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Prospective Cohort Study on Examining the Effect of Position on Maternal Hemodynamics and Block Level During Spinal Anesthesia Induction for Cesarean Delivery at Wolaita Sodo University Comprehensive Specialized Hospital, Southern Ethiopia 2023

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Abstract

Background: Type of anesthesia may be general anesthesia, spinal anesthesia, and epidural anesthesia. Spinal anesthesia is the most used approach type of anesthesia due to its simplicity, reliability, and speed in achieving appropriate anesthesia. The aim of this study is to assess the effects of positioning during induction of spinal anesthesia on maternal hemodynamics and block level on cesarean section.

Method: prospective observational cohort study design was employed. A consecutive sampling technique was employed to select study participants. Total sample size of 172 patients, taking spinal anesthesia in lateral and sitting positions 86 each group. Data was entered to epi-data version 4.6, and then exported to SPSS version 26 and analyzed. Independent sample t-test and Chi-square ($\chi 2$) were computed. The Kaplan-Meier survival analysis was used to determine the time to develop first hypotension, and onset of hypotension was compared using the log-rank test between groups and p-value≤0.05 considered significant.

Result: The incidence of hypotension for lateral and sitting group is 61.6% [95%CI, 52.3-72.1] and 79.1% [95%CI, 69.8-87.2] respectively (P<0.05). The onset to first hypotension was 10.981[95% CI, 8.690-13.272]; and 16.970 [95% CI, 14.569-19.372]; P<0.05), for sitting and lateral respectively. Level of sensory block after 5th Min of spinal anesthesia was significantly higher in sitting group than in lateral group patients, Motor block level after 5th Min and 10th Min of spinal anesthesia were significantly lower in sitting group patients than in lateral group patients (p< 0.05).

Conclusion: Occurrence of hypotension, intraoperative adverse events of spinal anesthesia, vasopressor and fluid consumption in lateral group was lower. However, rather than technical difficulties during induction of spinal anesthesia in lateral position, lateral position has better motor/sensory block than in sitting position. It is better to deliver spinal anesthesia later than sitting to preserve hemodynamic status.

Keywords: Cesarean Section; Hemodynamic; Positions; Spinal Anesthesia

Abbreviations: ASA: American Society of Anesthesiologist; IVC: Inferior Vena Cava Compression; PSH: Post Spinal Anesthesia Hypotension; SA: Spinal Anesthesia; SD: Standard Deviation; SPSS: Statistical Package for Social Science; WSUCSH: Wolaita Sodo University Comprehensive and Specialized Hospital

Background

Type of anesthesia may be general anesthesia, spinal anesthesia, and epidural anesthesia. Spinal anesthesia is the most used approach type of anesthesia due to its simplicity, reliability, and speed in achieving appropriate anesthesia and preference of

regional anesthesia for caesarean section increased from 69.4% in 1992 to 94.9% in 2002, and mainly spinal anesthesia accounted for 86.6% and now a day [1-5]. Regional anesthesia has become more popular for caesarean sections due to the better maternal and fetal benefits. Spinal anesthesia is carried out with different positions, like patient in the sitting or lateral decubitus position. Different scholars recommend different positions for different patients [6,7].

In sitting position, he or she should be encouraged to keep their spines flexed while sitting with one leg hanging off the side of the bed to help the Interspace open and now a day there are three modified sitting positions like sitting position with maximum extension of knees, adduction of hips, and forward bending or hamstring stretch position (HSP) [8]. Lateral position is described as side-lying with pillow arranged carefully along the patient's back, potentially buttocks, and a pillow positioned in between the patient's flexed legs to prevent hip adduction and internal rotation [9]. In addition to positioning for spinal anesthesia, patients positioning may be used to improve arterial blood oxygenation, facilitate the drainage of respiratory secretions, reduce gastro-esophageal reflux disease, nosocomial infections, pressure ulcers, and to enhance patient comfort and hemodynamic status [10].

Hemodynamics is a term that refers to basic measures of cardiovascular function, such as arterial blood pressure or cardiac output. The physical study of flowing of blood to all the solid structures through an artery and positioning of patients affects hemodynamic and block level outcomes [11,12]. Maternal position may influence the onset of sensory block by altering the diffusion of local anesthetic. However, studies of different maternal positions have yielded contradictory outcomes in terms of both hemodynamic stability and block onset speed. Spinal anesthesia has several challenges during positioning of patients before and after taking spinal anesthesia. Position may affect spread of local anesthetic, the speed of onset of sensory block and thus the hemodynamic effects [13]. From position dependent complications of spinal anesthesia categorized as minor or major a minor complication is like, temporary alteration in the patient's physiological condition like arterial hypotension, high block, Bradycardias, and total spinal [14,15].

