ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE

DEPARTMENT OF ANESTHESIOLOGY, CRITICAL CARE, AND PAIN MEDICINE

INCIDENCE AND ASSOCIATED FACTORS OF POST SPINAL ANESTHESIA HYPOTENSION AMONG PATIENTS UNDERGO EMERGENCY AND ELECTIVE SURGERY UNDER SPINAL ANESTHESIA AT TIKUR ANBESA SPECIALIZED HOSPITAL, ADDIS ABABA, ETHIOPIA, 2024

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INCIDENCE AND ASSOCIATED FACTORS OF HYPOTENSION AFTER SPINAL ANESHESIA WHO UNDERGO BOTH ELECTIVE AND EMERGENCY SURGERY UNDER SPINAL ANESTHESIA AT TIKUR ANBESA SPECIALIZED HOSPITAL

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Abstract

Background: Hypotension is one of the feared complications associated with spinal anesthesia. Though data is scarce in low-income countries, the incidence of post spinal hypotension ranges from 15-33%. Different factors are associated with the development of post spinal hypotension like patient related factors, anesthesia related factors and surgical related factors thus identifying the incident and associated factors of post spinal hypotension will help identify preventive measures.

Objective: To assess the incidence and associated factors of post spinal anesthesia hypotension on patients undergoing surgery at Tikur Anbesa specialized hospital, from November 1, 2023-Fev 30, 2024GC.

Method: Hospital based cross sectional study was conducted using 258 patients. A structured pre-tested modified and adopted questionnaire was used to collect data who underwent surgery using spinal anesthesia at Tikur Anbesa specialized hospital, from November 1, 2023-Fev 30, 2024GC. A proportional stratiefied random sampling was used to select study subjects. Data was entered cleared using Epi data version 3.1 then exported to SPSS version 27 for analysis.Odd ratio was calculated on variables to determine associated through binary and multivariate logistic regression.

Result: Among 258 patients who underwent surgery incident of post spinal hypotension was 15.5%, using at 5% level of significant multivariable binary logistic regression; hypertension, sensory block above T5 and hemoglobin level <10mg/dl were associated with development of post spinal hypotension. The odd ratio of developing post spinal hypotension in hypertensive patient was 3.47 times AOR = 3.474, 95%CI= [1.356–8.897] than patients who has no hypertension. The odd ratio of developing post spinal hypotension in patients' hemoglobin <10mg/dl was 2.85 times AOR =2.85, 95% CI= [1.113-7.299] than patients' hemoglobin >10mg/dl, sensory block above increase post spinal hypotension by 5 times T5, AOR = 5.196, 95% CI = [2,286 – 13.331]. But there was no association with age,baricity,baseline heart rate,chronic alcohol consumption,urgency of surgery.

Conclusion: This study revealed that the incidence of spinal anesthesia induced hypotension was relatively low, and the independent associated factors were history of

hypertension, hemoglobin level less than 10mg/dl and sensory block above T5. The mean time to develop post spinal hypotension was 14 minutes.

Key Words: Post Spinal Anesthesia hypotension, Baricite,

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LIST OF ACRONYMS

AAU	Addis Ababa University
ACCPM	Anesthesiology Critical Care and Pain Medicine
BMI	Body Mass Index
BP	Blood Pressure
CO	Cardiac Output
DM	Diabetes Mellitus
ENT	Ear Nose and Throat
Hgb	Hemoglobin
HR	Heart Rate
IOH	Intra-Operative Hypotension
LD	Low Dose
MD	Medium Dose
MAP	Mean Arterial Pressure
OR	Odd Ratio
PDPH	Post Dural Puncture Headache
PSA	Post Spinal Anesthesia
SBP	Systolic Blood Pressure
SPSS	Statistical Package for the Social Sciences

1. Introduction

1.1. Background

Although there is no universal definition for spinal anesthesia induce hypotension different literatures define it as SBP <90 mmHg, a MAP < 65 mmHg or a 20% decrease from the baseline measurement of either MAP or SBP during or after administration of spinal anesthesia. Blood pressure may be affected by many causes in perioperative medicine: one factor is spinal anesthesia. It is vital to maintain arterial blood pressure especially mean arterial blood pressure to ensure adequate perfusion of organs system; however, blood pressure may be affected from many causes in perioperative medicine. While spinal anesthesia provides significant benefit, it is frequently associated with spinal anesthesia induced hypotension [1].

