Original Article

Effect Of Baby Weight On Characteristics Of Spinal Anaesthesia In Parturients Undergoing Lower Segment Cesarean Section

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DOI: 10.47750/pnr.2022.13.S09.1109

Abstract

Back ground: Various characteristics such as height, weight, abdominal girth, symphysio-fundal height had studied for its effect on spinal anaesthesia in Parturients. However, we designed a study to determine the impact of a baby's birth weight on the characteristics of spinal anaesthesia rather than using indirect indicators like symphysis-fundal height or belly size.
Materials and methods: We included a total of 110 parturients who delivered by cesarean section under spinal anesthesia. All parturients, who fitted into inclusion criteria, received spinal anaesthesia with 2cc 0.5% bupivacaine following spinal anaesthesia. Sensory blockade was evaluated every 30 seconds till highest sensory blockade achieved. Motor blocked checked by bromage scale every minute till complete blockade. Number of hypotensive episodes and vasopressor requirement calculated at the end of surgery. Time of 2 segment regression and weaning of motor blockade was also noted in both the group. Baby weight noted in both the groups and parturients grouped according to baby weight, group I baby weight less than 3kg, group II baby weight more than 3kg. Hemodynamic continuous monitoring done and recorded at 1, 2,3,5, 10, 15, 20, 30, 40, 50, 60 minutes and every 15minutes till the end of surgery.
Results: The sensory blockade level of spinal anesthesia T6, was achieved at 2 min in two parturients in group II. At 3 min 12 patients in group I and 13 patients in group II patients. Majority of the parturient in both groups achieved T6 level within 5 mins. Majority attained complete motor blockade at 8th min in both group I and group II. However, group II patients attained complete motor blockade little late than group 1.
Conclusions: We did not find any statistically significant association between weight of the baby and sensory blockade, motor blockade and duration of analgesia.

Key words: Baby weight, Caesarean section, Sensory blockade, Spinal anesthesia

INTRODUCTION:

Spinal anaesthesia has come a long way since 1885. Every aspect of spinal anaesthesia safety has improved, from tools and medications to our understanding of physiology and anatomy.

Spinal anaesthesia is now frequently chosen for caesarean deliveries, as it is technically simple, effective, and has little to no detrimental effects on the foetus[1]. Due to increased abdominal pressure and decreased lumbosacral subarachnoid space, the spread of spinal anaesthesia, particularly in pregnant women, may occur unexpectedly [2,3].

Avoiding the numerous risks of general anaesthesia is an evident advantage of spinal anaesthesia. It has been found that spinal anaesthesia causes less maternal blood loss than general anaesthesia. The growing use of regional anaesthesia has been linked to declining rates of maternal death[4].

Both elective and emergency Caesarean sections frequently use spinal anaesthesia with bupivacaine. Although the spinal block has several benefits, such as sensory block, muscle relaxation, a low risk of aspiration, and a patient who is awake enough to assess clinical state, the method is linked to a considerable incidence of hypotension as a result of sympathetic blockade[5-7]. Dizziness, nausea, and vomiting are distressing symptoms of maternal hypotension, which also reduces placental perfusion and may negatively affect the fate of the foetus.[8-9]

Low level of blockade can result in insufficient anaesthesia and uncomfortable patients, a high level of blockade can cause high spinal anaesthesia and hypotension. Height, weight, body mass index, body surface area, truncal length, symphysis-fundal height, belly circumference, and weight gain throughout pregnancy are among parturient factors that have been studied to determine their impact on the degree of sensory blocking after spinal anaesthesia. However, these studies have either produced inconclusive or negative results[10-13]

Prolonged maternal hypotension frequently causes maternal nausea and vomiting in the mother, and can also be harmful to fetus. Even brief episodes of maternal hypotension can result in fetal acidosis, lower Apgar scores and hypoxic-ischemic encephalopathy.

Instead of indirect parameters such as symphysis-fundal height or abdominal circumference, we framed a study to know the effect of birth weight of baby on characteristics of spinal anaesthesia

METHODOLOGY

A prospective observational study was conducted after approval of Institutional Ethics Committee. We calculated sample size using maximum high sensory level which was 60% times associated with baby weight >3.5kg and 15% in group with baby weight <3.5kg. Considering this to get at least 30% difference in the two groups as reported by KS Sushma.[13]The calculated sample size required was 84 with 95% confidence level and power of the study as 80%, we decided to take 110parturients for more relative results. Parturients were further divided after caesarean section based on birth weight of the newborn into two groups.

