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INCIDENCE AND FACTORS ASSOCIATED WITH POST SPINAL PUNCTURE HEADACHE (PSPH) IN OBSTETRIC MOTHERS WHO UNDERWENT SPINAL ANESTHESIA: A PROSPECTIVE COHORT STUDY

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Abstract

Aim- The aim of this study was assessed the incidence and factors associated with postspinal headache in obstetric patients.
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Methods-
A prospective cohort study was done on 292 consecutively enrolled obstetric patients at Santokba Durlabhji Memorial Hospital, Jaipur, Rajasthan from August 2017 to November 2020. Pretested questionnaires were used to obtain the data needed for analysis. The data were entered into Microsoft Excel, coded, and computer IBM- SPSS Version 26 software for further statistical analysis. Descriptive statistics was used to determine the incidence of postspinal headache.

Results-
The overall incidence of postspinal headache was 39.72%. Factors with higher odds of developing postspinal headache included, Women with a Lower Body mass index (BMI) has been shown to be associated with higher risk of PSPH (.32+.467, t value 11.662, p= 0.000), undergoing 2 puncture attempts (.15+.355, t value 7.089, p =0.000),3 puncture attempts (.51+.501, t value 17.294, p =0.000), and >3 puncture attempts (.32+.467, t value 11.662, p =0.000), a level of puncture entry at L3-4 (.43+.496, t value 14.862, p =0.000) had lower odds of developing PSH, initiation of ambulation >24 h after spinal anesthesia (.46+.499, t value 15.602, p=0.000),cutting needle (.69+.463, t value 25.556, p=0.000), allowing 2-3 drops of cerebrospinal fluid (CSF) to fall (.73+.447, t value 27.770, p=0.000),having lost >1500 ml of blood intraoperatively (.47+.500,t value 15.928, p=0.000), having a previous history of chronic headache (.57+.496, t value 19.580, p=0.000), and those prescribed weak opioids (.91+.285, t value 54.563, p=0.000),

Conclusions-
This was significantly associated with needle design, amount of cerebro-spinal fluid lost, body mass index (BMI), number of puncture attempts, time at start of ambulation, amount of intraoperative blood loss, level of puncture entry, previous diagnosis with chronic headache, and class of analgesic prescribed. We recommend the use of a smaller gauge needle, preventing CSF loss, deliberate attempts to ensure successful puncture with fewer attempts, puncture attempts at L3-4, reducing intraoperative blood loss, earlier ambulation, and prescribing adequate analgesia to reduce the incidence of postspinal headache.

Key words: Post spinal puncture headache (PSPH), Spinal anesthesia, Headache.

INTRODUCTION

Spinal anesthesia (or spinal anesthesia), is also called spinal block, subarachnoid block, intradural block, and intrathecal block.[1] spinal anesthesia is generally utilized for cases undergoing surgery with major medical problems where they are considered a greater threat for general anesthesia. General anesthesia is the standard for utmost surgeries; still, some drawbacks can include negative drug side effects, protract recovery, and inadequate pain control. There is presently renewed attention to thoracic segmental spinal anesthesia for several common surgeries. Injection of anesthetics intrathecally into the preferred body height and above where the spinal cord terminates has been revealed to be precious in certain circumstances.

Post-spinal puncture headache (PSPH) is a well-known complication of spinal anesthesia. It occurs after spinal anesthesia induction due to a Dural and arachnoid puncture and has a significant effect on the case's postoperative well-being. The first spinal anesthetic was delivered by an accident. Its inception can be traced back in the late 19th century by James Leonard Corning. He reported on spinal anesthesia in 1885 for the first time. The first planned spinal anesthesia was administered by August Bier in 1898. He found the symptoms of post-spinal puncture headache (PSPH). Bier reported complications including back and leg pain, vomiting, and headache. Even at this early stage, he'd associated the loss of cerebrospinal fluid with post-spinal headache. [2,3] Spinal anesthesia offers numerous advantages for operation although the extent of its benefit isn't agreed widely.