Different literatures cite incidence of post spinal anesthesia hypotension range from 15-33% [2], prospective Study done in India post spinal anesthesia was found to be 30.7% [4]. However, the incidence in Thailand was 46.8% [3]

Those risk factors associated with post-spinal anesthesia hypotension includes patient-related factors such as older age, female gender, BMI>30kg/m2, and comorbidities like hypertension, anesthesia-related factors such as the level of sensory block above T5, dose and baricite of local anesthetic used and procedure related emergency or elective surgery [3].

Many patients in our hospital undergo spinal anesthesia both at the emergence and elective surgery. Thus, conducting this research enables to identify the incidence, and associated factors for post spinal anesthesia.

1.2. Statement of the problem

In Tikur Anbessa Hospital from monthly audit report in Anesthesiology, critical care and Pain Medicine department in average 160 patients per month, which is, more than 1900 patients /yr. undergo emergency and elective surgery with spinal anesthesia. Post spinal anesthesia hypotension ranges from 30-48% in other countries. Intraoperative hypotension (IOH) is common and associated with major organ injury like kidney, neurological and cardiac complication and even death[6].

Most of patients in our set up who undergo spinal anesthesia are orthopedic and urologic cases. Majority of these patients are elders so the incidence of post spinal anesthesia hypotension likely will be higher. Therefore, knowing the incidence and associated factors for post-spinal anesthesia hypotension can help to identify patients at risk and implement preventive measures to reduce the incidence and severity of this complication.

1.3. Significance of the study

The study of incidence and associated factors for post-spinal hypotension in non-obstetrics patients is significant for several reasons:

Patient safety: Post-spinal hypotension can lead to serious complications such as myocardial infarction, stroke, and renal failure. Identifying the incidence and associated factors can help healthcare providers take preventive measures to reduce the risk of these complications.

Cost-effectiveness: Post-spinal hypotension can increase hospital stay and healthcare costs. A study on the incidence and associated factors can help healthcare providers identify the high-risk patients and take preventive measures, which can reduce the length of hospital stay and healthcare costs.

Quality of care: The study can help healthcare providers improve the quality of care by identifying the factors that contribute to post-spinal hypotension. This can lead to the development of better treatment protocols and guidelines for managing patients at risk of post-spinal hypotension.

Overall, the study of incidence and associated factors for post-spinal hypotension in non-obstetrics patients is essential for improving patient safety, reducing healthcare costs, improving quality of care, and advancing research in the field.

2. Literature review

different literatures define post spinal anesthesia hypotension as SBP <90 mmHg, a MAP < 65 mmHg or a 20% decrease from the baseline measurement of either MAP or SBP during or after administration of spinal anesthesia[1].

In the setting of spinal anesthesia, hypotension (defined as systolic blood pressure <90 mm Hg or defined as a reduction in mean arterial blood pressure >30%) [11].

2.1. Incidence of post spinal anesthesia

Different studies show significant variation on the incident and associated factor for PSA hypotension. The high variation among publications may be explained by different definition of IOH.

Most Studies showed incidence PSP Hypotension to be greater than 30%.

Prospective study done in India in 2006, shows incidence of PSH was 30.7% [2]. In another retrospective cohort, study in a university hospital, Thailand; which was done on January 2014 GC and June 2019 GC, aim of the study was to examine the modifiable risk factors of pre-operative hypotension from the 186 patients, with an age of more than 60 years were included. The incidence of spinal anesthesia-induced hypotension was 46.8% [3]. Other retrospective study done 2019 GC in Java shows the incidence of hypotension in 56.25% patient's spinal anesthesia [10]. study, done in South Africa on 2016GC, incidence of hypotension after spinal anesthesia was 56% [8].

Few studies that showed the incidence of PSA hypotension less than 30%.

