

# Post Dural Puncture Headache: The Different Quincke Spinal Needles in Caesarean Section Patients in Somalia

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## ABSTRACT

**Introduction:** Post dural puncture headache is one of the frequent and undesired complications after spinal anesthesia especially in parturients. Although the mechanism of postdural puncture headache is not clear, the most common cause is cerebrospinal fluid leakage from the hole caused by the needle used for spinal anesthesia. Cerebrospinal fluid leakage decreases the intracranial pressure and places tension on the meningeal vessels and nerves. In Somalia, which is one of the underdeveloped countries, pregnant women are in lower socio-cultural and economic conditions compared to developed countries. In addition, they have very limited benefits from health services.

**Objectives:** This study was designed to compare the incidence and characteristics of PDPH, which has never been studied before, using 25-gauge and 26-gauge Quincke spinal needles on this population.

**Methods:** This prospective randomized, double-blind, controlled study investigated the development of PDPH after different spinal needle application. All patients were evaluated in their hospital beds for PDPH in the first 48 hours after the operation. Both groups received routine conservative management.

**Results:** A total of 154 parturients were participated in this study. Patients were divided into 2 groups as Group 1: 25-G (n: 77) and Group 2: 26-G (n: 77) according to Quincke spinal needle thickness. A statistically significant difference was found regarding the PDPH incidence between needle sizes ( $p < 0.05$ ). The incidence and onset time of PDPH in the group 1 was significantly higher than in group 2 ( $p < 0.05$ ).

**Conclusion:** We found that the incidence of PDPH in Somali pregnant women who underwent caesarean section was less in the use of 26-G Q spinal needles. The results of our study should be supported by advanced controlled randomized studies.

## KEY WORDS

cesarean section, postdural puncture headache, quincke needle, spinal anesthesia, Somalia

## INTRODUCTION

Spinal anesthesia is widely used in cesarean sections (C/S) all over the world. While this application has advantages, it also has some complications that will enforce the obstetrician, anaesthesiologist, and patient<sup>1)</sup>. One of the most common complications is the postdural puncture headache (PDPH)<sup>2)</sup>. The incidence of PDPH varies between 1% and 75% worldwide<sup>3)</sup>. It is usually seen in the bilateral frontal or occipital regions<sup>4-6)</sup>.

The Headache Classification Committee of the International Headache Society defines the PDPH in the third edition of the international Classification of Headache Disorders as an orthostatic headache caused by low cerebrospinal fluid pressure usually accompanied by neck pain, tinnitus, changes in hearing, photophobia and/or nausea. It occurs within five days of a lumbar puncture and is caused by cerebrospinal fluid leakage through the dural puncture<sup>7)</sup>. It is expressed as pain that aggravates when standing or sitting and relieves when lying flat<sup>8)</sup>. The prevalence of PDPH is 23.47% in pregnant women<sup>9)</sup>.

PDPH is seen with a higher incidence after spinal anesthesia, espe-

cially after the use of larger diameter piercing (Quincke) needles in pregnant patients<sup>9,10)</sup>. Studies have shown that PDPH develops as a result of CSF leakage from the iatrogenic hole in the dura mater<sup>11,12)</sup> and that there is a positive correlation between the size of the hole and the incidence of PDPH<sup>13)</sup>. The size of the hole in the dura is determined by the needle diameter used and the type of needle tip. It was shown that, the larger the needle diameter, the greater the incidence and severity of PDPH<sup>9)</sup>. For this reason, the use of small diameter needles in the size of 25-31G has come to the fore, especially in recent years.

Somalia is among the most underdeveloped countries in the world where fertility, maternal, and infant mortality are very high, but adequate health care is not provided. Moreover, exposure to civil war is The British aid group Save the Children ranks Somalia as the worst country on Earth for being a mother. The ranking is based on statistics for maternal health, child mortality, education, and women's income in Somalia. For this reason, the social, cultural, and economic characteristics of pregnant women are very different in this country from developed countries. To the best of our knowledge, this is the first study in the literature about the PDPH in Somalia.

