ANAESTHESIA, PAIN & INTENSIVE CARE
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ORIGINAL ARTICLE

# Role of prednisolone in management of post-dural puncture headache after spinal anesthesia in obstetric patients

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**Received:** February 07, 2019;
**Reviewed:** February 23, February 25, 2019;
**Revised:** March 07, March 31, 2019;
**Accepted:** April 5, 2019

## ABSTRACT

**Background and Aims:** Post-dural puncture headache **(**PDPH) is a common cause of morbidity in patients subjected to dural puncture for spinal anesthesia. PDPH is mostly a benign condition but can lead to delayed hospital discharge and considerable morbidity for the parturient. We aimed to study whether there is a positive role of prednisolone in post dural puncture headache management (after spinal anesthesia) in patients undergoing lower segment cesarean section (LSCS).

**Methodology:** A randomized controlled trial was conducted at department of gynecology and obstetrics, in Combined Military Hospital (CMH), Nowshera, from April 2018-September 2018. A sample size of 60 patients was determined through WHO calculator. Patients were selected through non probability consecutive sampling after ethical committee approval and consent forms were taken. Patients were randomly categorized into two groups. Group A was given tablet prednisolone while Group B was given a placebo tablet. Patients were followed for pain measurement using visual analogue scale (VAS). Data were analyzed using SPSS version 24. T-test and Chi-square test were applied. A $p \leq 0.05$ was considered significant.

**Results:** A total of 60 women undergone c sections were included in study**.** Mean age of women was 28.5 years ± 4.3. Mean pain scores were significantly reduced in prednisolone group as compared to placebo at 24, 48, 72 and 96 h ($p = 0.00$). Majority of patients in placebo group had severe headache as compare to oral prednisolone group after 96 h ($p = 0.00$).

**Conclusion:** Post-Dural Puncture Headache is a major complications following LSCS in spinal anesthesia. Oral prednisolone usage is very effective in lowering severity of headache and duration of PDPH. Oral prednisolone also limits adverse events associated with PDPH after LSCS performed in spinal anesthesia.

**Key words:** Prednisolone; Spinal anesthesia; Headache; Post-dural puncture headache; PDPH

**Citation:** Afridi N, Fareed A, Fatima A, Role of prednisolone in management of post-dural puncture headache after spinal anesthesia in obstetric patients . Anaesth. pain & intensive care 2019;23(2):168-171

## INTRODUCTION

Post-dural puncture headache is termed as headache associated with dural puncture (within 5 days).[1] According to International classification of Headache Disorder criteria for diagnosis of PDPH, condition improves within minutes after assuming spine position, however, the condition worsen while assuming erect position (within 15 minutes).[2] PDPH appears with features including vomiting, photophobia, nausea and neck stiffness. PDPH is a major side effect of neuraxial anesthesia. However, obstetric patients are at severe risk of developing PDPH due to sex, age and excessive use of neuraxial blocks.[3]

Pathophysiology of PDPH involves loss of cerebral

spinal fluid. Cerebral-spinal fluid pressure reduction is associated with loss of cushion effect. The ultimate intra-crania pain is due to traction. 2nd cause of PDPH is cerebral blood vessels distension.[4] Clinical sign and symptoms include headache within 3 days of dural puncture while 29% of patients present with only headache as symptom. However, some cases present with neck stiffness, hypoacusia, nausea and tinnitus. Literature reported that headache may be last for months.[5]

PDPH risk factors include female gender, pregnancy and young age. Literature reported that young adults are more prone to develop PDPH as compare to older age (due to elasticity loss in Dura with increasing age). Pregnant women are more likely to develop PDPH as compare to other women. Vaginal delivery is another significant risk factor for PDPH. Pushing efforts during vaginal delivery (2nd stage) leads to increase dural hole size ultimately resulting in CSF loss. Needle design, direction and size are also significant factors. Larger dural tears and cutting needles lead to high frequency of PDPH.[6]

Traditional interventions for PDPH involve hydration and bed rest. Invasive interventions involve i) epidural blood patch (prophylactically) ii) intra-thecal catheter placement and iii) administration of epidural saline. Parental corticosteroids are used for management of PDPH (both prophylactically and after headache occurrence).[7] Literature reported that visual analogue score (VAS) were significantly lower in oral corticosteroids group at 24. 72 and 96 hour after treatment as compare to conservative treatment.[8] Literature available on corticosteroids affect on management of PDPH is not enough to reach any conclusion. This study aims to determine oral prednisolone effect on post-dural puncture headache management (after spinal anesthesia) in patients undergoing LSCS in tertiary care hospital.

