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The Relation between Body Mass Index (BMI) and Post Dural Puncture Headache (PDPH) In Parturient Mother Undergoing Spinal Anaesthesia- A Prospective Cohort Study.

Parthadeep Jha[1,] Anuradha Mitra[2],Subrata Ray[2], Sourabh Roy[2]
[1](VMMC & Safdarjung Hospital, New Delhi, India))
[2](Department of Anaesthesiology,KPC Medical College &Hospital, Kolkata, India)
Corresponding Author: Anuradha Mitra

Abstract: *Post dural puncture headache is a complication of neuraxial anaesthesia. Spinal and unintended dural puncture during epidural procedure is the causal factor, and several risk factors have been attributed to this headache. Body weight or body mass index has been focused as associated to PDPH in recent years. Although conflicting results are available in various studies. We have planned this prospective cohort study to evaluate the relation of body weight with spinal anaesthesia induced headache in parturient mother. Total 60 patients were divided into two groups, Group A (BMI ≥ 31kg/m^2) and Group B (BMI ≤ 31kg/m^2). Patients body weight and calculated BMI recorded on admission before the procedure. Spinal anaesthesia was administered through midline approach, in postoperative period any incidence of headache and its character noted. There was significant association between height (P=0.011) and body weight (P≤0.0001) and patients of the two groups. Also there was significant association between PDPH and patients of two groups , proportion of PDPH being higher among BMI ≤ 31kg/m^2 group(36.7%) compared to BMI ≥31kg/m^2 group (6.7%). The risk of PDPH was 8.10 times more among patients with BMI ≤ 31kg/m^2 [OR-8.10 (1.61, 40.76); P=0.004]. Henceforth the above study showed that the incidence of post dural puncture headache is higher in patients with low BMI undergoing LUCS under spinal anesthesia.*

Key Words: *Headache, dura puncture, BMI, cesarean section.*

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I. Introduction

Neuraxial anaesthesia has become common for caesarean section globally. Evidence suggest that mortality as well as morbidity has decreased in comparison to general anaesthesia, but it is not without complication. Like hypotension, post dural puncture headache (PDPH) is another complication of neuraxial anaesthesia. Cerebrospinal fluid leak due to spinal and unintended dural puncture during epidural procedure is the causal factor[1, 2]and several risk factors [3,4,5] have been attributed to this headache. Body weight or body mass index (BMI) has been focused as associated to PDPH in recent years.[6,7]There are paucity of literature and conflicting opinion about the relation of BMI and PDPH. Most of the study and discussions are related to obstetric anaesthesia as parturient mother have higher incidence of headache.[8,9] Moreover majority of the studies are on PDPH after accidental dural puncture following epidural procedures instead of spinal anaesthesia and retrospective in nature.[10,11]And conflicting outcome have been noticed among few studies already done retrospectively.[11,12] Studies are very scant on spinal or intrathecal anaesthesia induced PDPH and its relation with BMI. Birajdar SB. et al (2016) studied spinal anaesthesia induced headache and found that patients of higher BMI group (≥30) has lower incidence of PDPH than lower BMI group(≤30).[13] It is evident that there is lack of large data and only very few prospective studies available to correlate BMI and spinal anaesthesia induced headache .Therefore we have planned this prospective study and the aim of our study was to correlate between body mass index and incidence of post dural puncture headache in pregnant women undergoing spinal anaesthesia for caesarean section delivery.

II. Material and Methods

This prospective cohort study was done at a medical college hospital in the city of Kolkata on patients of Department of Obstetrics and Gynaecology from March 2017 to September 2018. After approval from the institutional ethical committee and obtaining informed consent 65 pregnant mothers of the child bearing age were recruited for the study.

Study Design: Prospective open label observational study.

Study Location: This was a teaching hospital based study done in the Department of Anaesthesiology and Department of Obstetrics and Gynaecology in the city of Kolkata, West Bengal.

Study Duration: March 2017 to September 2018.
Sample Size: 65 patients.
Sample size calculation: Sample size was calculated from a previous study of Birajdar SB et al [13] and targeted 60 patients in total. Total 65 patients were recruited keeping in mind drop out and possible spinal failure.
Subjects & selection method: The study population was assigned from patients admitted to the Department of Obstetrics and gynaecology who have undergone caesarean section from March 2017 to September 2018.

