# TO COMPARE THE INCIDENCE OF POST DURAL PUNCTURE HEADACHE WITH PENCIL POINT 25 GAUGE WHITACRE VERSE CUTTING 25 GAUGE QUINCKE SPINAL NEEDLE IN PATIENTS FOR C SECTION UNDER SPINAL ANAESTHESIA

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## ABSTRACT

***Objective***: To compare the incidence of post dural puncture headache with pencil point 25 gauge Whitacre verse cutting 25 gauge Quincke spinal needle in patients for C section under spinal anaesthesia.

***Study Design***: Randomized controlled trial.

***Place and Duration of Study***: Operation Theatre, Department of Anaesthesia, Combined Military Hospital Lahore, from Nov 2015 to May 2016.

***Methodology***: All patients with ASA status-I or II, undergoing elective C section surgeries were included in the study. Patients assigned to Group W was administered spinal anesthesia by using 25 gauge Whitacre pencil point needle at the level of L3,L4 space while patients assigned to Group Q was administered spinal anesthesia by using 25 gauge Quincke needle at the level of L3, L4 space. Patients were observed for PDPH in the recovery room and then in the ward 6 hourly till 72 hours. All the data was entered and analyzed on SPSS version 10.

***Results***: In our study the mean age of the patients was 24.29 ± 3.78 years. The PDPH was observed in 33 (19.41%) patients. The mean value of VRS score after 6th hour was 2.92 ± 2.29, after 12$^{th}$ hour its mean value was 2.93 ± 2.28, its mean value after 18$^{th}$ hour was 2.93 ± 2.29 and the mean value of VRS after 24$^{th}$ hour was 3 ± 2.35, the mean value of VRS score after 36$^{th}$ hour was 2.93 ± 2.385, after 48th hour its mean value was 2.89 ± 2.269, its mean value after 60th hour was 2.99 ± 2.484 and the mean value of VRS score after 72th hour was 3.02 ± 2.475.

***Conclusion***: It has been proved in our study that significantly lower incidence of PDPH was noted in 25 G whitacre group patients as compared to 25 G quincke spinal needle in patients for c section under spinal anesthesia.

**Keywords**: Needle, cesarean section, Postdural puncture headache, PDPH, Quincke, Spinal anesthesia, Section, Whitacre.



## INTRODUCTION

Spinal, epidural, and caudal neuraxial blocks result in sensory analgesia, sympathetic block and motor block, depending upon concentration, dose or volume of local anaesthetic. Neuraxial anaesthesia is still the primary modality of regional blockade[1].

Effectiveness of spinal aneasthesia is similar to general anesthesia, along with favorable maternal and fetal outcome. Spinal anesthesia techniqueis most widely used currently for cesarean section surgery. It iseven used in complicated situations like cord prolapse, preeclampsia, and placenta previa, which were previously considered an indication for general anesthesia[2]. With the popularity of neuraxial anesthesia techniques in clinics, Post Dural Puncture Headache (PDPH), a common iatrogenic complication resulting from post-spinal taps is frequently being reported[3].

Post dural puncture headache (PDPH), also called spinal headache, is a characteristic headache and begins within 12-24 hours and may last a week or more. It is postural, being aggravated by raising the head and relieved by lying down. It usually effects occipital region and may be associated with neck stiffness[4]. It is frequently associated with dizziness, nausea, vomiting, tinnitus, vertigo, hearing loss, visual disturbances such as photophobias or cortical blindness. It may result in paraesthesias of the scalp and limb pain. It is

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more common in the younger women undergoing Caesarean Section under spinal anaesthesia[5].

The cause of postdural puncture headache (PDPH) is leakage of the cerebrospinal fluid through the puncture in dura formed by the spinal needle. Several theories exist to explain the genesis of headache, however two theories prevail. One of them is that the headache was due to reflex vasodilatation in response to hypotension in CSF space. The other theory says that the traction of intracranial structures, which are innervated for pain, caused by brain accommodation in the upright position due to low CSF pressure, is responsible for PDPH. In this case, the traction of the nerve roots C1 to C3 and 5th, 10th and 11th cranial nerves originate neuralgic syndrome[6].

