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Comparison of Effects of Preloading and Coloading with Ringer Lactate in Elective Caesarean Section Cases under Spinal Anaesthesia

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Abstract*: Spinal anaesthesia is the preferred technique in caesarean section. Hypotension during spinal anaesthesia for caesarean section remains a common scenario in our clinical practice. Intravenous crystalloid prehydration has poor efficacy; thus, the focus has changed toward co-hydration and use of colloids.. This study has been undertaken to assess the efficacy of volume preloading with RL and to compare the relative efficacy of RL co loading. The study include 60 health pregnant women with ASA grade I and II undergoing caesarean delivery between 18 to 25 years, divided into two groups. GROUP **P** – Parturients in this group received 15ml per Kg of RL as preload over 20 minutes before subarachnoid spinal block with 1.8ml of 0.5% Bupivacaine GROUP **C** – Parturients in this group received 15ml per Kg of RL as coload as fast as possible, starting as soon as CSF is tapped.. Our study revealed that the incidence of hypotension was lesser in co-load group (40%) as compared to the preload group (60%) and the difference was statistically significant (p-0.023) and the mean number of supplemental ephedrine doses(6mg boluses) administered and the mean total dose of ephedrine administered was more in the preload group than in the co-load group*

Keywords*: caesarean section, co loading, hypotension, preloading , spinal anaesthesia*

I. Introduction

Hypotension is one of the commonest serious problems following spinal anaesthesia for caesarean section, potentially endangering both mother and child. Measures to decrease the incidence and severity of maternal hypotension include left uterine displacement, fluid preload, fluid co-load, prophylactic vasoconstrictors, trendelenburg position and legs elevation etc.

Acute hydration has become the cornerstone of prophylaxis of hypotension in obstetrics. Several studies have been done to evaluate the efficiency of preloading and co-loading. This study has been undertaken to assess the efficacy of volume preloading with RL and to compare the relative efficacy of RL co-loading.

In 1891, Quincke demonstrated usefulness of spinal puncture in diagnosis. Bier of Greifswald, first person to produce spinal anaesthesia in animal and man, introduce this technique as a mode of anaesthesia.

In 1905, Pitkin popularized the method of introducing agents intrathecally and in 1927 he used light and heavy solution and also introduced fine bore, short bevel needle. Chen Schmidt introduced ephedrine in 1923 and used it to maintain blood pressure in spinal analgesia.

II. Aim of the study

- To assess whether volume preloading or co-loading is more useful in caesarean section under spinal anaesthesia.
- To compare the efficacy of Ringer's lactate as preloading and co-loading fluid.
- To compare the advantages and disadvantages of preloading and co-loading.

2.1 Objectives:

Hypotension after spinal anaesthesia is a commonly reported adverse event. It is more common in caesarean section cases. It contributes to decrease of uteroplacental circulation, hypoxia to mother and fetus. Preloading and co-loading with crystalloid causes decreased incidence of hypotension during spinal anaesthesia.

- To compare heart rate between two groups
- To compare incidence of hypotension between two groups
- To compare systolic blood pressure between two groups
- To compare use of ephedrine between two groups

III. Methodology:

The study include 60 healthy pregnant women with ASA gradeI and II undergoing caesarean delivery between 18 to 25 years, divided into two groups.

Group **P –** parturients in this group received 15ml per kg of RL as preload over 20 minutes before subarachnoid spinal block performed with 1.8 ml of 0.5% bupivacaine

Group **C –** parturients in this group received 15ml per kg of RL as co-load as fast as possible, starting as soon as csf is tapped. Spinal block performed with 1.8 ml of 0.5% bupivacaine.

3.1 Inclusion criteria:

- Patient posted for elective caesarean section
- ASA physical status class I and II
- Age between 18 and 25 years
- Weight between 40 and 70 kg

3.2 Exclusion criteria:

- Emergency surgeries
- All contraindications to SA
- Patient age < 18 y, or >25 y
- Patient with PIH, Diabetes, Obesity, Abruptio Placenta etc
- Other than ASA –I and ASA- II

3.3 procedure:

IV line (18 guage) was secured in a peripheral vein and RL kept ready. Premedication with injection rantidine 50mg IV, inj.metclopromide 10mg IV was given to every patient.. Patient was placed in left lateral position and baseline non-invasive blood pressure and heart rate measured.

The patient of **group p** received 15ml/kg of ringer lactate over a period of 20 minutes before spinal anaesthesia.

Spinal anaesthesia was administered in both groups using 1.8ml of 0.5% of bupivacaine, with a 25 guage, Quinke's spinal needle with aspetic precautions.

Patient of co-load **group c** received identical fluid load of 15ml/kg via a pressurized giving set to administer the fluid at the maximum possible rate at the time of identification of CSF. Non invasive blood pressure measurements were recorded in both groups at every minute for first 10 minutes, every 5 minutes for next 20 minutes and for every 10 minutes there after till the end of surgery.

