

**ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
DEPARTEMENT OF ANESTHESIA**



SCHOOL OF GRADUATE STUDY

THE PREVALENCE AND RISK FACTORS OF POST SPINAL HYPOTENSION AMONG PREGNANT MOTHERS WHO DELIVERED BY ELECTIVE CAESEREAN SECTION FROM JANUARY TO FEBRUARY AT GANDHI MEMORIAL HOSPITAL, ADDIS ABABA, ETHIOPIA. CROSS SECTIONAL STUDY DESIGN.

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ABSTRACT

INTRODUCTION: - Hypotension is a 20% to 30% reduction in systolic blood pressure, comparing it to initial values or absolute systolic blood pressure values between 100 mmHg and 90 mmHg. Hypotension during spinal anesthesia for cesarean section is one of the most common complication which decreases uteroplacental perfusion.

OBJECTIVES: - To assess incidence and risk factors of post spinal hypotension among pregnant mothers who delivered by elective cesarean sections from January to February 2016 at Gandhi Memorial Hospital, Addis Ababa.

METHODS: - Institution based cross sectional study design was conducted. All list of pregnant mothers who gave birth by elective cesarean section under spinal anesthesia at Gandhi Memorial Hospital were included. Training was given for data collectors and supervisors. Regular supervision and follow up made. Data was entered in to Epi info version 7 software and transported to SPSS version 20 for analysis. Odd ratio and 95% confidence interval was computed. Bivariate and Multivariate analysis used to identify factors associated with hypotension.

RESULTS: - The study was conducted on 60 study participants. 24(40%) were equally found between 25-29 years and 30-34 years. The incidence of hypotension was 80% during five to fifteen minute and 83% during fifteen to twenty five minute. 70% of the study participants were preloaded with more than 500ml of crystalloid and 60% were took oxytocin for uterine contraction. Majority of them were positioned in supine position prior to spinal anesthesia.

CONCLUSION AND RECCOMENDATION: -The incidence of hypotension was high so that vigorous fluid resuscitation and the use of prophylactic vasopressor were recommended.

Keywords: hypotension, pre-loading, spinal anesthesia

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LIST OF ACRONYMS AND ABBREVIATIONS

AAU	Addis Ababa University
CS	cesarean section
FMOH	Federal Ministry of Health
NGO	Non-Governmental Organization
RHB	Regional Health Bureau
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organization
ZHB	Zonal Health Bureau
BMI	Body Mass Index
LA	Local Anesthetics
SA	Spinal Anesthesia
GMH	Gandhi Memorial Hospital
CSF	Cerebrospinal Fluid

CHAPTER 1. INTRODUCTION

1.1 Background

Spinal anesthesia is induced by injecting small amounts of local anesthetic into the cerebro-spinal fluid (CSF). Spinal anesthesia is easy to perform, reliable and avoids the depressant effects of anesthetic drugs and has the potential to provide excellent operating conditions for caesarean section [1]. If the anesthetist has an adequate knowledge of the relevant anatomy, physiology and pharmacology; safe and satisfactory anesthesia can easily be obtained, to the mutual satisfaction of the patient, surgeon and anesthetist [2].

The most common definitions of hypotension after spinal anesthesia for caesarean delivery is a 20% to 30% reduction in systolic blood pressure, comparing it to initial values or absolute systolic blood pressure values between 100 mmHg and 90 mmHg [3]. Spinal hypotension during Caesarean section is common and up to 80% of anesthetics require the use of vasopressor to treat it [4].

Hypotension following spinal anesthesia is mainly occurring due to sympathetic blockade leading to peripheral vasodilatation and venous pooling of blood. As a result, there is decreased venous return and cardiac output leading to hypotension [5]. The risk of hypotension is increased in a parturient due to the higher level of block (T4) required for the cesarean section, unique physiologic and anatomic changes of pregnancy and increased susceptibility to the effects of sympathectomy due to reduced sensitivity to the endogenous vasoconstrictors [6].

Hypotension occurs less frequently when spinal anesthesia for a cesarean section is performed in the lateral position compared with the sitting position [7]. Staying patient in the sitting position for 5 minutes' results in lower sensory block levels that results in decrease in venous return and requirement of ephedrine for the treatment of hypotension following hyperbaric bupivacaine [8]. Slower speed of injection resulted in a lower incidence of hypotension and in addition, the hypotension was of delayed onset, shorter duration and required less ephedrine [9].

1.2 Statement of the problem

Hypotension following spinal anesthesia is a common physiological complication with an incidence ranging from 25-75% among general population in the world and a little higher in patients undergoing caesarean section. Occasionally, spinal anesthesia induced hypotension can be significantly severe, more so in pregnant females, which can increase intra-op and post-op morbidity [10, 11].

In North American survey, the most common threshold for treatment of hypotension was less than 20% of baseline pressure, whereas 13% tried to maintain BP at baseline level [12]. In New York, 919 term singleton pregnancies undergoing elective cesarean delivery under SA shown maternal hypotension of more than 30 and 50 % from baseline [13].

In a survey done in South Africa, hypotension contributes for the relatively high maternal mortality rate. Furthermore, hypotension has been linked to maternal and fetal morbidity, with increased nausea, vomiting and cardiac arrhythmia in parturient [14, 15].

In Kenyatta National Hospital, University of Nairobi, the shorter women (height <155 cm) receiving the same dosage of spinal local anesthetic agent as the taller ones would end up with higher maximum levels of spinal blockade and hence a higher incidence of hypotension and vasopressor use [16].

Studies have shown that the risk factors for development of severe hypotension in pregnant patients are: Age ≥ 35 years, Obesity (body mass index $\geq 29-35$ kg/m²), Pre-operative hypertension, associated co-morbidities and baricity of the drugs used [17].

Pre-loading decreases the incidence of hypotension after spinal anesthesia in the first 5 minutes following subarachnoid injection as compared to the patients who did not receive any pre-loading [18]. Colloid is more reliable than crystalloid in preventing hypotension in a systematic review, but is associated with additional risks and costs [19].

The aim of the study is to collect risk factors of post spinal hypotension and its prevalence so as to provide a baseline data and to encourage preventive methods of hypotension following caesarian deliveries under spinal anesthesia.

