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Original Research Article

Prevalence, common clinical presentations and severity patterns of post-dural puncture headache among parturients who underwent cesarean section using spinal anesthesia in western Uganda: a cross-sectional study

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ABSTRACT

Background: Post-dural puncture headache is a complication of regional blocks that results from intentional dural puncture during spinal anesthesia and unintentional dural puncture during epidural anesthesia. The aim of the study was to determine the prevalence, common clinical presentations and severity of post-spinal puncture headache among parturients who underwent cesarean section using spinal anesthesia in western Uganda.
Methods: A cross-sectional study was conducted on 249 mothers who were consecutively enrolled in their 3rd post-partum day during the period from April 2022 to July 2022 from postnatal ward of Fort portal Regional Referral Hospital. The data needed for analysis was gathered using pretested questionnaires. Data was entered into microsoft excel version 16, coded and transported into SPSS version 22 for analysis. Descriptive statistics was carried out using SPSS version 22.0.
Results: The prevalence of post-dural puncture headache among parturients who underwent cesarean section using spinal anesthesia was 81 (32.5%). Commonest clinical presentation being front/back headache 59 (72.8%), worsened with upright posture 81 (100%), coughing/sneezing 81 (100%) and improved on lying flat position 81 (100%). The commonest form was mild one 35 (43.2%).
Conclusions: This study revealed a high prevalence of post-dural puncture headache as compared to studies done in the region which mainly presented as frontal/back with the commonest form being mild.

Keywords: Post-dural puncture headache, Prevalence, Presentations, Severity, Cesarean section, Spinal anesthesia

INTRODUCTION

Spinal anesthesia has become the anesthesia of choice especially for major and minor operations below the umbilicus and pain relieve during labor because of its simplicity, cost-effectiveness, safety, and reliability.[1,2] It is carried out by trained personnel's who follow laided down protocol, including strict adherence to indication and contraindication, choice of approach and the design of the needle to be used among others to prevent and minimize complications such as post-spinal anesthesia.[4] Spinal anesthesia is usually administered as a single-shot anesthesia or continuous spinal anesthesia or combined spinal-epidural anesthesia.[5,6]

Post-dural puncture headache is a complication of neuraxial blocks that results from intentional or unintentional dural puncture during neuraxial anesthesia. The internal classification of the headache 3rd edition, defines post- dural puncture headache (PDPH) as a diagnosis of exclusion that is typically attributed to the low cerebral spinal fluid that results in a reduction of

intracranial pressure and thereafter sagging of brain matter. This headache worsens within 15 min of assuming an upright posture and improves within 30 min of assuming the horizontal change in position.[7] It is commonly associated with undesirable adverse effects such as visual disturbance, the rigidity of the neck, partial hearing loss or noise hearing, nausea, vomiting.[8]

A cross-sectional study on PDPH in North America, Jamaica reported a proportion of 17.4% among mothers undergoing caesarian sections at a public maternity Hospital.[9] In a similar study carried out at Bharatpur hospital of Chitwan district of Nepal, among a total of 282 patients found the proportion of post-spinal headache was 14.9%.[10] In India, a retrospective study done from May 2011 to April 2013 found the proportion of PSH in the patients who received spinal anesthesia was 3.9%.[10] While an institution-based cross-sectional study done among 251 obstetric patients at Felege Hiwot Referral Hospital, North West Ethiopia found that 107/251 (42.6%) patients developed PSH. In the meta-analysis study done by Chekol et al the pooled prevalence of PDPH was found to be 23.47%.[11] Typically, patients with post-spinal headache presents with bilateral headache which is either frontal or occipital or both that becomes worse with upright positions and improves on lying flat.[7,8] It is also associated with nausea, vomiting, blurring vision, tinnitus, reduced hearing and neck stiffness.[8] In a prospective cohort involving 205 patients, that studied the classification and severity of post-dural puncture headache, the majority of the PSH were found to be mild and the severity was studied by a combination of visual analog scale and functional grade rating.[12]. In one study in Kenya, the severity of post-dural headache was by visual analog scale and majority of participants (48%) were having moderate headache.[13]