Surgery was allowed to proceed after a block to T^6 had been established and the block level at the end of surgery was documented. If the systolic arterial blood pressure decreased to less than 20% of the calculated baseline value, 6mg ephedrine doses were administered.

The following indices were taken and statistically analyzed:

- Heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure —baseline, at 1 minute interval up to 10 minutes and after that at 5 minutes intervals next 20 minutes, every 10 minutes, till end of surgery.
- Need for vasopressors between two groups
- Total fluid requirement
- Neonatal assessment by APGAR score at birth

IV. Statistical method:

By using paired t-test for difference of means using statistical package for social sciences (SPSS Version 11.5) and referenced for p-value for their significance. Any p-value less than 0.05 ($p<0.05$) was taken as significant.

V. Results and observations:

Age, weight and height characteristics of two groups in our study were comparable as shown in table 1 and figure numbers 1a, 1b and 1c.

Table No 1: Comparison of Basic parameter's between two groups

Basic Characteristics	Group P	Group C	P value
Age in Years	22.67±1.86	22.10±1.84	0.24
Weight (kg)	55.27±6.43	56.43±5.69	0.89
Height (cm)	149.57±3.47	149.70±3.68	0.46

Figure 1(a)

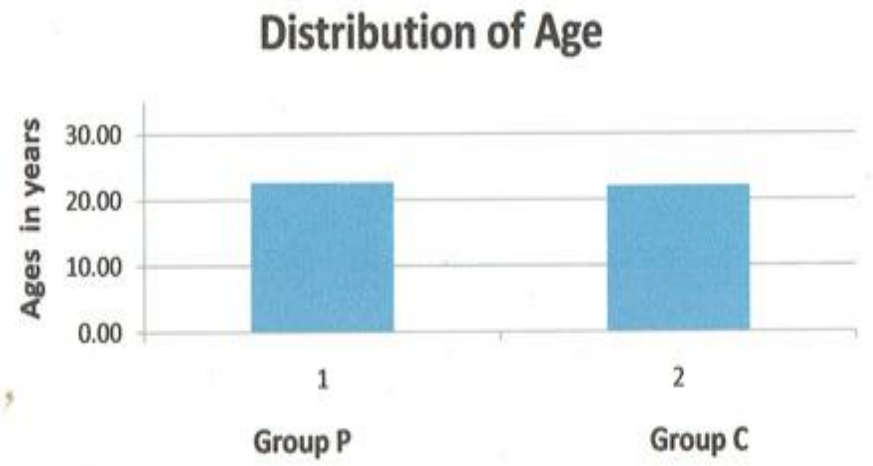


Figure 1(b)

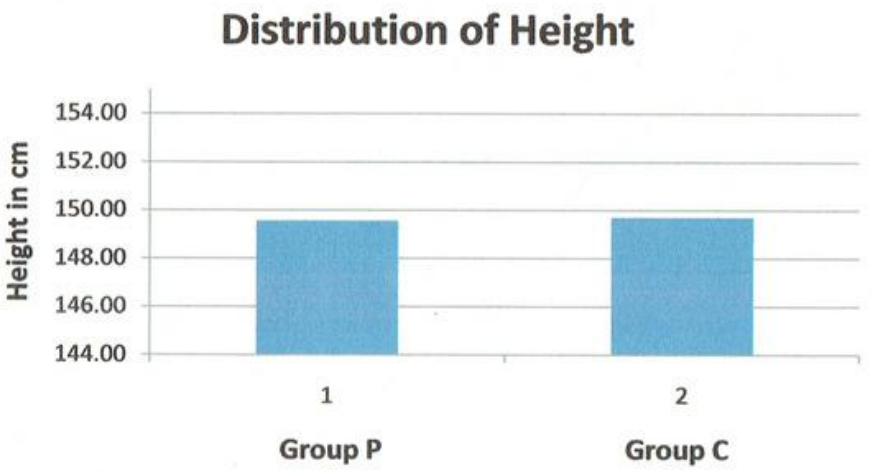


Figure 1(c)