1.3 Justification of the Study

Hypotension during spinal anesthesia is a common complication following caesarian section which results decrease in uterine blood flow with a potential compromise of fetal oxygenation. Thus, prevention of severe hypotension during caesarean section is much more important than that in normal population for a favorable maternal and fetal outcome. Therefore, it is very important to assess incidence and determine risk factors of post spinal hypotension.

The result of the study will also be helpful for governmental and non-governmental organizations who have strategies to reduce maternal morbidity and mortality.

Even though most of the study done in abroad showed that, there is a use of prophylactic measures to reduce hypotension after induction of spinal anesthesia for caesarean sections, it is very uncommon to use prophylactic vasopressor to reduce incidence and severity of post spinal hypotension.

There is no study conducted on this topic in our country so that it can be used as a base line data for further researchers.

It can also be used as a sole input to the literature.

CHAPTER 2. LITERATURE REVIEW

Spinal anesthesia is a form of regional anesthesia where conduction block of nerve roots is achieved by injecting a small volume of local anesthetic solution into the subarachnoid fluid through a lumbar puncture. It produces complete analgesia with profound muscle relaxation, quiet respiration and small contracted bowel [20].

Maternal hypotension is the commonest complication of spinal anesthesia during caesarean section and is associated with reduced uteroplacental perfusion, poses a risk to both mother and neonate [21]. From general population, the incidence of hypotension caused by spinal block is greater than 90% in pregnant females making this the most frequently occurring adverse effect. Multiple pregnancies are not considered to be a risk factor for hypotension caused by spinal anesthesia for caesarean section compared to single pregnancies [22].

A study conducted at Department of Anesthesiology, University Bangkok, Thailand, includes 722 parturient undergoing cesarean section under spinal anesthesia, the incidence of hypotension was 52.6% [23].

A retrospectively study reviewed on anesthetic records of 991 patients who received spinal anesthesia for cesarean section in Thailand at Siri raj Hospital shown the incidence of hypotension was 76.7%. The risk factors associated with increased incidence of hypotension were the patient's height, baseline systolic blood pressure and level of blockade [24].

The European survey stated us the incidence of hypotension following administration of spinal anesthesia for caesarean delivery varies between 50 and 100% [25]. Several strategies have been suggested to reduce the incidence or diminish the severity of hypotension, such as patient positioning, fluid administration, and use of vasopressors [26].

Retrospective analysis suggests chronic alcohol consumption, history of hypertension, increased body mass index and sensory block height as independent risk factors for post-spinal hypotension. The higher the segmental sympathetic blockade, the greater is the risk

of hypotension [27]. One study showed a significantly increased incidence of hypotension in the group with a higher baseline heart rate [28]. The incidence of hypotension after spinal anesthesia is more common in patients with hypertension [29].

Some studies have suggested that patients with an increased BMI are at increased risk for the development of hypotension under spinal anesthesia for Caesarean delivery [30].

Hypotension after induction of spinal anesthesia for cesarean section is remains a common clinical problem and a potentially serious complication despite acute expansion of intravascular volume [31].

Colloids have a longer half-life in the intravascular compartment and are able to maintain the increase in intravascular volume for longer durations. So, more effective in preventing the hypotension following spinal anesthesia when used for pre-loading as compared to crystalloid solutions [32].

Another study observed co-loading with crystalloids and colloids, the incidence of hypotension remains similar and no significant differences was observed in vasopressor requirements or hemodynamic stability with both crystalloid and colloid co-loading [33]. Results of few studies have shown a sustained increase in cardiac output with rapid administration of crystalloids after initiation of spinal anesthesia [34].

The administration of vasopressor drugs by infusion as close to the time of the spinal anesthesia administration is helpful in reducing the incidence of hypotension [35]. One study found that a 30- mg bolus of ephedrine administered over 30 seconds following intrathecal injection did not completely eliminate maternal hypotension, nausea, vomiting and fetal acidosis [36].

The addition of dexamethasone (8 mg) to lidocaine for spinal anesthesia provided significant prolongation of sensory and motor block in comparison with plain lidocaine and there is no difference between dexamethasone-lidocaine 5% and epinephrine (0.2 mg)-lidocaine 5% in sensory and motor block duration [37].

Administration of hyperbaric bupivacaine 0.5% combined with adjuvant drugs have become the method of choice for elective cesarean section and emergency situations in order to improve the quality of blockade and extend the duration of analgesia. Furthermore, addition of adjuvants allows reducing the dose of bupivacaine and minimizes the hemodynamic effects [38].

A study done in India showed that with 12mg bupivacaine along with 1000ml of lactated Ringer's solution preloading and 10mg ephedrine, the incidence of hypotension was 70% [39]; which further lowered to 58% when 9mg bupivacaine was used along with 1000ml lactated Ringer's solution preload with 15mg ephedrine [40]. The incidence was further reduced to 31% when 25µg of fentanyl and 5mg bupivacaine was used. Addition of an adjuvant to local anesthesia can provide effective surgical anesthesia, with fewer side effects, lesser hemodynamic fluctuations, more rapid recovery from motor blockade, more prolonged analgesia [41].

Another study showed that reducing the local anesthetic dose used in spinal anesthesia could reduce the incidence and severity of maternal hypotension caused by subarachnoid anesthesia by 20% [42].

