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original research article

COMPARISON OF 25 G WHITACRE AND QUINCKE SPINAL NEEDLES FOR INCIDENCE OF POST-DURAL PUNCTURE HEADACHE

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Abstract: *The retrospective study was conducted in tertiary care hospital from June 2022 to December 2022 to compare the severity and incidence of PDPH in patients administered spinal anesthesia for lower limb and lower abdominal surgeries using 25G Whitacre and 25G Quincke needles. A sample size of 140 70 in each of the two groups (group Quincke and group Whitacre) was included in the study. Results showed that 11 (15.7%) patients in group Quincke and 1 (1.4%) patient in group Whitacre had PDPH (P=.009). Females had a higher incidence of PDPH (P=0.018). Of 12 patients, 11 had mild, and 1 had moderate PDPH. 11 patients in group Whitacre and 3 in group Quincke had failed spinal anesthesia. 25G Whitacre spinal needles showed lower incidence and severity of post-dural puncture headache than 25G Quincke spinal needles.*

Keywords: Spinal Anesthesia, Post Dural Puncture Headache, Spinal Needles

Introduction

Spinal anesthesia is frequently used for lower limb, perineal, and lower abdominal regions. Though it is advantageous in many ways, it also poses some disadvantages to the patients. One of these disadvantages is post-dural puncture headache (PDPH), which results in distressing complications. PDPH is a bilateral throbbing headache associated with the position, and its severity varies (BALUSAMY et al., 2022). Various studies reported that the incidence of PDPH ranges from 0 to 37.3% (Khan et al., 2020). It usually occurs 24 to 48 hours post-procedure and may last from 1 day to two weeks after it resolves spontaneously (Cognat et al., 2021). It is associated with blurred vision, hearing disturbances, vertigo, vomiting, and nausea. Its pathophysiology includes loss of cerebrospinal fluid, which results in pain as the brain sags, resulting in intracerebral vasodilation in response to reduced intracranial pressure (Al-Hashel et al., 2022). Its risk factors include lower BMI, female gender, younger age, pregnancy, type of needle, and its larger size (Bein and Renner, 2019).

The Quincke needle has a terminal opening and diamond-shaped bevel, while the Whitacre needle has a lateral opening and pencil-point bevel. Large cutting needles cut dural fibers, leaving large defects that lead to CSF leakage. Pencil point needles do not cut dural fibers but rather separate them, so SF leakage is minimal (Singla et al., 2020). PDPH is mostly mild and does not need any treatment. Moderate symptoms need conservative treatment like bed rest, spine position with head down, proper hydration, analgesics (NSAID), corticosteroids, theophylline, and caffeine (Cognat et al., 2021). Aggressive treatments include epidural blood patch, epidural saline, and intrathecal catheter. The incidence of PDPH is associated with the size of the needle used for spinal anesthesia, which is 4.6%, 12.4%, and 21% for 27G Whitacre, 27G Quincke, and 25G Quincke, respectively (Baral et al., 2021). The current study compares the severity and incidence of PDPH in patients administered spinal anesthesia for lower limb and lower abdominal surgeries using 25G Whitacre and 25G Quincke needles.

Methodology

The retrospective study was conducted in tertiary hospitals from June 2022 to December 2022. Patients aged between 20 and 60 years who underwent lower limb and lower abdominal surgeries, having ASA I & II, and suitable for spinal anesthesia were included in the study. Those with a history of PDPH, migraine, increased intracranial tension, neurological disease, and patients allergic to bupivacaine were excluded. A sample size of 140 70 in each of the two groups (group Quincke and group Whitacre) was included in the study. Informed consent of the participants was taken. The ethical committee of the hospital approved the study.

Pre-procedural checkup with complete history, routine investigation, and physical examination was done. Baseline characteristics were monitored, including pulse rate, oxygen saturation (SpO2), respiratory rate and non-invasive blood pressure (NIBP). Patients were premedicated with IV ranitidine (50 mg) and IV ondansetron (4 mg). 500 mL IV ringer lactate was given 30 minutes before the spinal block. Spinal anesthesia was administered in the L3-L4 or L2-L3 intervertebral space. In group Quinck, a 25G Quincke needle was used for spinal anesthesia, and in group Whitacre, a 25G Whitacre needle was used.

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After the procedure, patients were shifted to the anesthesia Care Unit (PACU) and then to the ward, where they were monitored for side effects. Patients were followed up for three days for onset, severity, and incidence of PDPH. The observer not part of the study assessed PDPH signs and symptoms. PDPH was graded as no pain, mild pain (no treatment needed), moderate pain (limited activity and regular analgesics needed), and severe pain (anorexic and confined to bed). Patients who had failed spinal anesthesia were shifted to general anesthesia.

