ejpmr, 2022,9(2), 123-127

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

SPHENOPALATINE BLOCK RELIEVES POST DURAL PUNCTURE HEADACHE

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Article Received on 30/11/2021 **Article Revised on 20/12/2021** **Article Accepted on 10/01/2022**

ABSTRACT

Introduction: The sphenopalatine ganglion (SPG) is a parasympathetic ganglion, located in the pterygopalatine fossa. The SPG block has been used for a long time for treating headaches of varying etiologies. For anesthesiologists, treating postdural puncture headaches (PDPH) has always been challenging, however, EBP is an interventional procedure with the risk of bleeding, infection, and adverse neurological effects. **Objective:** To evaluate the sphenopalatine Block relieves post dural puncture headache. **Methods:** This prospective study was conducted at General Hospital and different Clinics, Tangail, Bangladesh from July 2020 to June 2021. Randomization was performed using the random number generator available at https://www.random.org. All the patients were women and sample size thirty eight (n=38). Patients divided were two groups: Group 1 (n=19): Takes paracetamol, Tramadol hydrochoride, caffeine, releaves pain 1- 2 days. Group 2 (n=19): Takes sphenopalatine Block, relief pain within 1/2 hour. **Results:** There was no statistically significant difference between the 2 groups in terms of age, height, weight, or body mass index. The mean Comparison of response to treatment (good & excellent) in both groups. However, the mean pain relieve at the one to three days Sphenopalatine Block group were significantly higher compared to Paracetamol, Tramadol Hydrochoride, Caffeine group ($p < 0.001$). **Conclusion:** Post dural puncture headache is directly related to the size and type of the spinal needle used. The study concluded that the incidence of post dural puncture headache can be reduced to minimum with the use of small sized needles and proper technique of spinal anesthesia by an experienced anesthesiologist. A unilateral SPGB is a rapid and effective method to treat PDPH. However, the safety of this technique requires further research due to complications encountered, including a seizure.

KEYWORDS: Analgesia, Post-Dural Puncture Headache, Sphenopalatine Block, Lignocaine.

INTRODUCTION

Post dural puncture headache (PDPH), also known as post lumbar puncture (LP) headache, is a common complication of diagnostic LP. It also can occur following spinal anesthesia or, more commonly, inadvertent dural puncture during attempted epidural catheter placement. Post-dural puncture headache (PDPH) can occur after the administration of spinal anesthesia due to leakage from the dural and arachnoid puncture.[1] Post dural puncture headache (PDPH) is a significant and well known complication of puncture of the duramater. This occurs in spinal anaesthesia and lumbar puncture and may accidentally, occur in epidural anaesthesia. Leakage of cerebro-spinal fluid (CSF) through dural puncture appears to be the main cause of PDPH and was first proposed in 1902.[1,2] Historical reference to PDPH was recorded by August Bier in 1899 and he described the headache as a feeling of very high pressure in the head, accompanied by light dizziness when raising quickly from the chair.[3] An excessive loss of cerebrospinal fluid (CSF) induces low pressure in the intrathecal space, which subsequently leads to increased tension on the falx cerebri, cerebral blood vessels, and tentorium cerebelli.[4] Another mechanism for the development of PDPH is distension of blood vessels. Lower pressure in the cranium due to CSF leakage without a concurrent reduction of intravenous pressure can lead to dilatation of the cranial blood vessels. The

gold standard treatment of PDPH is epidural blood patching (EBP).[5] Therapeutic EBP has a success rate ranging from 68% to 90%.[6] But it is associated with sequelae such as subdural haematoma,[7] infection, meningitis and delayed radicular pain.[8] Sphenopalatine ganglion block (SPGB), a non-invasive intervention with minimal adverse effects and high efficacy, had been tried as a treatment modality of PDPH.[9] SPGB efficacy has been proved in the management of migraine[9] and facial pain.[10] A sphenopalatine ganglion block (SPGB) has been successful in the treatment of migraines, status migrainosus, cluster-type headaches, and atypical facial pain.[11-13] Over the last few years, the use of transnasal SPGB to treat PDPH has been reported in case series and case reports with a low risk of complications.[14-17] SPGB is minimally invasive and easier to perform than EBP.[18,19] SPGB can also be beneficial in cases with contraindications for EBP, such as coagulopathy, septicemia, or puncture site infection.