In this study, we aimed to determine the effect of using two differ-

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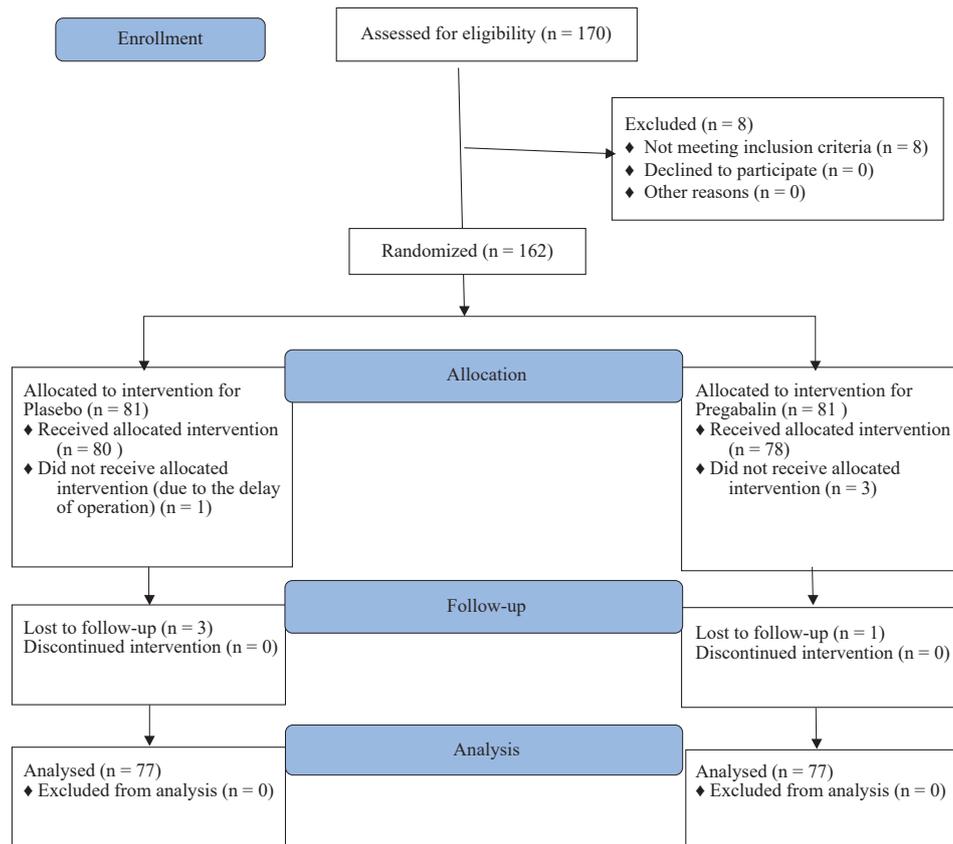


Figure 1: CONSORT 2010 Flow Diagram

ent spinal needles (25 G and 26 G) on the incidence of PDPH in patients who underwent C/S surgery with spinal anesthesia, the severity, location of the headache and the time of onset of the headache on Somalia population.

## MATERIALS AND METHOD

This prospective, randomized, double-blind, controlled trial was carried out in 2019 in Turkey Recep Tayyip Erdogan Training and Research Hospital in Mogadishu Somalia. Ethics committee approval was obtained before the initiation of the study. The study was carried out in accordance with the Declaration of Helsinki Principles.

The study included 154 women aged 18-45 years, with the American Society of Anesthesiologists (ASA) physical status II who underwent elective cesarean section under spinal anesthesia. We excluded those patients who had undergone lumbar disc or vertebra surgery, had chronic low back pain or headache or had contraindications for the neuraxial block or bleeding disorder. An informed consent form was obtained from each patient. Patients who were administered spinal anesthesia were randomized by means of a computer-generated randomization into 2 groups: Group 1: 25-G (n: 77) and Group 2: 26-G (n: 77) (Figure 1).

