

Prospective study of Incidence and Risk Factors for Post-Dural Puncture Headache in obstetric women

Masoomeh Nataj Majd¹, Mohamad Sorani², Afzal Shamsi³, Zahraa Mohammed Atiyah^{4*}

¹Department of Anesthesiology, Arash Women's Hospital, Tehran University of Medical Sciences, Tehran, Iran.

Email ID: mnataj54@yahoo.com

Orchid ID: <https://orcid.org/0000-0002-0253-6090>

²Department of Anesthesia, School of Allied Medical Sciences, Tehran University of Medical Sciences, Tehran, Iran, PhD in Health in Disasters and Emergencies, Tehran University of Medical Sciences, Tehran, Iran. (Co-Corresponding).

Email ID: Mohamad.sorani@gmail.com

Orchid ID: <https://orcid.org/0000-0001-6829-4891>

³Department of Anesthesia, School of Allied Medical Sciences, Tehran University of Medical Sciences, Tehran, Iran. Nursing and Midwifery Care Research center, Tehran University of Medical Sciences, Tehran, Iran.

Email ID: Afzal_sh63@yahoo.com

Orchid ID: <https://orcid.org/0000-0001-6231-0547>

⁴Department of Anesthesia, School of Allied Medical Sciences, Tehran University of Medical Sciences, Tehran, Iran.

Email ID: zm892968@gmail.com

Orchid ID: <https://orcid.org/0009-0008-1615-1029>

*Corresponding Author:

Zahraa Mohammed Atiyah,

Department of Anesthesia, School of Allied Medical Sciences, Tehran University of Medical Sciences, Tehran, Iran.

Email ID: zm892968@gmail.com

Orchid ID: <https://orcid.org/0009-0008-1615-1029>

Cite this paper as: Masoomeh Nataj Majd, Mohamad Sorani, Afzal Shamsi, Zahraa Mohammed Atiyah, (2025) Prospective study of Incidence and Risk Factors for Post-Dural Puncture Headache in obstetric women. *Journal of Neonatal Surgery*, 14 (23s), 81-95

ABSTRACT

Introduction: post-dural puncture headache (PDPH) consider the major incidence with the significant consequence specially with anesthesia for lower segment cesarean section (spinal anesthesia), headache is very annoying, and it severely limits their daily activities and causes the mother's dissatisfaction, and in cases that start early, it delays the discharge from the hospital and increases the cost. According to what is now known, the PDPH syndrome is more severe, often lasts longer, and has certain potentially fatal sequelae (cerebral hemorrhage) than is typically recognized or acknowledged. Currently, the important problems for obstetric anesthesia of mother was the post-spinal headache.

Material and Methods: the aimed of this research was to assess the occurring of post dural puncture headache in parturient under spinal anesthesia who had cesarean section also, determine the demographic/ biometric and clinical risk factors. The study design was a prospective cohort study conducted at an Iranian public hospital. The study included 316 pregnant women who had a cesarean section or any other surgery, using the conventional spinal anesthesia approach at Arash Hospital in Tehran city. Study participants will be selected from all patients who have the inclusion criteria using convenience sampling from 1 November 2024.

Findings: 316 pregnant women who participate within current study, 21.5% had incidence of PDPH. A previous history of sinusitis or chronic headache was significantly correlation with PDPH in both the early post-operative period (1–3 days PO, $p < 0.001$) and the total incidence of PDPH ($p < 0.001$). A history of headaches after previous spinal anesthesia was also significantly associated with PDPH in the early post-operative period (1–3 days PO, $p < 0.001$) and total PDPH ($p = 0.007$). Daily tea or coffee consumption showed a significant association with PDPH at 4–7 days PO ($p = 0.021$) but was not statistically significant in total PDPH incidence. Other variables, including age, pre-pregnancy BMI, number of previous cesarean sections, volume of fluids administered during the cesarean, and gestational age, did not show a significant association with PDPH in any of the observed time frames.

Conclusion: Our study revealed in the results the history of sinusitis or chronic headache, with the history of previous post-dural puncture headache, that will be elevate the occurring of PDPH in pregnant women..

Keywords: Caesarean section , Headache Disorders, Post dural puncture headache

1. INTRODUCTION

After a lumbar puncture the most frequent side effect appears within five days is known as PDPH. that presents as a dull bilateral Headache in the frontal and occipital regions[1].The patients who had PDPD increased the severity when the position was sitting or standing. When the patients were lying down, that will be decreased the intensity of the PDPH also, when individual lying down that will be decreased the occurrences for coughing with sneezing. It will be diminished after 14 days; it is accompanied by nausea, tinnitus, and neck stiffness, in addition to photophobia[2]. Several theories describe the mechanism of PDPH. The most commonly believed theory attributes PDPH to Cerebrospinal Fluid Leakage, and some neurologists and anesthesiologists believe that PDPH is related to downward traction [3].