But it's associated with headache pain, nausea, neck pain, dizziness, and photophobia (vision changes and sensitivity to light). Primary headaches (when pain is the complaint), similar to migraine, tension, and nervous headache, account for most headaches in young women.[4] The high frequentness of post spinal headache is associated with young age.[5] Postpartum headache occurs in about 30- 40 of all women in the first week after delivery, with pressure headaches first followed by migraine headaches. [6,7] Studies have shown that tension and migraine headaches are much more common in pregnant women compared to the other types of headaches.[8] Post-spinal headache is associated with significant morbidity and mortality and other socioeconomic consequences such as litigation, longer hospital stays, financial burden, reduced productivity, and interruption of maternal and neonatal bonding .[9,10] Dural puncture in spinal anesthesia is quite typical. It's a positional character, which occurs with a decrease in cerebrospinal fluid (CSF) pressure within 1 to 7 days after dural puncture. [4]

Cesarean section is one of the most common gynecological surgeries[11] , female gender, pregnancy, cutting spinal needle design[12] , previous history of postspinal headache, needle exposure vertical to dural Ebers.[13] Spinal anesthesia is the most generally chosen system of anesthesia for cesarean section, which is a popular technique due to its simplicity and high reliability, as well as the speed of achieving adequate anesthesia .[14] Spinal headaches are caused by leakage of cerebrospinal fluid through a puncture hole in the member that surrounds the spinal cord and typically appears within 2

to 3 days after anesthesia, while backache is generally secondary to localized inflammation, frequently associated with a degree of muscle spasm and lasts for a few days or a week. [15,16]

This method has fewer complications for mother and baby than general anesthesia and reduces the intensity of postoperative surgical pain[17]; however, post-dural puncture headache (PDPH) is one of the most common complications following spinal anesthesia, which is caused by rupture of the dura, CSF leakage, and meningeal traction.[18] Seventy percent of PDPH go away within 7 days.[19] PDPH is the sixth most common cause of postpartum headache. After a cesarean section, the most important thing is to diagnose different types of headaches. Many females experience a postpartum headache that has nothing to do with spinal anesthesia. [6,7] The aim of this study was assessed the incidence and factors associated with postspinal headache in obstetric patients.

MATERIALS AND METHODS

Study Design and Setting- This was a prospective cohort study that consecutively enrolled obstetric mothers in their immediate postpartum period (within 12 hours after undergoing successful spinal anesthesia during a caesarean section). The study was conducted from postnatal ward, Department of Obstetrics and Gynecology of Santokba Durlabhji Memorial Hospital, Jaipur, Rajasthan from August 2017 to November 2020.

Inclusion and Exclusion Criteria.

We included all obstetric patients who underwent successful spinal anesthesia during cesarean section. All women with life-threatening postoperative complications, unconscious patients, and those who did not have working telephone numbers were not included in the study.

Diagnosis of Post spinal Headache.

The clinical criteria for diagnosis of post spinal headache were used as that complication of spinal anesthesia in which a patient developed a bilateral frontal or occipital pain that was throbbing, dull in nature, of varying in intensity, typified by the pain getting worse when the patient sat up and/or stood and/or followed by Valsalva maneuvers such as coughing, straining, and sneezing and improved on lying down within 6-7 days after spinal anesthesia.

Data Collection.