Before the operation, fasting for 6 hours was recommended to the patients, and premedication was not applied to any of the patients. After the patients were shifted to the operating room, 10 mL/kg of 0.9% NaCl was administered for 30 minutes through 18-gauge intravenous cannula. Metoclopramide 20 mg IV was administered for aspiration prophylaxis. The patients were monitored with respect to electrocardiography, non-invasive blood pressure, heart rate, and peripheral oxygen saturation. All study needles were prepared for patients by an independent investigator who was not involved in the administration of spinal anesthesia. Observers and participating anesthetists were blinded to the provided study needle. The spinal needle was attempted a maximum of two times at the same level and applied maximum three times. If the procedure could not be completed within three attempts, the patient was excluded from the study.

The patients were given 12,5 mg hyperbaric bupivacaine intrathe-

cally following a successful dural puncture performed with a Quincke spinal needle at the L3□4 or L4□5 intervertebral space in the sitting position (with the needle tip directed upward) by an experienced anesthesiologist. In order not to dissect the dural fibers, the needles were directed parallel to the dural fibers. After the free flow of CSF was observed from the needle, the terminal hole of the needle was directed towards the cephalic region.

The sensory block level was evaluated with a pin□prick test; the operation started when the sensory block level was T4. The Bromage scale (0: free movement of legs and feet; 1: just able to flex knees with free movement of feet; 2: unable to flex knees, but with free movement of feet; 3: unable to move legs or feet) was used to evaluate the motor block level of the lower extremities. Immediately, the patients were placed in a supine position and the patient's bed was rotated 15° to the left to maintain hemodynamic stability and prevent compression of inferior vena cava syndrome (IVCS). A face mask was used to administer oxygen 6 L per minute for patients.

A decrease in systolic blood pressure of < 95 mmHg or > 30% from baseline was considered hypotension. When hypotension developed, iv fluids were given first, if not enough, 5-10 mg IV ephedrine was given. When the heart rate was < 45 beats/minute, it was accepted as bradycardia and when bradycardia developed, 0.015 mg/kg iv atropine was given. If the patient describes pain after delivery, Midazolam (0.01-0.03 mg/kg) and Fentanyl (0.5-1 mcg/kg) was administered. General anesthesia was administered to the patient in case of unsuccessful or insufficient spinal anesthesia blockade. These patients were excluded from the study.

When surgery was finished, the patient was placed in the recovery position in the postanesthesia care unit (PACU). The patients were instructed to rest for 6 hours. All patients were mobilized after the full return of the motor block.

PDPH was defined as headache that worsens within 15 min after sitting or standing and improves within 15 min after lying down after dural puncture has occurred or is suspected, develops within 5 days after dural puncture (confirmed or possible) and may or may not be accompanied by neck stiffness, vestibular, visual, or auditory symptoms. The severity of PDPH was evaluated at the patient's bedside at the end of the 1st and 2nd postoperative days according to the numeric rating scale (NRS - 11)<sup>(34)</sup>. On the scale, 0 is the absence of headache, 1 - 3 is mild

**Table 1: Patients' characteristics**

	Group 1 (n = 77)	Group 2 (n = 77)	P value
Age, years	26.6 ± 5.1	28.2 ± 5.7	0.070
Weight, kg	68.5 ± 14.4	70.9 ± 14.2	0.304
Height, cm	163.5 ± 6.8	165.3 ± 4.9	0.060
BMI, kg/m <sup>2</sup>	25.6 ± 5.2	26 ± 5.3	0.928
Preeclampsia	9 (11.7%)	8 (10.4%)	0.797
History of previous spinal anesthesia	18 (23.4%)	11 (14.3%)	0.149
<b>Surgery</b>			
Elective	21 (27.3%)	26 (33.8%)	0.382
Emergency	56 (72.7%)	51 (66.2%)	