PDPH consider one of the widely reported complications that occur following the diagnosis or therapeutic puncture of the dura mater, as well as inadvertently after spinal anesthesia[1]. The literature has reported several procedural and non-procedural-related risk factors for PDPH[4, 5]. Additionally, PDPH can vary depending on the type of surgery, surgical condition, anesthesia technique, and patient characteristics, Therefore, between 0.3% and 40% of patients who have undergone spinal anesthesia may experience headaches.[6,9]

Cesarean Section procedures are performed frequently in the Maternity Care facility worldwide[10]. Due to numerous advantages, including its straightforward implementation, avoidance of airway instrumentation, early recovery, and enhanced mother-fetal bonding, as well as potential complications of general anesthesia for mothers and fetuses, most of pregnant women selected spinal anesthesia for cesarean deliveries [11]. However, despite its widespread use and advantages, spinal anesthesia has some clinically significant problems, among which PDPH is one of the most troublesome and medically notable [12, 13]. Despite many new studies to treat this condition, we have not been successful in solving this problem so far. Many injectable and oral medications have been tried, but none have had satisfactory efficacy [8, 14, 15].

0.3% to 40% the occurring rate of headache (PDPH) following spinal anesthesia [16-18]. Risk variables pertaining to both procedures and non-procedures, including age, gender, kind and size of needles, number of spinal tries, and BMI, influence it. This wide statistical range for incidence indicates unknown risk factors[18].

The current thesis aimed to survey the occurring of PDPH with pregnant mother undergoing surgery under spinal anesthesia in Arash Hospital and to identify the complication aggravated by risk factors

2. MATERIALS AND METHODS

We conducted a prospective cohort study at Arash teaching hospital in Tehran, from November 1, 2024, to January 31, 2025. A total of 316 parturient aged from eighteen to forty-five included individuals who had spinal anesthesia for surgery of the cesarean delivery. Research data were gathered through a checklist prepared by the research team. We included patients who met all the following criteria: pregnant women aged eighteen to forty-five years old; the status of the Physical activity of the patient I-II its mean; elective or emergency surgery conducted under spinal anesthesia by the American Society of Anesthesiologists (ASA). available into our follow-up through hospital visits or phone interviews. We excluded patients with any of the following criteria: Spinal Abnormalities; Prior headache, Substance abuse; chronic low back pain; communication barriers; Comorbidities affecting questionnaire or visual analog scale (VAS) completion; Contraindications to Spinal Anesthesia; Technical failure or Difficult Spinal Anesthesia; Refusal to participate. Associated variables include age, The body mass index (BMI) prior to conception is based on worldwide prenatal growth cut-off points that were revised by the Institute of Medicine.[19], co morbidities, anesthesia time, and surgical duration. Intravenous fluids, blood loss, number of attempts for puncture, and Concurrent symptoms (e.g, nausea, vomiting, bradycardia, hypotension) were documented. PDPH were evaluated through in-person and calling assessments at six hours, also, twelve hours, furthermore twenty four hours, and at last seven days after surgery. The severity of pain for the patient will be measured by the Numerical Rating Scale (NRS), when the pain intensity equal to 0 that's mean the patient without pain, and the number 1 to 3 suggested a mild headache. also, referred to moderate pain the 4 to 7 number , and scores between 8 and 10 were attributed to severe pain. PDPH diagnosis was made when patients reported occipital pain that worsened while sitting, standing, Laying down helped alleviate coughing or sneezing.

Anesthesia Protocol

An expert anesthesiologist administered the spinal block utilizing from spinal needle type Quincke gage 25. The operations

were conducted while ensuring an individual remained in a seated posture. within level at L3-L4 or L4-L5 by injecting a hyperbaric bupivacaine 0.5% solution (volume 3 ml).

PDPH management

Intravenous hydration, oral/intravenous analgesics, and oral caffeine were administered to hospitalized patients with PDPH. Discharged patients were encouraged to return for further care. If symptoms didn't resolve after two rounds of conservative care, we may will be need for an epidural blood patches.

Statistical Analysis

Descriptive statistics have been employed to describe the main characteristics of the information being analyzed. Categorical data were presented using percentages and frequencies. Chi-square tests were utilized to examine the relationships among the potential associated risks and PDPH at each time point. When anticipated cell counts were below 5, They employed Fisher's exact test. A p-value is deemed highly significant if it is less than 0.05. For every outcome, logistic regression analysis were conducted in order to find independent predictors of PDPH. Reports were made using 95% CI and adjusted odds ratios (aOR). Stata version 17.0 was used to conduct statistical analysis.

