RESEARCH PAPER

Comparative Study of Post Dural Puncture Headache with 25g Quincke Needle and 25g Whitacre Needle

Raghupathy P[1], Krishnamurthy D[2*] and Madhusudhana R[3]

[1]*Junior Resident Department of Anaesthesiology, Sri Devaraj Urs Medical College, SDUAHER, Tamaka, Kolar, India*
[2]*Professor, Department of Anaesthesiology, Sri Devaraj Urs Medical College, SDUAHER, Tamaka, Kolar, India*
[3]*Professor, Department of Anaesthesiology, Sri Devaraj Urs Medical College, SDUAHER, Tamaka, Kolar, India*
[*]***Corresponding Author:*** *Krishnamurthy D*

Received: 24th April, 2026; Revised: 20th May 2026; Accepted: 30th June, 2026; Available Online: 10th July, 2026

Background: Spinal anaesthesia involves inserting a needle between the lumbar vertebrae and advancing it through the dura mater to administer a local anaesthetic into the subarachnoid space. "One of the recognized complications following this procedure is post-dural puncture headache (PDPH). Aim: The present study was undertaken to evaluate and compare the occurrence of PDPH when spinal anaesthesia is performed using a 25-gauge Quincke needle versus a 25-gauge Whitacre needle.

Materials and Methods: This comparative study was conducted at R.L. Jalappa Hospital and Research Centre, Kolar, from May 2024 to October 2025, including 112 patients (56 per group) undergoing surgeries under spinal anaesthesia, randomized by closed envelope method. Sample size was calculated based on expected PDPH proportions from previous literature (6), with 80% power and 5% significance. Patients aged 20–60 years (ASA I–II) received spinal anaesthesia with either 25G Quincke (Group Q) or 25G Whitacre (Group W) needles, and were followed for three postoperative days to assess incidence, onset, severity, and characteristics of PDPH along with associated complications.

Results: The study included 112 patients, with 56 each in Group Q and Group W, and both groups were comparable in terms of age, gender distribution, ASA class, anthropometric parameters, type of surgery, intervertebral space, number of attempts, and incidence of traumatic tap. A significantly higher incidence of PDPH was observed in Group Q (16.1%) compared to Group W (1.8%) ($p < 0.05$). Although onset and overall duration of headache were similar, mean duration and associated symptoms such as nausea and vomiting were more frequent in Group Q, with greater need for conservative management ($p < 0.05$). Time to ambulation, length of hospital stay, and incidence of hypotension and bradycardia were comparable between the groups.

Conclusion: The 25G Whitacre (pencil-point) needle is associated with a significantly lower incidence of PDPH and fewer associated symptoms compared to the 25G Quincke (cutting) needle, without compromising procedural success or perioperative outcomes."

Keywords: Whitacre, Quincke, Post-dural Puncture Headache, Spinal Anaesthesia.

How to cite this article: Raghupathy P, Krishnamurthy D, Madhusudhana R, Comparative Study of Post Dural Puncture Headache with 25g Quincke Needle and 25g Whitacre Needle. Int J Drug Deliv Technol. 2026;16(6): 605-609. DOI: 10.25258/ijddt.16.6.97
Source of support: Nil.
Conflict of interest: None

INTRODUCTION

Spinal anaesthesia represents a form of neuraxial blockade in which a local anaesthetic agent is introduced into the cerebrospinal fluid within the lumbar region of the spinal canal. This technique produces temporary loss of sensation by blocking the spinal nerve roots emerging from the spinal cord. It is widely employed to provide anaesthesia and analgesia for numerous surgical interventions involving the lower limbs, lower abdomen, pelvis, and perineal region.[1]

Spinal anaesthesia is carried out by introducing a needle between the lumbar vertebrae and advancing it through the dura mater to deliver the anaesthetic drug into the subarachnoid space. The procedure is usually performed at the mid- to lower-lumbar vertebral levels to minimize the risk of injury to the spinal cord. In most individuals, the spinal cord ends as the conus medullaris around the lower border of the first lumbar vertebra (L1), although in some cases it may extend slightly further caudally. For this reason, needle insertion is commonly performed at the L3–L4 or L4–L5 intervertebral space. Clinically, the interspace is identified using the line connecting the highest points of the iliac crests, which generally intersects the L4 vertebral body. However, this landmark can vary, ranging from L1/L2 to L4/L5, and it tends to lie at a relatively higher level in females and in individuals with obesity.[1]