Post-spinal headache is associated with significant morbidity and mortality and other socio-economic consequences such as litigation, longer hospital stay, financial burden, reduce productivity and interruption of maternal and neonatal bonding.[13,14] Unpublished survey between September to November 2021 in the postnatal ward at Fort Portal regional referral hospital (FRRH) showed 813 obstetric operations were undertaken of which 99.5% were under spinal anesthesia and more than 53% develop post-spinal headache post-caesarean section.

Regardless of the high number of operations done under spinal anesthesia, little is known about post-spinal headache. There was need for a study to assess the prevalence, common clinical presentation and severity of post-spinal headache in obstetric patients at FRRH.

METHODS

A cross-sectional study was conducted from postnatal ward of Fort portal Regional Referral Hospital (FRRH). A total of 249 mothers were consecutively enrolled 72 hours after undergoing spinal anesthesia during cesarean section in the period from April 2022 to July 2022.

The study participants came from catchment areas of FRRH such as Kabarole, Bundibugyo, Bunyangabu, Kyegegwa, Kamwenge, Kasese, Ntoroko and Kyenjojo districts and to a minor extent from other districts of Uganda, Rwanda, Tanzania and Democratic Republic of Congo. FRRH is a public hospital and serves as teaching, satellite center for Kampala International University (KIU) and internship center for Ugandan Medical Fraternity. It is situated in Fort portal town in Kabarole district, around 300 km west of Kampala, the country's capital city It is funded by Uganda Ministry of Health with a bed capacity of about 350 beds distributed between the different departments including obstetrics and gynecology, surgical, pediatric, internal medicine, psychiatric, accident and emergency, laboratory, mortuary and imaging department.

The department of obstetrics and gynecology of FRRH has 105 beds and records around 10-20 deliveries per day with the majority being Cesarean section deliveries done under spinal anesthesia. The department staff are from both ministry of health and KIU-Western Campus including 1 professor, 9 consultant obstetricians and gynecologists, 2 special grade medical officers, 5 senior house officers, 2 medical officers, 5 intern doctors, 10 nurses, 13 midwives and 6 Anesthetists. The study participants were consecutively enrolled until we reached the required sample size. The study was approved by research ethics committee of Kampala International University and administration of FRRH. All qualified mothers were asked for their consent and mothers with life-threatening post-operative complications and unconscious patients were not included in the study.

Each participant was given explanation regarding the study, procedures and details of the questionnaire followed by written consent. Data collection was done by trained nurses and midwives together with the principal investigator extracting information from patient's charts and records. Questionnaire and other data collection tools used were pretested from Kampala International University Hospital. During data collection eligible patients were consecutively enrolled until desired sample size was reached. Patients were interviewed in regards to development of headache and its characteristics. The sample size was determined using Kish Leslie formula (1965) using the proportion 20.35% at 95% confidence interval from the study done from Aga Khan University Hospital, in Nairobi, Kenya.[13] The maximum error of 5% was used and resulted into sample size of 249 participants.

The data needed for analysis was gathered using pretested questionnaires and entered into Microsoft excel version 16, coded and transported into SPSS version 22 for analysis. Descriptive statistics was carried out using SPSS version 22.0 to obtain prevalence, common clinical presentations and severity patterns of PDPH. The prevalence of PDSH was calculated as number of mothers with PDPH out of all mothers enrolled into the study. This was expressed as frequency and percentages and presented using pie chat. Likewise Common clinical presentations

and severity of PDPH were obtained by performing descriptive statistics. These were expressed as frequency and percentages and consecutively presented using table and bar charts.