3. RESULTS

The mean maternal age was 29.34 ± 5.42 years, with 78(24.69%) patients aged 18-25 years, 136(43.04%) participants aged 26-35 years, and 102(32.27%) patients aged between 36-45 years. Most patients (80.70%) had undergone 1–3 previous cesarean sections, and the predominant cesarean type was emergency (86.71%). The majority of participants were Iranian (78.48%), and 82.28% were classified as overweight based on pre-pregnancy BMI. The incidence of total PDPH was 21.5% (n=68).

Tables 1-4 show the relationship between characteristics of the individual with the PDPH occurring at different time frames: 1–3 days post-operative (PO), 4–7 days PO, one week PO, and total PDPH. PDPH was statistically related with individuals who had a history of sinusitis or persistent headaches during the beginning of the post-operative interval (1–3 days PO, $p < 0.001$) with the general prevalence of PDPH ($p < 0.001$). A history of headache after previous spinal anesthesia was also statistically related to PDPH in the early post-operative period (1–3 days PO, $p < 0.001$) and total PDPH ($p = 0.007$). Daily tea or coffee consumption showed a significant association with PDPH at 4–7 days PO ($p = 0.021$) but was not statistically significant in total PDPH incidence.

Other variables, including age, pre-pregnancy BMI, number of previous cesarean sections, volume of fluids administered during the cesarean, and gestational age, did not show a significant association with PDPH in any of the observed time frames.

Table 5 presents the finding of the univariate and multivariable binary logistic regression analysis for risk factors associated with total PDPH. In the univariate analysis, a history of sinusitis or chronic headache (OR = 4.592, 95% CI: 1.860-11.340, $p = 0.001$) and a history of headache after previous spinal anesthesia (OR = 2.430, 95% CI: 1.263-4.674, $p = 0.008$) were significantly associated with an increased risk of PDPH. Daily consumption of tea or coffee did not show a significant association. In the multivariable analysis, after adjusting for potential confounders, a history of sinusitis or chronic headache (aOR = 4.176, 95% CI: 1.654-10.542, $p = 0.002$) and a history of headache after previous spinal anesthesia (aOR = 2.089, 95% CI: 1.058-4.124, $p = 0.034$) remained significant predictors of PDPH.

Table 1- Incidence of Total PDPH and Patients Characteristics

Characteristics		Total (N=316)	Total PDPH		p-value
			No (N=248)	Yes (N=68)	
Maternal age groups	18-25	78(24.69%)	63(80.77%)	15(19.23%)	0.94
	26-35	136(43.04%)	107(78.68%)	29(21.32%)	
	36-45	102(32.27%)	78(76.47%)	24(23.53%)	
History of cigarette smoking	No	313 (99.05%)	246 (99.19%)	67 (98.53%)	0.62
	Yes	3	2	1	

		(0.95%)	(0.81%)	(1.47%)	
History of migraine	No	293 (92.72%)	230 (92.74%)	63 (92.65%)	0.98
	Yes	23 (7.28%)	18 (7.26%)	5 (7.35%)	
History of sinusitis or chronic headache	No	295 (93.35%)	238 (95.97%)	57 (83.82%)	<0.01
	Yes	21 (6.65%)	10 (4.03%)	11 (16.18%)	
History of taking anti-anxiety and psychiatric medications	No	301 (95.25%)	235 (94.76%)	66 (97.06%)	0.43
	Yes	15 (4.75%)	13 (5.24%)	2 (2.94%)	
History of headaches after previous spinal anesthesia	No	266 (84.18%)	216 (87.10%)	50 (73.53%)	0.007
	Yes	50 (15.82%)	32 (12.90%)	18 (26.47%)	
daily consumption of tea or coffee	Low	183 (57.91%)	146 (58.87%)	37 (54.41%)	0.28
	Average	62 (19.62%)	51 (20.56%)	11 (16.18%)	
	High	71 (22.47%)	51 (20.56%)	20 (29.41%)	
Nationality	Iranian	248 (78.48%)	194 (78.23%)	54 (79.41%)	0.83
	Afghan	68 (21.52%)	54 (21.77%)	14 (20.59%)	
number of previous cesarean sections	1-3	255 (80.70%)	198 (79.84%)	57 (83.82%)	0.46
	3≤	61 (19.30%)	50 (20.16%)	11 (16.18%)	
Pre-pregnancy BMI category	Normal weight (18.5-24.9) or underweight (18.5≤) *	56 (17.72%)	42 (16.94%)	14 (20.59%)	0.48
	Overweight (25≤)	260 (82.28%)	206 (83.06%)	54 (79.41%)	

				)	
Surgery type	Emergency	274 (86.71%)	215 (86.69%)	59 (86.76%)	0.99
	Elective	42 (13.29%)	33 (13.31%)	9 (13.24%)	
Gestational age	Preterm (36 $\geq$)	94 (29.75%)	80 (32.26%)	14 (20.59%)	0.06 ²
	Term (37-41)	222 (70.25%)	168 (67.74%)	54 (79.41%)	
Trimester	2 nd trimester	12 (3.80%)	11 (4.44%)	1 (1.47%)	0.26
	3 rd trimester	304 (96.20%)	237 (95.56%)	67 (98.53%)	
Volume of fluid administered during the cesarean	2000 $\geq$	295 (93.35%)	230 (92.74%)	65 (95.59%)	0.40
	2000 <	21 (6.65%)	18 (7.26%)	3 (4.41%)	

* Only one participant fell into the underweight category, so this group was merged with the normal-weight group.

