

## Comparative Assessment of Post-dural Puncture Headache Using three Different types of Needles on Sub-arachnoid Block- a Randomized Clinical Study

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### Abstract

**Objective:** Comparison of post-dural puncture headache using three different types of needles on sub arachnoid block- a clinical study.

**Material:** This prospective randomized comparative study in Department of Anaesthesiology, NMCH, Patna, Bihar, India for 1 year. 120 patients ASA I and II grades in the age group of 20 to 50 years and the height between 150 to 168cms, giving informed consent were included. Patients with h/o chronic headache, any contra indication to sub arachnoid block and who did not give consent to participate in the study were excluded. Patient was randomly allocated in to three groups. B.P., ECG, HR and SPO2 monitored non-invasively rate, of injection 1ml/15sec, volume 3ml of 0.5% bupivacaine heavy, lateral position and L3-4 interspace, were kept constant. The following parameters were compared: Number of attempts, PDPH, Back ache, NPDPH, and Patient acceptability. The results were compared statistically using Fischer exact test, Analysis of variance and Chi square test.

**Results:** Statistically analyzing, there was no significant difference in number of attempts in three types of needles with the use of introducer. PDPH 7.5% in Group 2.5, 2% in Group 2, and 0% in group 3 inferring that group1 is associated with higher incidence P.D.P.H.

**Conclusion:** All three types of needles were easy to insert when used with an introducer. Thus, pencil point Whitacre needle is better choice in view of low incidence of PDPH. However, cost factor which again should be weighed against the complication.

**Keywords:** Anesthesia technique; Onset of sensory block; SAB; PDPH; NPDPH; Equipment; 27G Whitacre; 27GQuincke; 27G Sprotte

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### Introduction

Headache Disorder, postdural puncture headache (PDPH) is defined as a headache occurring within 5 days after lumbar puncture (LP), which is aggravated when standing or sitting and relieved when lying

flat.[1] Associated symptoms include stiff neck, hearing loss, tinnitus, photophobia, hyperacusia, and nausea. The prevalence of PDPH is higher in pregnant women.[2] It is a common complication of lumbar

puncture, which is likely due to the loss of cerebrospinal fluid (CSF) into the epidural space through the dural tear. The reported incidence of PDPH varies from 10 to 40% depending on age, gender, and needle size. [3-5]

Postdural puncture headache (PDPH) is a major complication of neuraxial anesthesia that can occur following spinal anesthesia and with inadvertent dural puncture during epidural anesthesia. Obstetric patients are considered at increased risk for this condition because of their sex, young age, and the widespread use of neuraxial blocks. Inadvertent dural puncture during epidural anesthesia is a more common cause of PDPH than spinal anesthesia because of the use of small, pencil-point needles for spinal anesthesia in this population. During epidural placement, inadvertent puncture of the dura mater occurs at a rate of 1.5% (95% CI 1.5–1.5%), and more than half (52.1%; 95% CI: 51.4–52.8%) of these patients develop PDPH.[6] A more recent study showed that the incidence of PDPH after dural puncture with an epidural needle could be as high as 76–85%. [7]

Spinal anesthesia now regarded as the technique of choice for all lower abdominal surgeries as the well-known problems of general anesthesia are avoided. The advantage of spinal anesthesia over epidural anesthesia is more rapid onset and more consistent quality of anesthesia. Nevertheless, problems with spinal anesthesia can occur with difficulty in needle placement, failed blocks and trauma.[8]

### Materials and Methods:

This prospective randomized comparative study in Department of Anaesthesiology, NMCH, Patna, Bihar, India for 1 year. 120 patients were undertaken to study the effects on three different needles on subarchanoid block.

### Inclusion criteria:

Patients below 50 years whose height was between 150 to 168 cms scheduled for elective lower abdominal procedures.

### Exclusion criteria:

Patients with chronic headache/ migraine, backache and any contraindication to SAB were excluded from the study.

### Methodology

A detail history of present and past medical illness, past h/o of anesthetic exposure, concomitant history of drug allergy and any medications in preoperative period was recorded.

General physical examination and systemic examination of the patients was done. Routine and relevant specific investigations were done. Height in cms and weight in kgs were recorded.

### Groups

Patients were randomly allocated into 3 groups.

Group I - Quincke 27G needle n=40.

Group II - Sprotte 27G needle n=40.

Group III - Whitacre 27G needle n=40.

### Statistical Methods:

Statistical analysis was done by descriptive method been carried out in the present study. Significance is assessed at 5% level of significance. Analysis of variance (ANOVA) has been used to find the significance of study parameters between three or more groups of patients, Chi-square/2x3, 3x4 Fisher Exact test has been used to find the significance of study parameters on categorical scale between two groups. ANOVA has been used to test the homogeneity samples based on of age (or continuous parameters) and Chi-square test to test the homogeneity of samples based on parameters on categorical scale between two groups.

