Section: Critical Care

Original Research Article

TO STUDY THE ROLE OF LEFT LATERAL TILT IN IMPROVING MATERNAL HEMODYNAMICSIN PATIENTS UNDERGOING CAESAREAN DELIVERY UNDER SUBARACHNOID BLOCK

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Abstract

Background: In the background part, you should give a summary of the topic as well as an explanation of the relevance of the topic to the field of medicine. It is important to highlight the significance of the research problem and the potential impact it might have on the medical industry in the part that discusses the importance of the subject. This study aims to explore the role that left lateral tilt plays in improving maternal haemodynamics in patients undergoing subarachnoid block during caesarean delivery. Hypothesis- the investigation into the function of left lateral tilt in patients who were undergoing caesarean delivery and had a subarachnoid block did not result in an improvement in maternal haemodynamic stability. **Materials and Methods:** An examination of 150 elective caesarean sections performed under spinal anaesthesia for ASA class II patients was carried out at SKIMS in Soura, Srinagar, over the course of two years. In this experiment, the subjects were split into two groups: Group S, which stayed in a supine position, and Group T, which was given a left lateral tilt measured at 15 degrees. The variables of haemodynamics were examined, and phenylephrine was used to treat hypotension that occurred after spinal injection. Patients who have a previous history of cerbovascular or cardiovascular illness were not allowed to participate. **Result:** At the start of the trial, individuals under anaesthesia in both the tilt and supine positions showed similar heart rates, according to this research that examined blood pressure and heart rates. When comparing the supine and tilt positions six minutes after anaesthesia was applied, the heart rates in the former were significantly higher, suggesting that the heart rates remained constant. Both postures demonstrated a constant diastolic blood pressure (DBP), while the tilt position revealed a higher DBP. Mean arterial pressure (MAP) decreased after one minute of supine positioning, although the decline was not statistically significant. Similarly elevated SpO2 values were seen at both locations. The research included taking systolic blood pressure (SBP) readings when the subjects were lying prone and while they were tilted over. In addition, there was a more notable reduction in SBP when using the tilt position. During the full duration of monitoring, levels of SpO2 were constant. **Conclusion:** According to the findings of the research, the posture of the mother during a caesarean birth while she is under spinal anaesthesia has a substantial influence on the haemodynamic responses. The tilt posture provides improved stabilization of the heart rate, maintenance of blood pressure, and elevation of arterial pressure, which may result in a reduction in hypotension and perhaps reduced consequences.

INTRODUCTION

The haemodynamics of the mother during a caesarean birth, while she is under subarachnoid block (SAB) are very important for the outcomes of both the mother and the foetus. SAB is able to give adequate anaesthesia while enabling the mother to maintain consciousness. Yet, it has the potential to cause maternal hypotension due to sympathetic blocking, which reduces venous return and causes vasodilation.[1] Under these circumstances, hypotension may result in poor foetal oxygenation as well as decreased blood flow to the uteroplacental.[2] It is common practice to use the left lateral tilt (LLT) manoeuvre, which includes tilting the parturient to the left by 15 to 30 degrees.[3,4] This manoeuvre is utilized to reduce the impact of these haemodynamic variations.

The LLT can relieve the aortocaval compression that is induced by the gravid uterus, which contributes to the effectiveness of the LLT.[5,6] The enlarging uterus can compress the aorta and inferior vena cava while the woman is in a supine posture during pregnancy. This may result in a reduction in the amount of blood that returns to the heart from the veins and a decrease in the amount of blood that is produced by the heart.[5] In certain cases, this might make the hypotensive effects of SAB even worse. The LLT causes the uterus to be moved away from major blood arteries, which results in an improvement in venous return, a stabilization of blood pressure, and an enhancement in cardiac output.[6]

Numerous studies conducted in recent times have shown contradictory findings about the efficacy of the LLT in enhancing maternal haemodynamics. The actual impact on haemodynamics was found to be variable, according to a comprehensive review conducted by Gizzo et al.[7] While some studies reported significant improvements in blood pressure, others reported insignificant effects.[7] The researchers Pan et al,[8] discovered that the degree of tilt, the placement of the patient, and the features of the particular patient might all have an impact on the amount of benefit conferred by LLT, which increases cardiac output and decreases the occurrence of hypotension.