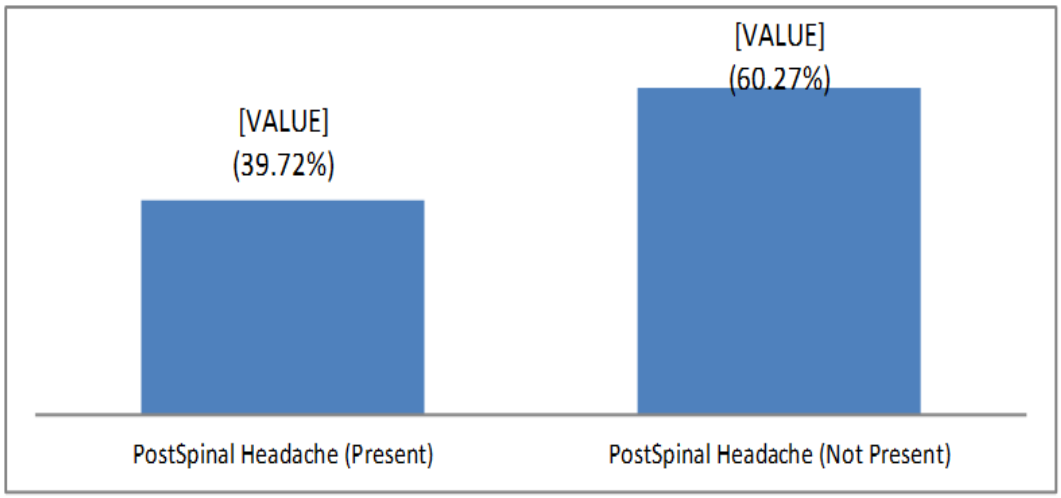
The data were collected by trained midwives together with the principal investigator from patient charts and recordings using a pretested questionnaire. The data collection tool was pretested at the Santokba Durlabhji Memorial Hospital, Jaipur, Rajasthan which provides obstetric and gynecological services. The adjustments needed were done in the data collection instruments. Patients were interviewed daily regarding the development of any headache and associated symptoms such as neck stiffness, nausea, vomiting, photophobia, tinnitus, and partial hearing loss. Those in the wards were seen at least once daily and interviewed for the development of postspinal headache and its clinical presentation. Those who were discharged before day 7 postspinal were called once daily for the same. The patient who reported bilateral, frontal-occipital headache within those 7 days which worsened on patient assuming upright position or Valsalva but improved on lying flat was suspected to have a post spinal headache.

Data was analyzed using computer IBM- SPSS Version 26 software for further statistical analysis. The descriptive analysis had done using frequency and proportion, mean, variance, Single t-test, and frequency tables and graphs used for presenting the information. The finding decided to use crude and adjusted or with a 95% confidence interval. Overall frequentness was compared using the Fisher exact test. Adverse goods of study medicines were compared using the ki-square test and Fisher exact test.

RESULTS

Incidence of Postspinal Headache in Obstetric Mothers Who underwent Spinal anesthesia at Santokba Durlabhji Memorial Hospital, Jaipur, Rajasthan. A total of 292 mothers in the immediate postnatal ward were recruited for the study with a response rate of 100%. The overall incidence of postspinal headache was 116 (39.72%), and 176 (60.27%) did not develop a postspinal headache (Figure 1).

Figure no.1: Incidence of postspinal headache in obstetric patients who underwent spinal anesthesia.



Factors Associated with Postspinal Headache in Obstetric Mothers Who Underwent Spinal Anesthesia from Santokba Durlabhji Memorial Hospital, Jaipur, Rajasthan. This study revealed that body mass index (BMI), history of chronic headache, amount of blood loss, start of ambulation, class of analgesia prescribed, number of attempts, CSF allowed to drop, the level of entry, and the design of needle were independent factors associated with postspinal headache. Precisely, women whose BMI ranged from 25 to 29.9 were 0.5 times less likely to develop PSH (0.23+.421, t-value 9.309, p =0.000) while those who reported a history of chronic headache were 3 times more likely to develop PSH (.57+.496, t-value 19.8580, p= 0.00). During operation, women who lost more than >1500 ml of blood were 7 times more likely to develop PSH (0.47+.500, t-value 15.928, p =0.000), and those who started ambulation >24 hours postoperatively were 2 times more likely to develop PSH (0.46+.499, t-value 15.602, p = 0.000). Women who were prescribed with weak opioids (.91+.285, t value 54.563, p= 0.000),While giving spinal anesthesia, women who had 2 puncture attempts (.15+.355, t-value 7.089, p 0.00), 3 puncture attempts (0.51+.501, t value 17.294, p = 0.000), and more than >3 puncture attempts (.32+.467, t value 11.662, p 0.000), were, respectively more likely to develop PSH as compared with those who had one attempt (.02+.130, t value 2.252, p 0.025), likewise women who lost 2-3 drops of CSF during injection of spinal anesthesia (.73+.447, t value 27.770, p = 0.000) were 3 times more likely to develop PSH while those whose level of entry of needle was L3-4 (0.43+.496, t value 14.862, p = 0.000) were less likely to develop PSH and finally those in whom cutting needle (0.69+.463, t value 25.556, p = 0.00) was used were 3 times more likely to have developed PSH . Women who were prescribed with weak opioids were, respectively more likely to develop PSH as compared with those who were prescribed with NSAIDs and strong opioids. The associated symptoms and signs in the were 253 (86.64%) (i.e., neck pain in 126 (43.15%) woman, sound sensitivity in 63 (21.57%) women, shoulder pain in 36 (12.32%) woman, and severe nausea in 28 (9.58%) woman). (Table 1).