**Table 3: Site and severity of PDPH**

	Group 1 (n = 38)	Group 2 (n = 18)	P value
<b>Site</b>			
Frontal	29 (76.3%)	15 (83.3%)	0.732
Occipital	25 (65.8%)	9 (50%)	0.259
Temporal	9 (23.7%)	3 (16.7%)	0.732
<b>Severity</b>			
Mild	2 (5.3%)	5 (13.2)	0.017
Moderate	8 (21.1%)	0	
Severe	28 (73.7%)	13 (72.2%)	

pain, 4 – 6 is moderate pain, and 7 – 10 is severe pain (disabling; unable to perform daily activities).

Demographic characteristics, BMI, spinal anesthesia history, parity, and side effects (nausea, vomiting, bradycardia, hypotension, and flushing), site, onset, and severity of postdural puncture headache were recorded. The patient who had been diagnosed with PDPH were treated with intravenous fluid, oral/ intravenous analgesics, and oral caffeine. All patient interviews and treatments were performed by a specialist who was unaware of the patient groups and was not involved in the operations of the patients.

**Power Analysis**

In the power analysis for the chi-square test to determine the sample size, the error level was determined as ( $\alpha$ ) = .05, the effect size (W) = .26, and the power (1- $\beta$ ) = .80, and the minimum sample size was 120.

**Statistical Methods**

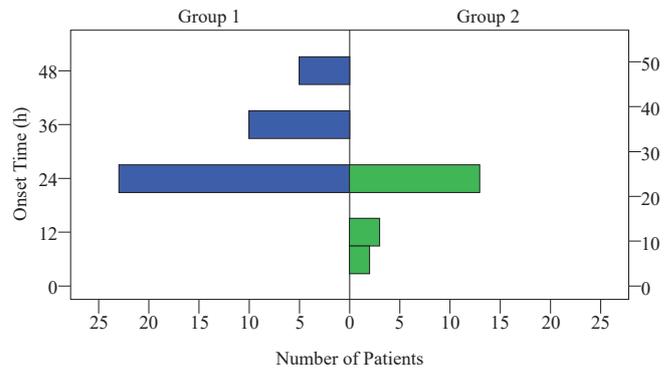
Data analysis was performed using the SPSS 25.0 (Statistical Package for the Social Sciences) program. Quantitative variables were reported as mean ± SD, and qualitative variables were reported as frequency and percentage. The differences regarding the qualitative variables between groups were analyzed with the Chi-squared test, while the differences regarding the non-normally distributed data between the two independent groups were analyzed with the Mann-Whitney U test. Continuous variables were compared by Student's t-test for two independent groups. In the study, the level of significance was set as p < 0.05

**RESULTS**

The study included 154 patients aged 18 – 45 years with ASA physical status I who underwent elective cesarean section under spinal anesthesia. Demographic data of the patients were similar (Table 1). Preeclampsia, spinal anesthesia history and urgency of the procedure were not statistically significant between the groups. (P > 0.05) (Table

**Table 2: Patients' outcome**

	Group 1 (n = 77)	Group 2 (n = 77)	P value
<b>Number of attempts for successful spinal anesthesia</b>			
1	42 (54.5%)	30 (39%)	0.053
More than 1	35 (45.5%)	47 (61%)	
PDPH	38 (49.4%)	18 (23.4%)	0.001
Onset time of PDPH	30.3 ± 8.7	20 ± 6.8	0.001



**Figure 2: Onset time of headache and number of patients**

1).

Number of attempts of the procedure were not statistically significant between the groups. (p > 0.05). The incidence and onset time of PDPH in the group 1 was significantly higher than in Group 2 (p < 0.05) (Table 2).

The severity of headache was statistically significantly higher in Group 1 compared to Group 2 (p < 0.05) (Table 3).

The incidence of headache onset at the postoperative 24th, 36th and 48th hours was statistically significantly higher in Group 1 than in Group 2 (p < 0.05) (Figure 2). None of the patients included in the study had persistent headaches that required blood patching. No additional complications were observed apart from PDPH due to spinal anaesthesia.