Post-dural puncture headache (PDPH) is a recognized iatrogenic complication that can occur following spinal anaesthesia or diagnostic lumbar puncture, primarily due to

**Author for Correspondence: Krishnamurthy D*

leakage and subsequent reduction of cerebrospinal fluid (CSF). To reduce the likelihood of such complications, various modifications in spinal needle design have been introduced over time. Among the modifiable factors influencing the occurrence of PDPH, the gauge of the needle and its design or type play an important role.[2,3]

For this purpose, the frequency of this complication was evaluated following spinal anaesthesia performed with two different needle designs—Quincke and Whitacre—while maintaining an identical needle gauge of 25G.

OBJECTIVES

Primary objective: "To compare the incidence of post dural puncture headache with 25 G Quincke needle and 25G Whitacre needle."

Secondary objective: To assess the severity of headache with both needles.

MATERIALS & METHODS

Source of data

This study was "conducted on patients undergoing surgeries under spinal anaesthesia at R.L.Jalappa Hospital and Research Centre attached to Sri Devaraj Urs Medical College, Tamaka, Kolar."

Study Design is Comparative study; Sample Size: 56 in each group; Sampling Method: Random sampling.

Method of collection of data:

- Patients undergoing surgeries under spinal anaesthesia are included; Informed consent was taken from the patients; Result values were recorded using a proforma.

Inclusion Criteria: Age 20 - 60 yrs; Patients undergoing laparoscopic surgeries under spinal anaesthesia; ASA 1 and 2

Exclusion Criteria :Patients with coagulation disorders; Patients with primary headache disorders(migraine);ASA 3 and 4;Pregnant woman undergoing LSCS; Technically difficult spinals; Patients with peripheral arterial disease and peripheral neuropathies; Patients with contraindication to spinal anaesthesia such as congenital spinal anomalies, post traumatic vertebral injury, hypovolemia, increased intracranial pressure and infection at the site of injection.

Sampling procedure

- Patient Detailed history of the was taken, Complete physical examination was done. Checked for Routine investigations, IV was secured and fluids were connected, Divided Patients into two groups randomly.
- **Group Q:** Patients who received spinal anaesthesia with 25G Quincke spinal needle.
- **Group W:** Patients who received spinal anaesthesia with 25G Whitacre spinal needle.

Spinal anaesthesia was administered with a 25G Quincke or 25G Whitacre needle after explaining the procedure to the patient. The back of the patient was cleaned with 10 % povidone iodine, spirit and draped with sterile towels. Spinal anaesthesia was performed, with the patient being in sitting position, using a midline approach at the L3-L4 or L4-L5 interspaces in the sagittal plane with bevel facing laterally. 2.0 ml of 0.5% hyperbaric bupivacaine was injected in subarachnoid space after obtaining free flow of CSF. After withdrawal of the needle, the patient was made to lie down in supine position.

- Level of sensory blockade and changes in parameters like heart rate, BP will be recorded at regular intervals
- Hypotension (Systolic BP<90mmhg/30% decrease in the baseline BP) is treated with Inj. Mephenteramine given intravenously. Complications like nausea, vomiting, bradycardia, respiratory depression was managed accordingly. After surgery, patient was shifted to post-operative care unit till recovery from spinal anaesthesia.
- All the patients were interviewed from day 0 to day 3 postoperatively and were questioned on regard to onset of headache, its severity, location, character and duration and associated symptoms like nausea, vomiting, auditory and ocular symptoms. Post dural puncture headache is defined as:

1. Headache occurring after mobilization.

2. Aggravated by erect or sitting position and coughing, sneezing and snoring.

3. Relieved by lying flat.

4. Mostly localized in occipital, frontal region or may be generalized.

5. Duration of PDPH: was assessed according to the number of hours for which PDPH persists postoperatively.

Sample size estimation

As per the study Malik et al. (2023), rates of post dural puncture headache in group where dural puncture was carried by Quincke's needle was 15.7% and that in the group where dural puncture was carried by Whitacre spinal needle was 1.4%. So $p_1 = 0.157$ and $p_2 = 0.014$. Thus, the minimum required sample for each group is $56.03 \cong 56$. So, total sample size in two group is 112.[6]

