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Prevalence of Hypotension in Caesarean Section underSpinal Anesthesia in Al-Jumhouri Teaching Hospital Authority in Sana'a City -Yemen

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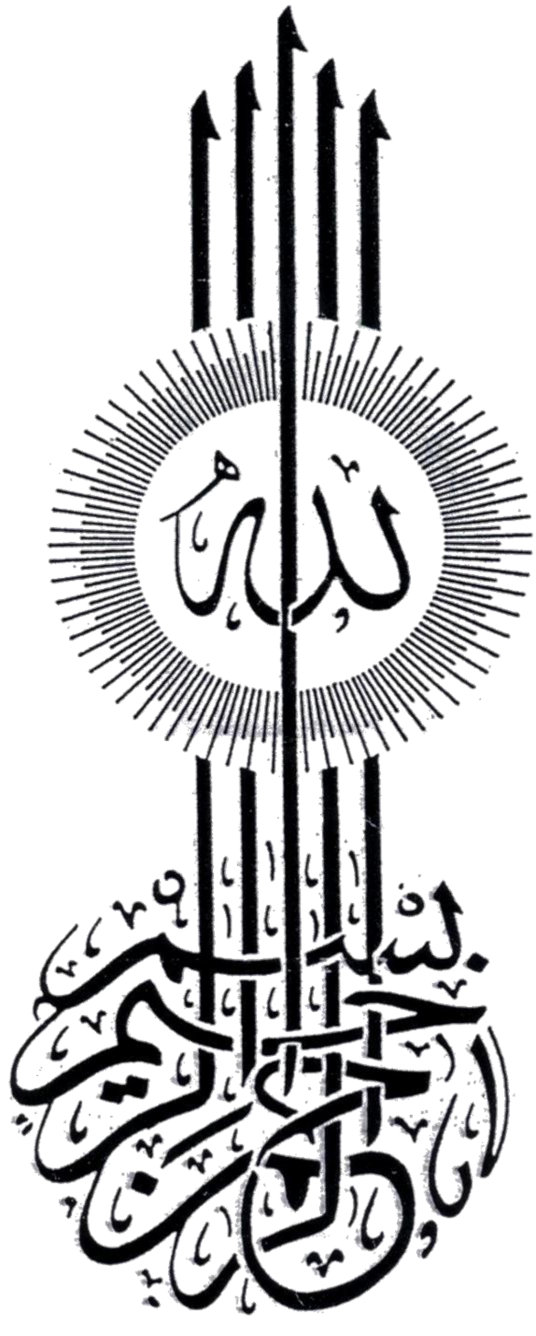
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(قالو سبحانك لا علم لنا الا ما علمتنا انك انت العليم الحكيم) 23

سورة البقرة

صدق الله العظيم

Dedication

First, we thank Allah for his blessings and reconcile during these years that have passed us to this stage of science, knowledge and culture. To the souls of our parents who taught us the alphabet of life and itstender values, who gave us love and supplication, Allah have mercy on them alive and dead, to those who were supporting us and scarified their time to reach achievements

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Definition of terms and abbreviation

Definitions	Term
ASA	American Society Of Anesthesiologists
BP	Blood Pressure
CS	Cesarean Section
CT	Computerized Tomography
DBP	Diastolic Blood Pressure
DNS	Dextrose Normal Saline
IV	Intravenous
MMHG	Millimeter Of Mercury
MRI	Magnetic Resonance Imaging
NS	Normal Saline
P	Pulse
PDPH	Post Dural Puncture Headache
PSH	Post-Spinal Hypotension
RL	Ringer Lactate
SA	Spinal Anesthesia
SBP	Systolic Blood Pressure
SPSS	Statistical Package For Social Science
UK	United Kingdom

Abstract

Background: Hypotension after spinal anesthesia for cesarean section is a common clinical finding and causes major morbidity and mortality.

Aim of the study: To Find out the prevalence of hypotension in patient undergoing cesarean section under spinal anesthesia.

Methods: A prospective analytical cross-sectional study design was conducted at public hospitals in Sana'a- Yemen, A convenience sample of 60 patients, who under want cesarean section under spinal anesthesia, an interview questionnaire, and observation checklist was used to collect data from first of April to the end of August 2021.

Result: The most female patients age 50% between 18-28 years, had medical history16.7% .The prevalence of intraoperative hypotension was 41.7% while postoperative hypotension was 28.3 % of patient underwent for cesarean section under spinal anesthesia.

Conclusion: The prevalence of hypotension in patient under cesarean section under spinal anesthesia was 41.7 %.

Key wards: Prevalence, Hypotension, cesarean section

المستخلص

خلفية الدراسة:

انخفاض ضغط الدم بعد التخدير الشوكي للولادة القيصري هو اكتشاف سريري شائع ويسبب ارتفاع في معدل المراضة والوفيات بشكل كبير.

هدف الدراسة:

معرفة مدى انتشار انخفاض ضغط الدم للمرضى الخاضعين للعمليات القيصرية تحت التخدير الشوكي.

طرائق البحث:

أجريت دراسة عرضية في المستشفيات العامة في صنعاء - اليمن، على عينة ملائمة شملت ٦٠ مريضة، خضعن لعمليات قيصرية تحت التخدير الشوكي، وجمعت البيانات واستخدام استبيان مقابلة، واستمارة التحقق من أبريل إلى نهاية أغسطس ٢٠٢١.

النتائج:

معظم المرضى الإناث الذين تتراوح أعمارهم بين ١٨-٢٨ سنة ٥٠٪ ، وكان التاريخ الطبي١٦.٧٪. وكان انتشار انخفاض ضغط الدم أثناء العملية الجراحية ٤١.٧٪ في حين كان انخفاض ضغط الدم بعد الجراحة ٢٨.٣٪ من المرضى الذين خضعن للعمليات القيصرية تحت التخدير الشوكي.

الاستنتاجات:

انتشار انخفاض ضغط الدم في المرضى اللاتي خضعن للعمليات القيصرية تحت التخدير الشوكي ٤١.٧٪.

الكلمات المفتاحية:

الانتشار، انخفاض ضغط الدم، العمليات القيصرية.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Hypotension after spinal anesthesia for caesarean section is a common clinical finding and causes major morbidity, and indeed, mortality, depending on the context with an incidence up to (60-70%). Spinal anesthesia is the popular route of anesthesia in parturient for cesarean delivery.

Prevention and treatment of post-spinal hypotension (PSH) in cesarean delivery has been frequently investigated. The basic components of management of PSH are: Fluid loading, pharmacological agents, and positioning protocols. Post spinal hypotension (PSH) in Cesarean section is mainly due to decreased vascular tone leading to decreased systemic vascular resistance and decreased venous return. Thus, measures used for prevention and management of PSH are mainly concerned by increasing vascular tone and increasing venous return which can be achieved by using vasopressors, fluid administration, and positioning regimens.

Although many measures have been reported for prevention and management of PSH, none of these measures totally eliminated the occurrence of hypotension. Attention to maternal blood pressure and heart rate is fundamental during anesthesia for cesarean delivery.

The clinical impact of similar degrees of hypotension differs between individuals, and the degree and duration of reduced uteroplacental flow that leads to significant fetal compromise isundetermined.

Different studies variably define hypotension, but typically use a fall in systolic arterial blood pressure from baseline of 10%–30%, or an absolute value of 80-100 mmHg.

Hypotension occurs in 80%–90% of women having caesarean deliveryunder regional block, depending on the definition.

Spinal anesthesia is a standard method in cesarean deliveries and is regarded as being safe for the mother and the baby, even though significant maternal hypotension often occur [1]. The vasodilator effect of spinal anesthesia is the main cause for this drop in blood pressure [2]. The compression of the aorta and inferior vena cava by the gravid uterus is known to reduce venous return and this is estimated to be of clinical importance after approximately 20 weeks of pregnancy. Pregnant women may find the supine position uncomfortable and avoid this position close to delivery. During cesarean delivery left lateral tilt is recommended to oppose this effect, and theoretically this should reduce the negative effects on maternal circulation. However, in clinical practice the incidence of spinal induced hypotension is high if no prophylactic measures to oppose the vasodilatation are included [1]. We have previously compared two different prophylactic methods, lower leg compression and phenylephrine [3]. In that study continuous infusion of phenylephrine was superior to lower leg compression and placebo. Lower leg compression was found to increase heart stroke volume compared to placebo indicating a significant effect on venous return. Some women have hypotension during cesarean delivery even if prophylactic infusion of phenylephrine and/or lower leg compression is practiced. Phenylephrine continuous infusion is not included as standard prophylaxis globally [4]. Previous attempts to predict risk of spinal induced hypotension and to individualize the prophylactic treatment have not yet changed clinical practice.

1.2 Important of Study:

To reduce the incidence of hypotension in cesarean sections under spinal anesthesia and how to treat it and avoid other complications

1.3 Problem of Study:

The problem is the lack of accurate information about the importance of the study among the anesthesia staff, towards the spinal anesthesia in cesarean sections, and what are the complications that occur due to the spinal anesthesia. The research that is concerned with measuring it, along with the results are important, and the information that can be provided by such studies is to reduce the costs that can result from the deterioration of the health status due to the importance of the number of studies.

1.4 Objective of the Study

1.4.1 General objective

To find out the prevalence of hypotension in cesarean section under spinalanesthesia**.**

1.4.2 Specific objectives

- To identify the possible causes of hypotension in cesarean section underspinal anesthesia.
- To identify the causes of cesarean section.
- To compare between demographic data and prevalence of hypotension.

1.5 Hypotheses of the Study:

The prevalence of hypotension in caesarian section under spinal anesthesia is less than 50%.