Table 2- Incidence of PDPH at 1-3 days Post-operative and the Patients Characteristics

Variables		Total (N=316)	PDPH at 1-3 days PO		p-value
			No (N=267)	Yes (N=49)	
History of cigarette smoking	No	313 (99.05%)	264 (98.88 %)	49 (100.00%)	0.46
	Yes	3 (0.95%)	3 (1.12%)	0 (0.00%)	
History of migraine	No	293 (92.72%)	248 (92.88%)	45 (91.84%)	0.80
	Yes	23 (7.28%)	19 (7.12%)	4 (8.16%)	
History of sinusitis or chronic headache	No	295 (93.35%)	256 (95.88%)	39 (79.59%)	<0.001
	Yes	21 (6.65%)	11 (4.12%)	10 (20.41%)	
History of taking anti-anxiety and psychiatric medications	No	301 (95.25%)	253 (94.76%)	48 (97.96%)	0.33
	Yes	15 (4.75%)	14 (5.24%)	1 (2.04%)	
History of headaches after previous spinal anesthesia	No	266 (84.18%)	233 (87.27%)	33 (67.35%)	<0.001
	Yes	50 (15.82%)	34 (12.73%)	16 (32.65%)	
Daily consumption of tea or coffee	Low	183 (57.91%)	159 (59.55%)	24 (48.98%)	0.17
	Average	62 (19.62%)	53 (19.85%)	9 (18.37%)	
	High	71 (22.47%)	55 (20.60%)	16 (32.65%)	

Nationality	Iranian	248 (78.48%)	211 (79.03%)	37 (75.51%)	0.58
	Afghan	68 (21.52%)	56 (20.97%)	12 (24.49%)	
Number of previous cesarean sections	1-3	255 (80.70%)	214 (80.15%)	41 (83.67%)	0.57
	3≤	61 (19.30%)	53 (19.85%)	8 (16.33%)	
Pre-pregnancy BMI category	Normal weight (18.5-24.9) or underweight (18.5≤) *	56 (17.72%)	45 (16.85%)	11 (22.45%)	0.35
	Overweight (25≤)	260 (82.28%)	222 (83.15%)	38 (77.55%)	
Surgery type	Emergency	274 (86.71%)	230 (86.14%)	44 (89.80%)	0.49
	Elective	42 (13.29%)	37 (13.86%)	5 (10.20%)	
Gestational age	Preterm (36≥)	94 (29.75%)	85 (31.84%)	9 (18.37%)	0.058
	Term (37-41)	222 (70.25%)	182 (68.16%)	40 (81.63%)	
Trimester	2 nd trimester	12 (3.80%)	11 (4.12%)	1 (2.04%)	0.48
	3 rd trimester	304 (96.20%)	256 (95.88%)	48 (97.96%)	
Volume of fluid administered during the cesarean	2000 ≥	295 (93.35%)	249 (93.26%)	46 (93.88%)	0.87
	2000 <	21 (6.65%)	18 (6.74%)	3 (6.12%)	

* Only one participant fell into the underweight category, so this group was merged with the normal-weight group.

Table 3- Incidence of PDPH at 4-7 days Post-operative and the Patients Characteristics

Variables		Total (N=316)	PDPH at 4-7 days PO		p-value
			No (N=275)	Yes (N=41)	
History of cigarette smoking	No	313 (99.05%)	273 (99.27%)	40 (97.56%)	0.29
	Yes	3 (0.95%)	2 (0.73%)	1 (2.44%)	
History of migraine	No	293 (92.72%)	254 (92.36%)	39 (95.12%)	0.53
	Yes	23 (7.28%)	21 (7.64%)	2 (4.88%)	
History of sinusitis or chronic headache	No	295 (93.35%)	258 (93.82%)	37 (90.24%)	0.39
	Yes	21 (6.65%)	17 (6.18%)	4 (9.76%)	
History of taking anti-anxiety and psychiatric medications	No	301 (95.25%)	262 (95.27%)	39 (95.12%)	0.97
	Yes	15 (4.75%)	13 (4.73%)	2 (4.88%)	