Hypotension is typical following spinal anesthesia during a caesarean section and the degree of hypotension is determined by the height of the block, the patient's position, and the volume status of the patient by influencing the spread of local anesthetic, maternal position can affect the rate of onset of sensory block and thus the hemodynamic effects [16,17]. Hypotension causes complications for both the mother and the fetus, such as vomiting, nausea, and dizziness in the mother and acidosis in the fetus. It has been shown that during intrathecal injection for caesarean section. The incidence of hypotension in lateral group was 48% compared to 13% of the parturient in the sitting group. 22% of the parturient in sitting group and 61% of those in the lateral group reported experiencing nausea and according to recent studies, IONV occurs frequently during cesarean section under spinal anesthesia is up to 80%. Because of the pregnancy by itself and positioning, pregnant women are more likely to experience nausea and vomiting [18,19].

Additional studies suggest that incidence of hypotension in lateral and sitting position is (50% vs 76.3%; p=0.016), Bradycardias (0% vs 21.1%; p=0.014) and vasopressors consumption (36.2% vs 76.3%; p=0.012) were statistically lower in lateral position. There were no significant differences in sensory height (p=0.89) and duration of sensory and motor block between the two groups (p=0.42, p=0.29; respectively). Previously most scholars focused on the hemodynamic difference and incidence of complication of spinal anesthesia between lateral and sitting group. However, that research has been done with combination of spinal anesthesia with epidural anesthesia. And some have spinal anesthesia with Adjuvants like opioids [20,21]. Unfortunately, there is too much scarcity of literature in comparison to the onset of the first hypotension between lateral and sitting group. Despite several research has done on this topic but still there is contradicting idea between the scholars on which position is better for pregnant mothers who undergo cesarean section during induction of spinal anesthesia.

And now a day there is scarcity of study conducted in resource limited area like Ethiopia and east Africa on this topic, in addition in most countries effect of position on spinal anesthesia is not tested more and the result is not consistent. We hope to fill those gaps by comparing the effects of position on hemodynamic and block level between lateral and sitting groups through this study by adding sample size, adding other new variables like onset to first hypotension, and by avoiding factors like combination of spinal with epidural and bupivacaine with opioids, and we had conducted with only on spinal anesthesia and bupivacaine alone. This study can deliver rational and evidence-based practical framework that reduces the occurrence of post-spinal hypotension and other spinal induced complications, and which is significance to patients and anesthetist, who use sitting position routinely. This study also makes obstetric patients' better beneficiary by reducing post-spinal hypotension that pregnant mothers suffer intraoperatively and reducing maternal morbidity and mortality and to increase quality of patient care.

Methods

Study Design and Areas

Institutional based prospective cohort study was conducted at WSUCSH, which is in the SNNPR of Ethiopia. The town is 328 kilometers from Addis Ababa. According to the Hospital administrative staff report, the Hospital was established in 1928. It is the oldest hospital in the area and gives both patient care and teaching services centers. Hospital services more than 5 million people around the area. The hospital provides general patient services, teaching, and research activities. Patient services include both inpatient and outpatient services such as medical, surgical,

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pediatric, psychiatric, Ophthalmic, Emergency, oncology, dialysis, Gynecology and Obstetrics care. Inpatient ward, the hospital has a total of 370 beds in departments such as medical, gynecology/obstructive, surgical ward, Oncology, dialysis, Ophthalmology, dental unit, and pediatric. WSUCSH provides ~1210 caesarian section (C/S) services under spinal anesthesia annually [22,23]. Ethical approval for this study was obtained from the ethical review board of Wolaita Sodo University, College of Health Sciences and Medicine, with protocol unique No chsm/erc/03/15.

Then, a support letter was obtained from the Medical Director of WSUCSH to conduct the research, and written informed consent was obtained from study participants. Privacy and confidentiality of the interviews and information was secured. All pregnant mothers who undergo caesarean section delivery under spinal anesthesia at WSUCSH belong to the source population. Patients who can communicate intraoperative side effects, ASA class II pregnant mothers, Patients, who take only 0.5% bupivacaine in between 10-12.5mg included in the study from May 15 to August 15, 2023. Those Patients who can't to sit or lie laterally and who can't to communicate well, Pregnant with amputated leg who have one leg or none, Pregnant with paralytic disease, who can't to move well, Hypotensive and hypertensive patients from the base line vital sign, high risk patients like sever preeclampsia (≥160/110mmhg) and mother with coagulopathy, cesarean section patient, who take general anesthesia, patients who complicated to total spinal and cardiac arrest and converted to general anesthesia were excluded from study.

Sample Size Determination and Sampling Technique

The sample size is calculated using G*power version 3.1.9.7 software of Refilter, Faul, & Buchner, and proportion difference between the two groups (Lateral and sitting position) is taken from a previous study done in Nigeria on the topic of comparison of the hemodynamic effects of lateral and sitting positions during induction of spinal anesthesia for caesarean section. From this study, because of no study is done in Ethiopia and east Africa on this topic and two independent sample size formulas based on the mean difference of SBP, HR, MAP, and incidences of hypotension (proportion) between the two groups is used to calculate effect size and sample size for each group and each objective.