The role of LLT in enhancing haemodynamics has received more attention in recent years due to the increased emphasis on mother safety during caesarean delivery. Improving LLT's parameters and learning its interactions with other treatments should be the focus of future study. Last but not least, under the auspices of SAB medical supervision, the left lateral inclination remains a crucial intervention in the control of the mother's haemodynamics during the caesarean delivery. Given this, the study's overarching goal is to learn how LLT affects maternal haemodynamics during caesarean sections performed under subarachnoid block. The premise put forward here is that LLT may improve maternal haemodynamics in patients undergoing caesarean sections while under subarachnoid block.

MATERIALS AND METHODS

In a hospital environment, this prospective observational study was conducted by researchers from the Department of Anaesthesia and Critical Care at SKIMS in Soura, Srinagar. The study lasted from December 2021 to December 2023. After receiving clearance from the Hospital Ethics Committee, we proceeded to obtain written informed consent from patients before beginning the experiment. One hundred fifty patients who were eligible for elective caesarean sections and were undergoing spinal anaesthesia were included in the study. These patients were classified as ASA class II. The prerequisites for admission include at least one full-term pregnancy, ASA II, and a minimum age of 18 to 40 years old. Exclusion criteria include a body mass index (BMI) that is more than 35 kg/m2, a history of cardiovascular illness or cerebrovascular disease, diabetes mellitus, preeclampsia, polyhydramnios, or any foetal anomalies. Patients who satisfy these criteria will not be eligible for the study. A failed subarachnoid block, which is defined as an insufficient amount of block to allow for a caesarian birth, was another factor that excluded patients from the research. Patients who lost more than twenty per cent of their blood volume had surgery that needed general anaesthesia, or had a failed subarachnoid block were not included in the study.

All of the people who participated in the study were admitted to the hospital at least twenty- four hours before the operation that was planned for them. During this stage, we carried out a pre-anesthesia assessment assessment. We were careful to ask about any co-morbidities, previous exposure to anaesthesia, medications, drug allergies, and lifestyle choices that the patient had made. We took the patient's medical history extremely seriously. In addition to doing a thorough assessment of the patient's heart, lungs, and brain, we also assessed the patient's airways as part of our complete general physical examination. We took careful note of each baseline information, including height, weight, body mass index, and all of the other relevant data. On the first day of the trial, we recorded the outcomes of all of the laboratory tests that were performed on each participant. These tests included things like a complete blood count, potassium levels, liver function tests, electrocardiograms, coagulograms, and more.

The expecting woman was provided with the standard assortment of monitors upon her arrival in the operating room. These monitors included an electrocardiogram (ECG), a pulse oximeter, and a blood pressure device that did not need any invasive procedures. Every haemodynamic parameter, including systolic and diastolic blood pressure, heart rates, mean arterial pressures, and peripheral oxygen saturation levels, was meticulously monitored and recorded. This included the monitoring and recording of those parameters. In order to establish peripheral intravenous access, a 16-gauge intravenous cannula was subsequently used.

Both ranitidine and metoclopramide were administered intravenously at doses of 2 to 2.5 mg/kg and 0.15 to 0.3 mg/kg, respectively, on the ward. In the course of the experiment, each participant got a total of one thousand millilitres of Ringer lactate solution preloaded into their systems.

In each of the two groups that we established, there were a total of seventy-five patients. In Group S, the patient was kept in a supine position during the whole operation, beginning with the administration of the sedative and continuing until the delivery of the placenta. Patients in

Group T were tilted to the left by 15 degrees. They had a wedge put under their right pelvis both before and after a successful subarachnoid block. This tilt was maintained until the placenta was delivered. Patients in Group T were also given a combination of these two procedures.

A thorough evaluation and documentation of the initial haemodynamic parameters was carried out before the spinal subarachnoid block was performed on either of the groups. Following the baseline measurements, further measurements were conducted one, two, four, and six minutes after the first values were obtained.

In order to provide a subarachnoid block in the L3-LL4 interspace, a spinal needle with a gauge of 27 G was used. Twenty-five microgrammes of fentanyl and three millilitres of a mixture of hyperbaric bupivacaine at a concentration of five per cent made up the block. The pin-prick test was used to determine whether or not a subarachnoid block was effective. A successful block was described as one that established an adequate barrier up to the T6 dermatome.

The subarachnoid block was performed, and immediately after that, each patient in group S was positioned in a supine posture, with no lean to the left. After the subarachnoid block, patients in Group T were positioned supine with a left lateral tilt of 15 degrees using a wedge until the procedure was complete.