Parameters to be observed

Following parameters were monitored:

1. Time of onset of nausea and headache.

2. Duration of headache.

3. Site of headache.

4. Number of attempts of puncture during administration of spinal anaesthesia.

5. Severity of headache.

6. Requirement of any intervention for headache

a) Occurrence of PDPH: defined as number of cases of PDPH occurring in each group.

b) Time of onset of PDPH: assessed from post operative

day 0 to day 3 in each group.

c) Severity of headache: assessed on 1-4 scale.

STATISTICAL ANALYSIS

"The collected data were coded and entered into an Excel database and subsequently analyzed using IBM SPSS Statistics version 20.0. Qualitative variables were summarized using frequencies and percentages, while quantitative variables were expressed as mean with standard deviation. The incidence of post-dural puncture headache between the two study groups was compared using the Z-test for two independent proportions. Other qualitative variables were analyzed using the chi-square test or Fisher's exact test, as appropriate. Quantitative variables were compared using the independent *t*-test for normally distributed data and the Mann–Whitney *U* test for non-normally distributed data. For all statistical analyses, *p*-values were calculated, and a value of less than 0.05 was considered statistically significant."

RESULTS

There were 112 patients in the current study, 56 of them were in groups Q and W.

Table 1: Comparison of mean age between the groups

	Group Q		Group W		p-value
	Mean	SD	Mean	SD	
Age (years)	41.4	12.1	38.3	12.8	0.195

The mean age between the groups were comparable with no significant difference, the mean age in group Q was 41.4yrs and 38.3yrs in group W.

Table 2: Gender distribution between the groups

		Group Q		Group W		Chi-square (p-value)
		Count	N %	Count	N %	
Gender	Female	25	44.6%	30	53.6%	0.893 (0.345)
	Male	31	55.4%	26	46.4%	

Gender-wise distribution showing no significant difference between the groups, with near to equal distribution of gender among study participants.

Table 3: Distribution of surgery type between the groups

Surgery type		Group Q		Group W		Chi-square (p-value)
		Count	N %	Count	N %	
Surgery type	Inguinal hernia repair	16	28.6%	6	10.7%	8.62 (0.071)
	Lower abdominal surgery	7	12.5%	12	21.4%	
	Lower limb orthopaedic	12	21.4%	12	21.4%	
	Perianal surgery	10	17.9%	18	32.1%	
	Urological procedure	11	19.6%	8	14.3%	

The surgical type distribution was found to be comparable between the groups. Majority were seen with inguinal hernia repair in group Q (28.6%), whereas perianal surgery in group W (32.1%). Other surgical type included were lower abdominal surgery, lower limb surgery and urological procedures.

Table: 4 Comparison of the number of attempts and traumatic tap between the groups

		Group Q		Group W		Chi-square (p-value)
		Count	N %	Count	N %	
No of attempts	1.0	46	82.1%	47	83.9%	0.344 (0.842)
	2.0	8	14.3%	8	14.3%	
	3.0	2	3.6%	1	1.8%	
Traumatic tap	No	49	87.5%	49	87.5%	-
	Yes	7	12.5%	7	12.5%	

There is no significant difference in the number of attempts between the groups, single attempt was commonly seen in both group with 82.1% in group Q and 83.9% in group W. The incidence of traumatic tap was seen in 7 cases in both the groups."