Then sample size was obtained when incidences of hypotension values are entered into the software. Based on this study the incidence of hypotension in lateral group is 17 (34%) and incidence of hypotension in sitting group is 28 (56%). Using G*power version 3.1.9.7 software, the calculated critical z value is 1.9599640. The sample size is calculated a priori using the difference between two independent proportions (two groups). Power (90, proportion (p1) =0.34, and proportion (p2) =0.56), using power of 90%, alpha = 0.05 and effect size of 0.5 and then calculated sample size was 172. n1=86 and n2=86. Patient who comes randomly to operation room for cesarean section from obstetrics ward or emergency and all those patients were included consecutively, if women come for cesarean section in random, who with indications for cesarean section.

Data Collection Tool and Procedure

Structured questionnaire was prepared in English after reviewing different literatures. The tool includes socio demographic data, preoperative vital signs, intraoperative vital signs, ASA classification, basicity of the drug, positions during induction of spinal anesthesia, and Total volume of drug, professional who administered the procedure, dose of additive and check list for level of motor block. Intraoperative data was collected after giving information about the procedure and taking informed written consent from a patient in English, Amharic, and wolaitigna (local language) version according to their language capability, from anesthesia sheet with four anesthetists after getting training with spinal anesthesia block assessment tool and sensory assessment tool.

And the principal investigator supervises the completeness of the data daily. The patient was monitored with NIBP cuffs, ECG, and pulse oximetry. And then obstetrics dose of local anesthetics (10-12.5mg) of 0.5 % isobaric bupivacaine was given by anesthesia professionals (Bsc anesthetist), anesthesia professional specialist (MSc in Advanced clinical anesthesia), between lumber three and four or lumber four and five levels. And all patients selected for the study were asked for their consent and instructed on how to self-report pain for pinprick stimulation. And patients were followed until the conclusion of surgery to observe occurrence of other complications. And censoring data was death and a patient with intraoperative normal blood pressure. And data collection was through face-to-face observation and interview.

Data Quality Control and Assurance

The principal Investigators trained the data collectors. The tool was prepared by principal investigator then it was reviewed by professional experts and after their review and comment, it was corrected, and pretest was conducted at wachemo university comprehensive and specialized hospital on 5% of the total sample size. And the tool was tested with reliability test of crombach alpha yielding 0.753. Regular monitoring and follow-up were done as necessary during data collection. Every day, the principal investigator checked the accuracy and consistency of the data. Everything utilized to collect data was organized sequentially and kept in a secure place.

Data Processing and Analysis

Data was personally verified for accuracy before being coded, entered, and entered to EPI data version 4.6 and SPSS version 26 were used for analysis. The data was tested for normality using graphical testing like histogram and analytical test like Shapiro-wilk test (p>0.05considerd as normally distributed). And the outlier was examined by box plot. When expressing continuous variables, normally distributed data like hemodynamics parameter was expressed as mean ± SD. We shall conduct frequency and cross

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tabulation to describe pertinent variables in connection with the result variables. Additionally, a t-test for independent samples was used to compare the means of two independent groups to compare baseline continuous variables after verifying the normality assumption. The X2(chi square), test for categorical and nominal data. And statistics are considered significant if the P value ≤ 0.05. And the Kaplan-Meier survival analysis was used to determine the time to develop hypotension, and it was compared using the log-rank test between the lateral and sitting groups. Variables with a p-value of ≤0.05 are deemed statistically significant. And data, text, tables, and figures were used for descriptive statistics to show the outcome.

Operational Definition

ASA status: is a subjective assessment of a patient's overall health that is based on five classes (1 to 5).

1. A patient is a completely healthy fit patient.
2. Patient has mild systemic disease.
3. Patient has severe systemic disease that is not incapacitating.
4. Patients have incapacitating disease that is a constant threat to life.
5. A moribund patient who is not expected to live 24 hours with or without surgery [24].

Postoperative Nausea and/or Vomiting (PONV): When a patient experiences at least one episode of either nausea or vomiting within 24 hours. And is an unpleasant experience that afflicts 20–30% of surgical patients after general anesthesia [25].

Hemodynamics: "The physical study of flowing blood and all the solid structures (such as arteries) through which it flows".

Hypotension: Hypotension was defined as a fall in systolic blood pressure >20% or a value <90 mmHg or mean arterial pressure changes of less than 65 mm Hg [26].

Bradicardia: Heart rate of less than 60bpm [27].

Positioning: Is the way to placing patient in anatomical alignment and to prevent harm, with padding on any hard surfaces that may come into contact wit0068 it [28].

Ethical Approval and Consent to Participate

Ethical approval for this study was obtained from the ethical review board of Wolaita Sodo University, College of Health Sciences and Medicine, with protocol unique No chsm/erc/03/15. Written informed consent was obtained from study participants. Privacy and confidentiality of the interviews and information were secured.