Group I : Parturients with baby weight less than 3kg

Group II: Parturients with baby weight more than 3kg

One hundred ten parturients of age between 18-40 years with height between 150-160cms belonging to ASA grade 1 and 2, who were hemodynamically stable patient with all routine investigations within normal limits without any comorbidities, during the study periods came for elective caesarean section, included in the study. A written and informed consent was taken from all patients.

We excluded patients with major neurological, cardiac, respiratory, metabolic, renal, hepatic disease with coagulation abnormalities, patients with known contraindication to spinal anesthesia.

Preloading with 10ml/kg of ringer lactate was done prior to spinal anesthesia. After painting and draping of the lumbar area, 2% lignocaine infiltrated in L3-L4 intervertebral space. Spinal anesthesia was given with 26 G spinal needle at L3-L4 intervertebral space with 2cc 0.5% bupivacaine. A wedge or left lateral position is given to reduce the aortocaval compression. Sensory blockade was evaluated every 30 seconds till highest sensory blockade achieved. Hemodynamic (heart rate and NIBP) continuous monitoring was done and recorded at 1, 2,3,5, 10, 15, 20, 30, 40, 50, 60 minutes and every 15minutes till the end of surgery.

Motor blocked checked by bromage scale every minute till complete blockade. Side effects like nausea, vomiting, restlessness, headache, hypotension, bradycardia noted and manages appropriately. The weight of newborn baby recorded soon after delivery. Number of hypotensive episodes and vasopressor required, calculated at the end of surgery. Time of 2 segment regression and weaning of motor blockade was also noted in both the group. At the end of surgery all patients were shifted to recovery area and observed for 4 hours and then shifted to ward.

The data recorded was analyzed using the Statistical Package for Social Sciences (SPSS), 21 version. The associations were evaluated with the use of Student's t-test for quantitative variables and $\chi 2$ tests for categorical variables. The level of significance was set at 5% for all significance tests.

RESULTS:

We analyzed a total of 110 women who delivered by cesarean section. There were 60 parturient with baby weight less than 3 kgs and 50 parturient with baby weight more than 3 kgs. The two study groups did not differ based on mean maternal age ,height, weight, abdominal girth and Symphysio fundal height (p>0.05).