MATERIALS AND METHODS

This prospective study was conducted at General Hospital, Tangail, Bangladesh from July 2020 to June 2021. Randomization was performed using the random number generator available at https://www.random.org. Patients with bilateral nasal septal deviations, epilepsy, lidocaine allergy, or epileptic seizures during treatment were excluded. In total, 38 patients were enrolled. A sealed envelope was used to make random assignments to receive the standard treatment (control group) or the standard treatment and a transnasal SPGB (block group). Written, informed consent was obtained from each participant.

All of the enrolled subjects diagnosed with PDPH were admitted to hospital, and the International Classification of Headache Disorders criteria were used to confirm the diagnosis.[14] PDPH was diagnosed based on a headache occurring within 5 days of the application of spinal anesthesia with frontal-occipital spread and aggravation while standing and relief in the supine position. Each patient's demographic data of age and body mass index (BMI), smoking and drinking habits, medication history, and comorbidities were obtained at the time of admission. The spinal needle size and type, onset of pain, start of treatment, and additional symptoms, such as nausea, vomiting, tinnitus, or visual impairment, were recorded. Complications experienced during the intervention and treatment were recorded. The patients were discharged 24 hours after the treatment, and contact information was provided for use in the event of any adverse event or headache recurrence.

Statistical analysis: All of the statistical analyses were performed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). In order to compare the numeric data, an independent samples t-test (2-sided) was used to determine normal distribution, and the Mann-Whitney U test (2-sided) was used for non-normal distribution. Fisher's exact test was used for the analysis of discrete variables. The results were within a 95% confidence interval, and a p value of <0.05 was considered significant.

RESULTS

Out of 38 women aged between 25 and 35 years were initially enrolled in this study. One participant who had an epileptic seizure after the SPGB was excluded; thus, the data from 38 subjects were analyzed. No other serious complication occurred. There was no statistically significant difference between the 2 groups in terms of age, height, weight, or BMI (p=0.550, p=0.402, p=0.052, and p=0.165, respectively (Table-1).

Table 1: Comparison of demographic characteristics (N=38).

	Paracetamol, Tramadol Hydrochoride, Caffeine (n=19	Sphenopalatine Block group (n=19)	p-value
Age (years)	28.9±5.2	30.4±5.8	0.550*
Weight (kg)	75.0±10.98	68.10±18.52	0.052**
Height (cm)	160.6±3.98	158.4±7.06	0.402*
Body mass index	26.61±5.01(27.5)	27.99±7.68(25.3)	0.165**

*Independent samples t-test: Values are given as mean±SD; **Mann-Whitney U test: Values are given as mean±SD (median). SPGB: Sphenopalatine ganglion block.

19 patients in Paracetamol, Tramadol Hydrochoride, Caffeine group and 19 patients in Sphenopalatine Block group were lost to follow-up. Hence 38 patients completed the study without major deviations and were evaluated. Though patients with severe pain intensity at study entry were slightly higher in the novel combination drug group compared to tramadol/paracetamol group, but the overall mean pain intensity was not statistically significant between the groups at Sphenopalatine Block (Table 2).

Table 2: Comparison of pain intensity score at baseline in both groups (N=38).

Drug	Mean	Std. dev.	SE of mean	Mean difference	Z	P-value
Paracetamol, Tramadol Hydrochoride, Caffeine	2.75	0.42	0.05	0.059	-0.706	0.206
phenopalatine Block	1.5	0.83	0.05			

The treatment satisfaction proportion patients responding to the medication based on treatment satisfaction or responders (good & excellent) in Sphenopalatine Block group were significantly higher compared to Paracetamol, Tramadol Hydrochoride, Caffeine group (p < 0.001) (Table 3).

Table 3: Comparison of response to treatment (good & excellent) in both groups (N=38).

Pain relief	Paracetamol, Tramadol Hydrochoride, Caffeine		Sphenopalatine Block		Difference in proportion	95% CI for difference	Z	*P*-Value
	N	%	N	%				
Good & excellent	19	45%	19	81%	0.35	0.10,0.25	8.21	<0.001*

The Pain intensity proportion of patients with mean pain intensity measured using a numerical scale, who had no pain or mild pain at end of the treatment were significantly higher in Sphenopalatine Block group compared to Paracetamol, Tramadol Hydrochoride, Caffeine group at the end of treatment (Table 4).