Following the administration of the subarachnoid block, the haemodynamic variables were observed and recorded at 1, 2, 4, 6, and 10 minutes. After that, recording was done at regular intervals of three minutes until the placenta was delivered, and then it was repeated at regular intervals of three minutes until the operation was finished. Phenylephrine was administered in increments of 25 milligrams in the event that there was any post-spinal hypotension treatment. We defined post-spinal hypotension to be present if the target systolic blood pressure was lower than 90 mmg, the mean arterial pressure was lower than 65 mmg, or if the systolic blood pressure had decreased by at least 25 percent from the measurement taken at the beginning of the study.[9,10]

Statistical analysis: Numbers or percentages were used to represent categorical variables. Alternatively, the mean plus or minus the standard deviation and medium were used to represent continuous values. The data underwent a normality examination with the use of the Kolmogorov- Smirnov test. We used the test for normality. We utilised the ANOVA test, which stands for repeated measures analysis of variance, to compare the quantitative variables. We employed a chi-square test to compare qualitative factors. We utilised SPSS version 28 for data analysis, and Microsoft Excel for data entry. A statistically significant result was defined as one with a p-value of less than or equal to 0.01 or ≤0.05.

RESULTS

This table presents a comparison of the variations in heart rate that occur between tilt and supine postures at a number of different time intervals. The heart rates between the tilt position (79.23 ± 10.12) and the supine position (78.58 ± 12.30) are comparable at the beginning of the study. There is no statistically significant difference between the two positions (p = 0.724). After spinal anaesthesia, the tilt was measured at 1 minute (tilt: 80.62 ± 11.25, supine: 79.30 ± 10.68, p = 0.462), 2 minutes (tilt: 80.55 ± 10.20, supine: 82.15 ±

11.28, p = 0.363), and 4 minutes (tilt: 80.85 ± 11.26, supine: 82.69 ± 11.52, p = 0.323). In each of these time intervals, there was no significant change. On the other hand, a statistically significant difference is observed at six minutes after the administration of anaesthesia. The heart rate in the supine position (86.50 ± 10.69) is higher than the heart rate in the tilt position (81.20 ± 12.21) (p = 0.005), indicating that the heart rates remained relatively stable throughout the observed periods in both positions.

The information shown in Table 2 presents a comparison of the variations in SBP that occur between tilt and supine postures at various periods after spinal anaesthesia. Between the tilt position (122.12 ± 12.24) and the supine position (123.05 ± 11.25), there is no significant change in the SBP at the beginning of the study (p = 0.628). After one minute after the administration of anaesthesia, the tilt was 120.68 ± 12.50, while the supine tilt was 120.58 ± 12.58, with a p-value of 0.961. Similarly, after two minutes, the tilt was 116.52 ± 10.58, and the supine tilt was 114.10 ± 12.36, with a p-value of 0.199. However, beginning at 4 minutes, there is a statistically significant difference in the SBP between the two positions. The tilt position demonstrates a higher SBP (116.90 ± 10.20) in comparison to the supine position (112.36 ± 11.28, p = 0.011). This substantial difference persists at the 6-minute mark, with the tilt position exhibiting a higher systolic blood pressure (113.60 ± 11.24) compared to the supine position (109.50 ± 10.58, p = 0.023). As a result, the SBP remained reasonably consistent from one position to the other during the periods that were monitored.

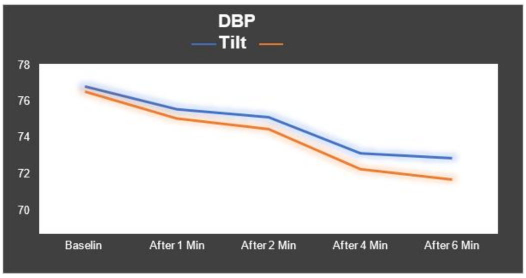

Figure 1: Comparison of diastolic blood pressure at pre-spinalanaesthesia between Tilt and Supine position.

The DBP is compared between tilt and supine postures at different periods after spinal anaesthesia. The data shown in Figure 1 compares the two positions simultaneously. Between the tilt position (76.20 ± 10.38) and the supine position (75.79 ± 8.69), there is no significant change in diastolic blood pressure (DBP) at the beginning of the study (p = 0.793). The absence of a significant difference is seen at both 1 minute (tilt: 74.31 ± 10.65, supine: 73.56 ± 10.20, p = 0.660) and 2 minutes (tilt: 73.65 ± 11.25, supine: 72.68 ± 9.28, p = 0.565) after the administration of anaesthesia. On the other hand, beginning at 4 minutes, there is a statistically significant difference in DBP, with the tilt position exhibiting greater DBP (70.64 ± 10.57) in comparison to the supine position (69.36 ± 11.36, p = 0.023). The tilt position exhibited a higher DBP score (70.24 ± 10.41) compared to the supine position (68.50 ± 10.68, p = 0.010). This substantial difference continues to be seen at the 6-minute mark. It may be deduced from this that the DBP stayed substantially unchanged over the periods that were observed in both locations.

