

## Effect of position on incidence of post-dural puncture headache in patients undergoing caesarean section: A comparative study

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### Abstract

**Background:** Postdural puncture headache (PDPH) is an expected complication after lumbar puncture (LP). Spinal anaesthesia (SA) is given to a patient in lateral decubitus or in the sitting position. Our aim is to compare the incidence of PDPH between sitting and lateral decubitus position among patients scheduled for LSCS.

**Methods:** This is a kind of comparative study done on 200 pregnant women scheduled for elective lower segment caesarean section at our tertiary care centre named NRI Institute of Medical Sciences, Chinakakani Andhra Pradesh, India. Patients were randomized into two groups as per the position used for spinal anaesthesia. Group S(sitting) included 100 patients and group D (lateral decubitus) included 100 patients.

**Results:** There is no significant difference in the mean age, mean BMI and ASA grade of patients in both groups. The incidence of post-dural puncture headache was more common in sitting group patients on a postoperative day 1 compared to lateral decubitus group patients. The intensity of headache was more in sitting group patients from days 1 to 3 postoperatively. There is no significant difference in postoperative nausea and vomiting between two groups.

**Conclusion:** The incidence of post-dural puncture headache is more common among patients in the sitting group compared to patients kept in lateral decubitus position. Also, the intensity of headache is more in the sitting group among pregnant women who were scheduled for elective lower segment caesarean section.

**Keywords:** Post dural puncture headache; Caesarean section; Sitting position; Lateral decubitus position; post-operative day

### 1. Introduction

Lower segment caesarean section (LSCS) is usually done under the subarachnoid block (SB), as it provides best sensory and motor blockades. SB is easy to perform, needs minimal apparatus, maintains blood electrolytes and maintains fetal and maternal arterial blood gases.

Postdural puncture headache (PDPH) is an expected complication after lumbar puncture (LP). Symptoms were caused due to traction on pain-sensitive structures that occurs due to low cerebrospinal fluid (CSF) pressure after leaking of CSF at the puncture site[1-3]. Reasons for PDPH include dural puncture after LP, subarachnoid (spinal) block, myelography, after dural puncture given for epidural anaesthesia. Low-CSF pressure symptoms can occur after craniotomy, after keeping shunts in the ventricle, and after a brain or spinal surgery or trauma, Risk factors for PDPH include systemic illness, dehydration, previous headache, being female, young age, pregnancy, using large cutting needle.

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Symptoms of PDPH commonly occur within 72 hours of LP but, it can be delayed for months later [4-5]. Various interventions like using atraumatic needle tips, spinal needles with a smaller diameter, giving intravenous crystalloids, caffeine, pain killers like non-steroidal anti-inflammatory drugs (NSAIDs) and bed rest, show varying success rates in reducing PDPH[6-7].

Spinal anaesthesia (SA) is given to a patient in lateral decubitus or in the sitting position. Doğan et al. [8] reported that prone position during surgery decreased the incidence of PDPH. Patient position during SA can affect CSF leakage. Studies investigating patient's position during SA administration and PDPH were less. Hence the current study was taken up at a tertiary care centre.

**Hypothesis:** We hypothesize that a sitting position may cause PDPH more compared to a lateral position.

#### *Aim*

We wanted to compare the incidence of PDPH between sitting and lateral decubitus position among patients scheduled for LSCS.

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## **2. Material and methods**

### **2.1. Type of study and study site**

This is a kind of comparative study done on 200 patients who were scheduled for elective LSCS, at a tertiary care center named NRI Institute of Medical Sciences, Chinakakani, Andhra Pradesh, India

### **2.2. Study duration**

The study was done for 6 months from June 2022 to November 2022.

### **2.3. Sampling method**

Simple random sampling.

### **2.4. Sample size calculation:**

As per the national health family survey-4, the prevalence of LSCS in India was 17.2%. [9]

The sample size is calculated as follows:

$$N = Z^2 P Q / E^2$$

N=sample size

P=Prevalence

P=17.2%

Q=1-P

E>Error: 5%,

90% confidence limits

N=156

156 is the minimum sample size.

So, we included 200 patients in the current study, considering a few losses to follow-up cases and incomplete data.

### **2.5. Inclusion criteria**

- Patients aged above 18 years
- Females scheduled for lower segment caesarean section.
- Anesthesia given by subarachnoid block (spinal anesthesia).
- Patients who provided informed consent.

### **2.6. Exclusion criteria**

- Patients with contraindications to spinal anaesthesia.

- Patients with more than 1 puncture
- Patients with a bad obstetric history
- Patients using painkillers chronically.
- Patients with a history of migraine headache.