SPSS version 23.0 was used for data analysis. Chi-square tests and unpaired t-test was used for demographic data. Fisher's test was used for calculating incidence. P value less than 0.05 was significant.

Results

The mean age of patients in Quincke patients was 35.8 years, and in the Whitacre group was 39.2 years (P=.14). Mean weight in group Quincke and group Whitacre were 60.41 and 61.92, respectively (P=.15). There were 31 (44.2%) males in group Quincke and 34 (48.5%) males in group Whitacre (P=0.61).

11 (15.7%) patients in group Quincke and 1 (1.4%) patients in group Whitacre had PDPH (P=0.009). In 3 patients, onset of PDPH was on the first post-operative day, and in 9 patients, it was on the second post-operative day. Females had a higher incidence of PDPH (P=.018). Of 12 patients, 11 had mild, and 1 had moderate PDPH. 11 patients in group Whitacre and 3 in group Quincke had failed spinal anesthesia (Table I-III).

Table 1 compares the incidence of Post-Dural Puncture Headache (PDPH) between two groups, Group Quincke, and Group Whitacre, at different time points following a procedure. Firstly, the overall incidence of PDPH is significantly higher in Group Quincke, with 15.7% of patients experiencing PDPH, compared to just 1.4% in Group Whitacre. This substantial difference is statistically significant, as indicated by the p-value of 0.009, suggesting that the choice of needle type (Quincke or Whitacre) may considerably impact the risk of developing PDPH.

Moving on to the specific time points, on the 1st post-operative day, Group Quincke displays a range of PDPH severity, with 95.7% of patients reporting no pain, 2.8% experiencing mild pain, and 1.4% having moderate pain. In stark contrast, Group Whitacre had a notably lower overall PDPH incidence, with all patients (100%) reporting no pain and no mild or moderate PDPH cases. This discrepancy is statistically significant (p-value of 0.012), suggesting that Group Whitacre has a distinct advantage in minimizing PDPH risk on the 1st postoperative day.

On the 2nd post-operative day, Group Quincke still exhibited a higher incidence of PDPH, with 88.5% of patients reporting no pain, 10% experiencing mild pain, and 1.4% reporting moderate pain. Meanwhile, Group Whitacre continued to have a notably lower PDPH incidence, with 98.5% of patients being pain-free and only 1.4% experiencing mild pain. Although the difference in PDPH incidence between the two groups on the 2nd day is not statistically significant (p-value of 0.09), Group Quincke maintained a somewhat higher incidence of mild and moderate PDPH.

Table I Comparison of severity and incidence of PDPH between both groups

PDPH		Group Quincke	Group Whitacre	P value
Overall incidence		**11 (15.7%)**	**1 (1.4%)**	**0.009**
1st Postoperative day	No pain	67 (95.7%)	70 (100%)	0.012
	Mild	2 (2.8%)	0	
	Moderate	1 (1.4%)	0	
	Severe	0	0	
2nd Postoperative day	No pain	62 (88.5%)	69 (98.5%)	0.09
	Mild	7 (10%)	1 (1.4%)	
	Moderate	1 (1.4%)	0	
	Severe	0	0	

Table 2 compares Post-Dural Puncture Headache (PDPH) incidence in two groups, Group Quincke, and Group Whitacre, stratified by gender (female and male). It reveals a statistically significant difference in PDPH incidence between the two needle types for both females and males, with PDPH being significantly less common in patients who received Group Whitacre than Group Quincke. These findings suggest that the choice of needle type plays a crucial role in mitigating the risk of PDPH, making Group Whitacre the preferred option for reducing PDPH incidence in both female and male patients.

Table II Gender-wise incidence of PDPH

Gender	PDPH	Group Quincke	Group Whitacre	P value
Female	Absent	29 (74.3%)	35(97.2%)	0.018
	Present	10 (25.6%)	1 (2.7%)	
Male	Absent	30 (96.7%)	34 (48.5%)	
	Present	1 (3.2%)	0	

Figure 1 compares the outcomes of spinal anesthesia between Group Quincke and Group Whitacre, presenting counts and percentages of successful and failed cases in each group. Group Quincke had a higher percentage of successful spinal anesthesia (95.7%) with a lower rate of failure (4.2%), whereas Group Whitacre had a slightly lower success rate (84.2%) and a higher failure rate (15.7%). The provided p-value of 0.03 indicates a statistically significant