Figure 2: Comparison of MAP at pre-spinal anesthesia between Tilt and Supine positions.

The findings indicate that there is no statistically significant difference in MAP between the tilt and supine positions at the beginning of the study (p = 0.483, hence not significant). Over the course of one minute, the mean arterial pressure (MAP) in the supine position (74.65 ± 9.21) is somewhat lower than the MAP in the tilt position (76.65 ± 8.69). However, this disparity does not meet the criteria for statistical significance (p = 0.173). When comparing the MAP in the tilt position (77.63 ± 9.41) to the MAP in the supine position (73.35 ± 8.29) after 2 minutes, it is seen that the supine position exhibits a significant drop in MAP, with a p-value of 0.004. This important distinction persists at four minutes (p = 0.001) and six minutes (p = 0.001), with the supine position exhibiting persistently lower MAP values (72.55 ± 7.58 and 70.65 ± 8.89, respectively) in comparison to the tilt position (78.45 ± 8.69 and 78.52 ± 11.25, respectively). Based on these data, it seems that the MAP remained consistently steady across the various periods that were tested in both orientations.

Figure 3: Comparison of SpO2 at pre-spinal anesthesia between Tilt and Supine positions.

The findings show that there is no statistically significant change in oxygen saturation (SpO2) between the tilt position and the supine position at any examined time point. With a p-value of 0.234, the SpO2 levels at the tilt position (99.45 ± 0.50) and the supine position (99.56 ± 0.62) at the start of the trial are still comparable. After one minute (p = 0.406), two minutes (p = 0.113), four minutes (p = 0.421), and six minutes (p = 0.283), this pattern is still present. Between the two positions, the SpO2 levels remain rather constant over this period. There does not appear to be a significant difference between the two sites, according to all of the p-values. As a result, SpO2 levels were constant throughout the whole observation time at both sites.

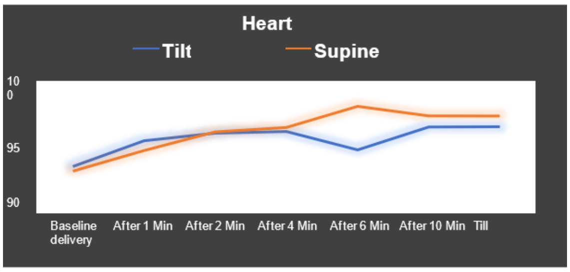

Figure 4: Comparison of Heart Rate (HR) at pre-spinal anaesthesia between Tilt and Supine positions.

The findings compare the variations in heart rate that occur between tilt and supine postures between different periods after spinal anaesthesia has been administered. There is no statistically significant difference in heart rate between the tilt position (80.64 ± 12.52) and the supine position (79.65 ± 11.99) of the subjects at the beginning of the study (p = 0.621). This lack of significant difference persists at several time intervals after the administration of anaesthesia, including 1 minute (tilt: 86.47 ± 14.81, supine: 84.31 ± 14.33, p = 0.365), 2 minutes (tilt: 88.19 ± 12.92, supine: 88.53 ± 15.94, p = 0.886), and 4 minutes (tilt: 88.55 ± 11.96, supine: 89.52 ± 14.94, p = 0.661). However, it has been noticed that there is a statistically significant difference in heart rate six minutes after the administration of anaesthesia. The supine position has a greater heart rate (94.30 ± 14.41) in comparison to the tilt position (89.40 ± 12.46, p = 0.027). Despite the fact that there are no significant differences at 10 minutes (tilt: 89.59 ± 12.40, supine: 92.15 ± 15.09, p = 0.258) or until the delivery of the placenta (tilt: 89.65 ± 12.23, supine: 92.12 ± 14.25, p = 0.256), this difference does not continue to exist. Let's compare the tilt position to the supine position. We can see that the tilt position displays a more prominent and statistically significant increase in heart rate over time. This is the case even though both postures show an increase in heart rate with time.