CHAPTER TOW

LITERATURE REVIEW

Chapter Tow: Literature Review

2.1 Introduction:

Spinal anaesthesia has long been established as the anaesthetic technique of choice for caesarean section because it avoids the risks of general anaesthesia such as failed tracheal intubation, aspiration and unwanted awareness. The mother is able to remain awake and participate fully in the birthing experience, thus facilitating earlier bonding and breast feeding with the baby and also benefits from excellent postoperative analgesia. Unfortunately, hypotension from sympathetic blockade occurs in up to 71% of mothers receiving spinal anaesthesia for caesarean section **(Klohr& Roth et al., 2010)**.

This can lead to unpleasant maternal side effects such as nausea, vomiting and dizziness. In addition, adverse effects on the neonate occur as a result of reduced uteroplacental blood flow resulting in impaired fetal oxygenation and fetal acidosis **(Reynolds & Seed, 2005)**. Choices of anesthesia for cesarean delivery in 1988 and 2000 were collected from a general hospital in Thailand (**Visalyaputra, 2332)**

General anesthesia was the main technique because the lack of anesthesiologists and nurse anesthetists did not allow the regional block to be performed. In 2004, spinal anesthesia was the main anesthetic technique at Siriraj Hospital because of its reliability and rapid onset. The major adverse effect of spinal anesthesia for mothers is hypotension **(Rout & Rocke, 1994)**. Maternal hypotension leads to uteroplacental hypoperfusion and provokes an acute fall in inter villous blood flow with the potential for feta academia Furthermore, cardiac arrest may occur **(Robert, 1995)**.

2.2 Definition:

2.2.1 Hypotension: is defined in clinical trials and in practice as any value that falls below the fifth or tenth percentile for gestational and postnatal age. These percentiles are defined by population- based normative blood pressure values. By this definition, hypotension occurs in approximately 50% of very low birth weight infants admitted to the intensive care unit. As discussed elsewhere in detail, three levels of cerebral blood flow compromise may also be used to define hypotension Engle WD. Hypotension: as systolic blood pressure (SBP) in the range of 60 mm Hg to 90 mm Hg**(Saunders & Elsevier, 2008)**. Medical history: Clinical medicine the patient's past and present, which may contain relevant information bearing on their health past, present, and future.

The medical history, being an account of all medical events and problems a person has experienced is an important tool in the management of the patient**(William & Shile, 2018)**. Urgent surgeryis one that can wait until the patient is medically stable, but should generally be don within 2 days. Emergency surgery is one that must be performed without delay; the patient has no choice other than immediate surgery, if they do not want to risk permanent disability or death **(William & Shile, 2018).**

Hypotension is an inevitable complication of spinal anaesthesia that occurs when the sympathetic chain becomes blocked, especially when higher dermatome levels are needed. A drop in blood pressure may initiate nausea and vomiting, indicating ischaemia on the spinal cord, which in turn induces an undesired condition for the patient and operating staff. Blood pressure changes between the left lateral to supine position has been determined as an indicator for predicting a perioperative decrease in obstetric patients undergoing caesarean delivery under spinal anaesthesia **(Jeon & Hwang et al, 2010).**

In a non-obstetric study population, changing patients to the Trendelenburg position for 10 minutes immediately following a spinal block has been demonstrated as efficient, as has loading with a lactated ringer or 6% hydroxylethyl starch solution by means of maintaining cardiac output. Co-hydration is more efficient than pre-hydration and colloid loading is better for maintaining cardiac output and blood pressure **(Zorko & Kamenik et al., 2009)**.

A reported by ***Shin et al.,*** investigated the influence of crystalloid and colloid loading on cerebrospinal fluid movements in volunteers, as well as the spread of local anaesthetics in patients. Although crystalloid pretreatment delayed the cranial spread of the block, it induced cerebrospinal fluid production, which may be valuable in the case of post- Dural puncture headache **(Shin & Kim et al., 2011).** In case of pregnancy, a decrease in blood pressure at the critical level may affect both mother and baby, and result in more serious outcomes over a longer period. Increased venodilatation under the influence of progesterone or prostaglandins may also contribute to changes in blood pressure **(Hwang & OhAY et al., 2012).**

The presence of hypertension, advanced age, increased body mass index, higher birth weight and higher block are considered as risk factors in hypotension performed with spinal anaesthesia. Fluid loading, lateral tilt or wedge performed under the right buttock to prevent aortocaval compression, or vasopressor therapy constitutes preventive measurements to treat hypotension in obstetric patients, the influence of aortocaval pressure or other determinants remain controversial in terms of how they contribute to haemodynamic during spinal anaesthesia. In order to attenuate the effect of hypotension, the influence of positioning the patient on a lateral decubitus position for a brief period was investigate (**Hwang & Oh AY et al., 2012)**.

The hypotension episode showed a slight delay, but the incidence of hypotension or drug use was the same as observed in patients lying supine

(Hwang & Oh AY et al., 2012).

Criticized the role of vena caval compression in light of the presence of persistent vasoconstriction, such as observed in patients with preeclampsia, which is known to be volume depleted or hypovolemic; hypotension, however, was observed to a lesser extent. These observations justify vasopressor therapy and indicate that sympathetic block affecting arterial vasculature might be a major concern related to arterial pressure drop **(Sharwood & Drummond, 2009)** Time, duration and the selection of vasoactive drugs are controversial issues where obstetric patients are concerned. Ephedrine may stimulate beta adrenergic receptors by crossing the umbilical cord and increasing foetal acidosis; therefore, phenylephrine has become the vasopressor of choice **(Nygan & Khaw et al, 2008).** Variable infusion has been demonstrated as being superior to the fixed infusion and 25-50 µg/min was demonstrated to be sufficient or maintaining hemodynamic status. On the other hand, a phenylephrine infusion may induce bradycardia, presumed (or) indicated by the baroreflex receptor mediated mechanism **(Nygan & Khaw et al., 2004).**

A decrease in body temperature is commonly encountered after neuraxial anaesthesia. Subarachnoid local anaesthetic administration blocks all afferents of skin temperature that patients are unable to release the decrease in core temperature. Vasodilation due to sympathetic blockade increases skin blood flow, which allows for lowering the body's core temperature in a reliable manner. In preparing the skin for surgery with antiseptic solutions, especially when performed on a large area, evaporation from surgical field and irrigation solutions, or fluid infusion at a higher rate, may also contribute to hypothermia during surgery, decrease in core temperature may initiate shivering, especially during the postoperative period, which increases oxygen consumption. Hypothermia is known to induce hyper coagulation and infections. Special care should be exerted to decrease this physiologic stress, especially in paediatric, obstetric and patients in advanced age, since it may lead to serious consequences, including low perfusion to the vital organs, coronary ischaemia and infection **(Crowley & Buggy, 2009)**

Post-dural-puncture headache is a troublesome complication, mostly observed in middle-aged women and the obstetric population. Lower body mass index, previous PDPH and the presence of chronic headaches are other risk factors,headache rarely occurs in the paediatric population, especially in neonates, but some physicians believe that this may be due to the inability to communicate pain in early childhood, PDPH also decreases with age, which may be related to changes in the composition of cerebral content, which increase on cerebrospinal fluid [CSF] that may compensate and prevents its occurrence ,PDPH requires differentiation from other causes of headache **(Bezov & Lipton et al,2010).**

It typically occurs in the fronto-occipital region with nuchal rigidity and initiates when moving from the supine position to sitting or standing up. It may vary from mild to severe and the type of pain may be dull, throbbing or burning. Vertigo, nausea and vomiting might be observed due to PDPH in some patients. Headache typically appears on the second day following the dural puncture and can range from lasting one to four days, but may be observed as early as 20 min after the dural puncture **(Lomax & Qureshi, 2008).** The leaking of CSF across the dural hole may initiate PDPH. This is explained by the following mechanisms: a decrease in intracranial pressure causes the traction of pain sensitive cranial structures, the depletion of CSF volume may induce compensatory cerebral vasodilatation [the Monroe-Kelly doctrine] and the activation of adenosine receptors may cause cerebral vasodilatation **(Hendricks & Stocks, 2007).** Patient position when performing spinal anaesthesia, the experience of the physician and using finer needles do not appear to influence the occurrence of PDPH **) Schmittner &Terboven et al., 2010).**

Transient neurologic symptoms radicular symptoms, including pain, a burning sensation on the buttocks, dysaesthesia and paraesthesia may be observed following spinal anaesthesia. These symptoms generally subside within two days. But these clinical features are alarming for possible serious consequences. There is no representation of these symptoms on radiographs, CT or MRI. Ambulatory surgery, lithotomy position, the type of local anaesthetic used, as well as the concentration of dextrose and osmolarity has being mentioned as contributing factors for transient neurologic symptoms. The use of spinal lidocaine is one factor that may increase the incidence of transient neurologic symptoms, especially when some factors are combined. An increase in local anaesthetic concentration by pooling and maldistribution may also increase the incidence of this complication **(Enron & Gurstieva et al, 2007).**

Bladder distension during the postoperative period produces discomfort to patients and unless relieved, leads to more severe complications, including permanent injury to the detrusor muscle. Spinal anaesthesia influences urination by blocking all afferent nerve fibres, rendering the patient unable to feel bladder distension or urinary urgency. Bladder catheterization is not innocuous; it carries the risk of urethral trauma and more severe complications, including infection and haematologic spread that may reach the surgical site **(Karason S&Olafsson TA, 2013).** Urodynamic studies indicate that the function of the detrusor muscle returns to normal after about 100 min longer than the sensorial level regression from the S2 to S3 level **(Karason S&Olafsson TA, 2013).** It has been demonstrated that spontaneous urination may be influenced by an intrathecal local anaesthetic; long-acting agents require a longer time to recover from urinary function**(Kamphuis ET&Ionescu TI et al,1998).**

2.2.2 Prevalence:

Prevalence is the proportion of a population who have a specific characteristic in a given time period.