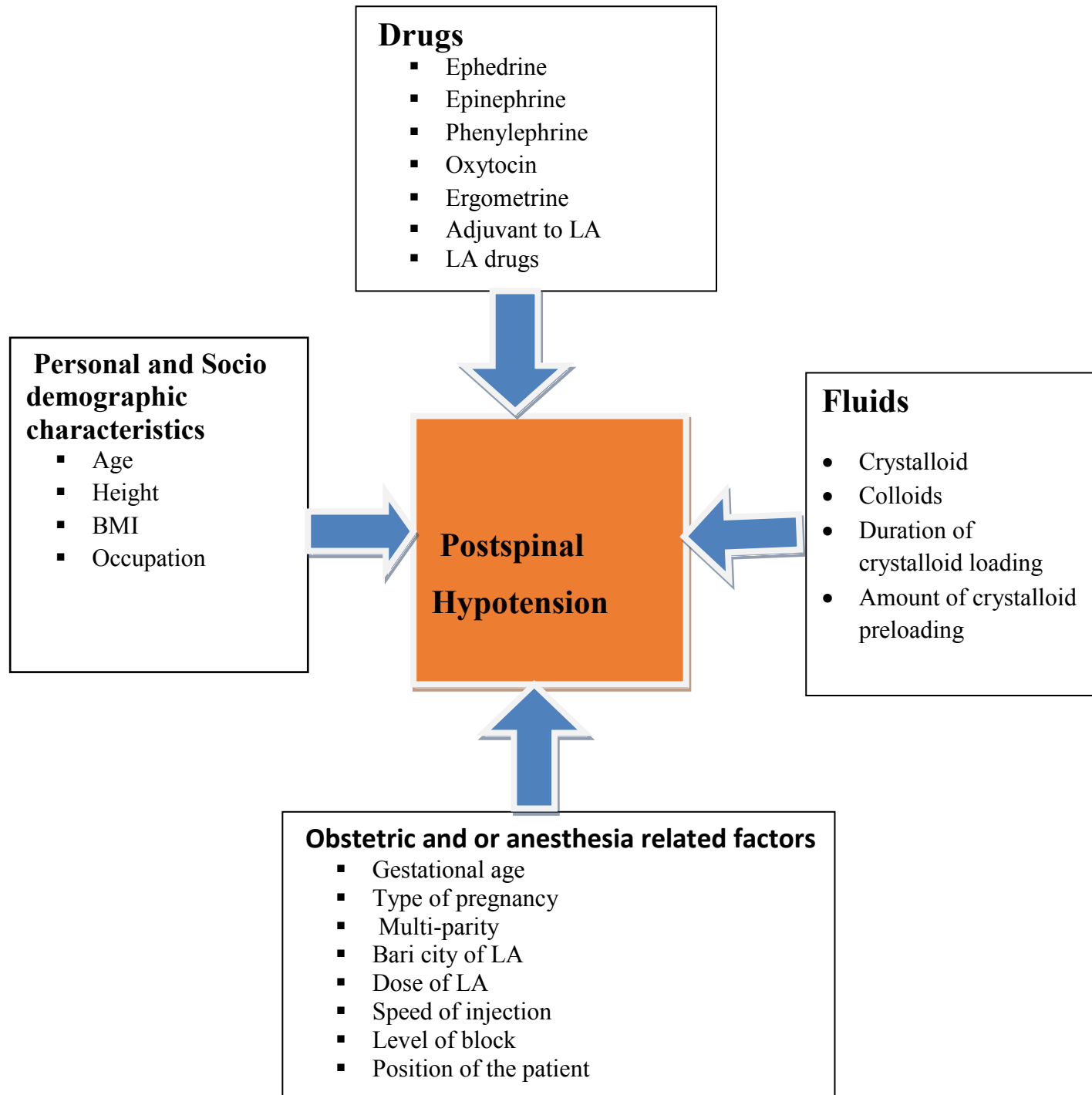


Figure 1: -Conceptual Framework

CHAPTER 3. OBJECTIVES

General Objective

To assess prevalence and risk factors of post spinal hypotension among pregnant mothers who delivered by elective cesarean sections from January to February at Gandhi Memorial Hospital, Addis Ababa, Ethiopia,2016.

Specific Objective

1. To assess prevalence of post spinal hypotension among pregnant mothers who delivered by elective cesarean sections at Gandhi Memorial Hospital, Addis Ababa, Ethiopia,2016.
2. To identify risk factors of post spinal hypotension among pregnant mothers who delivered by elective cesarean section at Gandhi Memorial Hospital, Addis Ababa, Ethiopia,2016.

CHAPTER 4. METHOD AND MATERIALS

4.1 Study area and period

The study was conducted at Gandhi Memorial Hospital located in Addis Ababa which is capital city of Ethiopia. It was established in 1958 G.C when it was called the only maternity hospital in Ethiopia. The hospital was named as Gandhi Memorial Hospital for the memory of Mohatema Gandhi. It is one of the thirteen governmental hospitals found in Addis Ababa and one of the hospitals which was administered by Addis Ababa Health Bureau. The Hospital primarily gives services for women and children. The Hospital provides Gynecologic, Obstetric and reproductive health services including Mother and Child Health (MCH), infertility and sexual violence services. Currently, it is providing inpatient, outpatient services and emergency cases. In October 2016, the hospital established a neonatal unit and currently serves as inpatient unit for at least 120 neonates per month. The hospital has 110 beds and delivers 25 neonates each day. The hospital has four operation theatre and average number of elective caesarian deliveries done at the hospital is two per day. Study was conducted from January to February 2016.

4.2 Study design: - Cross sectional study design was employed

4.3 Population

4.3.1 Source population: all pregnant mothers who gave birth by elective caesarian section at Gandhi Memorial Hospital, Addis Ababa, Ethiopia,2016.

4.3.2 Study population: Selected pregnant mothers who gave birth by elective caesarian section from January to February at Gandhi Memorial Hospital, Addis Ababa, Ethiopia,2016.

Exclusion criteria: - Failed spinal anesthesia, mothers who take antihypertensive drugs on the day of surgery and Preoperative maternal hypotension

4.4 Sampling technique and sample size determination: All list of mothers who come for elective cesarean section and done under spinal anesthesia from January to February 2016 at Gandhi Memorial Hospital was included. so that sampling technique and sample size determination was not used.

4.5 Study variables

4.5.1 Dependent variable: Post spinal hypotension.

4.5.2 Independent variables: -

- **Personal and Socio demographic characteristics:** Age, Height, BMI, Occupation
- **Fluids:** -Crystalloids, Colloids, Duration of crystalloid loading, Amount of fluid preloading
- **Drugs:** - Ephedrine, Epinephrine, Phenylephrine, Oxytocin, Ergometrine, Adjuvants to LA
- **Obstetric and or anesthesia related factors:** -Gestational age, Type of pregnancy, Multi-parity, Bari city of LA, Dose of LA, Speed of injection, Level of block and Position of the patient

4.6 Data collection tools and procedure

Data was collected using pretested structured questionnaires. It was prepared in English first and translated to the local language Amharic and again back to translation to English was made to check for consistency. Data was collected by two BSC holder anesthetists and supervised by one MSC holder Anesthetist by interview for some personal characteristics and follow up records for the vital signs.

4.7 Data Quality Assurance

Data collectors and supervisors was trained for a half day on each items included in the study tools, objective, relevant of study, right of respondents, confidentiality of information obtained. During data collection, regular supervision and follow up was made. Investigator was check for completeness and consistency of data on daily basis.