### Results:

**Table 1: Age, weight and Height distribution of patients studied**

Demographic variables	Group I	Group II	Group III	All patients	P value
Age in years	36.79 ± 8.21	37.21 ± 9.20	36.22 ± 9.62	37.98 ± 0.43	0.529
Weight in Kg	57.18 ± 5.71	58.55 ± 5.87	56.41 ± 5.31	57.77 ± 5.19	0.011 *
Height in cm	157.91 ± 2.23	158.61 ± 4.61	159.21 ± 4.43	159.77 ± 3.38	0.271

Weight (mean) is significantly less in Group II, but not clinically significant

**Table 2: Interspace comparison between the groups**

Inter space	Group I		Group II		Group III		All patients	
	No	%	No	%	No	%	No	%
L3-4	33	82.5	32	80.0	29	72.5	94	78.3
L4-5	7	17.5	8	20.0	11	27.5	26	21.6
Total	40	100.0	40	100.0	40	100.0	120	100.0

Inter space is statistically similar between three groups of patients with P=0.2

**Table 3: Comparison of Post dural puncture headache (PDPH)**

PDPH	Group I (n=40)	Group II (n=40)	Group III (n=40)
D1	3 (7.5%)	0	0
D2	1(2.5%)	0	0
D3	0	1(2.5%)	0
D4	0	0	0

Incidence of PDPH was seen more in group I (7.5% vs. 2.5% vs. 0%) when compared to group II & III with P=0.303.

**Table 4: Complications**

Complications	Group I (n=40)	Group II (n=40)	Group III (n=40)
Back ache	0	0	0
NPDPH	6(15.0%)	2 (5.0%)	4 (10.0%)

Highest number of complications is seen in group I (15%), followed by group III (10 %) and group II (5 %) respectively.

**Table 5: Acceptability: all the groups showed good acceptability (95%) within the study groups.**

Acceptability	Group I (n=40)	Group II (n=40)	Group III (n=40)
Good	38 (95%)	38(95%)	38(95%)
Not good	2 (5%)	2 (5%)	2 (5%)

**Table 6: Onset of PDPH**

Onset of PDPH	Group I (n=40)	Group II (n=40)	Group III (n=40)
D1	3 (7.5%)	0	0
D2	2 (5.0%)	0	0

D3	0	1(2.5%)	0
D4	0	0	0

Onset of PDPH was in group I (D1=7.5% and D2=5%). In group II (D3=2.5%) was observed.

**Table 7: Location of PDPH**

Location of PDPH	Group I (n=40)	Group II (n=40)	Group III (n=40)
Frontal	2 (5.0%)	0	0
Occipital	1(2.5%)	1(2.5%)	0
Generalized	0	0	0

5% of PDPH was located on frontal region and 2.5% was located on occipital region which can be seen in both group I & II. (p=0.303)

**Table 8: Severity of PDPH:**

Severity of PDPH	Group I (n=40)	Group II (n=40)	Group III (n=40)
Grade I	4(10.0%)	1(2.5%)	0
Grade II	0	0	0
Grade III	0	0	0

Grade I severity is seen in both group I & II. (p=0.324)

**Table 9: Duration of PDPH**

Duration of PDPH	Group I (n=40)	Group II (n=40)	Group III (n=40)
<24 hours	3(7.5%)	1(2.5%)	0
24-48 hours	0	0	0
>48 hours	0	0	0

Duration of PDPH was less than 24 hours in three patients in group I and 1 patient in group II. (p=0.324)

## Discussion

Inferring that number of attempts is similar in all three groups, with the use of introducer. The present study is comparable to the results of the study by Shutt LE et al who studied the ease of insertion of 22Gauge Whitacre needle and 25Gauge Whitacre. 22 Gauge Whitacre needle insertion was associated with more successful dural puncture in first attempt (72%) with a smaller failure rate. 25Gauge Whitacre needle for which the success rate was 64% on first attempt and 6% was failure rate.[9]

The results of this study indicated that a small pencil point spinal needle has a lower

risk of postdural puncture headache, which agrees with other similar studies. [10,11] However, another study conducted to compare 24-gauge Sprotte and 25-gauge Quincke needles and the effect of subarachnoid administration of fentanyl found no significant difference in PDPH between the pencil-point Sprotte and Quincke needle inserted parallel to the dural fibers in obstetric patients.[12]

The present study is compared to a study done by Santanen U et al. They compared 27Gauge Whitacre with 27Gauge Quincke needle with respect to PDPH and NPDPH. The incidence of PDPH in the Quincke

group is 2.7% while with the Whitacre needle it is 0.3%. [13]

The present study is comparable to a prospective randomized study and a meta-analysis, done by Flaatten H. et al. They compared the incidence of PDPH, in 27Gauge Quincke with 27Gauge Pencan needle (modified Sprotte). 27Gauge Quincke needle had 8% PDPH and 27G Pencan needle had 1.9%. [14]

Persistent failure of the dural puncture causes continuous leakage of CSF and contributes to postdural puncture headache. One potential mechanism for the lower rates of PDPH and therapeutic blood patch seen with extraction of higher volumes of CSF may be that transiently lower CSF pressures immediately following the procedure decrease continued leakage through the Dural puncture, facilitating dural closure. [15] However, another study found that there is no significant difference observed in the incidence of PDPH between single shot block and two or more attempts. [16]

It is comparable to study done by Corbey M.P. et al. The team compared the incidence of PDPH in 27Gauge Quincke with 26Gauge Quincke needle and systemic grading of severity of headache and standardized criteria of PDPH was proposed. The same classification is adopted in the present study. In their study, 27Gauge Quincke had 8% PDPH which is comparable to the present study.[17]

### Conclusion:

The findings of this study revealed that a small spinal needle is significantly superior to a large spinal needle regarding the occurrence of PDPH. All three types of needles were easy to insert when used with an introducer. Thus, pencil point Whitacre needle is better choice in view of low incidence of PDPH. However, cost factor which again should be weighed against the complication.

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