History of headaches after previous spinal anesthesia	No	266 (84.18%)	232 (84.36%)	34 (82.93%)	0.81
	Yes	50 (15.82%)	43 (15.64%)	7 (17.07%)	
Daily consumption of tea or coffee	Low	183 (57.91%)	163 (59.27%)	20 (48.78%)	0.02 1
	Average	62 (19.62%)	57 (20.73%)	5 (12.20%)	
	High	71 (22.47%)	55 (20.00%)	16 (39.02%)	
Nationality	Iranian	248 (78.48%)	215 (78.18%)	33 (80.49%)	0.74
	Afghan	68 (21.52%)	60 (21.82%)	8 (19.51%)	
Number of previous cesarean sections	1-3	255 (80.70%)	221 (80.36%)	34 (82.93%)	0.70
	3≤	61 (19.30%)	54 (19.64%)	7 (17.07%)	
	36-56	101 (31.96%)	87 (31.64%)	14 (34.15%)	
	171-200	21 (6.65%)	19 (6.91%)	2 (4.88%)	
Pre-pregnancy BMI category	Normal weight (18.5-24.9) or underweight (18.5≥) *	56 (17.72%)	49 (17.82%)	7 (17.07%)	0.91
	Overweight (25≤)	260 (82.28%)	226 (82.18%)	34 (82.93%)	
Surgery type	Emergency	274 (86.71%)	238 (86.55%)	36 (87.80%)	0.82
	Elective	42 (13.29%)	37 (13.45%)	5 (12.20%)	
Gestational age	Preterm (36≥)	94 (29.75%)	85 (30.91%)	9 (21.95%)	0.24
	Term (37-41)	222 (70.25%)	190 (69.09%)	32 (78.05%)	
Trimester	2 nd trimester	12 (3.80%)	12 (4.36%)	0 (0.00%)	0.17
	3 rd trimester	304 (96.20%)	263 (95.64%)	41 (100.00%)	
Volume of fluid administered during the cesarean	2000 ≥	295 (93.35%)	256 (93.09%)	39 (95.12%)	0.63
	2000 <	21 (6.65%)	19 (6.91%)	2 (4.88%)	

* Only one participant fell into the underweight category, so this group was merged with the normal-weight group.

Table 4- Incidence of PDPH One Week Post-operative and the Patients Characteristics

Variables		Total (N=316)	PDPH one week PO		p-value
			No (N=304)	Yes (N=12)	
History of cigarette smoking	No	313 (99.05%)	301 (99.01%)	12 (100.00%)	0.73
	Yes	3 (0.95%)	3 (0.99%)	0 (0.00%)	
History of migraine	No	293 (92.72%)	282 (92.76%)	11 (91.67%)	0.89
	Yes	23 (7.28%)	22 (7.24%)	1 (8.33%)	
History of sinusitis or chronic headache	No	295 (93.35%)	284 (93.42%)	11 (91.67%)	0.81
	Yes	21 (6.65%)	20 (6.58%)	1 (8.33%)	
History of taking anti-anxiety and psychiatric medications	No	301 (95.25%)	289 (95.07%)	12 (100.00%)	0.43
	Yes	15 (4.75%)	15 (4.93%)	0 (0.00%)	
History of headaches after previous spinal anesthesia	No	266 (84.18%)	256 (84.21%)	10 (83.33%)	0.93
	Yes	50 (15.82%)	48 (15.79%)	2 (16.67%)	
daily consumption of tea or coffee	Low	183 (57.91%)	176 (57.89%)	7 (58.33%)	0.48
	Average	62 (19.62%)	61 (20.07%)	1 (8.33%)	
	High	71 (22.47%)	67 (22.04%)	4 (33.33%)	
Nationality	Iranian	248 (78.48%)	238 (78.29%)	10 (83.33%)	0.68
	Afghan	68 (21.52%)	66 (21.71%)	2 (16.67%)	
Number of previous cesarean sections	1-3	255 (80.70%)	244 (80.26%)	11 (91.67%)	0.33
	3≤	61 (19.30%)	60 (19.74%)	1 (8.33%)	
	36-56	101 (31.96%)	99 (32.57%)	2 (16.67%)	
	171-200	21 (6.65%)	21 (6.91%)	0 (0.00%)	
Pre-pregnancy BMI category	Normal weight (18.5-24.9)or	56	53	3	0.50

	underweight (18.5≥)*	(17.72%)	(17.43%)	(25.00%)	
	Overweight (25≤)	260 (82.28%)	251 (82.57%)	9 (75.00%)	
Surgery type	Emergency	274 (86.71%)	264 (86.84%)	10 (83.33%)	0.73
	Elective	42 (13.29%)	40 (13.16%)	2 (16.67%)	
Gestational age	Preterm (36≥)	94 (29.75%)	92 (30.26%)	2 (16.67%)	0.31
	Term (37-41)	222 (70.25%)	212 (69.74%)	10 (83.33%)	
Trimester	2 nd trimester	12 (3.80%)	12 (3.95%)	0 (0.00%)	0.48
	3 rd trimester	304 (96.20%)	292 (96.05%)	12 (100.00%)	
Volume of fluid administered during the cesarean	2000 ≥	295 (93.35%)	283 (93.09%)	12 (100.00%)	0.35
	2000 <	21 (6.65%)	21 (6.91%)	0 (0.00%)	

* Only one participant fell into the underweight category, so this group was merged with the normal-weight group.