Once the data was collected and checked for completeness, consistency and accuracy, it was sorted, categorized and summarized. Double entry was made on 10% of the collected population.

4.8 Data Analyzing and processing

The data was entered on epi info version 7 and was exported to SPSS version 20 computer program for analysis. Descriptive statistics was used to summarize data, tables and figures for display results. Bivariate and multivariate analysis was used to see the effect of independent variable on post spinal hypotension. Variables which were significant on bivariate analysis at p-value less than 0.2 was taken to multivariate analysis. In multivariate analysis P- value of less than 0.05 was used as a cut of point for presence of association. Strength of association was measured by 95% confidence interval and/ Odd ratio.

4.9 Ethical Consideration

Ethical clearance and approval was obtained from ethical review committee, Anesthesia department, Addis Ababa University. Permission to conduct was obtained from Gandhi memorial Hospital. Informed written consent was secured from every study participant before the start of the interview after telling them about the objective of the study. The obtained data was only used for study purpose. Confidentiality and anonymity were ensured.

4.10 Operational Definition

Spinal anesthesia is induced by injecting small amounts of local anesthetic into the cerebro-spinal fluid (CSF).

Failed spinal is implying that a spinal anesthesia was attempted, but no block resulted and inadequacy relating to the extent, quality, or duration of local anesthetic action for the proposed surgery.

Post spinal hypotension is hypotension occurs immediately after administration of local anesthetics.

Cesarean delivery is the delivery of a fetus through surgical incisions made through the abdominal wall (laparotomy) and the uterine wall (hysterectomy).

Elective caesarean delivery: caesarean delivery done before the onset of labor in the absence of emergent situations that mandates urgent delivery.

Hypotension is Systolic blood pressures less than 85–90 mm Hg or a decrease of more than 20%–30% from the pre-anesthetic value.

Mild hypotension is a decrease of mean arterial pressure 20% below the baseline,

Moderate hypotension is a decrease of mean arterial pressure to below 20% to 30% from the base line.

Severe hypotension is a decrease of mean arterial pressure greater than 30% below the baseline.

Hypertension is a Systolic blood pressures greater than 140 mm Hg or an increase of more than 20%–30% from the pre-anesthetic value.

The level of sensory block is loss of sharp sensation to pinprick and was recorded bilaterally in the anterior axillary line or mid-clavicular line.

Bari city is the relation between the densities of a solution at a known temperature divided by the CSF density at the same temperature.

Adjuvant drugs is a drug that enhances the effectiveness or action of the principal ingredient.

Normal BMI is from 18.5-24.5kg/m², **Over weight** is from 25-29.5 kg/m²

Obesity is from 30-34.5 kg/m²

Multiparities is the condition of having borne a number of children

Multiple gestation is a pregnancy condition carrying two or more fetuses simultaneously

Gravidity is the number of times a woman has been pregnant, including current pregnancy.

Position of the patient is the pregnant mothers position prior to spinal anesthesia and during spinal anesthesia is given.

Duration of crystalloid loading is the time taken from the beginning of the preloading to start of spinal anesthesia

Amount of crystalloid loading is the amount of fluid administered before SA.

4.11 Dissemination plan

The copies of final results will be disseminated to college of health science and medicine, Hospitals and health centers in Addis Ababa, Federal Ministry of Health, Ethiopian Association of Anesthetists. Relevant development oriented or extension institutions will be informed about the findings of the study through manuals, brochures and leaflets. It will be published in national and international languages. It will be presented on workshop and different seminars.

CHAPTER FIVE: RESULT

Total number of pregnant mothers included in the study was 60. Among them, the highest number 24(40%) were belonged equally to the age group of 25 – 29 years and 30-34 years. The mean age of respondents was 29.30(minimum 22 and maximum 35). 24 (39.3%) were House wife. Half of the total participants are Amhara and overweight by body mass index. (table 1)

Socio-demographic characteristics

Table1: - socio-demographic characteristics of pregnant mothers who gave birth by elective ceserian section under spinal anesthesia at Gandhi Memorial Hospital ,Addis Ababa, Ethiopia,2016.

Variables	Category	Frequency	Percent
Age	20-24	6	10.0
	25-29	24	40.0
	30-34	24	40.0
	35-39	6	10.0
	Total	60	100.0
BMI	18.5-24.5	18	30.0
	25-29.5	30	50.0
	30-34.5	12	20.0
	Total	60	100.0
Ethnicity	Amhara	30	50.0
	Oromo	24	40.0
	Other	6	10.0
	Total	60	100.0
Occupation	Engineer	6	9.8
	federal police	6	9.8
	house wife	24	39.3
	Merchant	6	9.8
	Police	6	9.8
	Secretary	6	9.8
	Teacher	6	9.8
	Total	60	100.0

Obstetric and medical related problems

Out of the total 60 cases, majority of them were multigravida, 48(80%). Forty eight (80%) of all pregnant mother had no obstetric related medical problem were as 6 of them had hypertensive and Diabetes mellitus respectively. Most of pregnant mothers came at term with single gestation, 48(80%) followed by multiple gestation, 12(20%) (table 2)

Variables	Category	Frequency	Percent
Gravida	Gravida I	12	20.0
	Gravida II	36	60.0
	Gravida IV	12	20.0
	Total	60	100.0
Para	Para I	42	70.0
	Para II	6	10.0
	Para III	12	20.0
	Total	60	100.0
Abortion	Abortion 0	24	40.0
	Abortion I	36	60.0
	Total	60	100.0
Past medical and obstetric problem	Hypertension	6	10.0
	Diabetes mellitus	6	10.0
	Other	48	80.0
	Total	60	100.0
Type of gestation	Single	48	80.0
	Multiple	12	20.0
	Total	60	100.0
Gestational age in terms	Preterm	6	10.0
	Term	42	70.0
	Post term	12	20.0
	Total	60	100.0

Table 2: - Obstetric and medical related problems of pregnant mothers who gave birth by elective ceserian section under spinal anesthesia in Gandhi Memorial Hospital,Addis Ababa,Ethiopia,2016.

RISK FACTOR

About 36(60%) of all pregnant mothers were took oxytocin alone, 12(20%) were took ergometrine alone and 12(20%) took combination of oxytocin and ergometrine. More than half (59%) took 20IU of oxytocin infusion. (table 3).