2.2.3Cesarean section

A surgical procedure involving incision of the walls of the abdomen and uterus for delivery of offspring

2.3 Complications in Spinal Anaesthesiafor caesarean section

Spinal anaesthesia is one of the most popular and widely used anaesthetic procedures, it is a simple, cost effective and efficient technique that provides complete sensory and motor block, as well as postoperative analgesia with a high success rate. Several advantages of spinal anaesthesia include a decreased incidence of deep vein thrombosis, reduced intraoperative blood loss, as well as the prevention of pulmonary aspiration in case of emergency, especially in patients with potential airway problems and known respiratory diseases **(Cook & Counsell et al., 2009).**

Due to the invasive nature of spinal anaesthesia, there are several types of complications that may occur with different incidence. At least some of these problems appear to be inevitable and as such, it is not possible to eliminate them all. Fortunately, more severe neurological complications such as death, neuropathy, arachnoiditis and permanent neurologic injury are seldom observed. In a national survey performed in the UK, the incidence of permanent neurologic injury and death ranged from 0.7 to 1.8 in 100, 000 patients **(Cook & Counsell et al, 2009).**

2.4.1 Haematologic complications:

Spinal haematoma following spinal anaesthesia is a severe complication that requires early surgical intervention to prevent permanent neurological damage. Classically, the incidence of this condition has been accepted as 1 in 220, 000 patients undergoing spinal anaesthesia, but the actual incidence remains unknown and is presumed to be on the increase. Advanced age, female gender, patients receiving drugs that influence coagulation, difficulty in performing block and placement of the indwelling epidural catheter are mentioned as risk factors **(Horlocker TT, 2011).**

2.4.2 Infectious complications:

Although bacterial meningitis following neuraxial anaesthesia is an uncommon complication, in cases where it does occur it may result in severe harm, including permanent neurologic disability and death. The presence of a fever and neurologic disturbance may provide a differentiation from PDPH. Epidural abscess is generally caused by skin flora; the bacteria most frequently involved is S. aureus. It is therefore prudent to initiate treatment with synthetic penicillin, even in the absence of a positive culture. Other less common causes of infection are aerobic and anaerobic streptococci, and anaerobic gram-negative bacilli. The incidence of meningitis varies between 1 in 50, 000 and mostly occurs as a result of airborne pathogens. The exact mechanism for how the microorganism reaches the spinal cord remains controversial. It may occur during preparation or performing the block, with a droplet from medical personal is the predominant source. Infection is more likely to occur in streptococci in most of the cases, emphasizing the need for strict adherence to precautions while performing spinal anaesthesia (**Schulz & Pottinger etal, 2008).**

2.4.3 Neurologic complications:

Which included a large series of neurologic complications, reported that the incidence of permanent neurological injury following spinal anaesthesia varied between 0 to 4.2per 10 000 patients. In a French survey, permanent neurological injury other than that caused by haemorrhage was more common and included injury to the conusmedullaris, and the estimated risk was calculated as 1:78 660 spinal anaesthesia patients; incidence was nearly half the amount in obstetric patients compared to the non-obstetricpopulation , pre-existing spinal pathology or disease increasesthe incidence of postoperative neurologic complications following neuraxial blockade. Repeated attempts or improper positioning of patients may facilitate neurologic injury **(Hebl, 2006).**The presence of scoliosis with or without prior surgery constitutes difficulties for performing neuraxial anaesthesia. When compared to spinal blocks, the success rate was lower with epidural anaesthesia, due to technical difficulties and improper distribution of local anaesthetics **)KoJY & Leffert, 2009).**

Although the precise mechanism was not determined, hydrostatic pressure performed during an epidural block was indicated as a possible source of injury. On the other hand, direct needle trauma appears to be one of the preventable reasons for neurological complications. It is best to withdraw the needle in the case of paraesthesia, which is highly associated with postoperative radiculopathy and repeating local anaesthetic injection should be avoided in order to prevent toxic concentrations in the spinal cord **(Horlocker, 2011).**

2.5 Neurological diseases:

Patients with pre-existing neurological diseases such as multiple sclerosis, amyotrophic lateral sclerosis, or a post-poliomyelitis condition have previously been considered as relative contraindications for neuraxial anaesthesia. A double crush phenomenon was described to explain the deterioration of neurological disease in the case of vulnerable neurons, it is believed that mechanical trauma caused by a needle or catheter, toxicity induced by local anaesthetics or neural ischemia due to additives could worsen the patient's neurological status. Increased stress may induce inflammation deteriorates the clinical course, that may confuse with neural injury due to the procedure. However, recent evidence has demonstrated that spinal anaesthesia might be an option in this patient group**.** Neuraxial anaesthesia in patients with spinal canal pathology, including lumbar disk disease, spinal stenosis or previous surgery, is another issue that requires special concern. In a retrospective review **(Hebl &Horlocker, et al, 2010)**.

Found that patients with pre-existing spinal canal pathology demonstrated a higher rate of neurological complications. However, a lack of control groups receiving general anaesthesia presents a difficulty for describing results pertaining to whether complications occur due to surgery or because of the natural progression of disease. Additionally, due to data combinations, it is also impossible to conclude the particular role of single shot spinal anaesthesia. Trauma and complications may be more common when using large gauge Tuohy needles, or during catheter placement. Epidural anaesthesia and catheter placement in patients with previous spinal surgery appear to be more complicated, even when performed by experienced hands **(Karaaslan &Candan et al , 2006).**

These patients require special attention in terms of evaluating the use of neuraxial anaesthesia, preoperative neurological evaluation and special care in order to prevent additional injuries, in rare instances, silent pathologies involving the spinal column may induce acute post- operative neurological complications such as tuberculosis or unrecognized spinal tumour **)Valente & Frassanito et al , 2012).** Postoperative neurological complications were observed in a patient presenting adhesive arachnoiditis, extensive syringomyelia and a giant arachnoid cyst in the patient had been managed with a combination of spinal and epidural anaesthesia. These rare complications were linked to a reaction caused by the subarachnoid, the epidural drug, or as a result of catheter induced inflammation or trauma **(Hirai & Kato et al, 2012).**

2.6 Cardiac arrest and perioperative death:

Bradycardia and cardiac arrest are the most worrisome complications related to spinal anaesthesia. The incidence of these conditions has been observed to be higher with spinal block in comparison with general anaesthesia. Patients are generally healthy, ASA class I or II, athletic and male with parasympathetic overtones. The influence of cardio-accelerator fibres originating between T1 to T4 plays a crucial role in maintaining blood pressure and heart rate according to the level of anaesthesia induced by spinal block, depleted vascular volume or insufficient replacement with fluids and the presence of deep sedation is considered a risk factors for bradycardia and cardiac arrest. Surgical intervention may also trigger bradycardia and cardiac arrest by vagal discharge or embolization. In the case of severe bradycardia, early administration of epinephrine is important, especially in unresponsive cases to atropine and ephedrine that should be administered previously **(Limongi, 2011).** Most patients are monitored in the operating theatre, therefore early recognition of bradicardiaand cardiac arrest and intervention is possible. Survival rate is higher in patients with cardiac arrest observed during spinal anaesthesia compared to cases using general anaesthesia**(Kopp & Horlocker et al, 2005).**

2.7 Preventing spinal hypotension during Caesarean delivery:

Spinal hypotension is common in women who receive spinal anaesthesia for caesarean delivery, with an incidence of up to 71 % **(Klohr &Roth, et al, 2010)** .Spinal hypotension can occur precipitously and, if severe, can result in important perinatal adverse outcomes, such as maternal nausea and vomiting, fetal acidosis and may be an important contributory factor for maternal death related to regional anaesthesia**(Auroy & Benhamouet al, 2002)**.

Mothers with pre delivery hypovolaemia may be at risk of cardiovascular collapse because the sympathetic blockade may severely decrease venous return. As a consequence, prevention of spinal hypotension has been a key research area within the field of obstetric anaesthesia, to prevent spinal hypotension, a number of approaches have been investigated, notably fluid loading, vasopressors, or both **(Cyna& Andrew et al, 2006).** Despite early enthusiasm, the efficacy of fluid loading for preventing spinal hypotension has been called into question. In contrast, the use of vasopressors has gained increasing prominence as the primary technique for the prevention and treatment of spinal hypotension during caesarean delivery.

2.9 Vasopressors for treating spinal hypotension

Phenylephrine is widely considered as the vasopressor of choice for the treatment of spinal hypotension, phenylephrine has a number of important attributes for treating spinal hypotension: (i) as an alpha- adrenergic agonist, its mechanism of action directly addresses the decrease in systemic vascular resistance following spinal anaesthesia;(ii) phenylephrine has a faster onset of action compared with ephedrine; (iii) ephedrine is associated with a five-fold increased risk of fetal acidosis; and (iv) ephedrine is more likely to cross the placenta and increase concentrations of lactate, glucose, and catecholamines in the fetal circulation compared with phenylephrine. Furthermore, in view of the maternal response to spinal anaesthesia (decreased systemic vascular resistance; increased heart rate and cardiac output), the use of ephedrine with its beta-adrenergic agonist properties does not make sense from a physiological standpoint, there may be occasions when ephedrine may be useful, such as treating hypotension with decreased heart rate before or after delivery; therefore, ephedrine should not be completely removed from the operating theatres of labour and delivery units. However, the indications for ephedrine use need to be carefully considered **(Dyer & Reedet al, 2009)**.