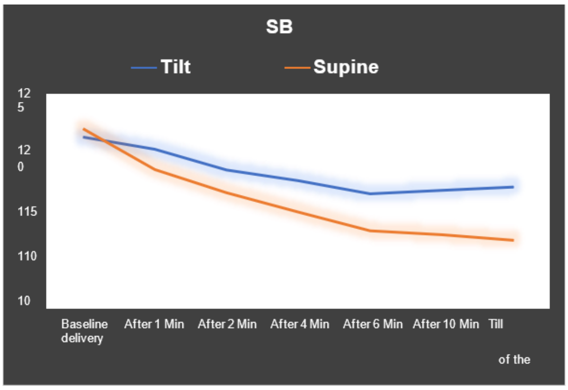

Figure 5: Comparison of systolic blood pressure (SBP) at pre-spinal anaesthesia between Tilt and Supine positions.

The findings indicate that the measures of systolic blood pressure (SBP) differ between the tilt position and the supine position with time. At the beginning of the study, there was no significant difference (p = 0.460). However, as time went on, the supine position produced a lower reduction in systolic blood pressure than the tilt position did. After a period of four minutes, discernible changes were seen (p=0.024). These differences remained significant after six minutes (p=0.008), ten minutes (p<0.001), and even up to the birth of the placenta (p<0.001). This demonstrates that both postures lead to a fall in SBP. However, the supine position exhibits a more dramatic and statistically significant decline compared to the tilt position. This suggests that the tilt position is more stable and that a drop in SBP is modest in comparison to the supine position.

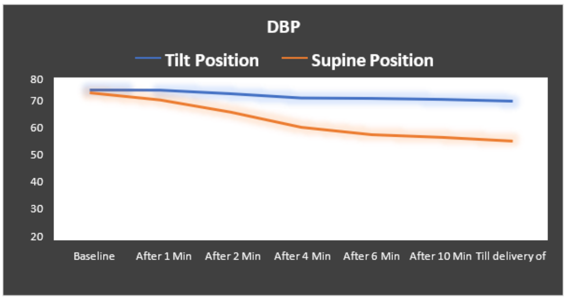

Figure 6: Comparison of systolic blood pressure (SBP) at pre-spinal anaesthesia between Tilt and Supine positions.

In the tilt and supine positions, the findings show that there are substantial changes in the diastolic blood pressure. There was not a significant difference at the beginning of the study (p = 0.318). On the other hand, beginning at one minute and continuing until the delivery of the placenta, the DBP in the supine position was continuously lower than in the tilt position. Furthermore, the differences were extremely significant from one minute onwards (p<0.001). This indicates that both postures result in a significant drop in DBP after spinal manipulation, with the supine position demonstrating a more significant reduction in comparison to the tilt position, which implies that the tilt position is more stable.

Based on the findings, it can be concluded that there is no important difference in MAP between the tilt and supine positions at the beginning of the study (p = 0.161, not significant). On the other hand, after the baseline, there is a discernible decrease in the MAP in the supine position in comparison to the tilt position at each consecutive time point. Just one minute after the baseline, the MAP in the supine position was found to be considerably lower (65.95 ± 7.41) as compared to the tilt position (76.71 ± 6.53), with a p-value that was less than 0.001. This pattern of considerably lower MAP in the supine position continues at two minutes, four minutes, six minutes, ten minutes, and until the delivery of the placenta, with all time points displaying p-values that are less than statistically significant (0.001). The MAP decreases in both positions; however, the tilt position maintains higher MAP values throughout the measurement duration in comparison to the supine position, which suggests that the tilt position is a more stable posture than the supine position.

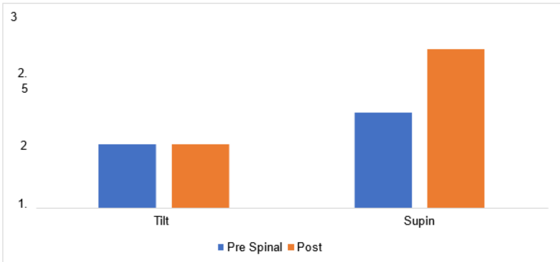

Figure 7: Bar diagram compares the total fluid intake during lower segment caesarean section (LSCS) in two positions: tilt and supine.