## METHODOLOGY

An RCT (Randomized controlled trial) study was conducted at gynecology and obstetrics department, in Combined Military Hospital (CMH), Nowshera. Study duration was 6 months (April 2018-September 2018). Ethical permission was taken from CMH ethical board. Sample size of 60 patients (each group contain 30 women) was determined with 5% significance level, 95% confidence level, P1 = 84.2% and P2 = 5.3% using WHO calculator[9]. Non probability consecutive sampling was used for patient's selection. Inclusion criterion was standardized on the bases of patient's age 18-45 years and diagnosed with PDPH after LSCS. No LSCS was done in emergency. An exclusion criterion was standardized on the bases of migraine history, cerebrovascular accidents, systemic infections, history of neurological disorders and diabetes mellitus. Consents of study were taken from all participating women. Patients were categories into two similar group (randomly through lottery method). Group A was given oral prednisolone 20 mg (once daily) plus conventional treatment (good hydration, recumbent positioning, combination of paracetamol + caffeine tablet TDS and stool softener). Group B was given placebo tablet (multivitamin) once daily plus conservative treatment. In our study, patients were given spinal anesthesia with 25 gauge quincke needle, in sitting position using midline approach. All patients received a single puncture without barbotage technique and hyperbaric bupivacaine (0.5%) was injected to all participants. Effectiveness of treatment was measured by the intensity of the headache with 0-10 visual analogue scale (VAS). The pain was measured at 12 h. 24 h, 48 h, 72 h and finally at 96 h. Severity of headache was categorized as follows; 0-1 score = no headache, 2-4 = mild, 5-7 = moderate and 8-10 = severe headache. If VAS score was more than 5 in any group, diclofenac was given as a rescue analgesia.

**Statistical analysis:** SPSS (version 24) was utilized for analysis of study data. Mean, standard deviation and frequency, percentages were calculated for quantitative and qualitative data respectively. Statistical tests applied were independent t-test and chi-square test. P value $\leq 0.05$ was considered significant.

## RESULTS

A total of 60 women were included in the study with each group containing 30 parturients (1:1 randomization). Patients mean age was 28.5 ± 4.3 years. There were 38 (63.3%) patients in age group 18-30 years and 22 (36.7%) in 31-45 years age group. Mean body mass index was 30.4 kg/m$^2$ ± 4.5. Mean height of patients was 170 ± 5.4 cm.

Mean pain scores in the groups at zero hour, after 24 h, 48 h, 72 h and 96 h are shown in Table 1. Mean number of diclofenac tablets required in patients having VAS >5 were 3.43 ± 0.5 and 6.86 ± 1.3 in prednisolone and placebo group respectively (p = 0.000) as given in Table I.

Out of 30 patients in oral prednisolone group, 19 (31.7%) patients had no pain, 9 (15%) had mild pain, 2 (3.3%) had moderate pain and 0 (0%) had severe pain after 96 h of puncture. In the placebo group, no patient was without pain, 2 (3.3%) had mild pain, 2 (3.3%) had moderate pain and 26 (43.3%) had severe pains after 96 h of puncture (p = 0.000) as given in Table 2.

Frequency of side effects was significantly lower in oral prednisolone group as compared to placebo as shown in Table 3.

**Table 1: comparison of post dural puncture headache (pain measurement) in both groups**

| Pain scores | Group A (Oral prednisolone) (N = 30) | Group B (Placebo) (N = 30) | P value |
|---|---|---|---|
| At zero h after puncture | 7.63 ± 0.85 | 8.13 ± 0.73 | 0.54 |
| After 24 h | 6.3 ± 0.4 | 7.2 ± 0.7 | 0.00 |
| After 48 h | 6.3 ± 0.4 | 7.1 ± 0.8 | 0.00 |
| After 72 h | 4.1 ± 0.7 | 6.5 ± 0.5 | 0.00 |
| After 96 h | 2.0 ± 0.7 | 6.4 ± 0.96 | 0.00 |
| Diclofenac (Tablets) required | 3.43 ± 0.50 | 6.86 ± 1.3 | 0.000 |