Inclusion Criteria:
1.Pregnant Women
2. Aged 20 to 39 years
3. American Society of Anesthesiologist physical status I and II
4. Giving informed consent for spinal anaesthesia and caesarean section.

Exclusion criteria:
1. Patient refusal
2. Obstetric co-morbidity like hypertension, pre-eclampsia
3. Hhistory of chronic headache
4. More than two attempts for lumbar puncture .

Methodology: Patients were counselled about nature of headache, pain measurement tools. Visual Analogue Score (VAS) was used for pain measurement at a scale of 0 to 10. Pain intensity was categorised as VAS 0= no pain, VAS 1-4= mild pain, VAS 5-7= moderate pain and VAS 8-10 as severe pain. On admission baseline heart rate, blood pressure, SpO_2 and foetal status were recorded by competent resident or consultant. Patients body weight and calculated BMI recorded on admission before the procedure. Spinal anaesthesia was administered by same group of anaesthetist. A midline approach followed in two lower lumbar inter space, 26 G Quincke type needle used, injection bupivacaine 0.5% heavy 10 mg to 12.5 mg as required given. Intra-operative and post operative monitoring done. In postoperative period any incidence of headache and its character noted and recorded. Patients followed up for five post operative days, and any patient discharged before that was followed up by telephone. Patients were divided into two groups, Group A (BMI $\geq$ 31kg/m^2) and Group B (BMI $\leq$ 31kg/m^2). All patients who had headache were treated as per standard protocol. [14]

Statistical analysis

Statistical analysis was done with Epi Info^{TM} 7.2.2.2. Epi Info is a trademark of the Centres for Disease Control and Prevention(CDC). Under descriptive statistics the mean with standard deviations were calculated, t-test was used to compare the means. Odds ratio with 95% Confidence Interval calculated to find risk factors. P-value $\leq$0.05 considered as statistically significant.

III. Results

Out of total recruited 65 patients, 2 patients subsequently refused spinal anaesthesia, 2 patients required more than two attempts of lumbar puncture, one had vaginal delivery. Finally 60 patients were divided into two groups, Group A(n-30) and Group B(n-30).

Our data showed that (Table no:1) there was no significant association between age and patients of the two groups (P=0.41). But there was significant association between height (P=0.011) and body weight (P$\leq$0.0001) and patients of the two groups.

Table no 1: Demographic parameters of patients.

Parameters	GroupA(n-30) mean±SD	Group B(n-30) mean±SD	T_{58} test	χ^2 test	P-value
Age(in years)	28.57±5.28	31.25±4.40	t_{58}=1.07	χ^2 =2.88	0.41
Height (in cm)	153.83±3.17	157.47±3.97	t_{58}=3.38	χ^2 =9.02	0.011
Weight (in kg)	75.10±3.28	60.19±4.98	t_{58}=13.44	χ^2 =56.17	<0.0001

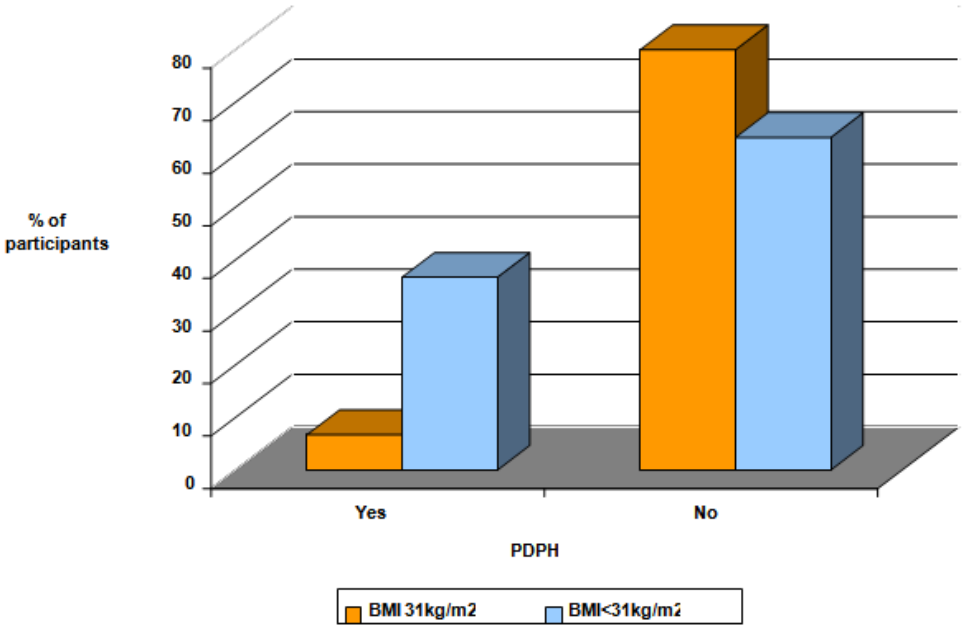
As shown in table no:2 there was significant association between PDPH and patients of two groups, proportion of PDPH being higher among BMI $\leq$ 31kg/m^2 group(36.7%) compared to BMI $\geq$31kg/m^2 group (6.7%).