There is accumulating evidence that phenylephrine delivered as an infusion is the most effective method for preventing maternal hypotension and intraoperative nausea or vomiting **(Ngan&Khaw et a., 2004).** In a recent meta-analysis that assessed the harm and benefit of prophylactic phenylephrine infusions, phenylephrine was associated with a reduced risk of pre- delivery hypotension and nausea and vomiting compared with placebob **(Heesen & Kolhr et al, 2014).** Furthermore, the use of an 'on– off' phenylephrine infusion (commenced at 100 mg min) in combination with crystalloid co-hydration has been shown to nearly eliminate the likelihood of spinal hypotension **(Ngan& Khaw, 2005).**

Data from the previously described dose-finding studies suggest that
50 mg min may be a preferable starting point for a prophylactic phenylephrine infusion compared with an initial infusion of 100mg min **(Allen & George et al., 2010).** Irrespective of the chosen initial phenylephrine rate, an infusion is recommended for maintaining maternal SBP close to baseline SBP to minimize maternal nausea, vomiting, and fetal acidosis **(Lee & Smiley, 2014).** who had their SBP maintained at baseline SBP with a phenylephrine infusion had a reduced incidence of

nausea or vomiting and higher umbilical artery pH values (from cord gases) compared with patients where SBP was maintained at, 100% of baseline values**(Stewart & Fernando et al., 2010).** Maternal heart rate ishighly correlated (r¼0.87) with cardiac output after phenylephrine administration; therefore, heart rate can potentially be used as a surrogate marker for cardiac output and for guiding phenylephrine dosing. Thephenylephrine infusion rate should be reduced if maternal heart rate decreases below baseline values **(Smith & Drummond, 2009).**

2.10 Future directions:

Variable rate phenylephrine infusions offer the potential to tightly control intraoperative blood pressure, with systems using closed-loops as a major technological advance **(Sayyid &Taha et al., 2014).** Data from two randomized trials comparing closed-loop vasopressor automated systems with manual boluses or manually controlled infusion suggest that arterial pressure control is better with closed-loop systems**(Sng & Tan et al., 2014(and (Ngan & Khaw, 2013).**

Although these approaches to blood pressure maintenance duringCaesarean delivery are novel, closed-loop systems are not yet commercially available for clinical use **(NganKee & Khaw, 2013).** These systems generally rely on non-invasive measurements of blood pressure forcalculating perioperative phenylephrine infusion rates, thus are constrainedby the influence of movement and shivering artifacts on blood pressure readings. Technological advances in real-time minimally-invasive and non- invasive devices may improve how we monitor maternal haemodynamic indices during Caesarean delivery **(Armstrong & Fernando et al., 2011).** Future studies should also consider novel approaches for predicting which patients are at risk of spinal hypotension, with vasopressor regimens being tailored according to each patient's individual risk profile.

2.11 Techniques for avoid a decrease in blood pressure during spinal anaesthesia for caesarean section split into three group: intravenous fluid therapy, medications, and physical methods:

Fluid therapy (crystalloid versus control; colloid versus crystalloid) It is uncertain whether crystalloids prevent hypotension because the quality of the evidence is very low. Giving colloids instead of crystalloids may mean that fewer women have low blood pressure after having spinal anaesthesia. We cannot be certain due to the very low quality evidence whether crystalloid or colloid are better at preventing maternal low heart rate (bradycardia), high blood pressure, nausea and vomiting, neonatal acidosis, or low Apgar scores. Whether women received crystalloids or no fluids did not affect the number of women who experienced nausea and/or vomiting **(Wiley & Sons, 2337).**

Medications (ephedrine versus phenylephrine; ondansetron versus control) Lower rates of bradycardia occurred in women receiving ephedrine versus phenylephrine, and with ondansetron versus no ondansetron, but the evidence is low quality. Ondansetron may prevent lowblood pressure and nausea/vomiting but made little or no difference to neonatal acidosis or Apgar scores. There was little difference between ephedrine and phenylephrine for low or high blood pressure, nausea and vomiting, neonatal acidosis, or Apgar scores. We cannot be certain of these results due to the low or very low quality of the evidence **(Wiley & Sons, 2337).**

Physical methods (leg compression versus control; walking versus lying**:** It is uncertain whether leg compression reduces the number of women with hypotension compared with no leg compression because the quality of evidence is very low. Similarly, we cannot be certain whether leg compression made any difference to women experiencing bradycardia or nausea and vomiting, or to babies' Apgar scores. It is also uncertain whether walking or lying down before the spinal anaesthesia reduces low blood pressure**(John & Sons, 2337).**

CHAPTER THERE

METHODOLOGY

CHAPTER THERE: METHODOLOGY

Study Design

A prospective analytical cross-sectional study design was conducted to identify the prevalence of hypotension in caesarian section under spinal anesthesia.

Study sitting

The study was conducted in the operation and recovery room in Al-Jumhouri Teaching Hospital Authority. AL-Sabeen maternity and child hospital, Thawra Modern General Hospital, Al-Kuwait University Hospital, and Republican teaching hospital authority) in Sana'a- Yemen were excluded from the study because their refuse to conduct study.

Study Population

The population of the study was all the patient underwent for caesarian section under spinal anesthesia in previous mentioning setting.

Sample Method

A total coverage of female patient underwent for caesarian section under spinal anesthesia in previous mentioning setting and agree to participate in the study during the data collection period.

Sample Size

A total sample was 60 female patients.

Data collection tools

An observation checklist to identify the prevalence of hypotension in caesarian section under spinal anesthesia was divided into two parts:

Part I: Socio demographic characteristics of female Patient: was covered age, medical and surgical history**,** indication of cesarean section and degree of urgency for cesarean section.

Part II: Perioperative data to identify the prevalence of hypotension in caesarian section under spinal anesthesia. It was categories under three items; preoperative intraoperative, and postoperative.

3**.7 Data collection technique:**

1) Approval was obtained from ethical committee of 21 September University.

2) An official written permission to conduct the study was obtained by the investigators from responsible authorities.

3) Verbal explanation of the nature and aim of the study was performed to medical and patient.

4) Validity: The content validity was established by a panel expertise in 21 September University, who reviewed the tools for clarity, relevance, comprehensiveness and applicability for implementation and according to their opinion some modifications were applied.

5) Oral consent was taken from all female patient and anesthetist staff and they have the right refuse to participate or to withdraw from the study without any effect on the study.

6) An observation checklist was done identify the incidence of hypotension in caesarian section under spinal anesthesia. Each patient was observed individually. The specific time for observed was between 8 a.m. to 3 p.m.

7) Data collections start from first April 2021 to the end of August 2021.

8) We record blood pressure by using cuff of monitor.

Plan for Data analysis

After the date collection, data were organized, tabulated, summarized and analyzed using appropriate statistical methods. The demographic data was tabulated and percentages were found by using number, percent, mean and standard deviation. The association between the demographic characteristics and knowledge were analyzed by Mean and standard Division. Data were collected, computed and statistically analyzed using the Statistical Package for Social Sciences (SPSS) version 24.0. The 0.05 level was used as the cut off value for statistical significance.

Ethical considerations

An approval from the ethical committee of the college of medical sciences of 21 September University has been obtained previously to carrying out this study. A cover letter has been sent to principle of university to obtain an approval to conduct this study as well. An approval from the hospital authority has been obtained for achieving the same purpose. The purpose and benefits of the study have been explained to participants. Oral consent has taken also from all nurses in the study and all the nurses also have the right to refuseto participate or to withdraw from the study without any effect on the study.

CHAPTER

FOUR

RESULTS

Results

This chapter deals with the analysis of data and interpretation of the results. The results are presented in different figures and tables.

The data were collected from 60 patients. The collected data were tabulated and analyzed using descriptive and inferential statistical methods.

The findings are summarized in the following sections.

Section I: Socio-Demographic data of patient.

Section II: perioperative data.

Section III: Association between patient demographic data and prevalenceof hypotension.

4.1 Demographic characteristics of patients:

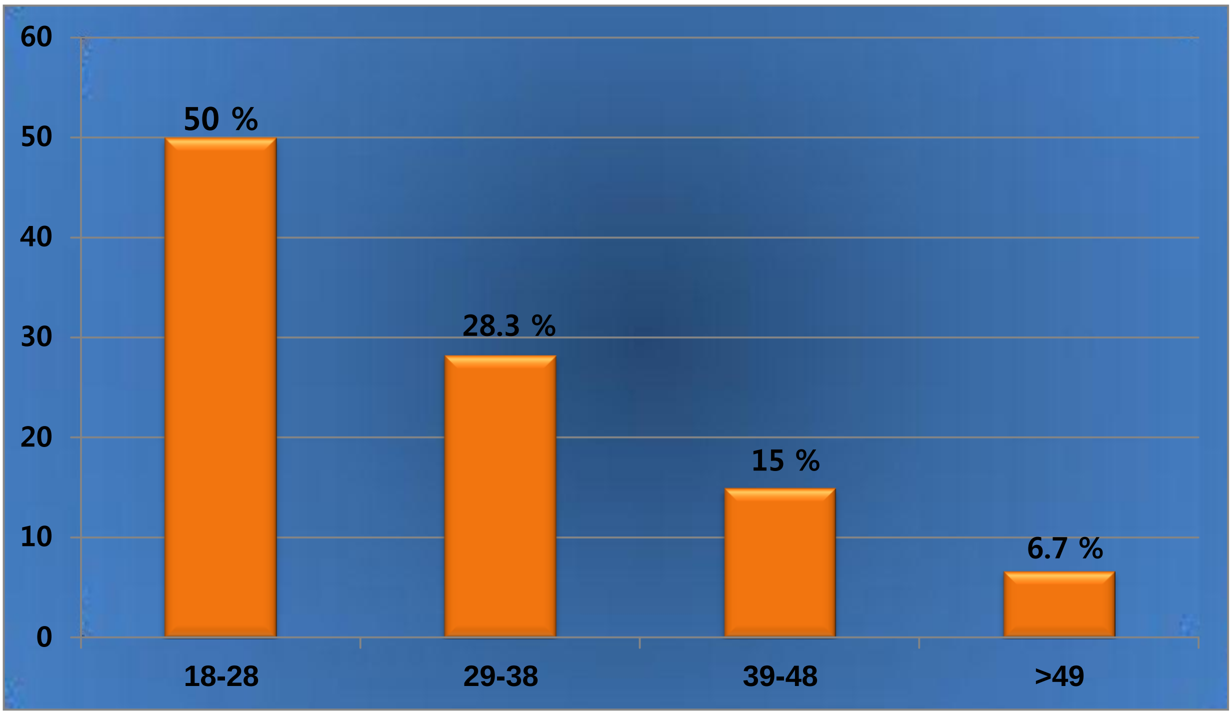

Figure (4-1): Distribution of patients according to age group (n=60).

