (p=0.003) 7. Bloody CSF (p=0.007).

A study conducted by S Birajdar et al. found that incidence of PDPH in women with high BMI (> 30) undergoing caesarean section under spinal anaesthesia have a lower incidence of PDPH when compared to those with lower BMI [12]. In our study, we also found similar association between these two. The decreased incidence can be explained by the fact that in obese or morbidly obese women increase in intra-abdominal pressure acts as an abdominal binder helping to seal the defect in duramater and decreasing the loss of CSF [13].

Literature suggests that hypothyroidism exacerbates headache [2, 14]. Our results also indicate that patients with hypothyroidism had a significantly higher incidence of PDPH. We also found a significant effect of tea consumption habit on PDPH occurrence. In contrast, Etezadi *et al.* found no association between habitual tea or coffee consumption and PDPH [4]. Intraoperative hypotension and ephedrine requirement were associated with PDPH. The low-flow state, induced by post-spinal hypotension, can result in compensatory dilatation of cerebral vessels to maintain adequate cerebral blood flow that may play a role in PDPH development [2, 15], but in our study, we have not found significant association between these factors.

Our results indicate that there is a relation between the incidence of PDPH and the number of skin punctures, and first pass success. These results are in concordance with the study of Mishra et al.<sup>2</sup> A Cochrane review found that bed rest increased PDPH compared to early ambulation.<sup>16</sup> Our results also indicate that a longer time to sitting and ambulation was associated with PDPH. This is in contrast with our finding, i.e. we have not found any significant association between PDPH and time of ambulation. While considering PDPB, Incidence of PDPB in our study was 4.7% in patients undergoing Caesarean Section under spinal anaesthesia. The backache was mild to moderate in intensity, of short duration and responded to diclofenac by oral and/or intravenous route. PDPB was associated with Body Mass Index (BMI); more than 30, poor quality of spinal landmarks, absence of 1<sup>st</sup> pass success of the needle, intervertebral space level change. Some of these factors are related to patient characteristics and previous history while some are related to Intra-operative procedure and Post-operative event.

The incidence of PDPB in the literature ranges from 2% to 29% in adults;<sup>6</sup> which is similar to our study i.e. 4.7%. Increased BMI and poor quality of landmarks were associated with occurrence of PDPB in a study conducted by Mishra, *et al.* [2]. Poor quality of landmarks results in multiple skin punctures, spinal needle redirections and needle passes. It also increases the need for change in intervertebral space level and increases first pass failure; we had same observations in our study. A significant association has been reported between backache and more than two needle insertions in women undergoing elective Caesarean Section under spinal anaesthesia and was considered to be due to soft tissue or periosteal trauma [17]. which is true for our study also, as we also found significant association between these factor and PDPB.

A study conducted by Mishra et al have found significant association between patients who had a traumatic tap (blood in CSF) experienced a higher incidence of backache compared to those who had clear CSF on dural puncture [2]. This could be related to multiple attempts during spinal procedure; but we have not found any such association between these factors. Other factors in our study that were not associated with PDPB were age, previous spinal anaesthesia, CSF, time to ambulation. The back pain can be attributed to tears in the ligaments, fascia or bone with localised bleeding, relaxation of the paraspinal muscles under anaesthesia, flattening of the normal lumbar convexity, immobility of the spine and stretching and straining of the lumbosacral ligaments and joint capsules [18]. But it is important that serious complications such as epidural haematoma or abscess should be ruled out.

## CONCLUSION

Incidence rate of PDPH is 8.7 % and PDPH is 4.7% among the obstetric population. Among these factors though some of them cannot be controlled but some of them can be prevented with technical expertise and proper decision making.

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