Results

Study Participant Characteristics

Thirty three of 205, who undergone cesarean section at WSUCSH throughout the study period were not included for eligibility, because those 20 patients have taken general anesthesia for direct indication and the remaining 13 have taken general anesthesia because of spinal anesthesia failed, no eligible participant was excluded from the study. The Analysis of the data from 172 respondents, response rate of 100% was conducted.

Demographic Data of the Patient

In this research, one hundred seventy-two women, including eighty-six women in Sitting group and eighty-six women in Lateral group were included over three-month study period. There was no statistically significant difference between lateral and sitting groups in age and other demographic characteristics of the patient (Table 1).

Table 1: Socio-Demographic Data of the Patient from WSUCSH May to August 15, 2023.

Variables	Lateral Group Mean±SD	Sitting Group Mean±SD	P-Value	T-Value
Age	26.20±4.573	25.29±3.675	0.153	1.434
Weight	63.15±9.936	64.55±7.064	0.29	-1.061
Height	1.6212±0.07202	1.5991±0.09514	0.088	1.011
Gestational Age	39.13±1.622	38.77±1.793	0.169	1.38

Data are Mean±SD.

Comparison of SBP and MAP in Sitting and Lateral Groups Based on Time

Mean Systolic blood pressure and mean arterial blood pressure after immediate induction to 30th Min was significantly lower in sitting group than in lateral group (p<0.05), (Table 2).

Incidence of Hypotension between Lateral and Sitting Group

Incidence of hypotension between lateral and sitting group patient after taking spinal anesthesia was recordable through systolic blood pressure and mean arterial blood pressure; the

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lowest blood pressure was recorded after oxytocin administration for lateral group and sitting group was 23.3% and 41.9% respectively. However, the overall incidence of hypotension for lateral and sitting group is 61.6% [95%CI, 52.3%- 72.1%] and 79.1% [95%CI, 69.8%-87.2%] respectively (P<0.05).

Hypotension among lateral compared to sitting groups

The risk of hypotension in lateral group was reduced by 57.5% relative to sitting group with 95% CI: [21.6%-83.7%]; (Chi-square P=0.005).

Table 2: Comparison of Systolic blood pressure and Mean Arterial Pressure in Sitting and Lateral Groups Based on Time at WSUCSH from May to July 2023.

Time	Systolic Blood Pressure (Mmhg)			MAP (mmHg)		
	Lateral Group Mean±SD	Sitting Group Mean±SD	P Value	Lateral Group Mean±SD	Sitting Group Mean±SD	P Value
Baseline	120.97±15.877	121.65±10.675	0.74	89.16±9.627	90.37±10.197	0.425
Immediately after induction	114.40±10.474	104.41±14.998	0.000*	83.52±9.694	72.40±15.050	0.000*
5th Min	107.59±11.305	97.42±15.584	0.000*	78.99±9.322	69.76±14.758	0.000*
10th Min	104.67±10.846	93.69±14.505	0.000*	76.92±8.730	66.84±12.588	0.000*
15th Min	104.62±13.327	93.48±13.211	0.000*	77.22±11.238	67.10±11.662	0.000*
20th Min	105.38±12.691	93.16±12.455	0.000*	77.93±9.834	66.50±10.759	0.000*
25th Min	106.51±11.297	94.50±12.168	0.000*	77.67±8.195	67.95±10.953	0.000*
30th Min	108.70±10.194	96.03±13.767	0.000*	78.50±7.929	68.31±11.947	0.000*

Data are Mean±SD.

Table 3: Comparison of Motor Block Level in Bromage Scale in Lateral and Sitting Groups Based on time at WSUCSH from May to August 2023.

Time	Motor Block Level (Bromage Scale)		
	Lateral Group Mean±SD	Sitting Group Mean±SD	P Value
5th Min	2.06±0.620	1.73±0.583	0.001*
10th Min	2.62±0.489	2.37±0.510	0.002*
15th Min	2.94±0.235	2.98±0.152	0.25

Data are Mean±SD.

Comparison of Motor Block Level in Bromage Scale in Lateral and Sitting Groups Based on Time

Motor block level after 5th Min and 10th Min after spinal anesthesia were significantly lower in sitting group patients than in lateral group patients(P<0.05), but no statically significant difference after 15th Minute, which means sitting group patients who take spinal anesthesia in sitting position have slower onset to reach Bromage scale three (complete block) than lateral group. Based on Cohen's d an effect size after 5th minute, 10th minute, and 15th minute was 0.5, 0.5, and 0.2 respectively. This indicates medium size effect for 5th minute and 10th minute, but on small effect size for 15th minute (Table 3).

Comparison of sensory block level between lateral and sitting group

Level of sensory block with pinprick test after 5th Min of spinal anesthesia, sensory block level (Cephalad spread) is significantly higher (T6) in sitting group than in lateral group patients (P<0.05). But frequency of sensory block level at T8-T10 is higher for lateral group, Hence, sensory block level after spinal anesthesia after 10th Min and 15th Min showed no significant difference between lateral and sitting group patients (Figure 1).