The findings of the post-test for SpO2 indicate that there were no changes that were statistically significant with time in either the tilt or supine positions. SpO2 exhibits a modest fluctuation while the patient is in the tilt position, beginning at 99.73 ± 0.62% at the beginning of the study and reaching 99.88 ± 0.52% at the time the placenta is delivered. Furthermore, while the patient is in the supine position, the SpO2 level stays reasonably steady, starting at 99.72 ± 0.47% at the beginning of the study and ending at 99.62 ± 0.55% when the placenta is delivered. Both of the p-values for the two positions are higher than the customary threshold of 0.05, which indicates that the changes in SpO2 are not statistically significant. The p-values for tilt are 0.094, while the p-value for supine is 0.300. As a result, the levels of SpO2 never change for the duration of the observation time in either posture. A comparison of the total fluid intake obtained during a LSCS in two different postures, namely tilt and supine, is shown in the bar diagram (figure 6). Both before and after spinal anaesthesia, the total amount of fluid that is consumed while in the tilt position is the same. Having an average capacity of one litre when tilted or used. A supine posture, on the other hand, results in a fluid intake of 2.5 litres following spinal anaesthesia, which is much more than the 1.5 litres that were consumed in the supine position before the administration of spinal anaesthesia. This indicates that there is a significant increase in the amount of fluid that is required during LSCS when the patient is in the supine position as opposed to the tilted position in order to keep the patient's haemodynamics stable.

Table 1: Comparison of Heart rate at pre-spinal anesthesia between Tilt and Supine position.

Heart Rate	Tilt Position	Supine Position	p-value
	Mean ± SD	**Mean ± SD**	
Baseline	79.23 ± 10.12	78.58±12.30	0.724NS
After 1 Min	80.62±11.25	79.30±10.68	0.462NS
After 2 Min	80.55± 10.20	82.15±11.28	0.363NS
After 4 Min	80.85±11.26	82.69±11.52	0.323NS
After 6 Min	81.20±12.21	86.50±10.69	0.005**

** Significant at 0.01 level; NS-Not Significant

Table 2: Comparison of Systolic blood pressure at pre-spinal anesthesiabetween Tilt and Supine position.

SBP	Tilt Position	Supine Position	p-value
	Mean ± SD	**Mean ± SD**	
Baseline	122.12±12.24	123.05±11.25	0.628NS
After 1 Min	120.68±12.50	120.58±12.58	0.961NS
After 2 Min	116.52±10.58	114.10±12.36	0.199NS
After 4 Min	116.90±10.20	112.36±11.28	0.011*
After 6 Min	113.60±11.24	109.50±10.58	0.023*

*-Significant at 0.05 level; NS-Not Significant.

DISCUSSION

The main goal of the present study was to find out what happened when patients undergoing caesarean delivery were given a 15-degree left lateral tilt, both before and after spinal anaesthesia was administered. We examined SPO2 in addition to the haemodynamic parameters, which included mean arterial pressure, diastolic blood pressure, blood pressure, and heart rate. These measures are crucial indicators of respiratory and cardiovascular function in pregnant women. They are an expression of the intricate equilibrium that the autonomic nervous system regulates in reaction to changes in posture.

A total of 150 full-term subjects in the study qualified for an elective caesarean delivery performed under spinal anaesthesia. These patients, who belonged to ASA class II, varied in age from 18 to 40. A similar number of people were discovered by Hasanin et al,[11] in their examination of the haemodynamic effects of the lateral approach.

The study examined tilt before and after spinal anaesthesia was given during caesarean delivery, spanning two years and 140 patients in total. The average age, weight, and body mass index (BMI) of the two groups were similar at the start of our study endeavour. The fact that this was the case suggested that rather than variations in the demographics of the persons involved, the discrepancies in physiological signs that we saw were most likely brought about by spinal anaesthesia and body position. Habib et al,[12] conducted a study with a similar participant demography for their investigation. This research was titled "Systematic review of spinal anaesthesia for caesarean delivery."The heart rate data demonstrated that, after the administration of spinal anaesthesia, there were notable differences between the tilt and supine positions. The heart rate decreased somewhat in the tilt position (79.23 ± 10.12 to 80.64 ± 12.52; $p > 0.05$) from its pre-spinal baseline value to its post-spinal baseline value. Similarly, the heart rate decreased from 80.62 ± 11.25 to 86.47 ± 14.81 ($p < 0.01$) after one minute following the spinal surgery. Conversely, in the tenth minute after spinal anaesthesia, the heart rates increased gradually and exceeded the pre-anesthesia values (89.59 ± 12.40). Up until the placenta was delivered, these elevated heart rates persisted (89.65 ± 12.23).