Table 3: - Risk factors of post spinal hypotension of pregnant mothers who gave birth by elective ceserian section under spinal anesthesia in Gandhi Memorial Hospital ,Addis Ababa, Ethiopia,2016.

Variable	Category	Frequency	Percent
Type of uterotonic agent used	oxytocin	36	60.0
	Ergometrine	12	20.0
	Both	12	20.0
	Total	60	100.0
Dose and route of uterotonic agent used	Oxytocin 20iu infusion	36	59.0
	ergometrine 0.4mg IM	12	19.7
	Oxytocin 10iu infusion and Ergometrine 0.25mg IM	6	9.8
	Oxytocin 20iu infusion and Ergometrine 0.4mg IM	6	9.8
	Total	60	100.0

Half (50%) of pregnant mothers had preloaded with crystalloid at less than or equal to twenty minutes before spinal anesthesia and all of the them preloaded with normal saline. Among the study participants 42(70%) were preloaded with more than 500ml and 18(30%) were preloading with less than or equal to 500ml. (Figure 2)

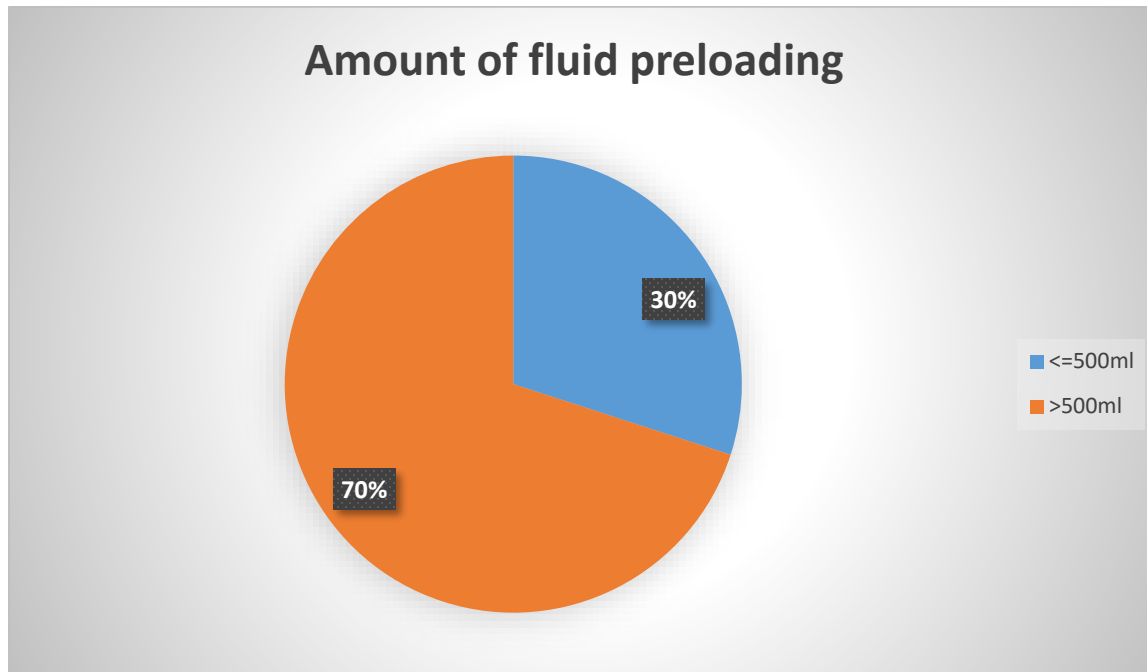


Figure 2: - Amount of fluid preloading used for spinal anesthesia in pregnant mothers who gave birth by elective ceserian section under spinal anesthesia in Gandhi Memorial Hospital ,Addis Ababa, Ethiopia,2016.

Among all local anesthetics used for spinal anesthesia 36(60%) were bupivacaine while 24(40%) were lidocaine and none of the local anesthetics was used with adjuvants. (Figure 3)

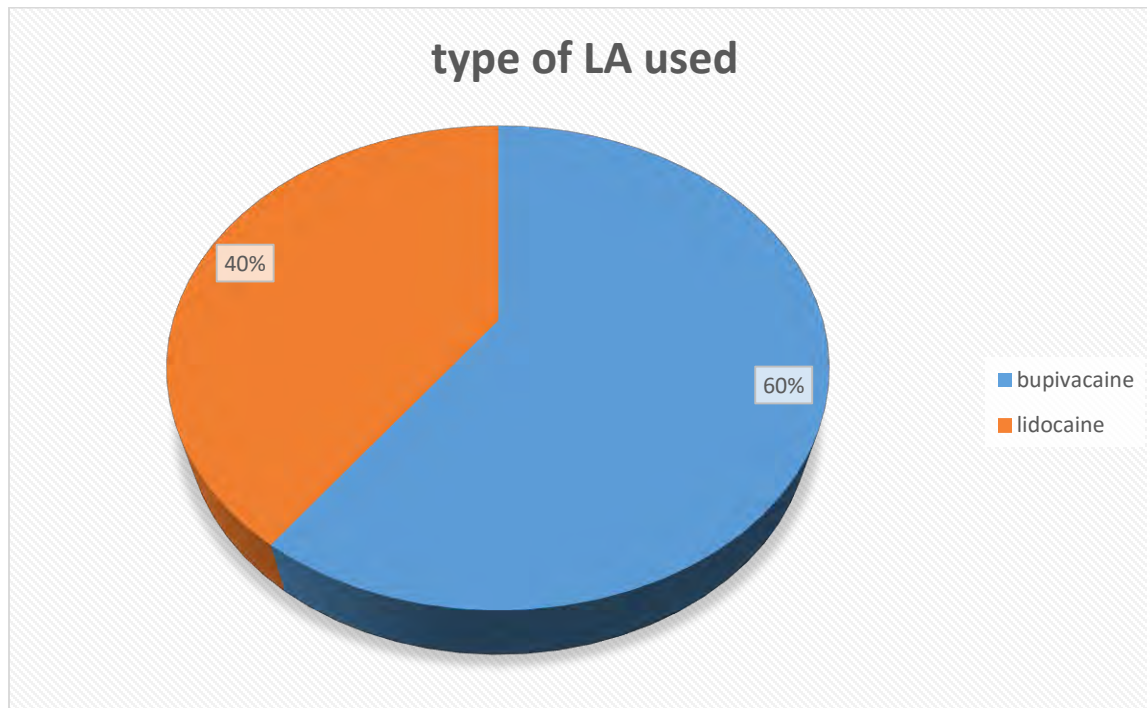


Figure 3: - local anesthetics used for spinal anesthesia in pregnant mothers who gave birth by elective ceserian section under spinal anesthesia in Gandhi Memorial Hospital,Addis Ababa,Ethiopia,2016.