As regarding to patients age figure (4-1) showed that the most patients 50% belong age group (18-28), while less frequency 6.7%belong more than 49 years.

Table (4-1): Distribution of patients according to age group (n=60).

Category	Minimum	Maximum	Mean ±SD
Age	**18.00**	**49.00**	**27.73 ± ٩.٢**

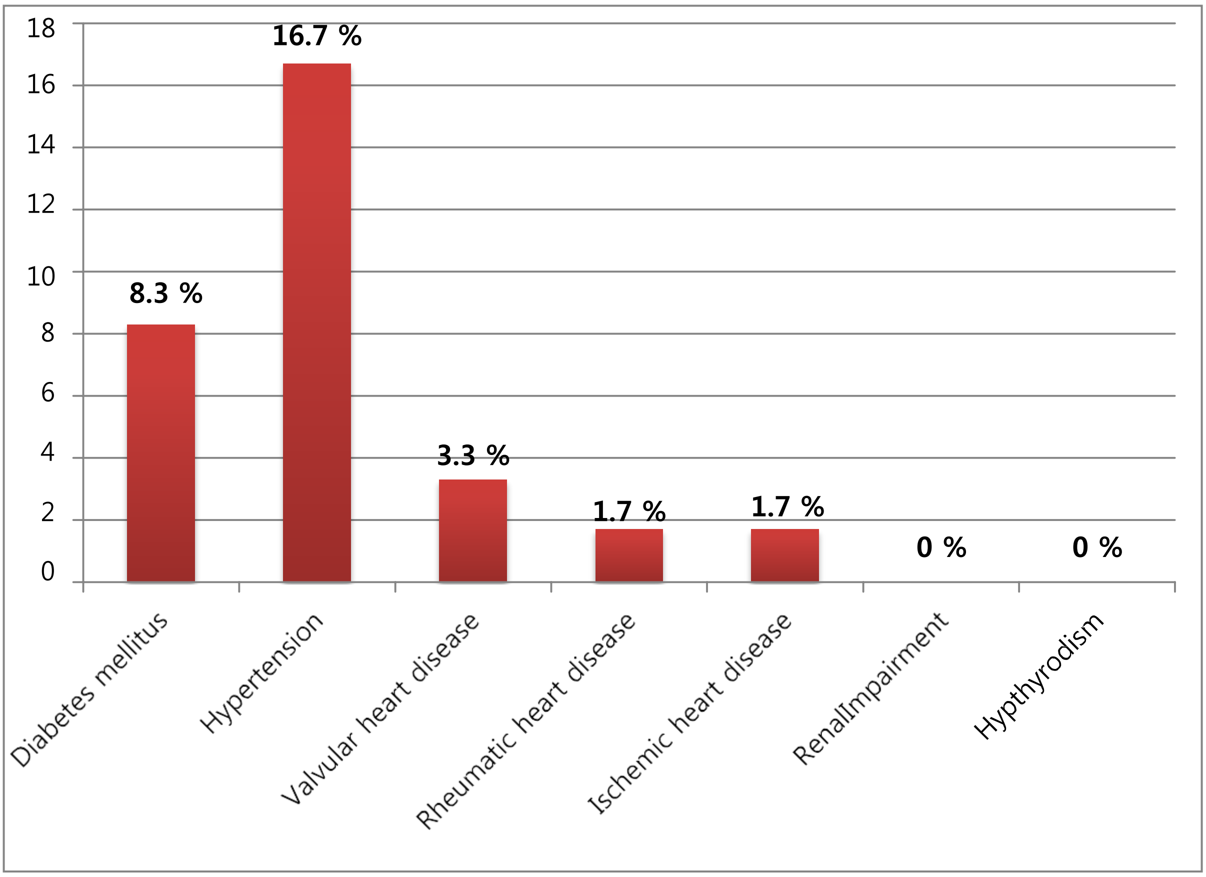

Figure (4-٢): Distribution of patient according to medical history(n=60).

Figure (4-٢) show the distribution of patients according to medical history,it noted that the most patient had hypertension 16.7%.

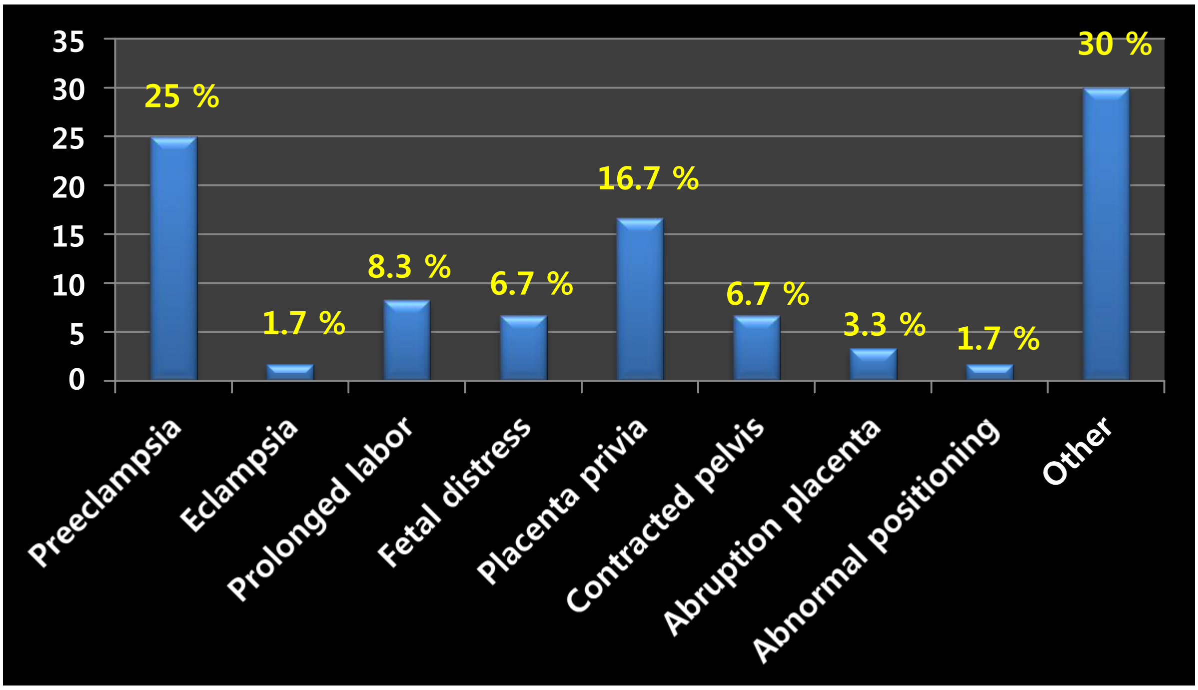

Figure (4-٣): Distribution of patients according to indication ofcesarean section (n=60).

Concerning to indication of cesarean section the figure (4-٣) showed that the most patient had other indications 30 %, while 1.7% had Eclampsia and abnormal positioning.

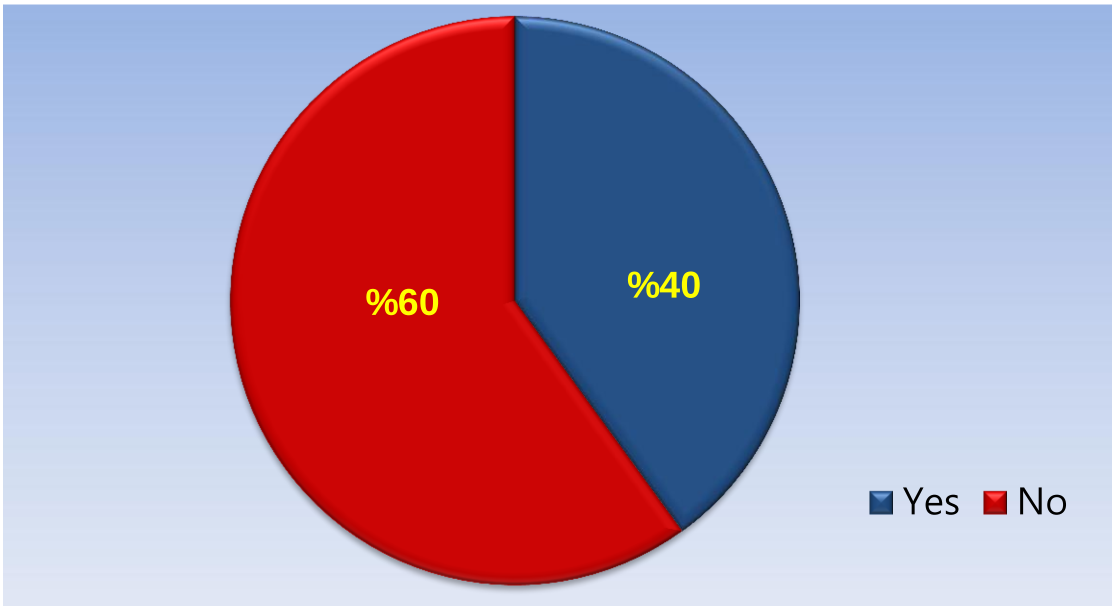

Figure (4-6): Distribution of patient according to surgical history(n=60).

As show in figure (4-6) Distribution of patients according to surgical history, it demonstrated that the most patient had not history 60%.