In contrast, heart rates increased significantly in the supine position from pre-spinal to post- spinal at all time points measured after the spinal surgery. The heart rate increased from 78.58 ± 12.30 to 79.65 ± 11.99 at the start of the research ($p = 0.590$). Furthermore, the heart rate increased from 79.30 ± 10.68 to 84.31 ± 14.33 one minute after the stimulation ($p = 0.016$).

The heart rate increased significantly two minutes after the spinal cord was severed (88.53 ± 15.94; $p < 0.01$), and it was elevated until the placenta was delivered (92.12 ± 14.25). These findings suggest that while heart rate increases in both postures during spinal anaesthesia, the tilt position enables the heart

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rate to return to baseline more quickly than the supine position, which permits the heart rate to return to normal. Heart rates increased with time in both positions, which is in line with earlier studies conducted by Habib et al.[12] This study supports the hypothesis that reflex tachycardia may occur during spinal anaesthesia as a compensatory response to hypotension. Furthermore, aortocaval compression—which is particularly frequent in pregnant women—may be caused by the supine position. The volume of blood that returns to the veins may be further limited as a result. Research,[13,14] indicates that when this happens, the increased heart rate may not be sufficient to make up for the drop in cardiac output, which can cause severe hypotension and potentially cause foetal distress in individuals who are pregnant. The tilt and supine positions caused different patterns in the subject's systolic blood pressure. SBP showed a statistically insignificant fall starting two minutes after the administration of spinal anaesthesia. However, it remained constant in the tilt position immediately after post-anesthesia. In under two minutes ($p = 0.039$), the SBP decreased from 116.52 ± 10.58 mmHg before spinal therapy to 112.71 ± 11.81 mmHg after spinal treatment. After four minutes (110.95 ± 14.65 mmHg; $p = 0.018$) and six minutes (108.80 ± 13.31 mmHg; $p < 0.001$) after spinal therapy, this decrease remained significant.

One minute after the spinal subarachnoid block, the patient's blood pressure in the supine position started to drop sooner than the baseline readings. After that, there was a continued decrease in SBP readings, which peaked two minutes after spinal intervention (109.04 ± 14.39 mmHg; $p = 0.022$). It kept dropping until the placenta was delivered (101.25 ± 10.60 mmHg), at which time it started to drop even further. These results indicate that, after the administration of spinal anaesthesia, the patient's blood pressure eventually decreases in both positions. When the patient is in the supine position, there is a noticeable decrease in supine blood pressure as compared to the baseline value. The tilt posture may improve haemodynamic stability by sustaining blood pressure that is closer to the baseline level at the start of the operation. The results shown here are similar to previous research by Hasanin et al,[11] which suggests that a tilted position may help reduce spinal-induced hypotension by alleviating aortocaval compression. The results that we found in our study were similar to those of Aust et al.[15] They discovered that while you are under spinal anaesthesia and positioned on your back for a caesarean delivery, your blood pressure lowers. This is due to the fact that maintaining your weight is not necessary.

Furthermore, when spinal anaesthesia was used, Roberts et al,[16] discovered that the LLT position produced a more stable systolic blood pressure. The research's conclusions indicate that there were fewer cases of significant hypotension, which is linked to better results for the developing foetus.

Both were much lower, according to the DBP data, with the supine position showing the greatest decreases compared to the other postures. The DBP did not significantly alter from pre-spinal to post-spinal measurements starting one minute after spinal (74.31 ± 10.65 to 74.16 ± 8.12; $p = 0.923$) when the tilt posture was being employed. By the time the placenta was delivered, the DBP had dropped further to 68.58 ± 9.28 mmHg; nevertheless, this drop is still statistically negligible.

Furthermore, the DBP decreased significantly while the patient was in the supine posture, with a more noticeable decrease starting just after spinal anaesthesia. At one minute ($p = 0.010$), DBP dropped from 72.63 ± 9.41 mmHg pre-spinal to 69.11 ± 10.68 mmHg postspinal. This trend continued throughout the course of the observation period, reaching 53.10 ± 8.58 mmHg at the moment of delivery. There was a statistically significant decline in this.

The diastolic blood pressure drop was greater in the supine posture, suggesting that the supine posture may be more susceptible to the hypotensive effects of spinal anaesthesia. This result is in accordance with the research of Hofhuizen et al,[17] which found that lying flat on your back may exacerbate the venous return decrease because of aortocaval compression, which causes bigger drops in blood pressure at the systolic and diastolic levels. Belachew et al,[18] found similar results. They discovered that while lying on one's back, bending the spine reduced diastolic blood pressure. This happened as a result of the decrease in systemic vascular resistance. Furthermore, Roberts et al,[16] reported that after spinal anaesthesia, the diastolic blood pressure was significantly lower in the supine position as opposed to the LLT position. The LLT position provided better protection against the significant reductions in diastolic blood pressure that may occur in that posture when compared to the supine position.