Table 5- Univariate and Multivariable Binary Logistic Regression Analysis of Risk Factors for Total PDPH after Cesarean

Predictors		Univariate model		Multivariable model	
		OR* (95% CI)	P-value	aOR* (95% CI)	P-value
History of sinusitis or chronic headache (no as reference)		4.592 (1.860-11.340)	0.001	4.176 (1.654-10.542)	0.002
History of headache after previous spinal anesthesia (no as reference)		2.430 (1.263-4.674)	0.008	2.089 (1.058-4.124)	0.034
Daily consumption of tea or coffee (low as a reference)	Average	0.851 (0.404-1.792)	0.671	0.894 (0.414-1.927)	0.776
	High	1.547 (0.823-2.906)	0.175	1.541 (0.802-2.963)	0.194

*Acronyms: OR: Odds Ratio, aOR: adjusted Odds Ratio

4. DISCUSSION

The aimed of this research to evaluate the incidence of PDPH with its contributing variables among the gestational mothers . The research was conducted at Arash Hospital in Tehran.

PDPH occurs more frequently in young individuals and females than in males. It occurs twice as frequently in nonpregnant women compared to men [20-24]. Consequently, pregnant women who have undergone cesarean sections are at an elevated risk due to their age and gender.

The incidence of PDPH is affected by many variables, Factors include sex, age, pregnancy status past history of post-spinal headache, the size and shape of the needle, the bevel orientation in relation to the dural fibers, the number of tries at lumbar

puncture, the route (lateral vs midline), the kind of local anesthetic used, and the operator's clinical background. [25, 26]. With the current study, we tried to eliminate technical risk factors so that we could easily examine other influential factors, so we used an experienced anesthesiologist, and the size and type of needle were the same in all patients, and all cases used the midline technique, and the cases that were tried more than once were excluded from the study.

In this research, 21.52% was the total result of PDPH among the 316 women under gone cesarean section. This result is within the range known in various studies [6-9]. There are studies with lower rates and articles with higher incidence than ours, Thakur et al. [27] in this study the occurring of PDPH was 11.4% and Osman et al. [28] that **among the pregnant women (38.3 %)** of them developed PDPH, and the main reason for these differences is procedural factors such as needle size. Nevertheless, There is a thesis conducted by Mohamed et al. [29], The findings indicated that 325 pregnant women (81.25%) experienced PDPH, whereas 75 women (18.75%) were not diagnosed with it. The results of this study disagree with our findings and are out of the normal range.

We thought that ethnic and racial factors (Iranian and Afghan) might have an effect on the occurrence of headaches because these two ethnic groups are slightly different in labor processes, but no significant difference was found in this study.

Another risk factor that we wanted to address in this study was the trimester of pregnancy. Also, **96.20% of the participants** in this study were in the 3rd trimester, so this could not be properly investigated. However, it seems that considering the pathophysiology proposed for PDPH, Pregnancy appears to be a risk factor, and different trimesters may have different effects. However, findings have varied across studies, and there is no consensus [30, 31].

Our study revealed statistically significant associations between the first 3 days or one week after post-dural puncture and a history of sinusitis as well as chronic headache. We found a significant association between PDPH and a history of headache after previous spinal anesthesia. Daily tea or coffee consumption statistically showed a significant correlation with PDPH at 4–7 days PO but was not statistically significant in total PDPH incidence.

In the univariate analysis, a history of sinusitis or chronic headache (OR = 4.592, 95% CI: 1.860-11.340) and a history of headaches after previous spinal anesthesia (OR = 2.430, 95% CI: 1.263-4.674) were significantly associated with an increased risk of PDPH. A history of sinusitis or chronic headache (aOR = 4.176, 95% CI: 1.654-10.542) and a history of headache after previous spinal anesthesia (aOR = 2.089, 95% CI: 1.058-4.124) remained significant predictors of PDPH. [32, 33].

According to the study of Amorim et al. [34], there is agreement with our study. The results had a significant differences correlation with the previous history of post dural puncture headache PDPH (the p-value was less than 0.005). A thesis produced by Ramadan et al. [30] The findings indicated a significant relationship within PDPH with the factors such as age, gender, educational level, and previous history of headache. Additionally, we concur with our findings. The multivariate logistic regression model indicated a highly significant correlation with the incidence of post dural puncture headache with the prior history of post dural puncture headache, conducted by Al-Hashel et al. [35]. There is a finding produced by Khraise et al. [7], in contrast with our finding that there is no correlation between the occurrence of post dural puncture headache with the history of sinusitis also, with the recurrent headache.