Study done in Germany from January 1, 1997, to August 5, 2000, on 3098 patients with SPA the incidence PSA hypotension was 5.4% [11].and another prospective cohort study was conducted Tikur Anbessa hospital in 2021GC and total of 110 elective patients with controlled hypertension (55) and normotensive (55) patients who underwent surgery with spinal anesthesia. The incidence of hypotension in the controlled hypertension group (23.6%) was higher than the normotensive group (7.3%) [7]. So, from this literature the significant variation in the incidence of hypotension after spinal anesthesia could be due to using different definition of hypotension.

2.2. Factors associated with post spinal hypotension

Many risk Factors associated with post spinal hypotension has assessed in different literatures:

2.2.1. Age

Prospective study done in India showed age above 55years has strong association with post spinal hypotension that increasing by 2.358 times [2].

Another study conducted in Thailand, shows age above 60-year increase the risk of hypotension after spinal anesthesia [3]. other retrospective study done 2019 in Java to assess various risk factor from 80 medical records shows hypotension in 56.25% patients spinal anesthesia of this 30% is above age 45yrs and 26.25% is age below 45yrs [10].

2.2.1. Gender

prospective study done in India in 2006GC, involving 1000 patients to Identification of various risk factors associated with early hypotension undergoing spinal anesthesia, female sex has association with development of hypotension with 1.127times [2]. other study done in south Africa shows female sex is associated with a higher risk for developing spinal hypotension, with 132 females of 212 total patients developing spinal hypotension (66.0%, p = 0.01[8]).

2.2.2 History of hypertension

A German study conducted from January 1, 1997 GC to August 5, 2000 GC revealed that a history of hypertension doubled the likelihood of post-spinal hypotension [OR = 2.21].[9]. Another prospective trial conducted in India in 2006 revealed that individuals with a history of preoperative hypertension had a twofold increased risk of hypotension [2]. A prospective cohort research was carried out in Tikur Anbessa Hospital in 2021 G.C. involving 110 elective patients, 55 of whom had managed hypertension and 55 of whom had normotension, who had spinal anesthesia for surgery. Compared to the normotensive group (7.3%), the managed hypertension group experienced a greater incidence of hypotension (23.6%).[7].

2.2.1 Spinal anesthesia doses and baricite

Study done in south Africa on 2004 on 50 patients, shows patients who has taken low dose local anesthetic has developed low incidence of hypotension after spinal anesthesia [5]. prospective, observational study, done in South Africa in 2016, a total of 357 patients age>55yr were recruited into the study increasing dosage of bupivacaine will increase the risk of post spinal hypotension and also isobaric bupivacaine increase the risk by (OR=1.5%) [8].

A prospective cohort study in Netherlands done in 2019GC, included 64 patients aged >65 years scheduled for procedures under SA; the patients received either 15 mg bupivacaine (the medium dose [MD] 33 patients or 10 mg bupivacaine with 5 mg sufentanil (the low dose [LD] 31 patients and There was no difference in CO and blood pressure change between dosages of 10 or 15 mg bupivacaine [4].another retrospective cohort study was conducted in a university hospital, Thailand[9] and prospective study done in India in 2006 ,involving 1000 patients[2] showed no association with dose and type of bupivacaine and hypotension after spinal anesthesia.

2.2.4. Level of the sensory block

Study done in Germany from January 1, 1997GC, to August 5, 2000GC, on 3098 patients with SPA showed the level of analgesia (sensory block higher thanT6) increase the risk of hypotension with (OR=2.32) [9]. Another retrospective cohort study was conducted in a university hospital, Thailand, sensor level higher than T5 increased the risk of hypotension, by approximately 7 times (p-value<0.001) [3]. other retrospective study done 2019 in Java to assess various risk factor from 80 medical records, showed the incidence of hypotension after spinal anesthesia increase 3 times when level of the sensory block > T4[10].

2.2.5 BMI

Study done in Germany from January 1, 1997GC, to August 5, 2000GC showed BMI >25.3 kg /m2 increased risk for hypotension with [OR=1.08][9]. another prospective study done in India in 2006, involving 1000 patients to Identification of various risk factors associated post spinal hypotension shows body mass index >30 kg m-2 increased the risk fold by 1.252 times [2]. A retrospective study done 2019GC in Java to assess various risk factor the result shows, incidence of hypotension will have a 4 times more frequent chance in patients with a BMI> 23kg / m2[10].

fluid preloading prior to spinal anesthesia

A retrospective study done 2019GC in Java to assess various risk factor of hypotension post spinal anesthesia on 80 patients show patients who are not given hydration fluids has the risk of developing hypotension 8 time than pre-hydrated with fluid(p = 0.002)[10].But prospective study done in India in 2006 ,involving 1000 patients[4] and prospective, observational study done in South Africa on 2016, a total of 357 patients age>55yr[8] shows no association between pre-hydration and hypotension.