Table no 2: Distribution of PDPH of the patients.

PDPH	BMI$\geq$31 kg/m^2	BMI<31 kg/m^2	Total

	(n=30)	(n=30)	
Yes	2	11	13
Row %	15.4	84.6	100.0
Col %	6.7	36.7	21.7
No	28	19	47
Row %	59.6	40.4	100.0
Col %	93.3	63.3	78.3
TOTAL	30	30	60
Row %	50.0	50.0	100.0
Col %	100.0	100.0	100.0

χ^2 =7.95; P=0.004



The risk of PDPH was 8.10 times more among patients with BMI ≤ 31kg/m^2 [OR-8.10 (1.61, 40.76); P=0.004]. Pain intensity measured as Vas score was significantly higher (table no:3) among patients with BMI ≤ 31kg/m^2 (t_{58} =2.235, P=0.0293). Headache intensity was mild to moderate in all and none developed severe headache. All patient who had mild to moderate headache were treated as per standard protocol.

Table no3: Distribution of VAS score of the patients.

VAS score	BMI≥31 kg/m^2 (n=30)	BMI<31 kg/m^2 (n=30)	Total
1-2	19	20	39
Row %	48.7	51.3	100.0
Col %	63.3	66.7	65.0
3-4	10	8	18
Row %	55.6	44.4	100.0
Col %	33.3	26.7	30.0
5 - 7	1	2	3
Row %	33.3	66.7	100.0
Col %	3.3	6.7	5.0
TOTAL	30	30	60
Row %	50.0	50.0	100.0
Col %	100.0	100.0	100.0
Mean±SD	1.88±0.75	2.40±1.10	t_{58}=2.235

χ^2 =9.02; p=0.011

IV. Discussion

Other than few retrospective study, very few study has prospectively evaluated effect of body mass index on spinal anaesthesia induced PDPH. Peralta F. et al (2015) evaluated 518 obstetric patients with unintentional dural puncture in their retrospectively done study and stated that incidence of headache in parturients with higher BMI was lower (39%) compared to parturients with a relatively lower BMI (56%).[12] Our results are corroborating to their results, although our study is different from there one being prospective in nature and considering post spinal instead of unintentional dura puncture headache. On the other hand in a similar study by Miu M. et al (2014) among 125 patients of accidental dural puncture and post dural puncture headache, there was no significant difference in higher BMI($\geq$30 kg/m^2) and lower BMI ($\leq$30kg/m^2) group.[10] Song J et al (2017) also in their study did not find any effect of BMI on headache following accidental dural puncture during labor epidural analgesia.[11] Both the above mentioned studies were also retrospective. Our study results are contradictory to the findings of the above two studies. In a similar study with our study Birajdar SB et al(2016) have noticed lower incidence of PDPH following spinal anaesthesia in patients who have higher BMI.[13] In another retrospective study Cohn [15]stated that headache induced by short term spinal catheter placement was not significantly related to BMI, which is also not corroborating to our study. In a recent study by M. Hashemi et al among 343 patients retrospectively, have shown that there is association between high BMI and reduced likelihood of PDPH. [16] In their study pain intensity was not influenced by BMI, which is different from our finding, as pain intensity was higher among lower BMI group. From this it appears that conflicting outcomes have been noticed , whatever small number of studies have been carried out. Our study has limitations also, sample size is small, could not be randomized. It was not blinded and only one type of surgery included.

V. Conclusion

From this study it can be concluded that the incidence of post dural puncture headache is higher in patients with low BMI undergoing LUCS under spinal anesthesia , however, more studies are required to make any strong evidence based conclusion.

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