Comparison of number of attempts, intraoperative fluid consumption, and intraoperative blood loss between groups

Intraoperative fluid consumption after spinal anesthesia in sitting group is significantly higher in sitting group than in lateral group (P<0.05). However, attempt of spinal needle insertion in lateral group is significantly higher than in sitting group (P<0.05). Hence, intraoperative blood loss in both lateral and sitting group after spinal anesthesia showed no significant difference (Table 4).

Comparison of Intraoperative complication between lateral and sitting group

Number of cases who had intraoperative complication like nausea/vomiting is significantly higher in sitting group than lateral group (P<0.05).

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Table 4: Comparison of number of attempts, intraoperative fluid consumption, and intraoperative blood loss in Lateral and Sitting Groups at WSUCSH May to August 2023.

Variables	Lateral Group Mean±SD	Sitting Group Mean±SD	P Value
Number of Attempt during Spinal anesthesia administration	2.60±0.871	1.71±0.717	0.000*
Intraoperative fluid consumption (ML)	2762.79±550.518	2974.42±670.239	0.025*
Intraoperative Blood loss (ML)	624.41±206.773	663.37±301.793	0.325

Data are Mean±SD.

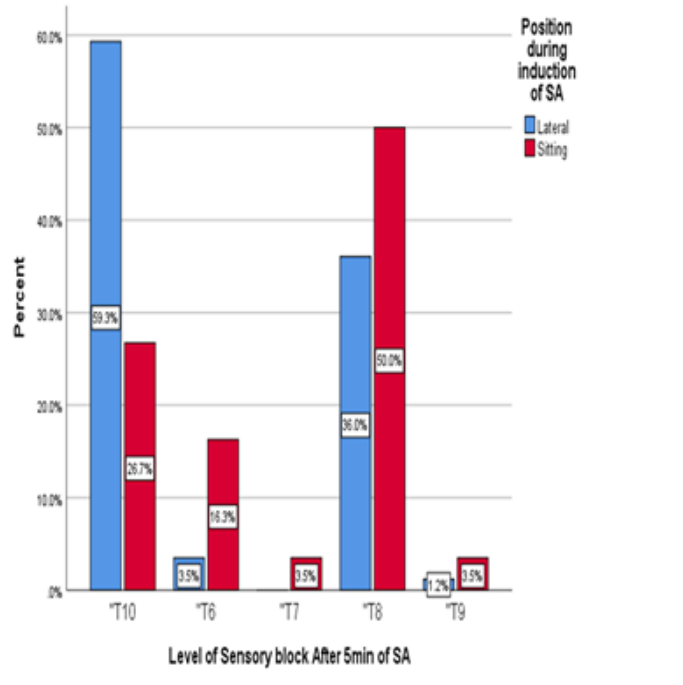

Figure 1: Comparison of sensory block level between lateral and sitting group at WSUCSH from May to August 2023.

Comparison of estimated time to first hypotension between group log rank test

In a log rank test, it was observed that the survival estimate time of two groups has statically significant difference. The sitting group mean time in minute is 10.485 [95% CI, 8.238-12.7322]; P<0.05) had shorter time to develop hypotension than the lateral group's mean time in minute is 16.506 [95% CI, 14.106-18.906]; P<0.05).

Discussion

This study targeted to assess the effect of positioning during induction of spinal anesthesia on the hemodynamic status, sensory/motor block level and onset time of first hypotension on patients who undergo cesarean section. In this study of healthy women receiving anesthetic solution of isobaric bupivacaine and, those in the sitting position revealed high incidence of hypotension, lower motor block with Bromage scale and received higher epinephrine than lateral group. Whereas sitting group has higher spread of the drug. In this study the overall incidence of hypotension for lateral and sitting group is 61.6% [95%CI, 52.3%- 72.1%] and 79.1% [95%CI, 69.8%-87.2%] respectively. The number of cases who developed hypotension was significantly higher in sitting group than lateral group, which is closely resembles with that of Simin et al, 50% and 76.3% for lateral and sitting group respectively [29].

José Ramon Ortiz-Gómez et al, 50.7% in sitting group, 60% in left lateral group, and 69.2% in right lateral group [30]. However, incidence of hypotension in study done by Obasuyi et al, revealed that 34% in lateral group and 56% in sitting. Nahid Manouchehrian et al, 24.5% in lateral group and 57.7% in sitting group. Muhammad Ali et al. [31]. These were not in line as compared to current study. So, using lateral position during induction of spinal is better than sitting position. And the possible reason for different outcome may be study population difference. However, study done by Obasuyi et al. On onset to first hypotension in minute is 11.8±10.7 in lateral group and 9.8±8.2 in sitting group, as this study there is not statically significant different between groups. In this current

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study onset to first hypotension in sitting group in minute is 10.981[95% CI, 8.690-13.272] and in lateral group's mean time in minute is 16.970 [95% CI, 14.569-19.372].