Table no.1: Factors associate with postspinal headache with mean, Standard deviation and p value.

		One-Sample Test								
									95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Std Error Mean	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Age	**23 Yrs.**	.25	.432	.025	9.759	291	.000	.247	.20	.30
	24-30 Yrs.	.35	.478	.028	12.499	291	.000	.349	.29	.40
	> 31 Yrs.	.06	.235	.014	4.241	291	.000	.058	.03	.09
Body Mass Index (BMI)	**>30**	.41	.493	.029	14.249	291	.000	.411	.35	.47
	25-29.99	.23	.421	.025	9.309	291	.000	.229	.18	.28
	<18.5	.32	.467	.027	11.662	291	.000	.318	.26	.37
	18.5-24.9	.04	.199	.012	3.531	291	.000	.041	.02	.06
Number of Attempts	**>3**	.32	.467	.027	11.662	291	.000	.318	.26	.37
	3	.51	.501	.029	17.294	291	.000	.507	.45	.56
	2	.15	.355	.021	7.089	291	.000	.147	.11	.19
	1	.02	.130	.008	2.252	291	.025	.017	.00	.03
Level of Entry of Needle	**L2-3**	.48	.500	.029	16.260	291	.000	.476	.42	.53
	L3-4	.43	.496	.029	14.862	291	.000	.432	.37	.49
	L4-5	.09	.290	.017	5.445	291	.000	.092	.06	.13
Start of Ambulation	**>24 Hrs.**	.46	.499	.029	15.602	291	.000	.455	.40	.51
	6-12 Hrs.	.18	.383	.022	7.940	291	.000	.178	.13	.22
	12-24 Hrs.	.04	.191	.011	3.375	291	.001	.038	.02	.06
Design of Needle	**Cutting**	.69	.463	.027	25.556	291	.000	.692	.64	.75
	Pencil Tip	.11	.317	.019	6.089	291	.000	.113	.08	.15
Size of Needle	**25G**	.81	.394	.023	35.019	291	.000	.808	.76	.85
	27G	.19	.394	.023	8.310	291	.000	.192	.15	.24
CSF Allowed to Drop	**2-3 Drops**	.73	.447	.026	27.770	291	.000	.726	.67	.78
	0-1 Drops	.08	.275	.016	5.105	291	.000	.082	.05	.11
Amount of Blood Loss	**>1500ml**	.47	.500	.029	15.928	291	.000	.466	.41	.52
	>1000-1500ml	.18	.386	.023	8.033	291	.000	.182	.14	.23
	>500-1000 ml	.28	.452	.026	10.750	291	.000	.284	.23	.34
	<500ml	.07	.253	.015	4.626	291	.000	.068	.04	.10
History Of Chronic Headache	**Yes**	.57	.496	.029	19.580	291	.000	.568	.51	.63
	No	.66	.475	.028	23.637	291	.000	.658	.60	.71
Analgesics Prescribed	**Tramadol**	.91	.285	.017	54.563	291	.000	.911	.88	.94
	Diclofenac /Panadol	.87	.337	.020	44.103	291	.000	.870	.83	.91
	Diclofenac and Tramadol	.88	.321	.019	46.991	291	.000	.884	.85	.92
	Diclofenac , Morephine /Pethidine	.83	.377	.022	37.529	291	.000	.829	.79	.87