Table 1: Demographic characteristics in both groups

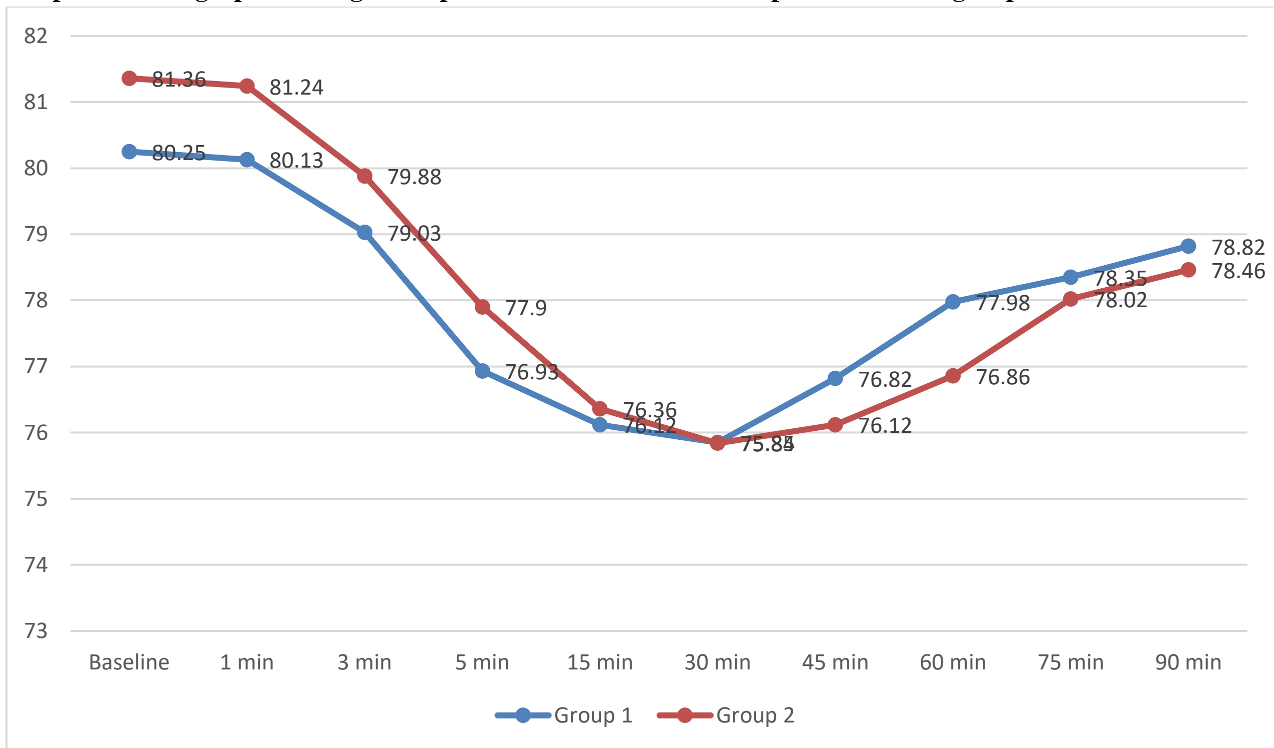
VARIABLES	**Group I**	**Group II**	**p Value**	**Statstical Significance**
	Mean ± SD	**Mean ± SD**		
AGE (YEARS)	25.7±4.07	27.08±4.59	0.107	Non significant
BODY WEIGHT (KG)	61.96±3.70	63.01±3.53	0.123	Non significant
HEIGHT (IN CMS)	152.22±1.61	152.92±2.24	0.072	Non significant
ABDOMINAL GIRTH (IN CMS)	102.5±3.52	103.64±5.14	0.567	Non significant
SYMPHYSIO-FUNDAL HEIGHT(IN CMS)	40.06±1.40	39.74±1.80	0.318	Non significant

Table 2 shows the intraoperative heart rate (HR) monitoring in both groups. The mean HR was increased at 30 mins, 45 mins and 60 mins in group 1 (birth weight <3 kgs) compared to group 2 (birth weight >3 kgs). This difference was statistically significant when independent t-test was applied (p<0.05), though statistical difference was there, it was not significant clinically. Graph 1 shows the mean MAP between two groups and there was no significant difference between two groups based on MAP (p>0.05)

Table 2: Intraoperative heart rate in both groups

Heart rate (beats/min)	Group I	Group II	p-value
Baseline	92.3±5.05	92.96±5.8	0.504
1 min	92.23±4.84	93.04±5.73	0.425
3 min	89.6±5.05	89.58±5.44	0.971
5 min	87.53±5.08	86.54±4.45	0.283
15 min	85.9±5.27	85.34±4.97	0.570
30 min	93.67±4.12	91.28±6.62	**0.023**
45 min	95.2±3.63	90.98±5.27	**<0.001**
60 min	90.02±4.53	86.24±4.54	**<0.001**
75 min	83.98±3.64	82.52±4.39	0.059
90 min	79.53±3.58	80.52±5.5	0.260

Graph2A : Line graph showing intraoperative mean arterial blood pressure in two groups.



In table 3, the highest level of spinal anaesthesia's sensory blocking at T6, was reached at the second minute in two parturients in group II. At third minute in 12 parturients in group 1 and 13 parturients in group II. Statistically speaking,

this difference was not significant ($p>0.05$). In both groups, the majority of the parturients reached T6 level within 5 minutes.

Table 3: Time required for sensory blockade till T6 dermatome in both groups

SENSORY BLOCKADE	Group I	Group II	CHI SQUARE	P VALUE
0MINS	0	0	6.35	0.174
1 MINS	0	0		
2 MINS	0	2		
3 MINS	12	13		
4 MINS	28	25		
5 MINS	19	7		
6 MINS	1	3		
7 MINS	0	0		
8 MINS	0	0		
9 MINS	0	0		
Total	60	50		

In table 4, Complete motor block was achieved in all the patients in our study. Majority attained complete motor blockade at 8th min in both group 1 and group II. However, group II patients attained complete motor blockade little late than group 1. This difference was statistically significant when chi-square test was applied ($p<0.05$).