Regarding the effect of pre-pregnancy BMI, in this thesis there was no clear difference between the two groups, which is consistent with the Miu et al. [36] study. This is contrary to the results of the Peralta et al. [37] study conducted in 2015. Of course, both of these studies were on cases where spinal anesthesia was inadvertently administered during an epidural. Beyaz et al. [38] in 2021 conducted a study. This prospective research showed that body mass index values did not alter PDPH in elective cesarean sections conducted under spinal anesthesia.

5. CONCLUSION

Our study revealed in the results the history of sinusitis or chronic with the history of previous post-dural puncture headache, increases the incidence of PDPH in pregnant women. However, according the research finding the history of smoking also the **pre-pregnancy BMI** in addition, demographic characteristics and the daily tea and coffee consumption furthermore cesarean type (elective/emergency), gestational age, parity, in addition to the Age of the pregnant women, and race, all of these variables without effect on the incidence of post dural puncture headache in our results

Ethical approval

Before initiating this experiment, Tehran University of Medical Science (TUMS) clearance was obtained. The committee on ethics accepted the project's use of human participants (IR.TUMS.SPH.REC.1403.107).

Conflicting interests: There is no interesting conflict

REFERENCES

- [1] Uppal, V., et al., Consensus Practice Guidelines on Postdural Puncture Headache From a Multisociety, International Working Group: A Summary Report. JAMA Netw Open, 2023. 6(8): p. e2325387.

- [2] Arrabal, P., et al., Chapter 45 - Postdural puncture headaches, in *Pharmacology, Physiology, and Practice in Obstetric Anesthesia*, A.D. Kaye and A.J. Kaye, Editors. 2025, Academic Press. p. 517-525.
- [3] Ghaleb, A., A. Khorasani, and D. Mangar, Post-dural puncture headache. *Int J Gen Med*, 2012. 5: p. 45-51.
- [4] Al-Hashel, J., et al., Post-dural puncture headache: a prospective study on incidence, risk factors, and clinical characterization of 285 consecutive procedures. *BMC Neurol*, 2022. 22(1): p. 261.
- [5] Azzi, A., et al., Correlates of post-dural puncture headache and efficacy of different treatment options: a monocentric retrospective study. *Br J Pain*, 2022. 16(2): p. 228-236.
- [6] Davoudi, M., et al., Effect of position during spinal anesthesia on postdural puncture headache after cesarean section: a prospective, single-blind randomized clinical trial. *Anesthesiology and Pain Medicine*, 2016. 6(4): p. e35486.
- [7] Khraise, W.N., et al., Assessment of risk factors for postdural puncture headache in women undergoing cesarean delivery in Jordan: a retrospective analytical study. *Local and Regional Anesthesia*, 2017: p. 9-13.
- [8] Kwak, K.-H., Postdural puncture headache. *Korean journal of anesthesiology*, 2017. 70(2): p. 136.
- [9] Morsy, K.M., et al., Post dural puncture headache in fibromyalgia after cesarean section: a comparative cohort study. *Pain Physician*, 2016. 19(6): p. E871.
- [10] Malik, N., et al., Cesarean Section Trends and Associated Factors at a Tertiary Care Center in India: A Retrospective Study. *Cureus*, 2024. 16(11): p. e73308.
- [11] BuckLin, B.A., et al., Obstetric Anesthesia Workforce Survey: 40-year Update. *Anesthesiology*, 2025.
- [12] Aftab, S., et al., Post dural puncture headache: comparison of 26G Quincke with 25 G Whitacre needle for elective caesarian section. *Pak J Surg*, 2009. 25(4): p. 257-261.
- [13] Malik, M.A., et al., To compare the frequency and severity of post-dural puncture headache (PDPH) in parturients given spinal anaesthesia with a 25 g Quincke needle with that of a 25 g Whitacre needle. *Pak J Med Health Sci*, 2012. 6: p. 90-3.
- [14] Wu, C., et al., Aminophylline for treatment of postdural puncture headache: A randomized clinical trial. *Neurology*, 2018. 90(17): p. e1523-e1529.
- [15] Shahriari, A., et al., The comparison of post-dural puncture headache treatment with acetaminophen-caffeine capsule and intravenous mannitol infusion: A randomized single-blind clinical trial. *Current Journal of Neurology*, 2021. 20(2): p. 95.
- [16] Jabbari, A., et al., Post spinal puncture headache, an old problem and new concepts: review of articles about predisposing factors. *Caspian J Intern Med*, 2013. 4(1): p. 595-602.
- [17] Demilew, B.C., et al., Incidence and associated factors of postdural puncture headache for parturients who underwent cesarean section with spinal anesthesia at Debre Tabor General Hospital, Ethiopia; 2019. *SAGE Open Med*, 2021. 9: p. 20503121211051926.
- [18] Weji, B.G., et al., Incidence and risk factors of postdural puncture headache: prospective cohort study design. *Perioper Med (Lond)*, 2020. 9(1): p. 32.
- [19] Yaktine, A.L. and K.M. Rasmussen, Weight gain during pregnancy: reexamining the guidelines. 2010.
- [20] Geurts, J.W., et al., Post-dural puncture headache in young patients. A comparative study between the use of 0.52 mm (25-gauge) and 0.33 mm (29-gauge) spinal needles. *Acta Anaesthesiologica Scandinavica*, 1990. 34(5): p. 350-353.
- [21] CorbEy, M.P., et al., Grading of severity of postdural puncture headache after 27-gauge Quincke and Whitacre needles. *Acta anaesthesiologica scandinavica*, 1997. 41(6): p. 779-784.
- [22] Girma, T., et al., Incidence and associated factors of post dural puncture headache in cesarean section done under spinal anesthesia, 2021 institutional-based prospective single-armed cohort study. *Annals of Medicine and Surgery*, 2022. 78.
- [23] NafiU, O.O., R.A. Salam, and E.O. Elegbe, Post dural puncture headache in obstetric patients: experience from a West African teaching hospital. *International journal of obstetric anesthesia*, 2007. 16(1): p. 4-7.
- [24] Ferede, Y.A., et al., Incidence and associated factors of post dural puncture headache after cesarean section delivery under spinal anesthesia in University of Gondar Comprehensive Specialized Hospital, 2019, cross-sectional study. *International Journal of Surgery Open*, 2021. 33: p. 100348.
- [25] Lybecker, H., et al., Incidence and prediction of postdural puncture headache: A prospective study of 1021 spinal anesthetics. *Anesthesia & Analgesia*, 1990. 70(4): p. 389-394.
- [26] Vallejo, M.C., et al., Postdural puncture headache: a randomized comparison of five spinal needles in obstetric patients. *Anesthesia & Analgesia*, 2000. 91(4): p. 916-920.