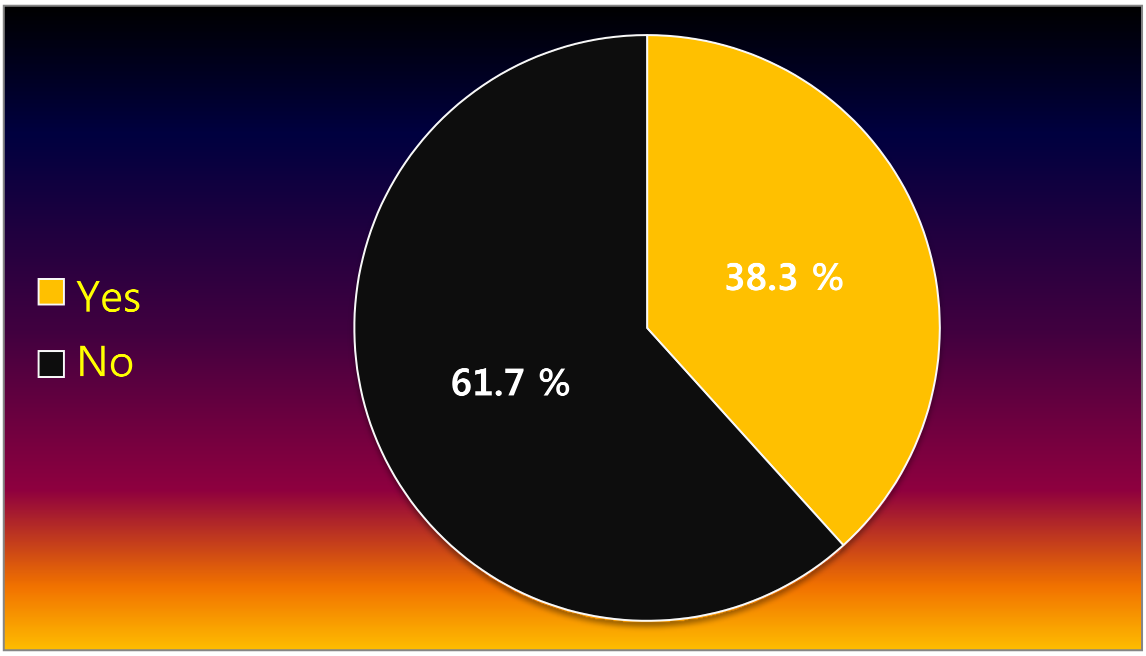

Figure (4-7): Distribution of patient according to previous spinal anesthesia (n=60).

As show in figure (4-7) Distribution of patients according to previous spinal anesthesia, it noted that the most patient had not previous spinal anesthesia 61.7%.

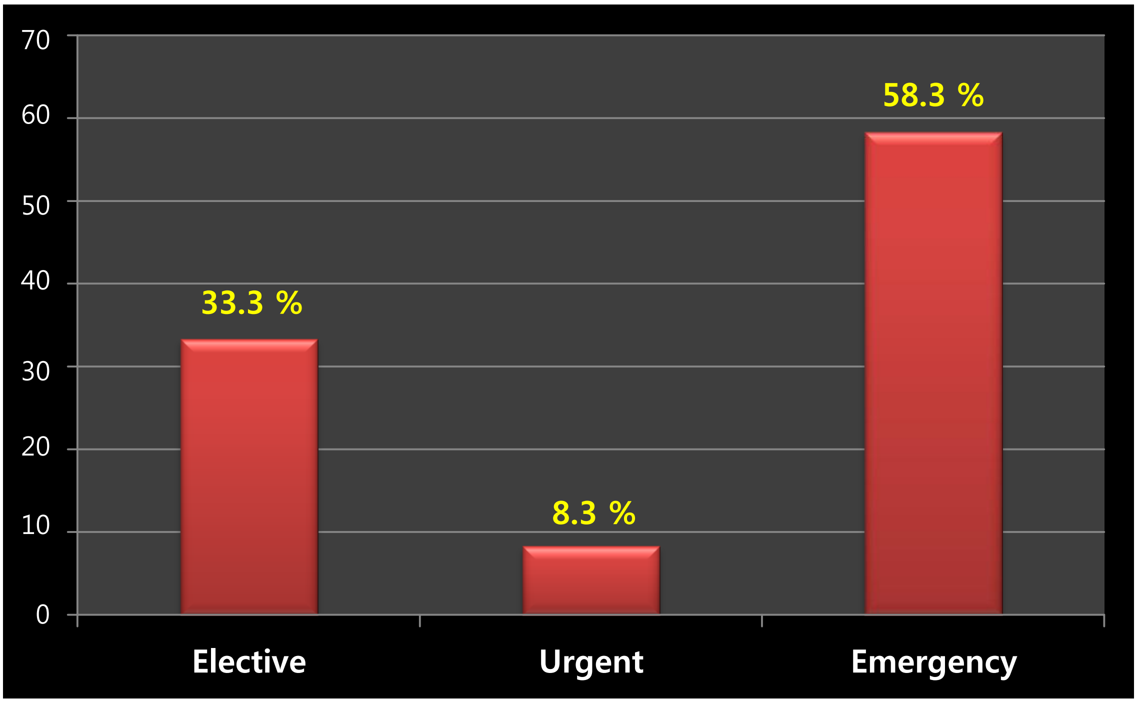

Figure (4-8): Distribution of patient according to urgency degree ofcesarean section (n=60).

Figure (4-8) show the distribution of patient according to degree ofurgency for cesarean section, it noted that the most patients 58.3%
emergency cesarean, while less frequency 8.3%belong urgent belong cesarean.

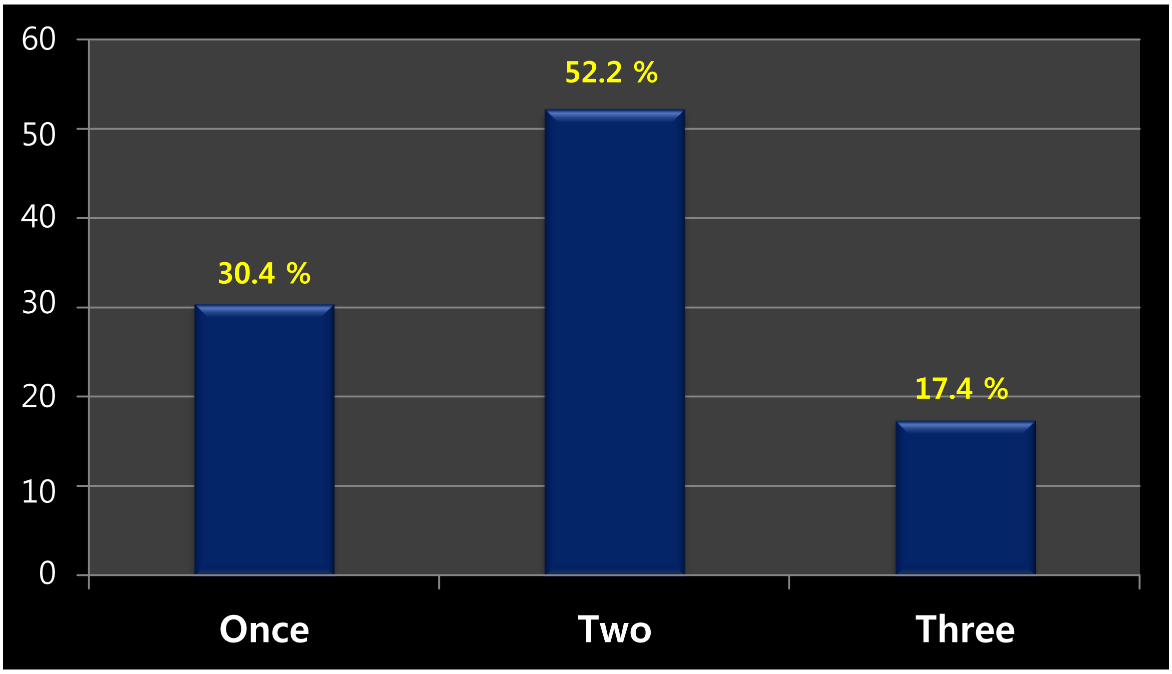

Figure (4-9): Distribution of patient according to number of previousspinal anesthesia (n=23).

Concerning to number of previous spinal anesthesia the figure (4-9) showed that the most patient 52.2% belonged (Two), while less frequency17.4% belonged (Three).

Table (4-2): Distribution of patients according to preoperative bloodpressure, pulse and fluid induction of anesthesia (n=60).

Preoperative blood pressure and pules	Minimum	Maximum	Mean ±SD
Systolic blood pressure	90.00	170.00	122.32 ±18.23
Diastolic blood pressure	55.00	110.00	82.13 ±12.96
Pulse	60.00	120.00	90.30±9.85
Fluid	250.00	2000.00	750.83±413.28

Table (4-2) show the Distribution of patients according to preoperative blood pressure, pulse and fluid induction of anesthesia the maximum preoperative systolic blood pressure was 170mmHg, while the minimumdiastolic blood pressure 55 mmHg.

Concerning to pulse the maximum was 120b/m while the minimum 60b/m.Concerning to Fluid the maximum was 2000ml, while the minimum 250ml.

Table (4-4): Distribution of patients according to intraoperative BPmeasurement (n=60).

Intraoperative time reading	SBP			DBP		
	Minimum	**Maximum**	**Mean±SD**	**Minimum**	**Maximum**	**Mean±SD**
At begin of anesthesia	80.00	160.00	117.98±19.04	41.00	110.00	79.50±6.43
After 10 minutes of anesthesia	85.00	160.00	113.40±17.81	42.00	110.00	75.65±15.25
After 20 minutes of anesthesia	80.00	153.00	107.55± 8.52	48.00	110.00	72.01±14.85
After 30 minutes of anesthesia	76.00	140.00	108.32±17.06	45.00	110.00	72.35± 4.08

Concerning to BP measurement indication at begin of spinal anesthesia, the systolic BP was reported at the minimum level 80 mmHg and diastolic BP was 41 mmHg, while after 20 minutes of spinal anesthesia the minimum level of systolic BP 80 mmHg and diastolic BP was 48 mmHg.