2.2.6. ASA class

A retrospective cohort study was conducted in a university hospital, Thailand. Hip fracture patients who underwent hip fracture surgery under spinal anesthesia between; January 2014 and June 2019, aim of the study was to examine the modifiable risk factors of pre-operative hypotension. From the 186 patients of the 100 patients were ASA 1, 2, and 86 patients were ASA 3. The result shows post spinal hypotension increases 2 times in patients with ASA 3(OR=2.03) [3]. But prospective, observational study done in South Africa in 2016, a total of 357 patients age>55yr the result shows incidence of hypotension was 56% of this 53.5% were ASA 1 and 2 and 43.5% were ASA 3, from this study there was no association ASA class with post spinal hypotension [8].

2.2.7. Types of surgery

Study done in Germany From January 1, 1997, to August 5, 2000,on 3098 patients with SPA and emergency procedures provided a nearly threefold risk for relevant hypotension (OR= 2.84) Relevant hypotension occurred approximately twice as often in general surgery and gynecology as compared with trauma surgery and urology[9].

2.2.8. Baseline heart rate

Prospective observational study, done in South Africa on 2016, a total of 357 patients age>55yr to identify various risk factors of hypotension after spinal hypotension 108 patients was having (tachycardia >90 bpm in the study) the result shows no association between baseline tachycardia and hypotension[8].another prospective study done in India in 2006 ,involving 1000 patients to Identification of various risk factors associated with early hypotension undergoing spinal anesthesia shows baseline HR >90bpm has increased the chance of hypotension by 1.095[2]

2.2.9. Anemia and diabetes mellitus

prospective study done in India in 2006, involving 1000 patients to identify of various risk factors associated with early hypotension undergoing spinal anesthesia Anemia Hgb<10mg/dl, was found to be associated with 1.459 times increased risk of hypotension and in this study, diabetes mellitus showed 1.302 times increased risk of hypotension [2].

2.2.10 Chronic alcohol consumption

Study done in Germany from January 1, 1997, to August 5, 2000, on 3098 patients with SpA). Chronic alcohol consumption showed the strongest association indicating more than threefold increased risk for hypotension [9]. However, study done in India in 2006 chronic alcohol consumption did not show any significant association with hypotension [2].

3. Objective

3.1 General objective

To assess the incidence and associated factors of hypotension after spinal anesthesia

3.2. Specific objective

- To determine the incidence of hypotension after spinal anesthesia at Tikur Anbesa Specialized Hospital
- To identify factors associated with hypotension after spinal anesthesia at Tikur Anbesa Specialized Hospital

4. Methods

4.1. Study area and period

This research was conducted at Tikur Anbesa Specialized hospital [TASH] in Addis Ababa, from November-February 2024G.C. Tikur Anbesa Hospital was established in 1964. It has 200 doctors, 700 beds, 379 nurses and 115 other health professionals offering health care services. The hospital consists of 950 permanent contract administrative staffs that supports the hospital activities.

Under School of Medicine, the hospital spans various departments, faculties and residents. The Department of Orthopedic Surgery is the main department of the hospital founded on 25 September 1987 as the leading orthopedic center in the country. It staffed 16 consultant surgeons and 16 residents in training. On 3 December 2022, the hospital planned to construct its own private hospital. The decision is to seek autonomy from the federal government and establish its own financial assets. It covers 15 hectares of land for hospital expansion

Currently TASH gives both in elective and emergency surgical services in the following units Neurosurgery, ENT surgery, Urological surgery, Cardio-Thoracic surgery, Pediatric surgery, vascular surgery, orthopedic surgery, Gastro intestinal tract surgery, Obstetrics and Gynecology surgery. Most of spinal anesthesia will gain in Urological surgery, vascular surgery, orthopedic surgery, and Obstetrics and Gynecology surgery. Tikur Anbesa specialized Hospital has 14

consultant and 87 residents under the department of Anesthesiology, Critical care and pain medicine [13].