36(60%) of the pregnant mother were secured with double Iv line while the rest was with single Iv line. Majority, 48(80%) were positioned in supine position prior to administration of spinal anesthesia when compared to left lateral position. All of spinal anesthesia was given in sitting position (Figure 4)

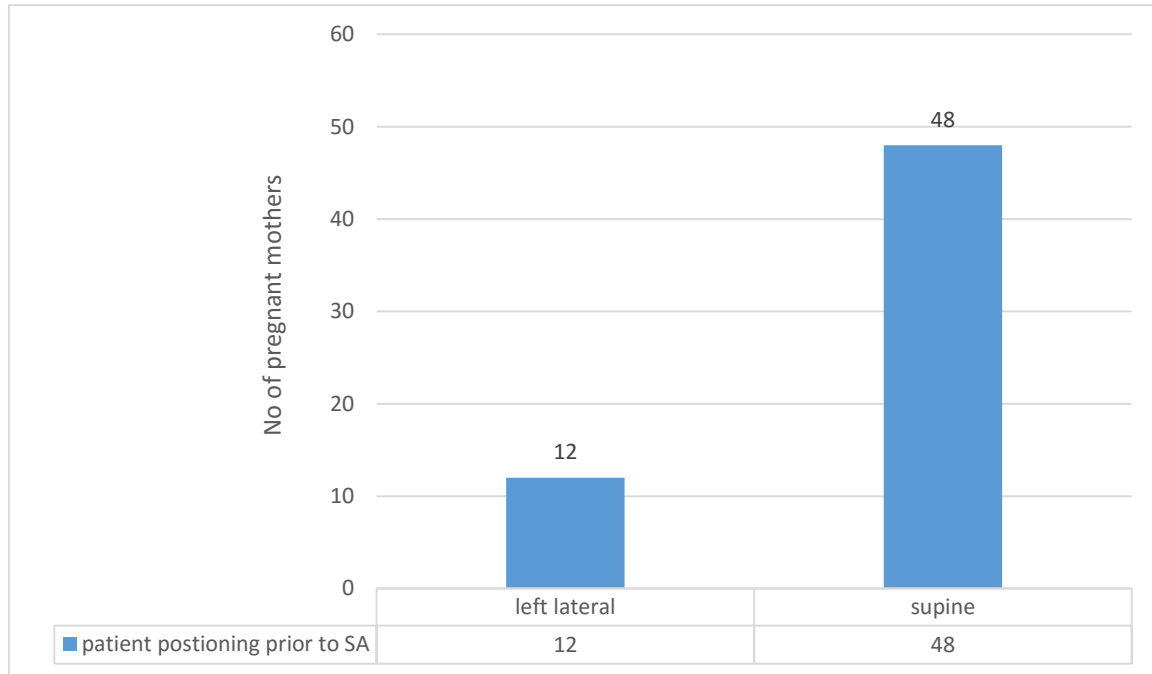


Figure 4: -Patient position prior to spinal anesthesia in pregnant mothers who gave birth by elective ceserian section under spinal anesthesia in Gandhi Memorial Hospital,Addis Ababa,Ethiopia,2016.

Comparing change in blood pressure from 5 to 15 minute to 15 to 25 minute, majority of pregnant mother developed moderate hypotension in the 15 to 25 minute. About 24 of all cases had mild hypotension from 5 to 15 minute. In both time groups equal number(n=4) of pregnant mothers develop severe hypotension. None of the patients used prophylactic vasopressor and colloid. (Figure 5)

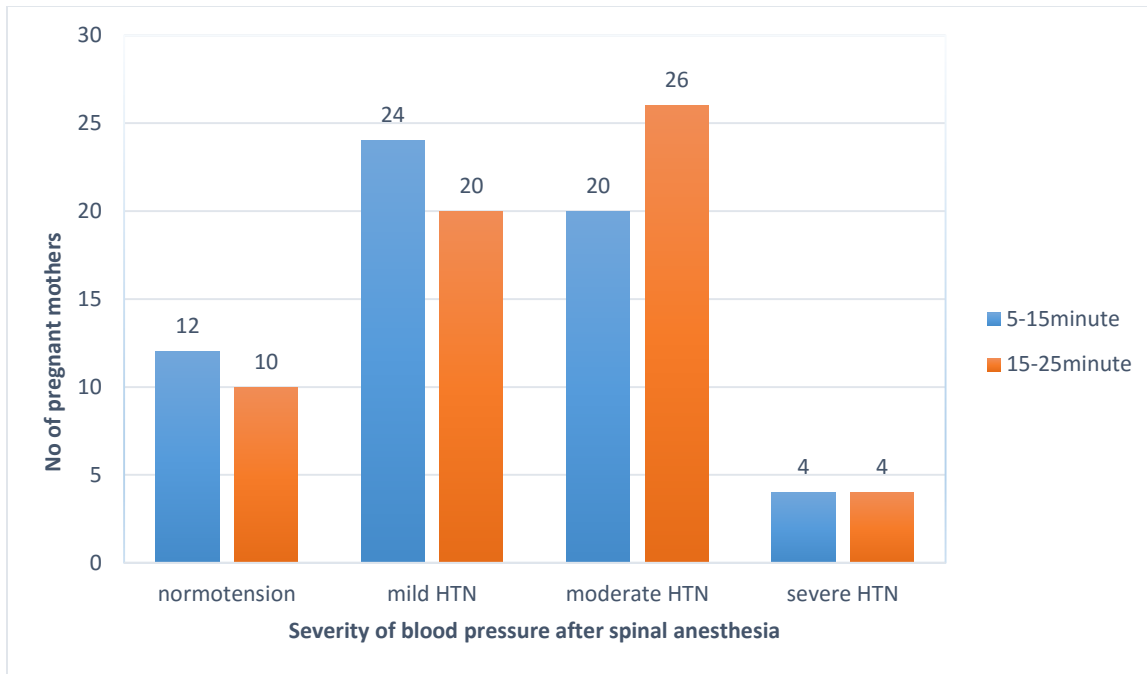


Figure 5: - Change in the blood pressure after spinal anesthesia in pregnant mothers who gave birth by elective ceserian section under spinal anesthesia in Gandhi Memorial Hospital,Addis Ababa,Ethiopia,2016.