Table-4: Comparison of pain intensity score at end of treatment in both groups (N=38)

Pain relief	Paracetamol, Tramadol Hydrochoride, Caffeine		Sphenopalatine Block		Difference in proportion	95% CI for difference	Z	P-Value
	N	%	N	%				
Good & excellent	19	45%	19	81%	0.35	0.10,0.25	8.21	<0.001*

Common expected adverse drug reaction like nausea, vomiting and dizziness occurred in both the study groups. The incidence of treatment related adverse drug reactions were significantly higher in Paracetamol, Tramadol Hydrochoride, and Caffeine group compared to Sphenopalatine Block group (Table 5). The most common adverse drug reaction noted in both group was nausea with lesser frequency in Sphenopalatine Block group compared to Paracetamol, Tramadol Hydrochoride, and Caffeine group. All adverse reactions noted in this study were minor in nature (Table 6), there was no reported serious adverse drug reaction in either of the patients groups. None of the patients pulled out of the study due to adverse drug reactions.

Table 5: Comparison of Adverse drug reactions in both the study groups (N=38)

Adverse reaction	Paracetamol, Tramadol Hydrochoride, Caffeine		Sphenopalatine Block		Total	X^2	*P*-Value
	N	%	N	%			
	19	65.75%	19	16.67%	209	125.694	<0.001*

Table 6: Adverse drug reactions in both the study groups (N=38).

Adverse reaction	Paracetamol, Tramadol Hydrochoride, Caffeine	Sphenopalatine Block
Nausea	44.09% (*n*=19)	11.90% (n=19)
Dizziness	40.15% (*n=19*)	7.93% (n=19)
Vomiting	30.70% (*n=19*)	3.96% (n=19)

DISCUSSION

This randomized comparative study evaluated the effects of transnasal SPGB on PDPH. The VAS values at the fourth hour were lower in the SPGB group. In our study 38 women aged between 25 and 35 years were initially enrolled in this study. One participant who had an epileptic seizure after the SPGB was excluded; thus, the data from 38 subjects were analyzed. No other serious complication occurred. There was no statistically significant difference between the 2 groups in terms of age, height, weight, or BMI (p=0.550, p=0.402, p=0.052, and p=0.165, respectively. There were no significant differences between the groups in terms of complications or additional symptoms. A PDPH is a severe clinical impairment that can lead to severe morbidity, affect maternal care and self-care, prolong hospital stay, and even become chronic. The EBP timing and method remain controversial, and the intervention success rate is <70 %, according to the literature.[20] SPGB is a safe treatment method that has been described in several recent case reports. Paracetamol is a non-opioid, non-salicylate analgesic with an unclear mechanism of action. It appears to have some central actions including inhibition of N-methyl-D-aspartate, substance P mediated nitric oxide synthesis and release of prostaglandin E2.[21] In this current study we have evaluated the analgesic efficacy of Paracetamol, Tramadol Hydrochoride, Caffeine compared with Sphenopalatine Block only in treatment of PDPH. The analgesic efficacy in terms of proportion of patients responding based on treatment satisfaction (good and excellent) and measurement of pain intensity (no pain or

mild pain) at end of treatment were significantly higher in the Sphenopalatine Block group with Paracetamol, Tramadol Hydrochoride and Caffeine. As mentioned, no previous study has compared SGGB and EBP efficacy.[22] The results of our study indicate that since EBP includes many additional risks, SPGB may be a safer means of improving patient comfort and become the first choice of treatment approach in PDPH patients. We concluded that this difference might be related to the sample size. In another study of 20 parturients, 88.89% of patients in the SPGB group had adequate pain relief within 5 minutes.[23] The pain was reduced for as much as 8 hours without any adverse effect. In our study, even after 2 hours, the Sphenopalatine Block were lower in the treatment group. SPGB is a simple, effective, and repeatable block method that is a minimally invasive treatment method for a mild PDPH.[24,25] Dubey et al.[26] treated 11 patients with PDPH and reported that 6 patients had complete relief after SPGB. A blood-stained applicator was noted after performing the block in another participant. In the clinical follow-up, there were no complaints or active bleeding. Minor complications and discomfort during the SPGB were evaluated as more tolerable when compared with EBP. A recent retrospective study evaluated 39 subjects who underwent EBP and 42 subjects who underwent SPGB. However, potential complications remain a concern, and further research is needed. Recently, the use of SPGB in combination with greater and lesser occipital nerve blocks has been suggested for the management of PDPH.[27]

CONCLUSION

In conclusion, SPGB is a rapid and effective method for the treatment of PDPH. Although further clinical trials are required and questions remain about the safety of this technique, SPGB may provide a first treatment step for PDPH cases. Post dural puncture headache is directly related to the size and type of the spinal needle used. The study concluded that the incidence of post dural puncture headache can be reduced to minimum with the use of small sized needles and proper technique of spinal anesthesia by an experienced anesthesiologist.

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