4.2. Study design

4.2.1. Inclusion and Exclusion criteria

4.2.2. Inclusion

All patients who undergo surgery with spinal anesthesia at TASH in the study period.

4.2.3. Exclusion criteria

- pregnant patients who had undergone surgery under spinal anesthesia in the study period
- Repeated spinal dose
- Combined spinal and epidural anesthesia
- Converted to GA within 30minute for different reason

4.5. Sample size determination and sampling procedure

Sample size was determined by using single population proportion formula with the following assumption. From the above-mentioned study the highest incidence of PSA hypotension was 56.25%, Confidence interval 95%, margin of error 5%.

$$Sample\ size\ n = \frac{\left[\left(z_{\alpha/2}\right)^2 \times p(1-p)\right]}{d^2}$$

Where: -

Z= Standard normal distribution value at 95% CI= (1.96)2

p= proportion of PSA hypotension; 56.25% (0.5625)

d= margin of error (0.05)

n= sample size

Therefore, n= $[(1.96)^2)\times(0.5625)\times(1-0.5625)]/ (0.05)^2$= 379

Since the population is <10,000 which is taken from 4-month monthly report of ACCPM department average case done with spinal anesthesia per month was 160 which is 640/4months the correction formula will be used to get the final sample size:

- $nf = \frac{ni}{1+ni/N}$ Where nf – final sample size

  ni– initial sample size

  N – Sampled population
- $nf = \frac{379}{1+\frac{379}{640}} = 238$
- $nf = 131$
  - When we add, 10% non-respondent percentage, final sample size will be **262**.
  -

Convention consecutive sampling method was used to recruit study participants. The four-month number of patients registered at operation room logbook from May 1/ 2023-August 30/2023 at TASH who had undergone non-obstetric emergency and elective surgery was taken which was 640. Then sample was distributed proportionally for each surgical unit using proportionate stratified random sampling formula:

Sample size in the stratum= **(Sample size/population size) *stratum size**.

Sample size=262

Population size= 640

Using the above formula the sample size result has been calculated as shown in the following table

Surgical unit	Ortho	Urology	gynecology	vascular	other	Total
Number of populations in the stratum	316	242	32	27	23	640
Sample size in the stratum	129	99	13	11	10	262

4.6. Data Collection techniques

4.6.1. Data Collection tool and methods

For data collection structured English questionnaires was adopted and modified by using literature review used in this study to those underwent surgery under spinal anesthesia from nov 1,2023-fev 30,2024. Then data was collected by anesthesiology, critical care and pain medicine [ACCPM] residents and anesthetists on the day of surgery using google form. The data collection process was supervised by the principal investigator (PI) from Nov 1, 2023 up to Fev 30, 2024 G.C. Before the actual data collection, data collectors were provided with brief training about the aim of the study and the content of the data collection tool.

4.7. study Variables

4.7.1 Dependent variable

Post spinal hypotension

4.7.2. Independent variables

Patient related:

- Age
- Sex,
- Baseline HR and BP,
- ASA status,
- Weight, height, BMI,
- Comorbidities [hypertension, DM]

Anesthesia related:

- Dose and basicity of local anesthetic
- Level of sensory block

Procedure related:

- Emergency or elective surgery and types of procedure.

4.8. Operational definitions

Post spinal hypotension:	the setting of spinal anesthesia, record of hypotension (defined as mean arterial blood pressure <65mmHg or decreasing from baseline mean arterial blood pressure by more than 20%) [9,10]
Tachycardia:	baseline HR >90bpm [8]
Chronic alcoholics	Consumption of more than 3 drink per day for more than 3months [2]

4.9. Data quality assurance

To assure data quality, Pretest was done on 10% of the sample size. Data collectors were trained on each item included in the study tools, objective, relevance of study, right of respondents, confidentiality of information obtained. NIBP and arterial line when indicated were used to measure blood pressure. Principal Investigators were cross checking for completeness and consistency of data on daily basis.. Then, the data was entered in to the computer using developed data entry, format, coded for each category of variables and again cross check for errors.