Table: 5 Comparison of presence of PDPH between the groups

		Group Q		Group W		Chi-square (p-value)
		Count	N %	Count	N %	
PDPH	No	47	83.9%	55	98.2%	**7.027**
	Yes	9	16.1%	1	1.8%	**(0.01)***

"Study documented significant higher incidence of PDPH among the cases in group Q (16.1%) compared to group W (1.8%). ($p<0.05$)

Table 6: Comparison of presence of nausea, vomiting and treatment received between the groups

		Group Q		Group W		Chi-square (p-value)
		Count	N %	Count	N %	
Associated nausea	No	3	33.3%	1	100.0%	1.667 (0.197)
	Yes	6	66.7%	0	0.0%	
Associated vomiting	No	4	44.4%	1	100.0%	1.11 (0.292)
	Yes	5	55.6%	0	0.0%	
Treatment given	Conservative	9	16.1%	1	1.8%	**7.07 (0.05)***
	None	47	83.9%	55	98.2%	

There is higher incidence of the associated nausea among group Q (66.7) compared to group W (0.0%). similarly there is higher incidence of the associated vomiting in group Q (55.6%) compared to group W (0.0%). The conservative management was given in 16.1% of the total cases in group Q compared to group W (1.8%).($p<0.05$).

DISCUSSION

Spinal anaesthesia is a widely practiced neuraxial technique in which local anaesthetic is injected into the cerebrospinal fluid at the lumbar level to achieve sensory and motor blockade for lower abdominal, pelvic, perineal, and lower limb surgeries.[1] "The procedure is typically performed at the L3–L4 or L4–L5 interspace to avoid injury to the spinal cord. Despite its advantages, post-dural puncture headache (PDPH) remains a well-recognized iatrogenic complication resulting primarily from cerebrospinal fluid leakage through the dural defect."[2,3] The incidence of PDPH is influenced by several factors, including patient characteristics (age, sex, pregnancy, prior history of PDPH), number of attempts, and technical aspects such as needle size, design, and bevel orientation.[4,5] The study included a total of 112 patients, with 56 patients each in Group Q and Group W.

Similar baseline comparability between Quincke and Whitacre groups has been reported by Ghosh S et al.,[6] Singla M et al.,[7] Devalla AR et al.,[8] and Hymavathi J et al.,[9]all of whom demonstrated no statistically significant differences in demographic or procedural characteristics between groups, supporting that variations in PDPH incidence are predominantly attributable to needle design rather than patient-related variables.

In study by Hymavathi J et al.,the frequency of multiple attempt to achieve the successful spinal anaesthesia was higher in Quincke (94%) compared to Whitacre spinal needle. [9] Also in study by Devalla AR et al., the number of attempts required to achieve a successful subarachnoid block was comparable between the two groups, with a single lumbar puncture being sufficient in 92% of patients in the Quincke group and 88% in the Whitacre group, while two punctures were required in 8% and 12% of patients, respectively."[8]

A significantly higher incidence of PDPH was observed in Group Q (16.1%) compared to Group W (1.8%), and this difference was statistically significant ($p < 0.05$). Similarly, Kanojiya S et al. observed PDPH in 7% of patients in the Quincke group, whereas no cases were noted in the Whitacre group.[10] Bhat M et al. also documented a declining trend in PDPH incidence from 23G Quincke (20.5%) to 25G Quincke (9.09%) and lowest with 25G Whitacre (3.03%), reinforcing the superiority of pencil-point needles.[11] Comparable statistically significant reductions in PDPH with Whitacre needles were reported by Mehraj A et al.,[12] Malik NA et al.,[7] Devanand J et al.,[13] and Hymavathi J et al.,[9] all of whom concluded that the 25G Whitacre needle was associated with a markedly lower incidence of PDPH compared to the 25G Quincke needle.

Our results also align with Singla M et al., who reported PDPH in 1.6% of patients in the Whitacre group compared with 15% in the Quincke group, closely mirroring the magnitude of difference observed in our study.[7] These consistent findings across multiple randomized and comparative studies strongly support the atraumatic design of pencil-point needles in reducing cerebrospinal fluid leakage and subsequent PDPH.

This observation parallels findings by Ghosh S et al.,[8] who noted greater severity, prolonged symptoms, and more frequent nausea and vomiting with Quincke needles. Devanand J et al.,[13] and Malik NA et al.,[7] similarly reported milder headache intensity with Whitacre needles. Mehraj A et al.,[12] also documented consistent VRS scores but concluded that incidence and severity were significantly lower with Whitacre needles

In our study, conservative management was required significantly more often in the Quincke group, reflecting the

higher clinical burden of PDPH. This observation is consistent with Khan AH et al., who demonstrated not only a higher incidence and severity with larger or cutting needles but also increased need for epidural blood patches and prolonged hospital stay when PDPH was more frequent.[14]