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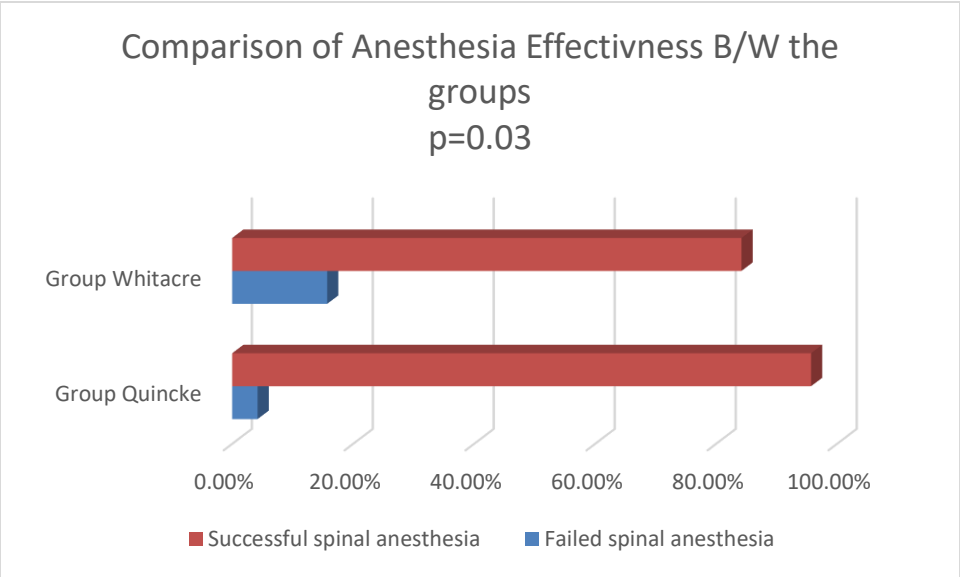

difference between the two groups regarding their spinal anesthesia outcomes, suggesting that Group Quincke is associated with a lower risk of failure compared to Group Whitacre. (Figure 1).

Figure 1 Intergroup comparison of effectiveness of anesthesia.

Discussion

Spinal anesthesia is associated with the risk of PDPH, particularly with the use of larger needles. Its incidence is not only related to the design and size of the spinal needle but also to the age and gender of the patient and the surgeon's experience. In this study, we compared the incidence of spinal anesthesia with 25G Quincke and Whitacre needles (Baral et al., 2021). It was observed that 11 (15.7%) patients in group Quincke and 1 (1.4%) patient in group Whitacre had PDPH (P=.009). A previous study reported that a 25G Whitacre needle resulted in a significantly lower incidence of spinal anesthesia than a 27G Quincke needle (Baral et al., 2021). Different studies have investigated the failure rate of spinal anesthesia and incidence of PDPH by non-cutting and cutting bevel spinal needles (Desai et al., 2021; KHALID et al., 2023; Valença and Silva-Néto, 2023). Studies reported the incidence of PDHP with Quincke 22G to be 37%, 3-26% with 25G, 0.2 to 21% with 26G, and 1.5 to 5.7% with 27G (Domingues et al., 2023). Though with 29G Quincke needles the incidence is 0 to 1%, its failure rate is higher.

Few studies have reported that the incidence of PDPH can be reduced through the parallel orientation of needles (Rodriguez-Camacho et al., 2023). A study suggested that the rate of CSF leakage was associated with needle size (Boyacı et al., 2023). In the current study, a parallel technique was used. The most significant factor for PDPH was the type and the gauge of the spinal needle. The headache was relieved by lying down and aggravated by straining and upright posture. In this study, 3 patients had onset of PDPH on the first post-operative day, and 9 patients on the second post-operative day. In the Whitacre group, no patient complained of headaches on the first post-op day. Similar results were reported by a previous study (Thakur et al., 2022). In this study none of the patients had severe headaches, 1 patient in the Quincke group had moderate headaches and the rest had mild headaches. Patients with mild headaches had no nausea or vomiting and had normal activity. A previous study reported that Whitacre needles were associated with less severe PDHP than Quincke needles (Thakur et al., 2022). In this study, the incidence of PDPH was higher in females. One male patient in the Quincke group and none in the Whitacre group developed headache. Overall, 15.7% females had headache. A previous study also reported that 11.1% females and 3.7% males had PDPH (BALUSAMY et al., 2022). A study on mechanism and management of failed spinal anesthesia reported that pencil point needle leads to partial loss of anesthetic solution in subdural and epidural space (Tiak and Zahari, 2023). In current study only 3 in group Quincke and 11 patients in group Whitacre (pencil point needle) had failed spinal anesthesia. The results of this study may be affected by subjective nature of pain.