This current study had showed that sitting group has shorter time to develop hypotension as compared to lateral. And lateral position had delayed hypotension than sitting position. These findings implicate pregnant mother who takes spinal anesthesia in lateral position was beneficial as compared to sitting position as lateral position prevents early hypotension and fetal acidosis. The patient's position during spinal anesthesia induction and properties of the drug has been found to alter the rate of onset of analgesia and sensory/motor blockade. In this current study Bromage motor scale assessment and pinprick test for sensory block were used. In this current study Motor block level after 5th Minute and 10th Minute after spinal anesthesia were significantly lower in sitting group patients than in lateral group patients. But no significant difference after 15th Minute, which means sitting group patients who take spinal anesthesia in sitting position have slower onset to reach Bromage scale three (complete block) than lateral group.

And this current study finding is in line with, study done by Nahid Manouchehrian et al, about the effects of maternal position during induction of spinal anesthesia for cesarean section showed level of motor block through Bromage motor assessment scale in 5minute is 2.82±0.52 in sitting group, which is late to reach scale three and 2.98±0.14 in lateral. Ece Dumanlar Tan et al. about motor block level between groups showed the degree of motor block at 2 minutes was higher in lateral group than that of sitting group [32]. And using the later position during induction can bring adequate level of motor block for cesarean section. A similar concept to motor block, in this study level of sensory block with pinprick test after 5th Min of spinal anesthesia, sensory block level (Cephalad spread) is significantly higher (T6) in sitting group than in lateral group patients.

But frequency of sensory block level at T8-T10 is higher for lateral group, Hence, sensory block level after spinal anesthesia after 10th Min and 15th Min showed no significant difference between lateral and sitting group patients. And this finding is in line with Obasuyi et al, had showed that sitting group had a higher cephalad spread of the block than lateral group, some patients in sitting group had a sensory block to the cervical dermatomes above T4, whereas no patient in lateral group had cervical spread. Overall, administering spinal anesthesia was good in lateral position for motor and sensory block level. Study, which is done by Ece Dumanlar Tan et al, showed that at all measurement time periods the maximal dermatome level of sensory block in the cranial direction was substantially higher in lateral group than in sitting group. A Inglis et al, the onset of anesthesia to T6, dermatomal level was faster in the lateral group [33]. Nahid Manouchehrian et al, the maximum sensory-motor block with spinal anesthesia was significantly higher in the lateral position than in the sitting position. These findings are non-comparable to this current study. This may be due to use of hyperbaric drug which has properties of position dependent spread.

Unfortunately, there are limited studies on comparison of spinal needle insertion attempt between groups, but those available studies support this current study. In this current study number of attempt during spinal anesthesia administration to appropriate place is compared between the group and the result had showed that a mean attempt in number is significantly higher to lateral 2.60±0.871 than in sitting group 1.71±0.717, And this finding from this study was in line with a studies done by Ece Dumanlar Tan et al, when the groups were compared in terms of the number of attempt to detect epidural space under combined spinal-epidural anesthesia, lateral group had considerably more attempts than sitting group. According to a study conducted by A. Inglis et al, lateral group took longer time to place spinal needles in the lateral position to the subarachnoid space than sitting group (240 vs 115 sec). But study done by Coppejans et al, there were fewer technical difficulties in identification of the intrathecal space on the first attempt with patients in the sitting position [34,35]. Rather than its technical difficulties, the overall benefit of lateral position over sitting position outweighs.

Fluid loading left lateral uterine displacement, and the use of vasopressors are all preventative measures for hypotension. A study done by M. Stoneham et al, revealed that additional fluid for intraoperative usage has no significant difference between groups. Mean fluid consumption in milliliters was 880±370 and 810±210 for lateral and oxford group respectively [36,37]. An additional study done by Pooran Hajian et al, showed that there is no significant difference between the groups regarding intraoperative fluid consumption [38]. This may be due to population difference, as elective cases come after resuscitation over. The side effects of neuraxial block might range from itching to nausea and vomiting, urine retention, respiratory depression, behavioral alterations, central nervous system excitation, heart rhythm abnormalities, neurotoxicity, and allergy. In José Ramon Ortiz-Gómez et al. Ece Dumanlar Tan et al.

Esther M et al. Study showed there were no differences between groups in the number of patients with intraoperative adverse effects of spinal anesthesia revealed that there was no statistically significant difference between the groups in terms of possible intraoperative and postoperative adverse event of spinal anesthesia like nausea, vomiting, skin flushing, shivering, and others. However, in our study the number of cases who had intraoperative complication like nausea/vomiting and Bradicardia was significantly higher in sitting group than in lateral group. And lateral group had significantly higher number of patients with shivering than in sitting group. This is due to study population difference (Elective only), study area, and higher spread of sensory block cranially in sitting group than in lateral and it causes medullary hypo-perfusion secondary to hypotension. This spinal

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anesthesia related adverse events are lower with lateral position for induction of spinal anesthesia.