**Table 2: Comparison of severity of headache after 96 h in both groups**

| Severity of headache (after 96 h) | Group A (Oral prednisolone) | Group B (Placebo) | Total | P value |
|---|---|---|---|---|
| No pain (0-1 scores) | 19 (31.7%) | 0 (0%) | 19 (31.7%) | 0.000 |
| Mild headache (2-4 scores) | 9 (15%) | 2 (3.3%) | 11 (18.3%) | |
| Moderate headache (5-7 sores) | 2 (3.3%) | 2 (3.3%) | 4 (6.7%) | |
| Severe headache (8-10 scores) | 0 (0%) | 26 (43.3%) | 26 (43.3%) | |
| Total | 30 (50%) | 30 (50%) | 60 (100%) | |

**Table 3: Frequency of side effects in oral prednisolone and placebo group**

| Side effects | Group A (Oral prednisolone) | Group B (Placebo) | Total | P value |
|---|---|---|---|---|
| Vomiting | 2 (3.3%) | 7 (11.7%) | 9 (15.0%) | 0.000 |
| Dizziness | 2 (3.3%) | 7 (11.7%) | 9 (15%) | |
| Photophobia | 2 (3.3%) | 7 (11.7%) | 9 (15%) | |
| Neck stiffness | 2 (3.3%) | 8 (13.3%) | 10 (16.7%) | |
| Total | 8 (13.2%) | 29 (48%) | 37 (61.2%) | |

## DISCUSSION

PDPH is a common cause of morbidity in patients undergoing dural puncture for LSCS. It has been reported that headache due to dural puncture leads to severe distressing condition, and restricts several patients to bed for more than two months. It is associated with high workload for the hospital staff. Evidence exist that PDPH is mostly benign. In majority of the patients it resolves spontaneously within a few days. But the patients' morbidity increases with passage of time. Choroid plexus system produces CSF that acts as a cushion for spinal cord and brain. PDPH has been hypothesized to be due to CSF leakage during dural puncture. The diminished CSF volume results in brain sagging (within cranial cavity) and traction on cranial nerves or other pain sensitive structures due to buoyant effect of CSF. PDPH leads to delayed recovery, increased hospital stay and cost.[10] In our study, the pain scores were 7.63 ± 0.83 in prednisolone group and 8.13 ± 0.73 in placebo group at zero hours after dural puncture (p = 0.54). Doroudian et al. reported that no significant difference in pain scores after 0 hour were found in corticosteroids and placebo groups (p > 0.05).[11] Alam et al. reported high corticosteroids usage on zero hour after dural puncture in LSCS patient (p = 0.01).[12]

In the present study, mean pain scores were 6.3 ± 0.4 in prednisolone group and 7.2 ± 0.7 in placebo group after 24 h of dural puncture (p = 0.00). Gentile et al. reported an insignificant association between pain scores after 24 h and corticosteroids (p = 0.43).[13] Turnbull et al. reported findings similar to our study. They found significantly lower pain scores in dural puncture patients after corticosteroids administrations (p = 0.02).[14]

Similarly mean pain scores in two groups after 48 h, 72 h and 96 h of dural puncture (p = 0.00) were in agreement with the results of Ashraf et al. and Turan et al., who reported significant positive correlation between corticosteroids and pain reduction in PDPH patients (p = 0.05).[15-18]

Mean number of diclofenac tablets required in patients having VAS >5 were 3.43 ± 0.5 and 6.86 ± 1.3 in prednisolone and placebo group respectively (p = 0.000). Henzi et al. reported that placebo required more diclofenac as compare to oral prednisolone (7.8 ± 0.8 vs 2.3 ± 0.3, p = 0.01) tablets.[19,20]

**Limitation:** Small sample size and lack of more aggressive follow up in terms of frequency of observations, limit generalization of the study findings. Meanwhile, the most optimum regimen for the adequate control of PDPH still continues.

## CONCLUSION

Post-dural puncture headache is a major complication

following spinal anesthesia for cesarean sections. The use of oral prednisolone is effective in lowering severity of headache and reducing duration of PDPH. It is thus helpful in limiting adverse events associated with PDPH after cesarean section performed in spinal anesthesia.

**Conflict of interest:** None declared by the authors

**Authors' contribution:**

NA: Literature search, conceptualization of study design, data collection, data analysis, data interpretation and proof reading
AF, AF: Literature search, data analysis, data interpretation, proof reading.

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