Diagnosis of post spinal headache

The participants were recruited on their 3rd post-partum day since majority of PDPH develop within 72 hours post spinal anesthesia. Post-dural puncture headache was diagnosed clinically in those who developed bilateral frontal or occipital headache worsening on upright position or any valsalva maneuvers like sneezing, cough or straining and improves on lying down. Patients were further interviewed regarding severity of their headache using numerical rate scale where 1 to 3 was representing mild pain, 4 to 6 representing moderate pain and 7 to 10 representing severe pain.

RESULTS

Prevalence of post-dural puncture headache among parturients who underwent cesarean section using spinal anesthesia in western Uganda

Of 249 participants enrolled in this study, the overall prevalence of post-dural puncture headache among mothers who underwent spinal anesthesia during cesarean section was 81 (32.5%). However, majority didn't develop PDPH 168 (67.5%) as shown in Figure 1.

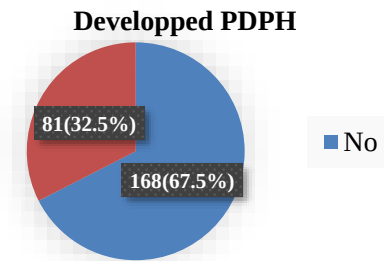

Figure 1: Prevalence of post-spinal puncture headache among parturients who underwent cesarean section with spinal anesthesia.

Severity of post-spinal puncture headache among parturients who underwent cesarean section with spinal anesthesia

The findings indicate the numerical rating scale showing that 35 (43.2%) of respondents had mild form of PDPH, 30 (37.0%) had moderate form of PDPH and 16 (19.8%) had severe form of PDPH.

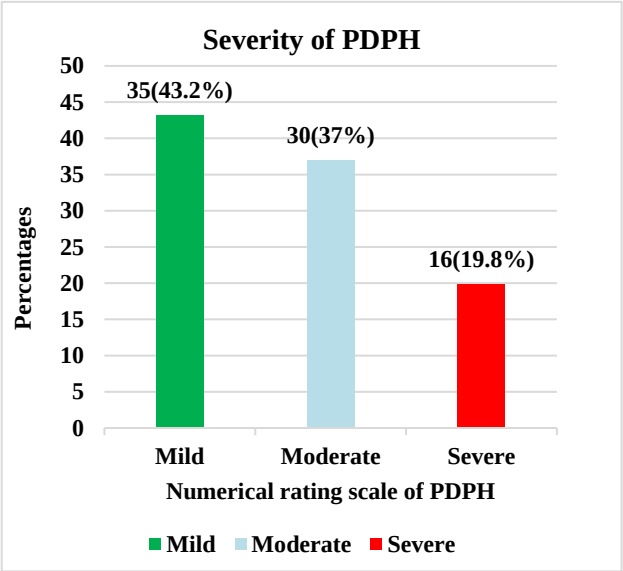

Figure 2: Severity of post-spinal puncture headache among parturients who underwent cesarean section with spinal anesthesia.

Common clinical presentations of post-spinal puncture headache among parturients who underwent cesarean section with spinal anesthesia

The research findings revealed that all our respondents reported headache which was worsening on upright position, with coughing and sneezing and improved with lying supine. Majority reported that the headache was front/back in location 59 (72.8%) and nausea/vomiting as associated symptoms in majority of respondents 36 (44.4%) (Table 1).

Table 1: Common clinical presentation of post-spinal puncture headache among parturients who underwent cesarean section with spinal anesthesia.