Table 4: Number of patients according to complete motor blockade in both groups

Motor blockade	Group I	Group II	P-value
5 min	1 (1.7%)	0	**<0.001**
6 min	18 (30%)	6 (12.2%)	
7 min	8 (13.3%)	7 (14.3%)	
8 min	33 (55%)	27 (54%)	
9 min	0	10 (20.4%)	

Table 5: Intraoperative finding in both groups

A. Intraoperative hypotensive episodes

	Number of episodes	Group I	Group II	P value
HYPOTENSIVE EPISODES	0	50	39	0.752
	1	6	6	

	2	4	5	

Table 6. mean time of weaning of motor blockade

	Group I	**Group II**	**P VALUE**	
MEAN TIME WEANING OF MOTOR BLOCKADE	213±12.65	210±15	0.277	Not Significant

Table 7. Mean time of 2 segment regression

	Group I	**Group II**	**P VALUE**	
MEAN TIME FOR 2 SEGMENT REGRESSION (MIN)	93.83±8.63	92.6±7.51	0.558	Not Significant

Table 8. Mean duration of analgesia

	Group I	**Group II**	**P VALUE**	
MEAN DURATION OF ANALGESIA (MIN)	264.48±13.23	260.00±19.65	0.184	Not Significant

Regarding hypotensive episodes, the need for vasopressors, the length of time for a 2-segment regression, the length of time for weaning from motor blockade, and the duration of analgesia, we observed no significant differences between the two groups ($p>0.05$).

DISCUSSION

The method most frequently used for caesarean deliveries is spinal anaesthesia. Excessive blockage raises hemodynamic instability and patient risk, whereas insufficient local anaesthetic spread renders the surgical environment unsuitable.[2] As a result, numerous research have looked into the elements that may contribute to the spread of spinal anaesthesia in pregnant individuals.[14,18]

The earlier study by Chang-Na Wei et al.[2] examined the relationship between abdomen circumference and the length of the vertebral column as predictors of spinal hyperbaric bupivacaine spread in term pregnant women. Significant univariate correlations between height, weight, belly circumference, and vertebral column length and spinal spread were found. The cephalad distribution of spinal anaesthesia with hyperbaric bupivacaine in term parturients was found to be significantly predicted by parturient belly girth and vertebral column length.

K.S. Sushma et al.[13] conducted an observational study on 46 pregnant women scheduled for elective Caesarean sections to determine the relationship between the baby's weight and the degree of sensory blockage during spinal anesthesia. According to their assessment, the sensory blockage of T4 was associated with the mother's height and the

baby's weight. In this study, there were 3 newborns weighing more than 3.5 kg, of which 2 had the greatest sensory blockage level (T4) at the 15th minute. When compared to babies weighing 2.5 to 3.5 kg, it equates to 66.7%, which suggests significance ('P' value of 0.093).

Instead of indirect parameters such as symphysio-fundal height or abdominal circumference, we framed this study to know the effect of birth weight of baby on characteristics of spinal anaesthesia. As per result Heart Rate, mean blood pressure, time taken for 2 segment regression in sensory blockade and weaning of motor blockade were comparable in both the groups, we did not find any difference in both the groups.Higher sensory level was achieved in group with baby weight more than 3 kg. There were no difference in hypotensive episodes and vasopressors required in both the groups. The relationship between sensory blockage and infant weight has not been examined in any studies. In Chung et al study parturients with grater abdominal circumference had achieved higher level of sensory blockade, thereby predicting some positive correlation between neonatal weight and post spinal anaesthesia hypotension.[15]

In our observational study we did not find significant correlation, as we had divided groups as group I <3kg and group II >3kg, where as in other studies baby weight was taken group I <2.4kg and group II >3.9kg.

CONCLUSION:

In pregnant women undergoing caesarean sections, we could not discover any statistically significant correlation between the infant's weight and spinal characteristics such as sensory and motor blockade, two segment regression and duration of analgesia. Also there was no correlation between number of hypotensive episode and vasopressor requirement.

LIMITATIONS:

- Preoperative ultrasonographic Baby weight should be observed for better result.
- Small sample size ,so for more precise results higher sample size is recommended.

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