**DISCUSSION**

This prospective randomized, double-blind, controlled study investigated the development of PDPH after different spinal needle application. It was determined that the use of 26 G needles during spinal anesthesia in patients who underwent cesarean section increased the incidence of PDPH more than 25 G needles. PDPH is one of the well-known and important complications of spinal anesthesia. Although spinal anesthesia is a very advantageous method in terms of providing a fast onset and effective nerve block for C/S operations, it also has some disadvantages such as temporary anesthesia duration, infection, hypotension, and development of PDPH. There are many studies in the literature suggesting that reducing needle diameter will lessen CSF loss and PDPH by sinking the hole in the dura<sup>15,16</sup>.

In our study, the incidence of PDF was 49.4 % in patients using 25-G spinal needles and 23.6 % in patients using 26-G Q spinal needles. The onset time of PDPH in the 25-G spinal needles group was significantly higher than in 26-G Q spinal needles group (p < 0.05).

The incidence of PDPH in C/S cases using 25-G Q was found as 3.55%<sup>17,18</sup>, 6.1%<sup>19</sup>, 8.3%<sup>20</sup> and 10.8%<sup>21</sup> in different studies. The incidence of PDPH in C/S cases using 26-GQ was found to be 8%<sup>22</sup>, 5%<sup>23</sup>, 20%<sup>24</sup>, 10.3%<sup>25</sup>, 5%<sup>26</sup>, and 6%<sup>27</sup>. It has been shown in the literature that the relationship between different needle sizes and the incidence of PDPH is variable, and it has been emphasized that the use of fine needles reduces the incidence of PDPH<sup>28,29</sup>.

It has been reported in the literature that the reasons for the different results in the incidence of PDPH may be different follow-up periods, PDPH diagnosis criteria, population, age, study method, and genetic factors<sup>23</sup>. In the study, which also included emergency cases, the lack of

time to complete the fluid deficit in C/S patients was also suggested as a reason for increasing PDPH rates<sup>30</sup>.

In addition, these different results show that the true pathophysiology of PDPH is not fully understood, and studies should be conducted in different populations. The differences in the definition and perception of pain in individuals<sup>19</sup> there are studies stating that pain thresholds, sensitivities, and desire to indicate pain may vary according to age, gender, and race of the patients<sup>31,32</sup>. A prospective cohort study found that 39% of women experienced post-partum headache, but 96% of these patients were still able to take care of themselves and their babies<sup>33</sup>.

When we compared the results of this study with the studies using needles of the same thickness in the literature, we found a higher incidence of PDPH. Both C/S operation and spinal anesthesia are not routine practices that Somalian pregnant women are familiar with socially and culturally. This may be a reason that increases the incidence. In a study performed with Somalian immigrant women; it was stated that women perceive, interpret, and react to modern health practices regarding their own cultural, religious, and scientific perspectives<sup>34</sup>. We think that this study is important in that it is the first study on PDPH in pregnant women in Somalia and should be supported by novel studies.

## CONCLUSION

We found that the incidence of PDPH in Somali pregnant women who underwent C/S was less in the use of 26-G Q spinal needles. It was observed that needle size contributed to the determination of PDPH severity. For C/S operations, we recommend using as small diameter needle as possible in order to encounter fewer PDPH cases in spinal anesthesia applications. The results of our study should be supported by advanced controlled randomized studies.

## LIMITATIONS

In this study, we used fine size needles 25-G and 26-G Q. Since the hospitalization period of the patients after the operation is 48 hours; we were able to follow the cases in terms of PDPH only during this period. The main limitations of this study were that; we did not include finer spinal needle sizes and we could not follow the patients after 48 hours. We think that studies in which the cases are followed for a longer time and with thinner needles will contribute to this issue better.

## CONFLICTS OF INTEREST

(including financial and other relationships)  
None

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