Strengths And Limitation of the Study

Regarding to this research, the study was the first for its type in the study areas which specifically compares the hemodynamic effects of lateral and sitting position, block level, and onset of first hypotension on pregnant mothers who undergo cesarean section. It can be used as a cornerstone for further studies in the study area. And application of strongly advanced analysis model, homogeneity of study population can be taken as strength. However, this study is observational, and the findings especially vital signs follow up timing are not vivid, because of lack of hemodynamics measurement materials as beat to beat and follow each minute, this can be limitation of the study.

Conclusion

In this study we have found statistical differences between lateral and sitting groups. Spinal anesthesia performed in lateral and sitting position with isobaric bupivacaine has an influence on hemodynamics status, sensory block level, motor block level and onset to first hypotension. Spinal anesthesia in lateral position has lower occurrence of intraoperative hypotension, optimal sensory/motor block level and lower incidence adverse events of spinal anesthesia like nausea, vomiting, and shivering. In addition to this, lateral position has lower vasopressor and fluid consumption. However, rather than technical difficulties during delivering spinal anesthesia in lateral position, lateral position has better effect than in sitting position.

Declarations

Ethics approval and consent to participant

The proposal was examined by the college of health science research review board prior to data collection, and a formal letter was obtained under project number CHSM/ERC/03/15. Following the submission of an official letter, obtain approval from the WSUCSH clinical director office. Additionally, during data collection time the study's goal was disclosed to the study participants in Amharic and local language (Wolaiteigna) accordingly. The survey was locked, and code numbers used instead of personal identification names to ensure confidentiality. Written consent from the pregnant mothers was obtained after disclosure of the benefit and risk in English, Amharic, and Wolaiteigna language according to their language ability to understand accordingly.

Author Contributions

SS was involved in the conception, design, analysis, interpretation, report, and manuscript writing. BK, WB, and TD participated in the conception, design, analysis, interpretation, and report writing. GD, AK, NS, AA, TM, SG and SR were involved in designing the study, analysis, report, and manuscript writing.

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References

1. Olawin AM, JM Das (2021) Spinal anesthesia, StatPearls Publishing.
2. Davoudi M, Tarbiat M, Ebadian MR, Hajian P (2016) Effect of position during spinal anesthesia on postdural puncture headache after cesarean section: a prospective, single-blind randomized clinical trial. Anesthesiology and Pain Medicine 6(4): e35486.
3. Al Husban N (2021) Anesthesia for cesarean section: retrospective comparative study. International Journal of Women's Health 13: 141-152.
4. Manouchehrian N, A Moradi, L Torkashvand (2021) Comparative study of effect of spinal anesthesia in sitting and lateral positions on the onset time of sensory block and hemodynamic condition in cesarean section: a randomized clinical trial. Anesthesiology and Pain Medicine 11(1): e111483.
5. Zangouei A, Zahraei SA, Sabertanha A, Nademi A, Golafshan Z, et al. (2019) Effect of low-dose intravenous ketamine on prevention of headache after spinal anesthesia in patients undergoing elective cesarean section: A double-blind clinical trial study. Anesthesiology and pain medicine 9(6): e97249.
6. Obasuyi B, S Fyneface Ogan, C Mato (2013) A comparison of the haemodynamic effects of lateral and sitting positions during induction of spinal anaesthesia for caesarean section. International journal of obstetric anesthesia 22(2): 124-128.
7. Mohammadi SS, M Piri, A Khajehnasiri (2017) Comparing three different modified sitting positions for ease of spinal needle insertion in patients undergoing spinal anesthesia. Anesthesiology and Pain Medicine 7(5): e55932.
8. Hewitt N, T Bucknall, NM Faraone (2016) Lateral positioning for critically ill adult patients. Cochrane database of systematic reviews 2016(5): CD007205.
9. Thomas P, J Parratt (2007) Is there evidence to support the use of lateral positioning in intensive care? A systematic review. Anaesthesia and intensive care 35(2): 239-255.
10. Secomb TW (2016) Hemodynamics. Comprehensive physiology 6(2): pp. 975.
11. Doering L (1993) The effect of positioning on hemodynamics and gas exchange in the critically ill: a review. American Journal of Critical Care 2(3): 208-216.
12. Ali M, A Sharif, SHE Naqvi (2018) Comparison of the hemodynamic effects of lateral and sitting positions during induction of spinal anaesthesia for caesarean section using Hyperbaric Bupivacaine. Pakistan Armed Forces Medical Journal 68(1): 45-49.
13. Javed S, Shareen H, Fatima A, Khawaja Tahir M (2011) Spinal anesthesia induced complications in caesarean section-A review. Journal of Pharmaceutical Sciences and Research 3(10): 1530-1538.
14. Lambert DH (1989) Complications of spinal anesthesia. International anesthesiology clinics 27(1): 51-55.

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15. Simin A, Bahman N, Haleh F, Saeede M, Hatami Marandi P, et al. (2018) Effect of Position during Induction of Spinal Anaesthesia for Caesarean Section on Maternal Haemodynamic: Randomised Clinical Trial. Journal of Clinical & Diagnostic Research 12(2): UC05-UC08.

