

## The Relationship Between Body Mass Index and Incidence of Postdural Puncture Headache in Female Patients Undergoing Infraumbilical Surgeries

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### Abstract

**Introduction:** Postdural puncture headache is a common complication following dural puncture for spinal anesthesia. The objective was to study the relationship between body mass index and incidence of postdural puncture headache in female patients undergoing infraumbilical surgeries under spinal anesthesia. **Methodology:** After institutional ethical committee clearance and written informed consent, a prospective observational study was conducted in 70 female patients undergoing infraumbilical surgeries under spinal anesthesia. Body mass index was calculated and they were grouped into 2 groups, one with BMI < 25kg/m<sup>2</sup> and another with BMI ≥ 25kg/m<sup>2</sup>. Incidence of PDPH was assessed in both the groups. **Results:** Postdural puncture headache was reported in 5 patients in the group with BMI < 25kg/m<sup>2</sup> and in one patient in the higher BMI group. The overall incidence of PDPH was 8.57% following spinal anesthesia. But the incidence of PDPH was higher in the low BMI group compared to the high BMI group and the results showed a statistical significance with a *p* value <0.04. Gauge of the needle and number of attempts showed no correlation with the incidence of PDPH and results had a *p* value >0.05. **Conclusion:** The findings of our study was consistent with the previous studies that showed an inverse relationship between body mass index and incidence of postdural puncture headache.

**Keywords:** Postdural puncture headache, body mass index, spinal anesthesia, infraumbilical surgeries

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### Introduction

Postdural puncture headache is caused either due to intentional or unintentional dural puncture during therapeutic or diagnostic lumbar puncture.<sup>1</sup> International headache society defined PDPH as any headache that developed within 5 days of dural puncture and is not better accounted for any other cause.<sup>2</sup>

The advantages of regional anesthesia is that it allows minimal manipulation of the airway, avoidance of cardiodepressant drugs and decreased incidence of postoperative nausea and vomiting.<sup>3</sup>

Identification of the midline and bony landmarks is difficult in obese patients. The fat pockets present in them give a false positive loss of resistance which results in more number of needle placement attempts.<sup>3</sup>

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The retrospective study by Miu et al found no correlation between higher body mass index and development of PDPH after accidental dural puncture following epidural and combined spinal epidural insertions in women. Another retrospective study by Peralta et al showed that incidence of PDPH decreased with increasing BMI after unintentional dural puncture in parturients .

The purpose of this prospective study is to evaluate the relationship between body mass index and PDPH in female patients undergoing infraumbilical surgeries under spinal anesthesia.

**Materials and Methods**

The prospective study was conducted after obtaining institutional ethical clearance in our tertiary care hospital. The study comprised of 70 female patients posted for elective infraumbilical surgeries of ASA grade 1 and 2. The preoperative evaluation was done and the procedure was explained. A written informed consent was taken. The BMI was calculated and patients were grouped into two groups. Group A with BMI <25kg/m<sup>2</sup> and group B with BMI ≥25kg/m<sup>2</sup> according to WHO definition of normal weight and overweight.<sup>6</sup>

**Inclusion criteria**

- 1 Female aged between 18-60 years
- 2 ASA grade I and II
- 3 Elective infraumbilical surgeries

**Exclusion criteria**

- 1 Patient refusal
- 2 Previous history of migraine, neurological disease, history of fever, common cold, sinusitis and features of raised intracranial pressure.

Baseline heart rate, blood pressure and saturation were recorded. 18 gauge intravenous access was secured.

Under all aseptic precautions subarachnoid block was preformed using Quincke Babcock needle of either 23G, 25G or 26G.

Postoperatively the patients were followed up for 7days. The patients were asked to report if they experienced frontal or occipital headache, radiating to the neck and shoulders, which occurs or worsens less than 15minutes after assuming upright position and improves with recumbent position.<sup>7,8</sup>

Patients complaining of headache were reassured, psychological counseling was given, were advised bed rest, to maintain adequate

hydration by drinking plenty of oral liquids as most of them reported headache after the second postoperative day when they tolerating oral intake. Caffeine in the form of coffee and acetaminophen was also prescribed. The headache was relieved by these conservative methods.

**Statistical Analysis**

The comparison of proportions between two groups was tested by applying z-test and the result is considered statistically significant whenever P value is less than or equal to 0.05.

**Results**

Seventy female patients in the age group between 18-60 years undergoing infraumbilical surgeries under spinal anesthesia were included in the study.