- [27] Thakur, S., et al., 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*, 2022. 14(Suppl 1): p. S209-S213.
 - [28] Osman, M.J., et al., Incidence and Factors Associated with Postspinal Headache in Obstetric Mothers Who Underwent Spinal Anesthesia from a Tertiary Hospital in Western Uganda: A Prospective Cohort Study. *Anesthesiology Research and Practice*, 2023. 2023(1): p. 5522444.
 - [29] Mohamed, G., et al., Multiple Risk Factors Analysis of Post-dural Puncture Headache (PDPH) among Parturient Patients Underwent Caesarean Section at Obstetric Hospitals in Somaliland. *The Open Anesthesia Journal*, 2024. 18(1).
 - [30] K Ramadan, M., S. M Hassan, and M. F Mahrous, Factors Contributing to Headache and its Associated Symptoms for Post Lumbar Puncture Patients. *Egyptian Journal of Health Care*, 2018. 9(3): p. 548-572.
 - [31] Bezov, D., R.B. Lipton, and S. Ashina, Post-dural puncture headache: part I diagnosis, epidemiology, etiology, and pathophysiology. *Headache: The Journal of Head and Face Pain*, 2010. 50(7): p. 1144-1152.
 - [32] Vandam, L.D. and R.D. Dripps, Long-term follow-up of patients who received 10,098 spinal anesthetics: syndrome of decreased intracranial pressure (headache and ocular and auditory difficulties). *Journal of the American Medical Association*, 1956. 161(7): p. 586-591.
 - [33] Seeberger, M.D., et al., Repeated dural punctures increase the incidence of postdural puncture headache. *Anesthesia & Analgesia*, 1996. 82(2): p. 302-305.
 - [34] Amorim, J.A., M.V. Gomes de Barros, and M.M. Valença, Post-dural (post-lumbar) puncture headache: risk factors and clinical features. *Cephalalgia*, 2012. 32(12): p. 916-923.
 - [35] Al-Hashel, J., et al., Post-dural puncture headache: a prospective study on incidence, risk factors, and clinical characterization of 285 consecutive procedures. *BMC Neurology*, 2022. 22(1): p. 261.
 - [36] Miu, M., M.J. Paech, and E. Nathan, The relationship between body mass index and post-dural puncture headache in obstetric patients. *International journal of obstetric anesthesia*, 2014. 23(4): p. 371-375.
 - [37] Peralta, F., et al., The relationship of body mass index with the incidence of postdural puncture headache in parturients. *Anesthesia & Analgesia*, 2015. 121(2): p. 451-456.
 - [38] Beyaz, S.G., et al., The interrelation between body mass index and post-dural puncture headache in parturient women. *Journal of Anaesthesiology Clinical Pharmacology*, 2021. 37(3): p. 425-429.
-