16. El Kadi GA, RAS Mohamed, AM Fares (2018) A Comparative Study between the Performing Spinal Anesthesia in Sitting versus Lateral Position on Patient Hemodynamics. The Egyptian Journal of Hospital Medicine 73(1): 5748-5752.

17. Jelting Y, Klein C, Harlander T, Eberhart L, Roewer N, et al. (2017) Preventing nausea and vomiting in women undergoing regional anesthesia for cesarean section: challenges and solutions. Local and regional anesthesia 10: 83-90.

18. Patel M, Samsoon G, Swami A, Morgan B (1993) Posture and the spread of hyperbaric bupivacaine in parturients using the combined spinal epidural technique. Canadian journal of anaesthesia 40(10): 943-946.

20. Russell R, Popat M, Richards E, Burry J (2002) Combined spinal epidural anaesthesia for caesarean section: a randomised comparison of Oxford, lateral and sitting positions. International Journal of Obstetric Anesthesia 11(3): 190-195.

21. Hasanin A, AM Mokhtar, Ahmed AB, Reham Fouad, et al. (2017) post-spinal anesthesia hypotension during cesarean delivery, a review article. Egyptian Journal of Anaesthesia 33(2): 189-193.

22. Mamo M, Zema Z, Abera W, Tila M, Darma B, et al. (2023) Effect of intravenous tramadol versus pethidine on postspinal shivering control among mothers during cesarean section at Wolaita Sodo University Comprehensive Specialized Hospital, Southern Ethiopia: a prospective observational cohort study. Annals of Medicine and Surgery 85(6): 2324.

23. Ageru TA (2022) Burden of Intestinal Parasite Among Patients Attended Wolaita Sodo University Comprehensive Specialized Hospital in Ethiopia. American Journal of Life Sciences 10(4): 53-57.

24. Daabiss M (2011) American Society of Anaesthesiologists physical status classification 55(2): 111-115.

25. Apfel CC, Heidrich FM, Jukar Rao S, Jalota L, Hornuss C, et al. (2012) Evidence-based analysis of risk factors for postoperative nausea and vomiting 109(5): 742-753.

26. Sharma S, MF Hashmi, PT Bhattacharya (2023) Hypotension, StatPearls Publishing.

27. Sidhu S, Marine JE (2020) Evaluating and managing bradycardia 30(5): 265-272.

28. Spruce L (2021) Positioning the Patient. Aorn J 114(1): 75-84.

29. Moosavi Tekye SM, Alipour M (2014) Comparison of the effects and complications of unilateral spinal anesthesia versus standard spinal anesthesia in lower-limb orthopedic surgery. Revista Brasileira de Anestesiologia 64: 173-176.

30. José Ramon OG, Francisco Javier PA, Francisco MR, Inocencia FR, Lorenzo-Jiménez AM (2015) Effect of position on maternal haemodynamics during elective caesarean delivery under spinal anaesthesia. Anaesthesia 9: 22-29.

31. Ali M, A Sharif, SHE Naqvi (2018) Comparison of the hemodynamic effects of lateral and sitting positions during induction of spinal anaesthesia for caesarean section using Hyperbaric Bupivacaine. Pakistan Armed Forces Medical Journal 2018(1): 45-49.

32. Tan ED, B Günaydın (2014) Comparison of maternal and neonatal effects of combined spinal epidural Anaesthesia in either the sitting or lateral position during elective cesarean section. Turkish journal of anesthesiology and reanimation 42(1): 23-32.

33. Inglis A, M Daniel, E McGrady (1995) Maternal position during induction of spinal Anaesthesia for caesarean section: a comparison of right lateral and sitting positions. Anaesthesia 50(4): 363-365.

34. Coppejans HC, Hendrickx E, Goossens J, Vercauteren MP (2006) The sitting versus right lateral position during combined spinal-epidural anesthesia for cesarean delivery: block characteristics and severity of hypotension. Anesthesia & Analgesia 102(1): 243-247.

35. Yun EM, GF Marx, AC Santos (1998) The effects of maternal position during induction of combined spinal-epidural anesthesia for cesarean delivery. Anesthesia & Analgesia 87(3): 614-618.

36. Laithangbam P (2013) Comparison of the lateral, Oxford and sitting positions for combined spinal and epidural anesthesia for elective caesarean section. Journal of Medical Society 27(1): 70-74.

37. Stoneham MD, Eldridge J, Popat M, Russell R (1999) Oxford positioning technique improves haemodynamic stability and predictability of block height of spinal Anaesthesia for elective caesarean section. International Journal of Obstetric Anesthesia 8(4): 242-248.

38. Hajian P, M Nikooseresht, T Lotfi (2017) Comparison of 1-and 2-minute sitting positions versus immediately lying down on hemodynamic variables after spinal anesthesia with hyperbaric bupivacaine in elective cesarean section. Anesthesiology and pain medicine 7(2): e43462.

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