Variables	Categories	N	%
Location of headache	Front/back	59	72.8
	Left/right sided	5	6.2
	Generalized	17	21
Effect of upright posture on headache	Worsened	81	100
Effect of lying flat position on headache	Improved	81	100
Effect of coughing/sneezing on headache	Worsened	81	100
Associated symptoms of headache	Nausea/vomiting	36	44.4
	Hearing problems/tinnitus	13	16
	Vision problem/photophobia	5	6.2
	Neck pain /dizziness	27	33.3

DISCUSSION

In this study the overall prevalence of post dural puncture headache among Parturients undergoing cesarean section in western Uganda was 81 (32.5%). This is consistent with 33% obtained from a study done by Uwihoreye et al. in Rwanda, 31.3% obtained from the study done by Ferede et al in the University of Gondar Comprehensive Specialized Hospital, Ethiopia and 29.5% from a study conducted at Ibn Sina hospital, Kuwait by Al-hashel et al.[16-18]

The prevalence of PDPH from our study is lower than 48.8% obtained from the study done from Mulago Hospital, Kampala, 42.6% obtained in study done from North West Ethiopia and 43.9% obtained from a 48 h follow up study conducted from Dilla University, Ethiopia.[19,20] The difference is based on population characteristics, sampling techniques. The study done from Mulago hospital was from urban areas as compared to the current study conducted from rural setting. This study done from Dilla University employed systematic random sampling which is different from consecutive sampling used in the current study.

The prevalence of PDPH from our findings is higher than 6% obtained from a cross sectional study done by Neto et al in Brazil, 21.7% in a study done by Tafesse and Melkamayew at Dilchora Hospital and Sabian Primary Hospital, Ethiopia, 23.47% obtained in a meta-analysis done by Chekol, Yetneberk and Teshome, 28.7% obtained from the study done by Weji et al.[11,21,22] at Wolaita Sodo university Hospital and 20.35% obtained from the study done in Kenya.[13,23] The discrepancy is attributed to difference in study participants, population characteristics and surgical procedures underwent. In this study done from Brazil considered both gender and all types of surgeries under spinal anesthesia. In that study done from Ethiopia, study participants were systematically selected every two other patients interval as compared to consecutive sampling used in our study. In a study done from Kenya was from a private facility in urban areas as compared to the current study done from public facility in rural areas.

In this study majority of the patients reported mild PSH 45 (42.9%), followed by moderate 31 (29.5%) and severe 29 (27.6%) type. This was consistent with a cross-sectional study findings by Aregawi et al. at university of Gondar referral and Teaching hospital that found mild cases represented (42.2%), moderate cases (31.1%) and severe cases (26.7%).[24] The similarity stem clear study methodology. The similar study by Dr. Kumar and Rahul Kanana found 8 (47.1%) and 4 (23.5%) of the participants who developed PSH reported mild form in the obstetrics and non-obstetric patients respectively and the remainder reported moderate form 4 (23.5%) and 1 (5.9%) respectively.[25] It was observed that the study participants were fewer (60 participants) as compared to our study and included both obstetrics and non-obstetric patients.

In contrast to the current study, Corbey and colleagues found 7 (35%) mild, 10 (50%) moderate and 3 (15%) severe form of PDPH. We attributed the slight difference to the study population that involved obstetrics and non-obstetrics patients as compared to obstetrics patients considered in our study. A comparable cross-sectional study found moderate form of PDPH in 62/120 (52%) and severe form in 20/120 (16%) cases as compared to mild form of PDPH in 38/120 (32%) of cases.[17] It was observed that this study used visual analogue scale to outline the severity of PDPH as compared to our study which employed numerical rating scale. This way we were always able to take the higher of the two scales which seemed to improve patient understanding of the magnitude of their problem. A similar study done from Aga Khan University Hospital reported 3 (13%) mild, 11 (48%) moderate and 9 (39%) severe form of the PSH.[26] The difference may be explained by the scale used to study the severity. In Aga Khan University Hospital a visual analogue scale (VAS) was used where as in our study numerical scale rating was used. The setting may also explain the difference as this current study was done from rural setting whereas the other one was done from urban setting. Urban participants subjectively exaggerate their suffering compared to rural participants.