4.9.1. Data processing and analysis

Epi data version 3.1 was used to insert data. SPSS version 27 used to clean and analysis the data. Data cleaning and screening was conducted by exclusively by principal investigator. Descriptive analysis showing frequency, mean was done and present using table categorical variable has been presented as percent. Odd ratios were calculated on variables to determine the association between the outcome and selected variables through binary logistic regression. Variable with a p value < or =0.25 in bivariate logistic regression were taken to multivariate logistic regression. Multivariate logistic regression used to control cofounders and calculating adjusted odd ratio with p value 0.05 and confidence interval of 95 % using tables.

4.10. Ethics consideration

Ethical clearance and supportive letters were obtained from Addis Ababa University College of health science, department of Anesthesiology Critical Care and Pain Medicine then it was submitted to Tikur Anbesa Specialized Hospital chief clinical and academic director offices. Informed oral consent was taken from every parent of study participants before the surgery. Once the patient is developing hypotension, level of hypotension was documented and managed as protocol fluid or vasopressors**.**

4.11. Dissemination of result

The result of this study will be presented in the presence of Stakeholders that will be invited on the day of thesis defense/ presentation. The findings of the research will be disseminated to all public hospitals, AAU department of ACCPM, Addis Ababa Health Bureau, and Ethiopian Anesthesiologist Association (Physician anesthesia providers), Ethiopian Anesthetist Association (Nurse anesthesia providers), Minister of health, and ministry of education. It will also present workshops and different seminars. Copies of the research report will also be available in college of health science library. Finally, the manuscript will be submitted to peer-reviewed reputable scientific journals for possible publication.

5. Results

Among 258 patients who underwent surgery using spinal anesthesia in Tikur Anbesa specialized Hospital 220(85.3%) was elective and 38(14.7%) was emergency surgery. The incidence of post spinal anesthesia hypotension was 15.5%.

5.1. Status of sociodemographic Characteristics

Of 258 patients who had undergone emergency and elective surgery under spinal anesthesia, among these 160(62%) were males and 98(38%) were females. The study included a diverse age group, where the mean (±SD) age of the respondent was 43 (±19). Among all patients 122(47.3%) was age >45years and 136 (52.7%) was age <45years.

5.2 Surgical and anesthesia related factors

Most of the patients 202(78.3%), have normal BMI ranging, 41(15.9%) have overweight BMI, 13(5%) underweight and 2(0.8%) case are obese. of patients have ASA class I 167(64.7%) ASA II and 78(30.2%) and ASA III 13(5%). Of all patients, 68.2% have baseline heart rate less than 90. Mean arterial pressure ranging from 67 to 122. Of all patients 40 (15.5%) have history of hypertension, chronic alcohol use was reported in 14 patients (5.4%), 27(10.5%) patients were diabetic and anemia (Hgb<10mg/dl) was seen in 35 (13.6%). In 254 (98.4%) patients used heavy baric bupivacaine and only in 4 (1.6%) patients was used isobaric bupivacaine. In 232 (87.6%) intrathecal, opioid was added. Preloading Fluid was administered in 120(46.7%) and Co-loading fluid in 137 (53.3%). for most patients the surgery was elective 220 (85.3%) and the rest 38(14.7%) had emergency surgery. most spinal anesthesia was given for Orthopedics patients 129(88.4%) followed by urologic patients 99 (38.4%). In 226 (87.6%) cases, sensory level was below T5 and 32(12.4%) patients has sensory level above T5.

5.2.1. Table 1: Surgical and anesthesia related factors among patient's undergone surgery under spinal anesthesia at TASH, 2023/24 (n=258)

Variable	Category	Frquency	Percent
HTN		40	15.50%
level of sensory block	Below T5	226	87.60%
	Above T5	32	12.40%
Baricity	Heavy	254	98.40%
	ISO	4	1.60%
Urgency of Procedure	Elective	220	85.30%
	Emergent	38	14.70%
Type of Procedure	Urologic	99	38.40%
	Orthopedic	129	50%
	Gynecologic	13	5%
	Other	17	6.60%
Fliud Bous	Preloading	120	46.70%
	Coloading	138	53.30%
DM		27	10.5%
Anemia	Hgb<10mg/dl	35	13.6%
	Hgb>10mg/dl	223	86.4%

5.3. Incidence of post Spinal Anesthesia hypotension

In this cross-sectional study among 258 participants who had undergo emergency and elective surgery under spinal anesthesia, the incidence of post spinal anesthesia hypotension was 15.5% (40).