Five patients out of the 35 in group A experienced PDPH i.e, 14.28% and one patient in group B with BMI ≥ 25kg/m<sup>2</sup> i.e, 2.86% patients experienced PDPH. The statistically analysis of the data had a p value <0.04 (Table 1) which was significant and showed that the BMI was inversely related to the incidence of PDPH following spinal anesthesia.

**Table 1:** Comparison of incidence of PDPH in group A and B

Postdural puncture headache	BMI		Total	p-value	
	<25	≥ 25			
Yes	5	1	6	p < 0.04	Significant
No	30	34	64		
Total	35	35	70		

23G, 25G and 26G Quincke Babcock needle were used in the study. 3 patients with 23G needle and 3 patients with 26G needle experienced PDPH. But none of the patients with 25G needle group experienced PDPH. The relation between the gauge of the needle and incidence of PDPH was statistically insignificant with a p value >0.05 (Table 2)

A maximum of 3 attempts was take to do lumbar puncture. The number of attempts did not show any correlation with the incidence of PDPH and the p value was >0.05 (Table 3).

**Table 2:** Comparison between gauge of the needle and PDPH

Postdural puncture headache	Gauge of needle			Total	p-value	
	23.0	25.0	26.0			
Yes	3	0	3	6	p > 0.05	Not significant
No	4	10	50	64		
Total	7	10	53	70		

**Table 3:** Comparison between the number of attempts and PDPH

Postdural puncture headache	No. of attempts			Total	p - value	Not significant
	1	2	3			
Yes	3	1	2	6	P > 0.05	
No	53	9	2	64		
Total	56	10	4	70		

## Discussion

The decreased CSF volume causing, sagging of the intracranial structures, due to the leakage of cerebrospinal fluid out of the intrathecal space is the cause for postdural puncture headache. The traction on the pain sensitive areas of the brain and meninges causes headache. The CSF loss causes increased cerebral blood flow and vascular dilation which also results in headache similar to that of vascular origin.<sup>9</sup>

In our study comprising of 70 female patients undergoing infraumbilical surgeries under spinal anesthesia showed an inverse relationship between BMI and incidence of PDPH. 5 patients in group A with BMI < 25kg/m<sup>2</sup> and one patient with BMI ≥ 25kg/m<sup>2</sup> in group B experienced PDPH and p value was <0.04 was statistically significant.

The results of our study correlated with the study conducted by Peralta et al, the incidence of PDPH after unintentional dural puncture in parturients with BMI > 31.5kg/m<sup>2</sup> was lower than with BMI < 31.5kg/m<sup>2</sup>.

The increased abdominal pressure results in increased epidural pressure in obese compared to thin patients which lessens the pressure gradient from the intrathecal space to the epidural space, decreasing CSF loss.<sup>10,11</sup>

But another retrospective study conducted by M.Miu et al, found no evidence that women of higher BMI are less likely to develop PDPH. The bigger epidural needle caused a rent in the dura, epidural fat did not tamponade it nor did the inflammatory response heal the meningeal tear was the explanation given in the study. In our study the smaller gauge spinal needle used may be the reason for the correlation observed.

The gauge of the needle used in our study showed no significant correlation with the incidence of PDPH. Similar results were observed in a review of 70 studies conducted by Arevalo-Rodriguez I et al. the varies sizes of the large and small gauge needles showed no significant difference in the effects in terms of risk of PDPH.

Sumitra G Bakshi, in patients of age 20-40years showed a positive correlation between the needle size and the incidence of PDPH. Many studies have confirmed that a bigger needle increased the incidence of PDPH and with Quinckes needle the severity was directly related to the size of the needle.<sup>1,7,10</sup>

The number of attempts did not have a positive correlation in our study on the incidence of PDPH. Khraise N Wail et al, the repeated puncture attempt increased the risk of PDPH by 2.55-fold. Though 50% of patients with 3 attempts developed PDPH in our study, 10% with 2 attempts and 5.36% with single attempt, the results had a p value >0.05 and was not significant. The small number of patients enrolled may be the reason.

## Conclusion

Our study was consistent with the previous studies and the incidence of PDPH was inversely related to the body mass index in female patients undergoing infraumbilical surgeries under spinal anesthesia. The size of the needle had no correlation to the incidence of postdural puncture headache. The number of attempts showed a positive correlation to the incidence of PDPH but was not statistically significant.

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