## 2.7. Methodology

200 pregnant women were recruited after taking informed consent from parents or legally accepted representatives. They were divided into two groups. After pre-anesthetic assessment, monitoring of blood pressure, pulse rate, oxygen saturation, and electrocardiography, were done for all patients in the surgical room. No patient was given a sedative, as it may affect lactation. Each patient received 10 mL/kg crystalloid solution before giving spinal anesthesia. Spinal anesthesia was given using bupivacaine along with 1 mL sufentanil using 24-gauge spinal needle either in the sitting or in left lateral decubitus position. Lumbar puncture was given at L3-L4 interspinal space. In the left lateral decubitus position, patients lay on their left side parallel to the rim of surgical table. Post-puncture headache was done using numeric pain rating scale (NRS) scale on post operative days 1 to 3. NRS is an 11-point scale. It is used for self-reporting of pain intensity.

- 0: Absence of headache
- 1 to 3: Mild headache
- 4 - 6 is moderate pain -affects activities of daily living
- 7-10: severe pain and patient can't perform daily activities.

## 2.8. Groups

The study included 2 groups of patients. Patients were divided into 2 groups by computer-generated software randomization.

Group S- Patients who received spinal anesthesia in sitting position-100 pregnant women.

Group D- Patients who received spinal anesthesia in lateral decubitus position-100 pregnant women.

## 2.9. Parameters assessed

- Age
- BMI
- ASA grade
- Incidence of PDPH on days 1 to 3
- Intensity of PDPH on days 1 to 3 as per NRS
- Incidence of post operative nausea and vomiting

## 2.10. Ethical considerations

Permission from the Institutional ethics committee attached to the NRI Institute of Medical Sciences was taken before conducting the study. All parents were explained the complete process and benefits of their data for the study. After he/she accepts, an informed consent form was provided in the local language or and the person was asked to sign it or put a thumb impression.

## 2.11. Statistical analysis

Statistical analysis was done using Epi Info software version 7.2.5. The results were expressed as mean  $\pm$  S.D, percentages. A comparison between the two groups was done using students T test and chi square test. for proportions. P value  $<0.05$  is considered statistically significant.

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## 3. Results

### 3.1. Age

There is no significant difference in the mean age between two groups of patients.

**Table 1** Mean age in two groups

Parameter	Group S	Group D	P Value
Mean age	26.7±4.8 years	26.4±3.4 years	0.61, T=0.51

### 3.2. BMI

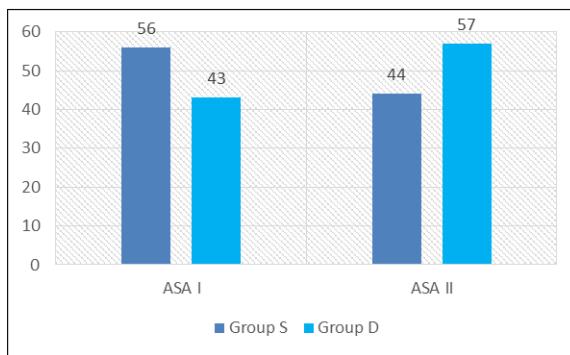
There is no significant difference in mean BMI between two groups. Hence the comparison is justifiable.

**Table 2** Mean BMI in two groups

Parameter	Group S	Group D	P Value
Mean BMI	27.8±4.2 kg/m <sup>2</sup>	27.1±3.9 years	0.22 T=1.22

### 3.3. ASA grade

There is no significant difference in ASA grade between two groups, as per chi square analysis (p=0.65). 43 patients of group D and 56 patients of group S belonged to ASA I

**Figure 1** ASA grade in two groups

### 3.4. Incidence of PDPH on days 1 to 3

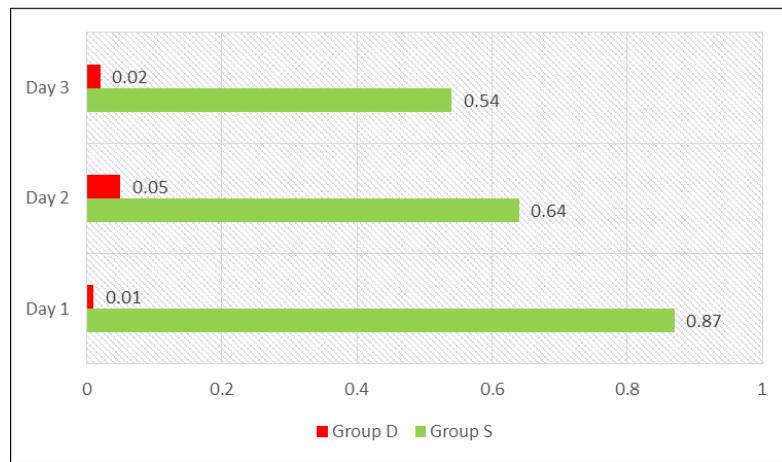
The incidence of PDPH was more in sitting group (group S), compared to group D during 1st post operative day.