From this 21 (52.5%) was age >45years and 19(47.5%) was age <45yr. Of these16 (40%) were female. Post spinal hypotension was seen at 10min in 14 (35%) and 15 min in 16 (40%) patients. Among all post spinal hypotensive patients 26(65%) have average BMI. ASA 1 and ASA 2 comprises most of patients who develop post spinal hypotensive making 19(47.5%) and 21(52.5%) respectively.

5.4 Associated Factors of post spinal hypotension

A crude analysis of each independent variable with post spinal hypotension was run at 25% level of significance. Baseline heart rate, age, history of hypertension, Anemia (Hgb<10mg/dl), level of sensory block, baricite of bupivacaine, history of consumption of alcohol, and urgency of surgery was found significant with P value less than 0.25.

Only three variables: history of hypertensive, hemoglobin <10mg/dl, sensory level above T5, has independently associated with P value less than 0.05.

5.4.1 Table 2. Bivariate and multivariate regression analysis results

Variable	Category	PSH		COR	CI	P value	AOR (95% CI)	P value
		yes	No					
Baseline HR	>=90	17	65	1.740	0.872 - 3.471	0.116	1.686(.755-3.764)	0.203
	<90	23	153					
Age	>=45	23	100	1.695	0.808 – 3.155	0.178	1.175(.505-2.733)	0.708
	<45	17	118					
HTN	Yes	13	26	3.556	1.633 – 7.742	0.001	3.474(1.356-8.897)	**0.009***
	No	27	192					
HgB	<10mg/dl	12	23	3.634	1.629 – 8.107	0,002	2.850(1.113-7.299)	**0.029***
	>10mg/dl	28	195					
Alchol	Yes	4	10	2.311	0,688 – 7.768	0.176	1.680(.394-7.163)	0.483
	No	36	208					
Baricity	Iso	2	2	5.684	0.777 – 41.585	0.087	8.513(.761-95.180)	0.082
	Heavy	38	216					
Sensory	Above T5	15	17	7.094	3.158 – 15.934	0.000	5.297(2.150-13.050)	**<0.001***
	Below T5	25	201					
Urgency	Emergency	9	29	1.892	0.818 – 4.377	0.136	1.513(.552-4.144)	0.421
	Elective	31	189	1.892				

* significant association with P value < 0.05.

6. Discussion

In this study, the overall incidence of post spinal anesthesia hypotension was 15.5% (40) which is lower compared to studies conducted in India (30.7%), Thailand (46.8%), and Java (56.25%) [2, 3, 8] this deference could be due to the involvement of elderly patients in previous studies but in ours study included many young participants because of majority of patients were from orthopedic unit at time data collection there were active conflict in country and possible case could be different cutoff value for definition of post spinal hypotension.

Patients with history of hypertension has 3.4 times increased incidence of post spinal hypotension with AOR = 3.474, 95%CI= [1.356–8.897] with P= 0. 009.this signficant association has similar finding with previous studies done in India,thailand,Jermeny[2,3,9]

Hemoglobin <10mg/dl has 2.85 times increased incidence of post spinal Hypotension compared to having hemoglobin > 10mg/dl, at AOR =2.85, 95% CI= [1.113-7.299], P = 0. 029.it is simiilar with the other studies in India[2].

Even though the peak time of post spinal hypotension is not mentioned in previous studies this study revealed that it is higher with in 10minute to 15 minutes and mean time to hypotension was 14 minutes. This could be due to the time when spinal anesthesia works in most patients.

7. Conclusion, future direction and implications

In this study, the overall incidence of intraoperative hypotension was relatively lower and the mean time to develop post spinal hypotension was 14 minutes. Pre-existing hypertension, hemoglobin level less than 10mg/dl and having sensory block above T5 were associated with increased risk of intra operative hypotension.

8. Strength and limitation

Strength: This study was involving wide range of age distribution undergoing both elective & emergency surgery. This study also tried to determine the trend and mean time of post spinal hypotension.