Conclusion

The use of 25G Whitacre spinal needles showed lower incidence and severity of post-dural puncture headache than 25G Quincke spinal needles.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
Approved by the department Concerned.
Consent for publication
Approved
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Not applicable

Conflict of interest

The authors declared an absence of conflict of interest.

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References

Al-Hashel, J., Rady, A., Massoud, F., and Ismail, I. I. (2022). Post-dural puncture headache: a prospective study on incidence, risk factors, and clinical characterization of 285 consecutive procedures. *BMC neurology* **22**, 261.

BALUSAMY, D., KHOIROM, S., CHARAN, N., NAHAKPAM, S., DEVI, N. J., DIVYABHARATHI, S., DEVI, L. R., and ALI, M. A. (2022). Incidence and Severity of Postdural Puncture Headache following Subarachanoid Block using 25G Quincke and 25G Whitacre Spinal Needles: A Double-blinded, Randomised Control Study. *Journal of Clinical & Diagnostic Research* **16**.

Baral, P. P., Pathak, L., Udaya, R. K., Lawoju, A., Pokhrel, S., and Gupta, P. K. (2021). Post Dural Puncture Headache After Elective Caesarean Section Using 27 G Quincke and Whitacre Spinal Needles: A Comparative Study. *Journal of Universal College of Medical Sciences* **9**, 4-8.

Bein, B., and Renner, J. (2019). Best practice & research clinical anaesthesiology: advances in haemodynamic monitoring for the perioperative patient: perioperative cardiac output monitoring. *Best Practice & Research Clinical Anaesthesiology* **33**, 139-153.

Boyacı, S., Onay, M., and Güleç, M. S. (2023). Optic nerve sheath diameter measurement for prediction of postdural puncture headache. *Journal of Clinical Monitoring and Computing*, 1-8.

Cognat, E., Koehl, B., Lilamand, M., Goutagny, S., Belbachir, A., de Charentenay, L., Guiddir, T., Zetlaoui, P., Roos, C., and Paquet, C. (2021). Preventing post-lumbar puncture headache. *Annals of emergency medicine* **78**, 443-450.

Desai, N., Kirkham, K., and Albrecht, E. (2021). Local anaesthetic adjuncts for peripheral regional anaesthesia: a narrative review. *Anaesthesia* **76**, 100-109.

Domingues, R., Giafferi, C., Vega, M., Salomão, D., and Senne, C. (2023). Needle caliber and design are associated with the risk of post-dural puncture headache after diagnostic lumbar puncture. *Headache Medicine* **14**, 32-35.

KHALID, M., ASHFAQ, M., OBAID, A., JAVED, H., IQBAL, A., and BUTT, M. (2023). EFFECTIVENESS OF 25G COMPARED TO 27G QUINCKE SPINAL NEEDLE IN REGARD OF POST-DURAL PUNCTURE HEADACHE IN OBSTETRICS PATIENTS UNDERGOING SPINAL ANESTHESIA. *Biological and Clinical Sciences Research Journal* **2023**, 359-359.

Khan, A., Idrees, M., Ali, N., and Rafi, M. I. (2020). POST DURAL PUNCTURE HEADACHE AFTER SPINAL ANESTHESIA, COMPARISON BETWEEN 22 GAUGE AND 25 GAUGE WHITACRE SPINAL NEEDLES IN ELECTIVE CAESAREAN SECTION. *Annals of Allied Health Sciences* **6**.

Rodriguez-Camacho, M., Guirado-Ruiz, P., and Barrero-Hernández, F. (2023). Risk factors in post-dural puncture headache. *Revista Clínica Española (English Edition)* **223**, 331-339.

Singla, M., Santpur, M., Khan, M. A., and Singh, S. (2020). A Clinical Study to Compare 25 G Whitacre and Quincke Spinal Needles for Incidence of Post Dural Puncture Headache (PDPH) and Failed Spinal Anaesthesia. *Indian Journal of Public Health Research & Development* **11**.

Thakur, S., Sharma, A., Kaushal, S., Sharma, A., Sharma, N., and Thakur, P. S. (2022). Incidence and risk factors of "postdural puncture headache" in women undergoing cesarean delivery under spinal anesthesia with 26g quincke spinal needle, experience of medical college in rural settings in India 2019: A prospective cohort study design. *Journal of Pharmacy and Bioallied Sciences* **14**, S209-S213.

Tiak, H. S., and Zahari, M. (2023). Isolated Abducens Nerve Palsy Following Spinal Anesthesia. *Cureus* **15**.

Valença, M. M., and Silva-Néto, R. P. (2023). Post-dural puncture headache. *Headache Medicine* **14**, 1-2.

[Citation: 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.* doi: https://doi.org/10.54112/bcsrj.v2023i1.462]