**Table 3** Incidence of PDPH in both groups from days 1 to 3

Parameter	Group S	Group D	P Value
Presence of PDPH on day 1	12 out of 100 patients	1 out of 100 patients	0.001 Chi square=15.7
Presence of PDPH on day 2	5 out of 100 patients	1 out of 100 patients	0.09 Chi square=2.74
Presence of PDPH on day 3	3 out of 100 patients	1 out of 100 patients	0.31 Chi square=1.02

### 3.5. Intensity of PDPH as per NRS

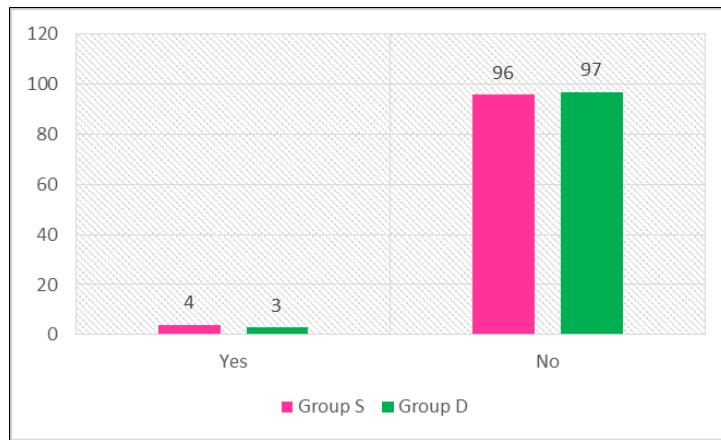
There is significant difference in the mean intensity of PDPH between two groups as per t test (p=0.0001, p=0.0001, p=0.0001) on days 1 to 3 respectively. It was more in group S cases.



**Figure 2** Intensity of PDPH as per NRS during days 1 to 3

### 3.6. Post-operative nausea and vomiting

There is no significant difference in the incidence of postoperative nausea and vomiting between both groups, as per chi-square analysis. ( $p=0.70$ )



**Figure 3** Post operative nausea and vomiting in both groups

## 4. Discussion

This was a comparative study conducted at NRI Institute of medical sciences, a tertiary care centre with well-equipped facilities.

There are various mechanisms for raised incidence of PDPH in sitting position, which include delay healing. This occurs due to spaces between two vertebrae, being more noticeable, and so, needle puncture is easy and less traumatic. [10]

Proposed theories behind PDPH include leakage of CSF both during dural puncture and later, which causes less CSF pressure leading to vasodilatation of meningeal vessels along with cranial nerve traction in upright posture. [11]

There is no significant difference in the mean age, mean BMI and ASA grade between the two groups of patients. This implied that the comparison between the two groups is justifiable. PDPH was found to be more common in sitting group compared to lateral decubitus position group in our study. 12% of patients in sitting group had PDPH. The overall incidence of PDPH in our study 6.5 % during 1st postoperative day, 3% during 2nd postoperative day and 2% during 3rd postoperative day in our study.

Sharma *et al.*[12] did a study on 134 pregnant women scheduled for LSCS. Post-dural puncture headache was compared in sitting and lateral decubitus position. PDPH was monitored for 5 days. The incidence of post-dural puncture headache

was found to be more common in sitting group compared to the lateral decubitus group. aged below 3 years. Overall, 17% patients in sitting group had PDPH.

PDPH was also found to be more common in sitting posture group in the studies done by Davoudi M *et al.*[13] and Majd SA *et al.*[14] who reported that the incidence of PDPH in sitting posture as 20.8% and 45% respectively. Study done by Zorilla-Vaca *et al.*[15] reported similar results

In the study of Asoke *et al.* [16] 300 patients who were scheduled for various surgeries under spinal anaesthesia were included. Incidence of PDPH was found to be 11.66%. There was no significant difference in incidence between sitting or lateral decubitus group, in contrast to our study findings.

In the study by Öztürk I *et al.* [17] done-on patients scheduled for caesarean section, the authors found no significant difference between the incidence of PDPH in sitting and lateral positions, in contrast to our study. In the study of Kyu Chang Lee *et al.*[18] authors wanted to determine incidence of PDPH after giving spinal anaesthesia, The incidence was 4% in patients of sitting group. In the research of Siamak Majd, *et al.*[19] also authors found more PDPH in patients of sitting group. It was 45% in sitting group. position 16.6%. In this study, the incidence is very high, which could be due to larger diameter of Quincke needle they used. Study done by Shah [20] showed that an epidural pressure of 6.4 cm H2O showed PDPH and found decrease in pressure to 6.9cm in supine position.

Small sample size is the main limitation. This is not multi-centric study. So, the results can't be generalized completely.

## 5. Conclusion

Our study proved that the incidence of post dural puncture headache is more common among patients in sitting group compared to patients kept in lateral decubitus position. Also, the intensity of headache is more in sitting group among pregnant women who were scheduled for elective lower segment caesarean section.

## Compliance with ethical standards

### *Acknowledgments*

I would like to thank the principal and superintendent of NRI institute of medical sciences, our institutional ethics committee and the patients who provided informed consent to participate in the study.

### *Disclosure of conflict of interest*

There were no conflicts of interest.

### *Statement of ethical approval*

The current study was done after getting approval from the institutional ethics committee of the NRI Institute of Medical Sciences, Chinakakani.

### *Statement of informed consent*

Informed consent was taken from each and every patient who participated in our study.

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