CONCLUSION

Study demonstrated that "the incidence of post-dural puncture headache (PDPH) was significantly higher with the 25G Quincke needle (16.1%) compared to the 25G Whitacre needle (1.8%) ($p < 0.05$). Although the onset and overall duration of headache were similar, the mean duration, associated symptoms such as nausea and vomiting, and the need for conservative management were greater in the Quincke group. Based on these findings, it can be concluded that the 25G Whitacre (pencil-point) needle is associated with a significantly lower incidence of PDPH and fewer associated symptoms compared to the 25G Quincke (cutting) needle, without compromising procedural success or perioperative outcomes." Therefore, the 25G Whitacre needle may be considered a preferable option for spinal anesthesia, particularly in patients at risk of developing post-dural puncture headache.

REFERENCES

1. Khan YS, Lui F. Neuroanatomy, Spinal Cord. [Updated 2023 Jul 24]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan.
2. Schyns-van den Berg AMJV, Gupta A. Postdural puncture headache: Revisited. Best Pract Res Clin Anaesthesiol. 2023 ;37(2):171-187.
3. Xu H, Liu Y, Song W, Kan S, Liu F, Zhang D, Ning G, Feng S. Comparison of cutting and pencil-point spinal needle in spinal anesthesia regarding postdural puncture headache: A meta-analysis. Medicine (Baltimore). 2017 ;96(14):e6527.
4. Abdullayev R, Kucukebe OB, Celik B, Hatipoglu S, Hatipoglu F. Incidence of postdural puncture headache: Two different fine gauge spinal needles of the same diameter. J Obstet Anaesth Crit Care 2014;4:64-8.
5. Weji BG, Obsa MS, Melese KG, Azeze GA. Incidence and risk factors of postdural puncture headache: prospective cohort study design. Perioper Med (Lond). 2020 Nov 9;9(1):32.
6 Ghosh S, Nayak SK, Roy S. Assessment of Post Dural Puncture Headache in Patients Undergoing Caesarean Section: A Comparison between 25 G Quinke V/S Whitacre Needles. J. Adv. Med. Med. Res. [Internet]. 2017;19(9):17.
7. Malik, N.A., Chougle, N.A.K., Alamgir, A.R., Shafiq, S., Islam, H.F.U., Faraz, A., Ashfaq., F. (2023). Comparison of 25 g Whitacre and Quincke spinal needles for incidence of post-dural puncture headache. Biol. Clin. Sci. Res. J., 2023: 462.
8. Devalla AR, Ninave SS, Singam AP. To compare the incidence of post-dural puncture headache using 25G Quincke and 25G Whitacre spinal needles in patients undergoing lower segment Caesarean section. J Evolution Med Dent Sci 2021;10(14):1014-1019,
9. J H, Tehoor R, PV S, B L. Incidence of Postdural Puncture Headache With 25G Quincke Needle Versus 25G Whitacre Needle After Spinal Anesthesia for Caesarean Section in a Tertiary Care Hospital. WKMJ [Internet]. 2024 ;66(4):443-52.
10. Kanojiya S, Mehta V, Jadhav VP. Comparative study of post-dural puncture headache using two types of needles Quincke's and Whitacre. J. Evolution Med. Dent. Sci. 2016;5(32):1707-1709.
11. Bhat MT, Hegde BK. Spinal anaesthesia for caesarean section: Comparison of 25G Whitacre needles with 25G and 23G Quincke needles for technical problems and post-operative complications [Internet]. Indian J Clin Anaesth. 2017;4(2):202-207.
12. Mehraj A, Raja A, Rehman S, Adil N. 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. Pak Armed Forces Med J 2020 ;70(6):1897-901.
13 J D, I AH, Michael J, Tarsis S. Study to compare the incidence of post-dural puncture headache in obstetric patients using cutting and pencil-point spinal needle in spinal anesthesia. Natl J Physiol Pharm Pharmacol. 2024; 14(10): 2130-2134.
14. Rah man M A. " Post Dural Puncture Headache: A Comparative Study Of 25g And 27g Spinal Needle In Caesarean Section".IOSR-JNHS 2018;7(2):48-53.