Amount of fluid preloading(>500ml), duration of crystalloid loading before spinal, BMI was strongly associated with post spinal hypotension at p-value less than 0.05 at five to fifteen-minute post spinal anesthesia while Gestational age in terms, types of gestation pregnancy, Patient positioning prior to SA, type of uterotonic agent used were not associated with post spinal hypotension at the same value. The mothers who took less than or equal to 500ml fluid preloading developing post spinal hypotension 2 times more than who took more than 500ml fluid. (AOR, 1.897 95% C.I , 0.246 - 3.272). The pregnant mother who was preloading with crystalloid for greater than 20 min before spinal anesthesia was about 9 times more likely to develop hypotension than those preloaded for less than or equal to 20 min before spinal anesthesia. (AOR, 9.000, 95% C.I, 1.418 - 57.117). (Table 4)

Table 4:- Association of factors affecting post spinal anesthesia at five to fifteen minute after spinal anesthesia in pregnant mothers who gave birth by elective ceserian section under spinal anesthesia in Gandhi Memorial Hospital ,Addis Ababa,Ethiopia,2016.

Variable	Category	p-value	AOR	95% C.I. for EXP(B)	
				Lower	Upper
Gestational age in terms	Preterm	*	*	*	*
	Term	.390	.324	.025	4.230
	Post term	.619	.686	.156	3.026
Types of gestation pregnancy	Single	.221	.399	*	*
	Multiple	1.547	.520	0.475	1.587
BMI	Normal	*	*	*	*
	Over weight	.028	.798	.653	.976
	Obesity	0.046			
Patient positioning prior to SA	Supine	.746	.778	.170	3.564
	Left lateral	*	*	*	*
Type of uterotonic agent used	Oxytocin	.975	.974	.186	5.096
	Ergometrine	.217	.174	.011	2.783
	Both	*	*	*	*
Duration of crystalloid loading before spinal	<= 20min	*	*	*	*
	>20min	0.020	9.000	1.418	57.117
Amount of fluid preloading	<= 500ml	.870	1.897	.246	3.272
	>500ml	*	*	*	*

BMI, Oxytocin agent used, amount of fluid preloading was strongly associated with post spinal hypotension at p-value less than 0.05 at fifteen minute to twenty-five minutes while Gestational age in terms, types of gestation pregnancy, Patient positioning prior to Spinal anesthesia and duration of crystalloid loading were not associated with post spinal hypotension at the same value. The mothers who took oxytocin develop post spinal hypotension 4 times more than those who took ergometrine or both. (AOR, 3.965 95% C.I ,1.473 -10.674). The pregnant mother who placed in supine position prior to spinal anesthesia was about 3 times more likely to develop hypotension than left lateral position. (AOR, 2.953 95% C.I ,0.356 - 24.519). (Table 5)

Table 5:- Association of factors affecting post spinal anesthesia at fifteen to twenty- five minute after spinal anesthesia in pregnant mothers who gave birth by elective ceserian section under spinal anesthesia in Gandhi Memorial Hospital ,Addis Ababa,Ethiopia,2016.

Variable	category	p-value	AOR	95% C.I. for EXP(B)	
				Lower	Upper
Gestational age in terms	Preterm	*	*	*	*
	Term	.340	3.119	.301	4.340
	Post term	.838	.827	.134	.838
Types of gestation pregnancy	Single	*	*	*	*
	multiple	.316	1.219	.316	2.327
BMI	Normal		*	*	*
	Over weight	.038	.040	.002	.833
Patient positioning prior to SA	Left lateral	*	*	*	*
	supine	.316	2.953	.356	24.519
Type of uterotonic agent used	oxytocin	.006	3.965	1.473	4.674
	Ergometrine	.122	.182	.021	1.578
	Both	*	*	*	*
Duration of crystalloid loading before spinal	<= 20min	.235	*	*	*
	>20min	.241	.426	.102	1.773
Amount of fluid preloading	<= 500ml	.035	12.143	1.193	23.618
	>500ml	*	*	*	*

NB. * shows constant

CHAPTER SIX: DISCUSSION

Most of the pregnant mother were belonged similarly to the age group of 25-29 year 24(40%) and age group of 30-34 year 24(40%). The mean average is 29.30(minimum 22 and maximum 35). Incidence of post spinal hypotension was 80% in five to fifteen minutes and 83.7% in fifteen to twenty-five minutes. The result from University Bangkok, Thailand, revealed that the incidence of post spinal hypotension was 52.6%. [22] This is most likely due to a pre-load fluid bolus are not sufficient to maintain hemodynamic stability after the initiation of spinal anesthesia and they used vasopressor as prophylaxis and add adjuvant drugs.

The present study indicated that the highest decrease in Systolic blood pressure occurred in both time groups after spinal anesthesia which is consistent with other similar studies [21,22]. This can be due to the sensitivity of the autonomous nervous system and sympathetic paralysis below the blockage site before sensory and motor paralysis. Moreover, in pregnant women, the hypotension can also be result of aortic and inferior vena cava compression in supine position after spinal anesthesia [43].

This study revealed that amount of fluid preloading (<500ml) and duration of crystalloid loading before spinal anesthesia was strongly associated with post spinal hypotension at five to fifteen minutes. And amount of fluid preloading (<500ml) was also associated with post spinal hypotension from fifteen to twenty-five minutes. The odd of developing post spinal hypotension was two times more in mothers who took less than or equal to 500ml fluid preloading than the odd of developing post spinal hypotension who took more than 500ml fluid. However, another study Rout *et al*, noted that the incidence of hypotension was reduced in patients who received crystalloid 20 ml/kg than in patients without pre-hydration [44]

In this study the pregnant mother who was preloading with crystalloid for greater than 20 min before spinal anesthesia was about 9 times more likely to develop hypotension than those preloaded for less than or equal to 20 minutes. In contrast, a study done in South Korea, Department of Anesthesiology and pain Medicine, the timing of crystalloid loading does not have an impact on the incidence of post spinal hypotension [45].

This is most likely due to only small portion of crystalloid fluid is remained in intravascular space at the time of vasodilatation after spinal anesthesia.