DISCUSSION

AGE OF THE CLIENT

A total of 292 mothers were enrolled in the study. The age mean of the patients in the study was found to be 23 Years (Mean .25, SD .432), 24 -30 Years (Mean .35, SD .478) , and >31 years (mean .06, SD .235). Women seem to process nociceptive information differently from men, showing greater sensitivity to painful stimulation which facilitates the central sensitization process. [20,21] Some studies emphasis on the incidence of PSPH is higher among females and there is an inverse relationship between PSPH and increasing age. [22,23,24,25]

BODY MASS

This study found that participant with a body mass index of 25–29.9 kg/m2 were less likely to develop PSH (p = 0.000) as compared to those with BMI of 18.5–24.5 kg/m2. Lower Body mass index (BMI) has been shown to be associated with higher risk of PSPH. This may be because of the large abdominal panniculus acting like an abdominal binder and raising the intra-abdominal pressure, thus, reducing the rate of leak of CSF through the dural defect .[26, 27,18,29,30] A majority of their study participants were obese 120 (41.09%) with BMI > 30 kg/m2 , only 67 (22.94%) had a BMI 25-29.9 Kg/m2 , compared to this study where only 93 (31.84%) had a BMI <18.5kg/m2, and 26 (8.90%) with BMI 18.5- 24.9 kg/m2.

NUMBER OF ATTEMPTS

This study found that women who had 2, 3, and >3 puncture attempts were, respectively, more likely to develop PSH as compared to those who had 1 attempt. Numbers of attempts are the major causes of PSH. [22,24,31,32,33,34] The number of puncture attempts is a reflection of the magnitude of damage that is caused, resulting in more sites from which CSF is lost; therefore, fewer attempts result in a lower incidence of PSH.

LEVEL OF ENTRY

This study found that women who underwent spinal anesthesia via entry at the level of L3-4 were less likely to develop PSH (p = 0.000) compared to those with entry at L4-5. Different studies showed that PSPH was more frequent when L4-L5 was chosen than L3-L4 and explained by pressure of CSF.[35] The explanation is the difference in CSF pressure gradient between subarachnoid space and epidural space at the different levels that results in more CSF leakage. This pressure gradient is potentiated even further in an upright position.

START OF AMBULATION

This study found that women who started postoperative ambulation >24 hours after administration of spinal anesthesia were more likely to develop PSH (p = 0.000) as compared to those who started ambulating within 12−24 hours of spinal anesthesia. The difference may be explained by the activities they were using to quantify the start of ambulation such as raising the head, sitting position, and upright posture without considering moving out of bed. According to Viming et al. prophylactic treatment by placing a patient horizontal for a period of time after a dural puncture have no effect on the incidence or duration of a PSPH but, it only delays the onset of the PSPH until the patient ambulates.[36]

DESIGN OF NEEDLE

This study found that women who underwent spinal anesthesia using cutting spinal needle (27G) 19.17% were more likely to develop PSH (p = 0.000). Others researchers also found the in their study by Ghaleb A et al.[37,38,39] The association between needle size and type of needle with incidence of PDPH was described as 75 % for 16-18G needles, 30 % for 22G Quinke needles and reduced to 0.37 % for 27G pencil point needles and the most favorable needle sizes for spinal anesthesia25G, 26G, and 27G needles.[40,41]