All our patients presented with positional headache that got worsened on upright posture and Valsalva manoeuvers such as coughing and sneezing and improved on lying flat. In horizontal position the cerebro-spinal fluid pressure ranges from 5 to 15 cm H_2O and in vertical position the pressures are higher at 40 cm H_2O. Another possible mechanism is the low CSF pressure can results in cerebral vasodilation which will results in increased intracranial pressure by monro-kellie doctrine. According to Aregawi et al and majority of other literatures, the headache is usually described as bilateral fronto-occipital that is positional and in this study the headache was located in frontal and/or occipital region 59 (72.8%), on the left side and/or right side in 5 (6.2%) and generalized in 17 (21%).[24] Comparable is a cross-sectional study in Nepal that found the headache was located in the frontal 24 (57.1%), temporal 1 (2.4%), occipital 13 (31%), generalized 2 (4.8%) and had positional variation. The onset was on average within 7.52 minutes of raising the head. It was worsened on raising the head 38 (90.5%) and improved on lying flat in 42 (100%). The pain was radiating to the neck and shoulder in 19 (45.2%) of cases.[10] Bhusal et al also reported post spinal headache was associated with nausea, vomiting, tinnitus, neck stiffness among others.[10] A cross-sectional study in Ethiopia found associated symptoms including neck stiffness 34 (29.3%), tinnitus 2 (1.7%), photophobia 1 (0.9%), nausea 10 (8.6%) and none in 69 (59.5%) of cases.[24]

Study strength and limitation

This is the first study undertaken in western Uganda particularly at FPRRH. Mothers were recruited on 3rd postoperative day, therefore those who developed PDPH

afterwards were not captured. A follow up study is needed to be done.

CONCLUSION

Prevalence of post-spinal puncture headache among parturients who underwent cesarean section with spinal anesthesia was high as compared to few studies undertaken in neighboring countries. Post spinal headache is typified by postural headache and is associated with nausea and vomiting. We recommend Fort portal regional referral hospital to undertake measures to foresee and avert post spinal headache through development of spinal anesthesia protocol and development and implementation of a screening pool. Clinicians should familiarize themselves with a clinical diagnosis of post spinal headache.