The 25G Whitacre pencil point spinal needle is recommended for Subarachnoid Block in the cesarean section of obstetric patients at high risk of post dural puncture headache. However the cost of the Whitacre pencil point spinal needle has to be balanced against the risk of post dural puncture headache which may result in higher cost of a longer hospital stay, and the hazardous therapy of an epidural blood patch[7]. In our population cutting quincke needle is usually used to give spinal anaesthesia for c section because it is cost effective and easy to use.

Previous studies have indicated that pencil-point needles may produce fewer post dural puncture headache symptoms. In a study carried out byAnirban Pal, Amita Acharya *et al*, the incidence of post dural puncture headache was 5% in group Whitacre and 28.12% in group Quincke, and the difference in incidence was statistically significant ($p$<0.001)[8].

The rationale of my study was to compare 25 gauged Whitacre pencil point with 25 gauged cutting Quincke needle in young patients undergoing C Section under spinal anaesthesia and as per literature the incidence of post dural puncture headache reduced significantly when pencil point needle is used for spinal anaesthesia. This study showed the effect of different needles in our population. The needle with less incidence of PDPH will be preferred in our population.

## METHODOLOGY

This study was conducted at Department of Anesthesia, Combined Military Hospital Lahore. Non probability consecutive sampling was used and 170 patients were included in study, from November 2015 to May 2016. Sample size was calculated by using WHO sample size calculator by taking level of significance 5% and power of the test 80%. Anticipated population proportion (P1) was 5%[8] with post dural puncture headache for Whitacre Pencil point group, anticipated population proportion (P2) was 28.12% with post dural puncture headache for Quincke cutting group[8]. All pregnant females aged 18-30 years undergoing elective cesarean section under spinal anaesthesia having American society of Anaesthesiology (ASA) status-I or II were included in study. Exclusion crieteria included Patient refusal, history of recurrent headache (on previous medical record), patients having traumatic deformity of the spine (on history and examination), patients having any contraindication to spinal anaesthesia e.g. local sepsis (skin), coagulopathy (PT, APTT deranged more than 4 sec, increased intracranial pressure, severe aortic stenosis and severe mitral stenosis (on previous medical record) and patients unwilling for spinal anaesthesia. After taking informed written consent, all the patients were divided into two groups: group W-Whitacre Pencil point group (n=85) and group Q-Quincke group (n=85) by lottery method. Patients assigned to group W was administered spinal anesthesia by using 25 gauge Whitacre pencil point needle at the level of L3, L4 space while patients assigned to group Q was administered spinal anesthesia by using 25 gauge Quincke needle at the level of L3,L4 space. If lumber puncture could not be done in three attempts, it was declared unsuccessful and patient excluded from study. End point for both the approaches for successful spinal was visualization of clear CSF in the spinal needle. Patients were observed for post dural puncture headache in the recovery room and then in the ward 6 hourly till 72 hours.

Post dural puncture headache was labeled if patient had headache on verbal rating scale (VRS) more then 4/10 after spinal anesthesia and headache occured on slightest movement of neck. PDPH was assessed 6 hourly till 72 hours. A single VRS score of more than 4/10 was labeled as PDPH. VRS score increased as the severity of headache increased. Patients of PDPH were treated as per hospital routine. All collected data was entered and analyzed in the statistical package for social science (SPSS) version 10.0. Descriptive statistic was calculated for both qualitative and quantitative variables. Frequencies and percentage was calculated for qualitative variables (PDPH). Mean and standard deviation was calculated for quantitative data (age). For comparison of mean VRS score in both groups, Mann Whitney U-test (as data was not following normal distribution), while for comparison of PDPH in both groups, chi-square test was used, keeping *p*-value ≤0.05 as significant.