SIZE OF NEEDLE

Patients who received spinal anesthesia with 25G and 27G needles respectively developed PSPH. Difference was statistically in significant (p=0.000), and One of the authors reported an incidence of 40% with a 20G needle, 25% with a 25G needle, 2-10% with a 26 G needle, and less than 2% with a 29G needle.[42] This discrepancy may be attributed to the differences in preoperative hydration, study settings, and the size of the needle used in majority of cases. In this particular study, Sumaya Syed et al. [43] found that there was no definite advantage of 27 G Quincke needle over 25 G Quincke needle as far as the incidence of PDPH is concerned. In current study were used in the majority of

their cases G25 needle used in 80.82 % of our study participants. There are enough evidences that both needle size, and tip design impact the incidence of PSPH. [44]

CSE ALLOWED TO DROP

This study found that a higher drop in CSF was strongly associated with PSPH, which agrees with other similar studies. [45,46] This may be due to an acute decrease in intracranial CSF pressure owing to extraction of larger volumes of CSF, triggering meningeal vasodilatation and positional traction on intracranial structures. If no further leakage of CSF occurs following the procedure, the amount of CSF removed should be replenished within several hours at physiological rates of CSF production.[47]

AMOUNT OF BLOOD LOSS

This study found that women who had lost >1500 ml of blood were 7 times more likely to develop PSH ($p = 0.000$) as compared to those who lost <500 ml. Spinal anesthesia and blood loss of more than 500mls are the major associated factors. Other studies have also confirmed that obstetric risk factors, such as parity, gestational age, and fetal macrosomia, contribute to the occurrence of obstetric blood loss. [48,49,50] The relationship between blood loss and appearance of PSH may be due to cerebral vasodilation that comes with hypotension during episodes of hypovolemic shock; hence, preferential blood supply to the brain is enhanced (brain spearing effect).

PREVIOUS HISTORY OF CHRONIC HEADACHE

This study found that participants having a previous history of chronic headache were 3 times more likely to develop PSH ($p = 0.000$), compared to those who reported no history of headache. Other researchers also noted the prevalence of post-dural puncture headache was significantly greater in the group with a previous positive history for post-dural puncture headache and females had a greater risk of a recurrence. [51]

OTHER ISSUES

This study found that women prescribed weak opioids ($p = 0.000$), nonsteroidal anti-inflammatory drugs with nonopioids ($p = 0.000$), nonsteroidal anti-inflammatory with weak opioids ($p = 0.000$) were more likely to develop PSH, respectively, as compared to those with nonsteroidal anti-inflammatory and strong opioids. In this study, the secondary outcomes of Post spinal puncture headache (such as mean severity, movement limitation, days of PSPH, need for analgesic, associated symptoms and signs such as nausea, vomiting, shoulder pain, and neck pain, and sound and photosensitivity were more apparent, and its associated symptoms and signs are important because each of these complaints restricts women from performing housekeeping duties and caring for their child, as well as increases

CONCLUSIONS

The incidence of post spinal headache among obstetric mothers undergoing spinal anesthesia at Santokba Durlabhji Memorial Hospital, Jaipur, Rajasthan. Post spinal headache is significantly associated with increased risk of PSH if a cutting spinal needle is used, a higher amount of intraoperative blood loss , low body mass index , allowing a higher amount of CSF to fall, an increased number of puncture attempts, late postoperative ambulation, By using a smaller gauge needle, preventing CSF loss, past medical history of chronic headache , making deliberate attempts to ensure a successful puncture attempt with fewer attempts, reducing intraoperative blood loss, encouraging earlier ambulation, and prescribing adequate analgesia can reduce the incidence and may be the severity of postspinal headache. The identification of factors that predict the likelihood of PSPH is important so that measures can be taken to minimize this painful complication resulting from spinal anesthesia.

LIMITATION -

The present study results, " Incidence and Factors Associated with Post spinal puncture headache (PSPH) in Obstetric Mothers Who Underwent Spinal Anesthesia" were statistical, and it's a short-term and area-based study to study the long-term effects of Spinal Anesthesia to obtain results for a more extended population.

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CONFLICT OF INTEREST- The authors declare that they need no conflict of interest.

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