In the study, it was found that took oxytocin was four times more likely to develop post spinal hypotension than the pregnant mother who underwent spinal anesthesia and took ergometrine for uterine contraction from fifteen to twenty-five-minute post spinal anesthesia. Another study done in United Kingdom, Birmingham Women's Hospital suggested that, although there is controversial concerning the effect of oxytocin on hemodynamic effect, there is a decrease in mean arterial blood pressure in healthy women having elective caesarian section [46].

According to the findings of this study, the odds of developing post spinal hypotension in supine position prior to spinal anesthesia was three times more likely as compared to developing post spinal hypotension in left lateral position. The findings of other study revealed that the degree of hypotension was higher in supine when compared to left lateral position. During supine position the gravid uterus of the pregnant woman compresses the aorta and the inferior vena cava against the bodies of lumbar of vertebra. This results in decreased venous return which may decreases maternal cardiac output and blood pressure [47].

It was also observed from the result of current study that body mass index was significantly associated with the development of post spinal hypotension at both five to fifteen and fifteen to twenty-five minutes. Similarly, another studies have suggested that patients with an increased BMI are at increased risk for the development of hypotension under spinal anesthesia for Caesarean delivery [29].

LIMITATION OF THE STUDY

The study lacks literatures from Africa and Ethiopia.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION

7.1 Conclusions

In this study the incidence of post spinal hypotension was high at both time intervals.

Body mass index, amount of fluid preloading and duration of crystalloid loaded before spinal anesthesia were the major factors of post spinal hypotension at both intervals.

Preloading the pregnant mother with more than 500ml of crystalloid for 20 minute prior to spinal anesthesia had a great impact to reduce the incidence of post spinal hypotension.

The use of Ergometrine and combination of Ergometrine and oxytocin to stabilize hemodynamic effects.

7.2 Recommendations

Based on the finding of the study the following recommendation were drawn

Anesthetist were recommended to use more than 500ml of crystalloid fluids within 20 minutes prior to spinal anesthesia, to minimize use of oxytocin alone for uterine contraction.

Obstetrician should position the patient in left lateral position prior to spinal anesthesia to avoid the effect of aortocaval compression caused by gravid uterus.

Researchers were recommended to conduct further research's on factors affecting change in blood pressure using analytical study design.

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ANNEXES I. INFORMATION SHEET

Hello ladies and gentle men.

My name is Ashebir Nigussie. I am a researcher and I have been attending postgraduate program in the field of Anesthesia at Addis ababa university. I am going to conduct research **on prevalence and risk factors of post spinal hypotension in pregnant mothers who delivered by elective ceserean section from January to February 2016 at Gandhi Memorial Hospital.**

The information going to obtained will help the government and other responsible bodies to reduce post spinal hypotension which helps to reduce maternal mortality and morbidity. Be mindful that whatever we will get here is for research purposes only and the information will not be used by any other person apart from this research and therefore,confidentiality can be guaranteed. However, your names will not be mentioned or be attached to anything that you say.

Do yo want to continue yes-----No------(Thank you in advance for your help!)

Name and contact address of invesigators

Ashebir Nugussie Email ashebirnigussie3@gmail.com Cell phone +251-924-09-36-27

Patient’s Identification card no. -----

PART I: SOCIO DEMOGRAPHIC CHARACTERISTICS

			Skip pattern	Remark
101	Age	-----		
102	Weight	-----		
103	Height	-----		
104	BMI	-----		
105	Ethnicity	Amhara -----1 Oromo -----2 Tigre-----3 Others(specify)-----5		
106	Occupation	-----		
107	Family size	-----		

PART II.OBSTETRICS AND/MEDICAL RELATED FACTORS

			Skip pattern	Remark
701	Pregnancy state	Gravida(specify in no.)----- Abortion(specify in no.)----- Para(specify in no.)-----		
702	Gestational age (in weeks)	-----		
703	Past Medical and/or obstetrics problem	Hypertension-----1 Diabetes mellitus-----2 Previous history of PIH-----3 None-----4		
704	Please, specify other current obstetric related disorder	-----		
705	Types of gestation (pregnancy)	Single-----1 Twin gestation-----2 Others(please specify)-----3		

PART III. RISK FACTORS

			Skip pattern	Remark
801	Iv line	Single -----1 Double -----2 Others-----3		
802	Gauge of Iv cannula used	-----		
803	Patient positioning prior to spinal anesthesia	Left lateral-----1 Others(specify)-----2		
804	Vital sign before spinal anesthesia	PR-----bpm BP-----mmhg SPO2-----%		
805	Is patient loaded?	Yes-----1 No -----2	806 →	
806	Type of solution for loading	Crystalloid -----1 Colloid-----2		
807	If Crystalloid (please,specify)	-----		
808	Amount of Crystalloid loaded(in milliliter)	-----ml		
809	Duration of Crystalloid loading before spinal	-----min		
810	If colloids (please,specify)	_____		
811	Amount of colloid loaded (in milliliter)	-----ml		
812	Time of Vasopressor used	Before spinal-----1 During spinal-----2 After spinal-----3		
813	Type and dose of vasopressor used	-----		
814	Patient positioning during spinal anesthesia	sitting-----1 lateral-----2		
815	Local anesthetics used	Lidocaine-----1 Bupivacaine-----2		
816	Other adjuvants (specify type and dose)	-----		

817	Baricity of LA	-----		
818	Dose of LA	-----mg		
819	Level of sensory block (Bilaterally)	T10 T9 Other (specify)		
820	Vital sign after spinal anesthesia	Measure 5 min after SA given PR----- BP----- SPO2----- Then, 10min after SA PR----- BP----- SPO2----- After 15min PR----- BP----- SPO2----- After 20min PR----- BP----- SPO2----- After 25min PR----- BP----- SPO2-----		
821	Type and dose of uterotonic agent used	Oxytocin-----1 Ergometrin-----2		
822	Dose and route of uterotonic agent used	-----		
823	Duration of Anesthesia	-----		
824	Duration of surgery	-----		

ANNEX II ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical Conduct of the research project and for provision of required progress reports as per terms And conditions of the research publications office in effect at the time of grant is forwarded as the result of this application.

Name of the student: -----

Date-----

Signature-----

Approval of the primary Advisor

Name of the primary advisor: -----

Date-----

Signature -----