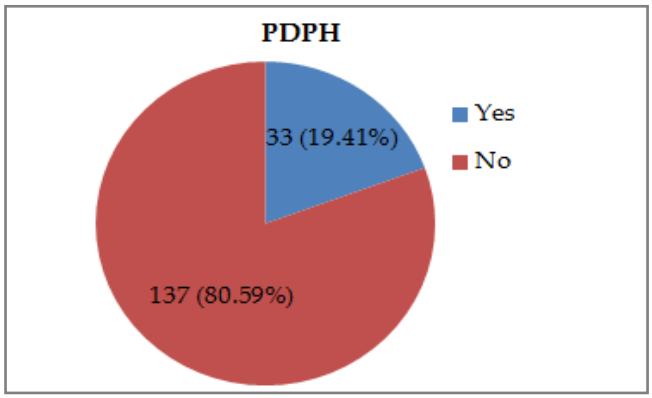


**Figure-1: Frequency distribution of PDPH.**

## RESULTS

In whitacre group, the mean age of the patients was 24.99 ± 3.73 years and in quincke group was 23.59 ± 3.74 years. In whitacre group, there were 24 (28.2%) primiparous females while 61 (71.8%) multiparous. In quincke group, there were 24 (28.2%) primiparous females while 61 (71.8%) multiparous. In whitacre group, 38 (44.7%) females had ASA I and 47 (55.3%) had ASA II. In quincke group, 43 (50.6%) females had ASA I and 42 (49.4%) had ASA II table-I.

The median (IQR) VRS score was calculated in both the groups. Statistically significant difference was found between the study groups with VRS score at different follow-ups i.e, *p*-value <0.05. In our study the PDPH was observed in total 33 (19.41%) patients, out of which 6 (7.1%) patients in whitacre group had PDPH while 27 (31.8%) patients had PDPH in quincke group. Statistically significant difference was found between the two study groups i.e., *p*-value <0.0001.

**Table-I: Baseline characteristics of patients.**

| | Study Group | |
|---|---|---|
| | Whitacre | Quincke |
| n | 85 | 85 |
| Age (years) | 24.99 ± 3.73 | 23.59 ± 3.74 |
| **Parity** | | |
| Primiparous | 24 (28.2%) | 24 (28.2%) |
| Multiparous | 61 (71.8%) | 61 (71.8%) |
| **ASA status** | | |
| I | 38 (44.7%) | 43 (50.6%) |
| II | 47 (55.3%) | 42 (49.4%) |

**Table-II: Comparison of VRS score with study groups at different follow-ups [median (IQR)].**

| | Study Group | | *p*-value |
|---|---|---|---|
| VRS Score After | Whitcare | Quincke | |
| 6th hour | 2.00 (2) | 4.00 (4) | 0.000 |
| 12th hour | 2.00 (2) | 4.00 (4) | 0.000 |
| 18th hour | 2.00 (2) | 4.00 (4) | 0.000 |
| 24th hour | 2.00 (2) | 4.00 (4) | 0.000 |
| 36th hour | 2.00 (2) | 4.00 (4) | 0.000 |
| 48th hour | 2.00 (2) | 4.00 (4) | 0.000 |
| 60th hour | 2.00 (2) | 4.00 (5) | 0.000 |
| 72th hour | 2.00 (2) | 4.00 (5) | 0.000 |

**Table-III: Comparison of PDPH in both groups.**

| | | Study Groups | | Total |
|---|---|---|---|---|
| | | Whitacre | Quincke | |
| PDPH | Yes | 6 (7.1%) | 27 (31.8%) | 33 (19.4%) |
| | No | 79 (92.9%) | 58 (68.2%) | 137 (80.6%) |
| Total | | 85 | 85 | 170 |

*p*-value=0.000 (Significant).