Limitation: Being single center study , lack of local literatures, and dose of bupivacaine was not controlled. There is no standard definition of post spinal hypotension.

9. Recommendation

From this study, anesthesia providers have to focus on correction of anemia and preoperative optimization of hypertension when time allows for no emergent surgery. And strictly following sensory level should be important point spinal anesthesia is administered and special attention has to be given within 10 to15minutes after spinal anesthesia administration the time at which most post spinal hypotension occurred.

10. Declaration

I the undersigned agree to accept all responsibilities for the scientific and ethical conduct of the research project. I will provide timely progress report to my advisor and seek the necessary advice and approval from my advisor in the course of the research. I will communicate timely to my advisor all stakeholders involved.

Name of the student: Simachew Biadglign (MD, ACCPM R2)

Signature: _____

Date: _____

Approval of the Advisor:

Name of the advisor: _____

Signature: _____

Date: _____

Approval of the Advisor:

Name of the advisor: _____

Signature: _____

Date: _____

11. Reference

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12.Annex

12.1. Annex 1: Information sheet

Addis Ababa University, school of public health, from specialty program. A questionnaire for assessing the incidence and associated risk factors of hypotension after spinal anesthesia undergo surgery with spinal anesthesia in Addis Ababa University at Tikur Anbessa Specialized Hospital.

Good morning/good afternoon. My name----------; we come from Addis Ababa University. We are working with an investigator, Dr Simachew Biadglign, doing his thesis for the partial fulfillment of specialty certificate of Anesthesiology, critical care and pain medicine. We are interviewing associated risk factors of hypotension for after spinal anesthesia. We are going to ask you some questions that are not difficult to answer. Your name will not be written in this format and never be used in connection with any of the information you are going to tell me. You are not obliged to answer any question that you do not want to answer and you may end this interview at any time you want to. However, your honest answers to these questions will help us to identify the main risk factors associated with hypotension after spinal anesthesia and helps to solve the identified problems in the future to prevent and manage it. We would like to appreciate your help in responding to these questions, and the interview will not take more than 20 minutes.

Name: Dr SIMACHEW BIADGLIGN

Tel- +251-922714437

Email- simachewbiadglign@gmail.com

12.2. Annex 2: Informed consent

I am the individual asked to be a study participant. Based on the information provided by the principal investigator, I understand that it is not necessary to write my name, the information I tell to her/him will not to be used for other purpose and the information obtained from me will help to identify the main risk factors associated with hypotension after spinal anesthesia and helps to solve the identified problems in the future to prevent and manage it in the future.

So, I agree to be a study participant.

1. Yes……. 2. No……

If yes go to next section. If no go to next participant

Questioner code ----------

Name of data collector----------

Signature----------

12.3. Annex 3: Questionnaire

MRN ----------

12.3.1 Table 3: Sociodemographic factors

NO	Factor	Response						
1	Sex	1.female 2. Male						
2	Age	……						
3	Weight	…[kg]						
4	Hight	…[meter]						
5	BMI	…[KG/M2]						
	ASA class	…						
6		baseline	5’	10’	15’	20’	25’	30’
	Systolic blood pressure							
7	MAP							
8	HR							

12.3.2 Table 4: Patient related factors

No	Factor	Response
9	History of hypertensive	A.YES B.NO
10	On antihypertensive	a. yes b.no
11	If number question10 is yes What is the medication did the patient takes?	……
12	Diabetic	A.YES B.NO
13	Anemia Hgb <10mg/Dl	A. Hgb<10mg/dl B.>10mg/dl
15	Chronic alcohol consumption	A.YES B.NO

12.3.3 Table.5. anesthesia related risk factor

NO	Factor	Response
17	Dose of bupivacaine	…..
18	Baricity	A. Heavy B. ISOBARIC
19	Level sensory of block	A. belowT5 B. aboveT5

20	Intrathecal opioid	A.yes B.no
21	Fluid bolus	A. Preloading B. coloading C.no

12.3.4 Table.6. procedure related

21	Procedure	A. ELECTIVE B. EMERGENCCY
22	Type of procedure	A. urology B.Orthopedics C.vascular D.gynacology E.orther…….