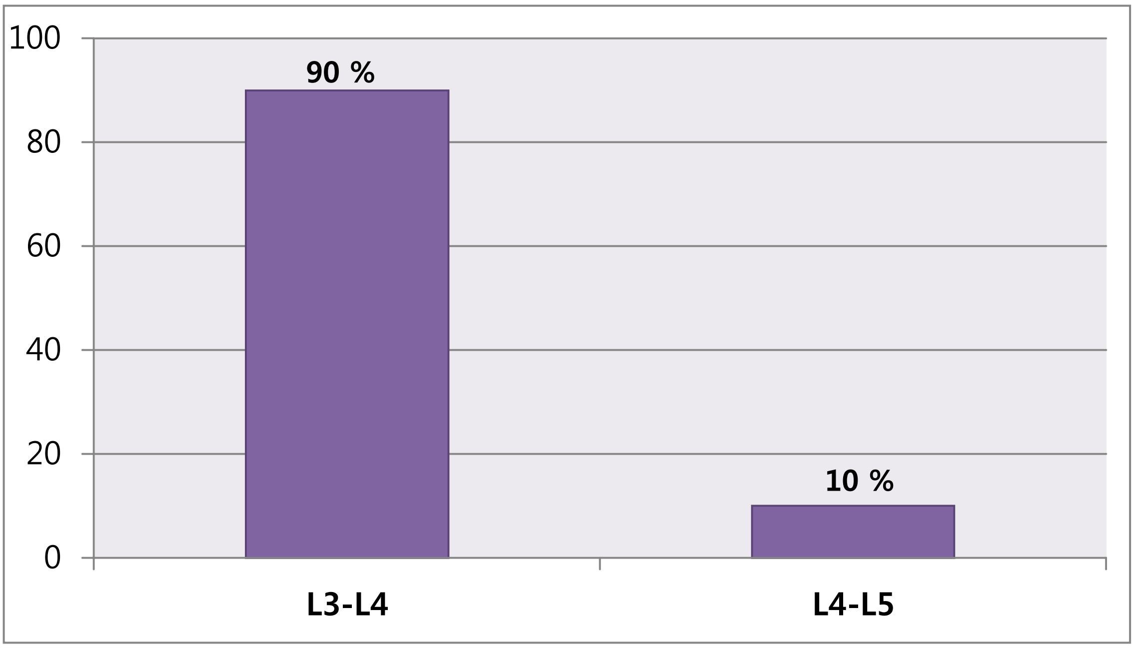

Figure (4-11): Distribution of patient according to sit of spinal needleinsertion (n=60).

As regarding Figure (4-11) Distribution of patient according to sit ofspinal needle insertion, it clarified that the most patients 90% used **Lumber3-Lumber4** site, while 10% inserted **Lumber4-Lumber5.**

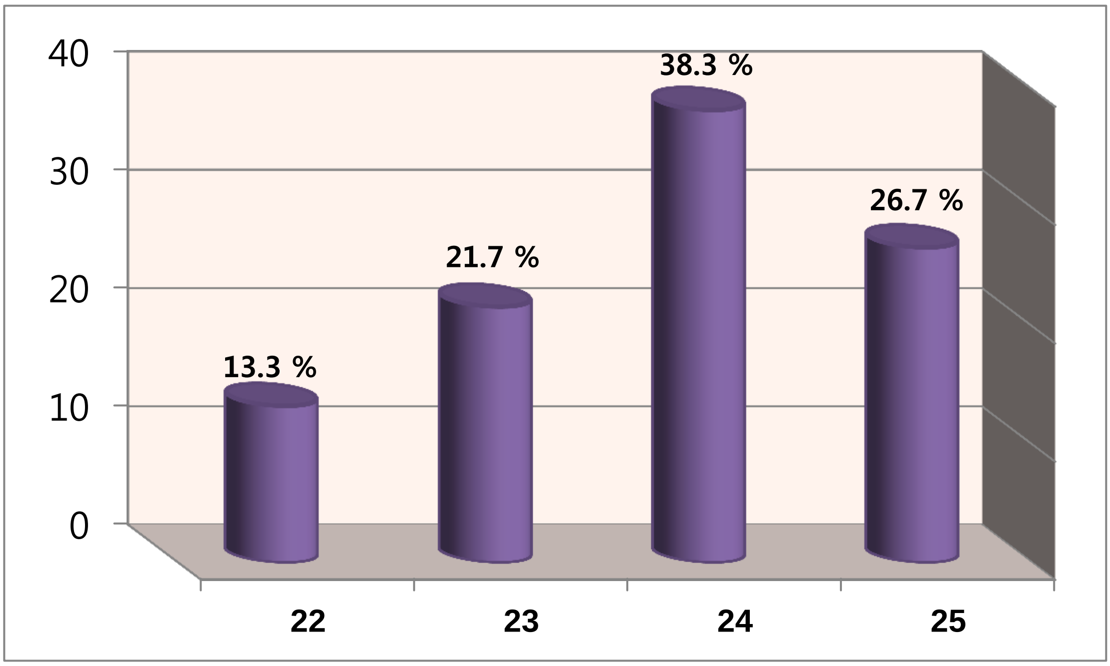

Figure (4-12): Distribution of patient according to size of spinal needleused (n=60).

As regarding to size of spinal needle used figure (4-12) showed that the most needle size 38.3% needle size used in spinal anesthesia was 24G, while 13.3% used 22G.

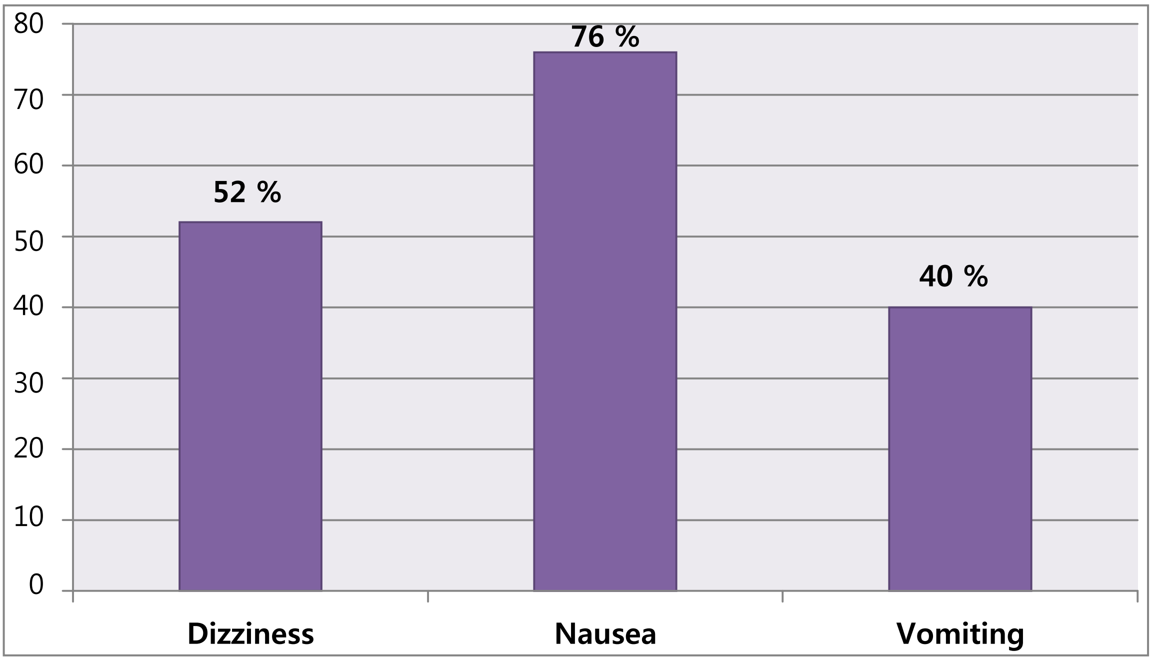

Figure (4-14): Distribution of patients according to signs andsymptoms associated with hypotension.

Figure (4-14) show the distribution of patients according of signs and symptoms associated with hypotension, it noted that the most patient'scomplain of nausea 76%, while 40%was vomiting.

Table (4-5): Distribution of patients according to intraoperative management of hypotension.

Management of hypotension	F	Minimum	Maximum	Mean ±SD
Ephedrine	**25**	10	30.00	21.40 ±8.36
Normal Saline	**48**	0	3000.00	683.33±536.52
RL	**55**	0	2000.00	941.67±496.53
DNS	**5**	0	500.00	41.67±139.36

Table (4-5) shows the management of intraoperative hypotension,it clarified that, the most drug used was Ephedrine 21.40 ±8.36.

Concerning to intravenous fluid intraoperatively, the most fluid used wasNormal Saline and the maximum 3000mL, while DNS and RL was less.

Table (4-7): Distribution of patients according to Postoperative BP measurement (n=60).

Intraoperative time reading	SBP			DBP		
	Minimum	Maximum	Mean±SD	Minimum	Maximum	Mean±SD
10 minutes after operation	83.00	160.00	113.92±16.35	52.00	110.00	77.32±13.35
20 minutes after operation	85.00	150.00	115.72±15.32	49.00	100.00	77.53±12.19

Table (4-7) show the mean score of patients according to BP measurementregarding postoperative, It demonstrated that the minimum of systolic blood pressure after ten minutes of operation 83 mmHg with **Mean±SD**
113.92 ± 16.35 and the minimum diastolic blood pressure 52 mmHg with**Mean±SD** 77.32 ± 13.35, while after 20 minutes of operation the minimum of systolic blood pressure 85 mmHg with **Mean±SD**
115.72 ±
15.35 and the minimum diastolic blood pressure 49 mmHg with **Mean±SD** 77.53 ± 12.19.

Table (4-8): Relationship between demographic characteristics of patients andintraoperative hypotension (n=60).