## DISCUSSION

PDPH is an iatrogenic complication of spinal anaesthesia that occurs due to puncture of the dura mater leading to constant CSF leak. This CSF leakage through the puncture hole results in low CSF pressure because the choroid plexus is unable to secrete sufficient fluid to maintain the

CSF pressure. The overall incidence of distressing post spinal headache has varied from <2% to 36%, as reported by various authors[3]. The first pencil-point needle was designed by Hart and Whitacre, in the 1950s. They claimed a decrease in incidence of PDPH from 5 to 2%, using 20 gauge needles[9].

In our study the PDPH was observed in 33 (19.41%) patients in which 6 cases were from whitacre group and 27 cases were from quincke group. Statistically significant lower indicdence of PDPH was noted in whitacre group as compared to quincke group. i.e, *p*-value = 0.000. Similarly statistically lower VRS score was noted in whitacre group as compared to quincke group. In another study at Tianjin Medical University General Hospital, pencil-point spinal needle resulted in lower rate of PDPH (RR 2.50; 95% CI [1.96, 3.19]; $p<0.00001$) and severe PDPH (RR 3.27; 95% CI [2.15, 4.96]; $p<0.00001$)[10].

Shah *et al*[8], conducted a study using three different gauges of spinal needle. He concluded that the incidence was found to be minimum with 27G Whitacre needle (although statistically insignificant), but failure rate was higher on first attempt of needle insertion. Another study by Shaikh *et al*[9], resulted that frequency of PDPH following the use of 25G Quincke (group I), 27G Quincke (group II) and 27G Whitacre (group III) spinal needles was 8.3% (14/168), 3.8% (6/160) and 2.0% (3/152) respectively. In group I, PDPH was mild in 5 patients, moderate in 7 patients and severe in 2 patients. In group II, it was mild in 2, moderate in 3 and severe in 1 patient. In group III, it was mild in 2 and moderate in 1 patient. There was no case of severe PDPH in group III. Most of the cases developed PDPH within 24 to 48 hours.

In a study by Landau *et al*[10], incidence of PDPH with 27-gauge Whitacre needle was less than 1%, even lower than Shaikh *et al*, study. In a study carried out byAnirban Pal, Amita Acharya *et al*, the incidence of PDPH was 28.12% in group Quincke and 5% in group Whitacre. Tthe difference in incidence was statistically significant ($p<0.001$)[8].

Vallejo *et al*[14], in their study of one thousand and two obstetric patients, undergoing elective Cesarean delivery, studied the difference in incidence of PDPH, using five different types of spinal needles, and found that the 25G Quincke needle had a higher frequency of PDPH compared to the pencil-point needles (which included 25G Whitacre).

A recent meta-analysis and systemic review of comparison between traumatic and atraumatic needles revealed that incidence of postdural-puncture headache was significantly reduced from 11% (95% CI 9.1-13.3) in the conventional needle group to 4.2% (3.3-5.2) in the atraumatic group (relative risk 0.40, 95% CI 0.34-0.47, $p<0.0001$; I2=45.4%)[11].

Shaikh *et al*, in their study of 480 post Cesarean section patients, used 25G and 27G Quincke needles and 27G Whitacre spinal needles and found that 27G Whitacre spinal needles had better outcomes[9]. There are other studies showing statistically no significant difference between Whitacre spinal needle and Quincke needle in respect to PDPH[9,12,13].

A Cochrane database systemic review was conducted in 2017 to compare effects of gauge and design of needle tip on post dural puncture headache which showed a higher risk of onset of PDPH with traumatic compared to atraumatic needles (36 studies, 9378 participants, risk ratio (RR) 2.14, 95% confidence interval (CI) 1.72 to 2.67, I2 = 9%)[14-18].

## CONCLUSION

It has been proved in our study that significantly lower incidence of PDPH was noted in 25 G whitacre group patients as compared to 25 G quincke spinal needle in patients for C section under spinal anesthesia. Now in future we will recommend the use of 25 G whitacre needle for spinal anesthesia in lower abdominal surgeries particularly in cesarean sections instead of quincke.

## CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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