Even though the MAP data showed a decline in both locations, the tilt position continued to have greater MAP values than the other position over the duration of the measurement period. While the placenta was being delivered, the MAP dropped from a baseline of 77.36 ± 7.89 mmHg before the spinal puncture to 70.25 ± 8.52 mmHg. This tumble happened when tilted. Conversely, the supine position showed a more notable drop in MAP, which dropped from 75.58 ± 7.60 mmHg after spinal delivery to 55.20 ± 7.54 mmHg at placenta delivery. Our observations suggest that the tilt position may allow better maintenance of cerebral and placental perfusion, even if both postures experience a drop in MAP during spinal anaesthesia. The results of a study by Sonninno and colleagues,[19] suggest that higher MAP values in the tilt position might be the consequence of reduced aortic valve squeezing and faster vein return because of the tilt posture. More regular blood flow occurs during a caesarean delivery when spinal anaesthesia is used. Pump et al,[20] discovery that a supine position may reduce MAP due to decreased cardiac output and systemic vascular resistance was comparable to this one.

Throughout the observation time, the levels of SpO2 were constant in both postures, and no statistically significant differences were seen between the two groups that were the subject of the study. The temperature ranged from 98.45 ± 0.50% before spinal administration to 99.88 ± 0.52% after spinal administration. However, it consistently stayed within the normal physiological range. Similarly, there were some fluctuations in the patient's SpO2 levels. At the same time, they were in the supine position, but they were constant between 99.56 ± 0.62% before delivery and 99.62 ± 0.55% after it.

The woman undergoing treatment's respiratory function seems to have been little affected by spinal anaesthesia, as shown by the steady SpO2 levels in both postures. This result is consistent with other studies by Wei et al,[21] and Wang et al,[22] which showed that under spinal anaesthesia, there were no significant differences in mother oxygenation between inclined postures and supine positions.

Overall, the study results provide strong evidence that placement has a significant role in regulating the patient's haemodynamic reactions during spinal anaesthesia after a caesarean birth. The tilt position seems to offer benefits in terms of blood pressure and heart rate stabilization, indicating that it could be useful in enhancing the mother's and the fetus's outcomes during caesarean delivery. These findings support the notion that the standard operating procedure for caesarean sections should include a tilt posture to achieve the dual objectives of maximizing haemodynamic stability and minimizing the incidence of haemodynamic issues brought on by spinal anaesthesia.

Limitations of the present study: Several limitations are present in this research, such as the limited sample size, the dependence on a single measurement technique for pulse rate, blood pressure, mean arterial pressure, and systolic blood pressure, and the possibility of measurement mistakes. A greater sample size would result in more reliable data and would also increase the dependability of the data. It is recommended that future research endeavours strive to involve a greater number of individuals in order to validate these results. Furthermore, discussing the accuracy and precision of the measuring instruments that were used for these measurements is something that should be done.

Recommendations for future research: In light of the limitations of the study, it is recommended that future research should expand the sample size in order to enhance the statistical power and reliability of the findings. To guarantee that the results are relevant to a larger community, it is important to research a varied population that includes people of varying ages, ethnicities, and health conditions. In addition, more sophisticated methods of assessment, such as continuous blood pressure monitoring, impedance cardiography, and advanced pulse wave analysis, are able to provide more in-depth insights into the responses of the cardiovascular and respiratory systems. Through the implementation of these suggestions, the study's applicability and generalisability will be improved.

CONCLUSION

According to the findings of the research, the placement of the mother during a caesarean birth while under spinal anaesthesia has a substantial impact on the haemodynamic reactions of the baby. Because the tilted posture provides better heart rate stabilization, blood pressure control, and greater arterial pressure, it has the potential to reduce the risk of spinal anaesthesia-induced hypotension and the consequences that are associated with it. Although both postures are capable of maintaining oxygen saturation, the tilt position has a more favourable haemodynamic profile, which indicates that it has the potential to improve the outcomes for both the mother and the foetus simultaneously. Incorporating a tilt position into normal practice has the potential to improve haemodynamic stability and lessen the negative effects of spinal anaesthesia.

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