Demographic data	Intraoperative hypotension				
	Yes		No		P-value
	F	%	F	%	
Age:					
<25 years	7	28%	14	40%	0.051
25-35 years	18	72%	16	45.7%	
>35 years	0	0%	5	14.3%	
Hospital of type:					
Al-Thawra hospital	9	36%	16	45.7%	0.030
Al-Kuwait hospital	9	36%	3	8.6%	
Al-Jamhori hospital	7	28%	16	45.7%	
Medical history:					
Yes	3	12%	12	34.3%	0.049
No	22	88%	23	65.7%	

Table (9): Relationship between prevalence of hypotension and operation data (n=60).

Operation data	Intraoperative hypotension				
	Yes		No		P-value
	F	%	F	%	
Size of spinal needle:					
22	**4**	**13.8%**	**4**	**12.9%**	**0.370**
23	**7**	**24.1%**	**6**	**19.3%**	
24	**8**	**27.6%**	**15**	**48.4%**	
25	**10**	**34.5**	**6**	**19.3%**	
Site of spinal needle:					
L3-L4	**25**	**86.2%**	**29**	**93.5%**	**0.344**
L4-L5	**4**	**13.8%**	**2**	**6.5%**	
Dose of Bupivacaine:					
15mg	**20**	**69%**	**14**	**45.2%**	**0.063**
25mg	**9**	**31%**	**17**	**54.8%**	

Concerning to relation between demographic data and prevalence of intraoperative hypotension table (4-9) clarified that there was statistical significant different between type of hospital, medical history were p value 0.030, 0.040 respectively, while there was no statistical significant different between size of spinal needle, insertion site and intraoperative hypotension were p value 0.370, 0.344 respectively.

CHAPTER FIVE DISCUSSION

CHAPTER FIVE: DISCUSSION

Hypotension during cesarean section under spinal anesthesia remains a frequent scenario in obstetric practice. A number of factors play a role in altering the incidence and severity of hypotension. Counteracting aortocaval compression does not significantly prevent hypotension in most singleton pregnancies **(Chumpathong et al., 2004)**

The aim of the study was to find out the prevalence of hypotension in cesarean section under spinal anesthesia, and specific objectives was to obtain demographic data of patient, to identify the possible causes of hypotension in cesarean section under spinal anesthesia, to identify the causes of cesarean section, and to compare between demographic data and prevalence of hypotension. Hypotension research was prevalence of hypotension in cesarean section under spinal anesthesia will 50%.

The present study showed that the most of patient's age belong 18-25 year 50% with mean age 26.73±5.1, the most patients from Al-Thawra Modern General hospital 41.7%, most of them had history of hypertension 16.7%, the most indication of cesarean section was preeclampsia 25%, and was emergency operation 58.3%.

This result is consistent with Chumpathong et al, who reported that the age of most patients was <35years 8.9% with age mean 29.7±5.7, while 51.5% of patients were emergency cesarean section **(Chumpathong et al., 2004**). In addition, Haves et al, who study the spinal anesthesia for elective cesarean section is associated with shorter hospital stay compared to general anesthesia found that mean age of patients was (31.4±4.8) (Haves et al., 2013).

In addition Kahoro et al, who study the incidence and risk factor during spinal anesthesia after cesarean section in the Kenyata National Hospital, demonstrated that the most of patient's age belong 20-29 years and mean age 29, while 51.2% were underwent emergency surgery **(Kahoro et al., 2009).**

Concerning to site of spinal needle insertion current study clarified that the most of anesthetist 90% used lumber 3-4 site for insertion of spinal needle. Moreover, size 24 gauge of spinal needle was the most used 38.3% and all of these needles was befle type 100%. The most of patients 76% had nausea associated with intraoperatively hypotension, about 41.7% of patients were given ephedrine with mean 11.08±11,24. The present study demonstrated that postoperative causes of hypotension is most patients 21.7% belong hypovolemia.

The result does not agree with champathong et al, who reported that most patients used <T5 (70.9%) had hypotension **(Chumpathong et al., 2004)**, although Kahoro et al, who demonstrated that the most patients 67% used lumber 5, and most patients 80% does not complain of nausea and vomiting (Kahoro et al., 2009).

The result with champathong et al, who reported that the mean ephedrine used 12.6±6.8, while Haves et al, who clarified that 50% used ephedrine, Kahoro et al, who demonstrated that about 83.1% used ephedrine and 82 used crystalloid fluid **(Kahoroet al., 2009).**

As concerning to prevalence of intraoperative hypotension current study noted that 41.7% patients had hypotension. As comparing with other study the prevalence in our study was less than a study of Kahoro et al, who reported that the incidence of hypotension was 64% **(Kahoro et**

al., 2009), which close with champathong et al, who reported the about 76.7% of patients had hypotension **(Chumpathong et al., 2004).** While Haves et al, who demonstrated that higher incidence of hypotension45.7% **(Haves et al., 2013)**

As regarding to the association between the demographic characteristic and prevalence of hypotension, there was no relationship between site and size of spinal needle and prevalence of hypotension were p value
>0.05, however there is relation between age and medical history with prevalence of hypotension were p value <0.05

The result with Kahoro et al, who reported that there was no relationship between age and sensory level of hypotension were p value >0.07**(Kahro et al., 2009)**, while Chumpathong et al who demonstrated that the parameters that have statistically significant differences associated with development of hypotension in the present study include maternal height
< 155 cm, control systolic blood pressure below 130 mmHg and sensory level higher than T5 **(Chumpathong et al., 2004).**

CHAPTER SIX

CONCLUSION & RECOMMENDATION

6.1 Conclusion:

From the results of the study, we conclude that:

- The most female patient's age 50% between 18-25 years, the most medical history was hypotension 16.7%. The prevalence of intraoperative hypotension was 41.7%, while postoperative hypotension was 28.3% of patient underwent in cesarean section under spinal anesthesia. Most of surgical procedures were emergency 58.3%.
- The study shows there was no statistically significant relationship between age and prevalence of hypotension.

6.2 Recommendation:

General Recommendation:

1) Educational program for patient about advantage of spinal anesthesia**.**

2) Training program for anesthetist staff regarding spinal anesthesia andmanagement of its complication.

3) Develop written protocol about spinal anesthesia.

4) Provide a different type and size of spinal needle**.**

5) Good preoperative patient assessment.

For further researcher

The following suggestions are made for further research.

1) Large sample from privates and governments to generalize a result.
2) An anesthetic checklist should be conducted before the start of spinalanesthesia.

Chapter Seven

Refere

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A. Demographic Data:

I. The Patient Data:

1) Age ( ).

2) Medical history:

a. Diabetic mellitus ( ).
b. Rheumatic heart d sease ( ).
c. Hypertension ( ).
d. Ischemic Heart disease ( ).
e. Valvular Heart disease ( ).
f. Renal Impairment ( ).
g. Other Specify:……………………………...

3) Indication of cesarean section:

a. Preeclampsia ( ).
b. Contracted pelvis ( ).
c. Eclampsia ( ).
d. Abruption placenta ( ).
e. Prolonged labor ( ).
f. Abnormal positioning ( ).
g. Fetal distress ( ).
h. Cord prolapse ( ).
i. Placenta privia ( ).
j. Meconium ( ).
k. Old primly ( ).
l. Rupture membrane ( )
m. Other Specify:……………………………...

4) Previous spinal anesthesia:

a. Yes ( ). b. No ( ).

5) Degree of urgency for cesarean section:

A. Elective ( ) B. Urgent ( ) C. Emergency ( )

6) Number of previous cesarean section ( ).

II. Operation data:

1)

Type of local agent	Dose
A.	

2) Blood pressure before induction of anesthesia a. BP ……………… b. Pulse…………..

3) Fluid load before induction:

Volume given in ML ……………………..

4) Blood pressure measurement after induction :

TIME	30 min	30 min	30 min	30 min
PB				
Systolic				
Diastolic				

5) Site of needle insertion:

a. L3–L4 ( ). b. L4–L9 ( )c. other specify:………………..

6) Size of spinal needle used: ……………………

- Type of needle used: …………………

7) Signs and symptoms associated with hypotension:

a. Dizziness ( ). b. Nausea ( ).
c. Vomiting ( ). d. Other Specify: …………………………

8) Management of hypotension:

Inotropic drug	Dose	Time

9) What is the type of fluid?

Type of IV fluid.	Amount
a.	
b.	
c.	

10) Complication associated with hypotension **:**

A- Myocardia infraction ( ) B- Cardiac arrest ( ) C- Admission in ICU ( ) D- Other specify (

11) Operative time ……………………………

12) Anesthetic time…………………………..

III. Post-operative data:

1) Patient has hypotension?

a. Yes ( ) b. No ( )

2) If yes, what the causes of hypotension?

a. Hypothermia ( ) b. hyperthermia ( ) c. hypovolemic ( )
d. Other specify……………………………………………..

3) Blood pressure measurement :

TIME PB	30 min	30 min	30 min	30 min
Systolic				
Diastolic				

جامعة
الرازي
كلية
العلوم
الطبية
كلية
العلوم
الطبية
قسم العلوم الطبية
التطبيقية قسم
التخدير

معدل انحشار انخفاض ضغط الدم في المرضى الخاضعين للعمليات القيصرية جخث الحخدير الشوكي

بحث هقذهت الٍ لغن العلىم الطبُت الخطبُمُت، كلُت العلىم الطبُت،جاهعت الشاصٌ، العخكوال هخطلباث دسجت البكالىسَىط فٍ الخخذَش

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عوش الغلطاى
عاسة هحوذ الواطشٍ
هٌاد صالح
سٌُك هلال
احوذ عبذالشحوي الشلٍ
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هشفش البحث

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اعخشاسٌ حخذَش و عٌاَه هشكضة

د/غال علٍ حغُي الملعت

أعخار هغاعذ يٍ الخوشَط الباغٌٍ والجشاحٍ

جاهعت الشاصً

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