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REFERENCES

1. Ring L, Landau R, Delgado C. The Current Role of General Anesthesia for Cesarean Delivery. Curr Anesthesiol Rep. 2021;11(1):18-27.
2. Salik F, Kiliç E, Akelma H, Güzel A. The effects of the quincke spinal needle bevel insertion on postdural puncture headache and hemodynamics in obstetric patients. Anesth Essays Res. 2018;12(3):705.
3. Franjić S. Advanced Clinical Anesthesiology and Pain Medicine A Few Words about Neuraxial Anesthesia. 2022;1(2):1-5.
4. Ashagrie HE, Fentie DY, Kassahun HG. A review article on epidural analgesia for labor pain management: A systematic review. Int J Surg Open. 2020;24:100-4.
5. Luiz EI, Marildo AG, Nathália MG, Sylvio LN. Spinal Anesthesia: Much More Than Single Shot of Hyperbaric Bupivacaine. Int J Anesth Anesthesiol. 2021;8(2).
6. Jain SP, Rashmi N, Chandrapal B, Kumar GR. Effect of Continuous Spinal Anesthesia and Single Shot Spinal Anesthesia on Hemodynamics for Lower Abdominal and Hip Surgeries in Adults: An Observational Study. Anesth Clin Care. 2019;6(2):1-6.
7. Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd ed. Cephalalgia. 2018;38(1):1-211.
8. Klimkowicz A, Rutyna R, Kotlinska-Hasiec E, Dabrowski W. Perinatal complications associated with neuraxial blocks. Ginekol Pol. 2021.
9. Fearon FN, Bourne PA, Gibson AJ, Foster C. Post-Dural puncture headache after spinal Anaesthesia for caesarean section at a public Maternity Hospital in Jamaica. 2021;(2019):190-204.
10. Bhusal MK, Rajbanshi L, Amgain G. Incidence and factors associated with post-spinal headache among patient receiving spinal anaesthesia at bharatpur hospital chitwan nepal. Eur J Pharm Med Res. 2017;4(5):319-24.
11. Chekol B, Yetneberk T, Teshome D. Prevalence and associated factors of post dural puncture headache among parturients who underwent cesarean section with spinal anesthesia: A systemic review and meta-analysis, 2021. Ann Med Surg (Lond). 2021;66:102456.
12. Corbey MP, Berg P, Quaynor H. Classification and severity of postdural puncture headache. Comparison of 26-gauge and 27-gauge Quincke needle for spinal anaesthesia in day-care surgery in patients under 45 years. Anaesthesia. 1993;48(9):776-81.
13. Gisore E, Mung'ayi V, Sharif T. Incidence of post dural puncture headache following caesarean section under spinal anaesthesia at the Aga Khan University Hospital, Nairobi. East Afr Med J. 2010;87(6):227-30.
14. Jabbari A, Alijanpour E, Mir M, Bani Hashem N, Rabiea SM, Rupani MA. Post spinal puncture headache, an old problem and new concepts: review of articles about predisposing factors. Caspian J Intern Med. 2013;4(1):595-602.
15. Wiegand H. Survey Sampling. John Wiley and Sons: London: 1965.
16. Uwihoreye C, Kwizera JN, Uzamukunda C, Nizeyimana F, Edler A. Incidence of postdural puncture headache in patients who underwent Cesarean delivery in three hospitals in Rwanda. Can J Anaesth. 2022;69(5):682-3.
17. Ferede YA, Nigatu YA, Agegnehu AF, Mustofa SY. International Journal of Surgery Open Incidence and associated factors of post dural puncture headache after cesarean section delivery under spinal anesthesia in University of Gondar Comprehensive Specialized Hospital, cross sectional study. Int J Surg Open. 2021;33:100348.
18. Hashel J, Rady A, Massoud F, Ismail II. Post-dural puncture headache: a prospective study on incidence, risk factors, and clinical characterization of 285 consecutive procedures. BMC Neurol. 2022;22(1):261.
19. Tarekegn F, Eshetie S, Aregawi A, Moges K. Assessment of the Prevalence and Associated Risk Factors of Post Dural Puncture Headache (PDPH) after Cesarean Section Delivery under Spinal Anesthesia. J Anesth Crit Care Open Access. 2017;8(6).
20. Girma T, Mergia G, Tadesse M, Assen S. Incidence and associated factors of post dural puncture

headache in cesarean section done under spinal anesthesia 2021 institutional based prospective single-armed cohort study. Ann Med Surg (Lond). 2022;78:103729.
21. Neto SBI, Vaz JLM, Oliveira CAB, Alvarenga RMP, Souza JÁ, Mota-Binda AL, et al. Prevalence of Headache After Spinal Anesthesia Among Brazilian Patients. Biomed J Sci Tech Res. 2019;22(1):16418-22.
22. Tafesse D, Melkamayew A. Magnitude of post dural puncture headache and associated factors in obstetric mothers undergone spinal anesthesia for caesarean section. JACCOA. 2019;46-50.
23. Weji BG, Obsa MS, Melese KG, Azeze GA. Incidence and risk factors of postdural puncture headache: prospective cohort study design. Perioper Med (Lond). 2020;9(1):32.
24. Aregawi AK, Beyen TK, Denu ZA. Anesthesia and Clinical Post Dural Puncture Headache (PDPH) and Associated Factors after Spinal Anesthesia among Patients in University of Gondar Referral and Teaching. J Anesth Crit Care Open Access. 2015;6(7):1-6.
25. Kumar P. Incidence of Post Dural puncture headache among obstetric and non obstetric surgical patients: A prospective study. 2020;07(08):3263-70.
26. Gisore E, Mung'ayi V, Sharif T. Incidence of post dural puncture headache following caesarean section under spinal anaesthesia at the Aga Khan University Hospital, Nairobi. East Afr Med J. 2010;87(6):227-30.

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