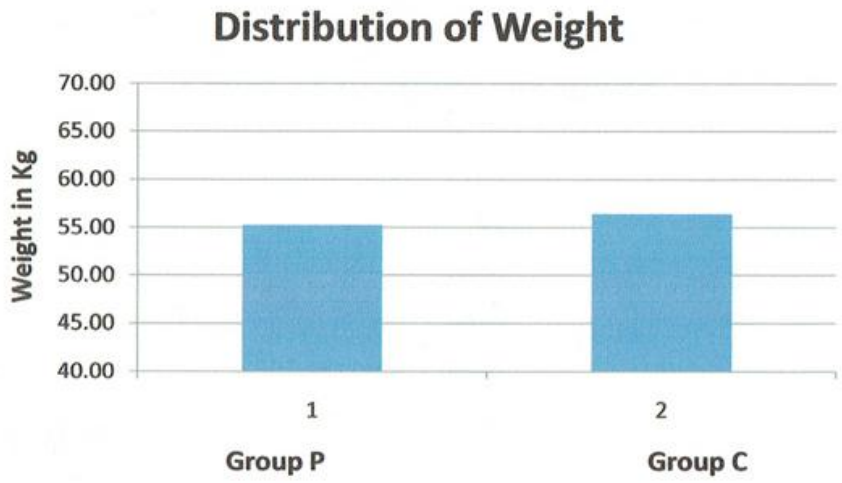


Table no 2: comparison of Heart rate between two groups of patients

Study Period	Group P		Group C		P value
	Mean	Standard Deviation	Mean	Standard Deviation	
0(Basal)	90	1	86	1.48	<0.0000001
1	90	1.7	90	3.35	NA
2	90	0.66	92	2.36	0.0001
3	86	1.96	95	2.36	<0.00000001
4	88	2.44	97	2.58	0.0000001
5	90	2.27	96	3.04	0.00001
6	90	3.09	88	2.88	0.005
7	90	1	86	3.05	0.00001
8	89	0.92	84	3.33	0.00001
9	95	1	84	2.91	<0.00000001
10	96	2.69	87	2.56	0.0000001
15	100	2.14	87	3.22	<0.00000001
20	100	0.98	84	2.97	<0.01*10power 10
25	99	0.96	85	2.67	<0.01*10power 11
30	90	1.88	84	2.39	<0.000001
40	90	1.02	83	3.01	<0.0000001
50	90	0.96	86	2.55	0.00001
60	89	1.06	84	1.99	<0.0000001
70	88	1.93	83	2.94	0.00001
80	89	0.93	82	3.66	<0.000001
90	90	3.1	81	3.41	<0.000001

Figure No 2

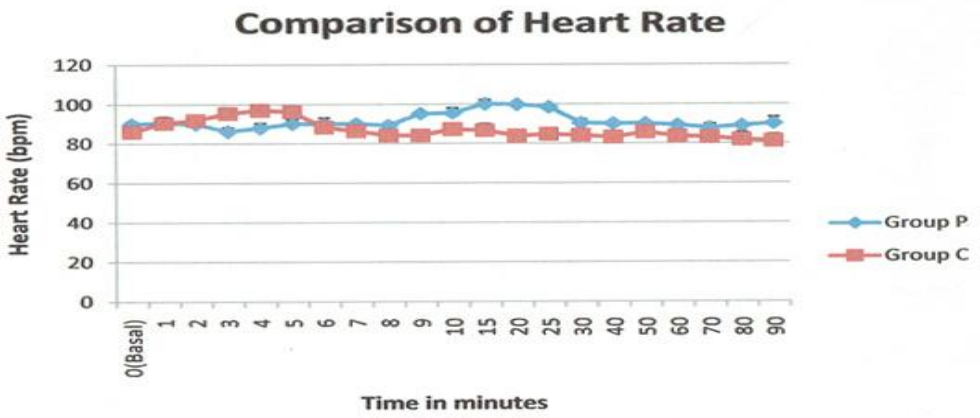


Figure No 3: comparison of systolic blood pressure

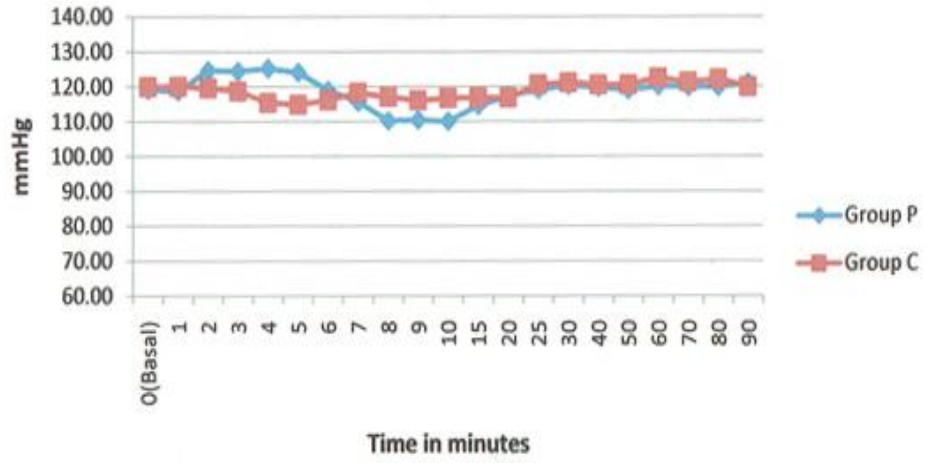


Figure No 4: comparison of diastolic blood pressure

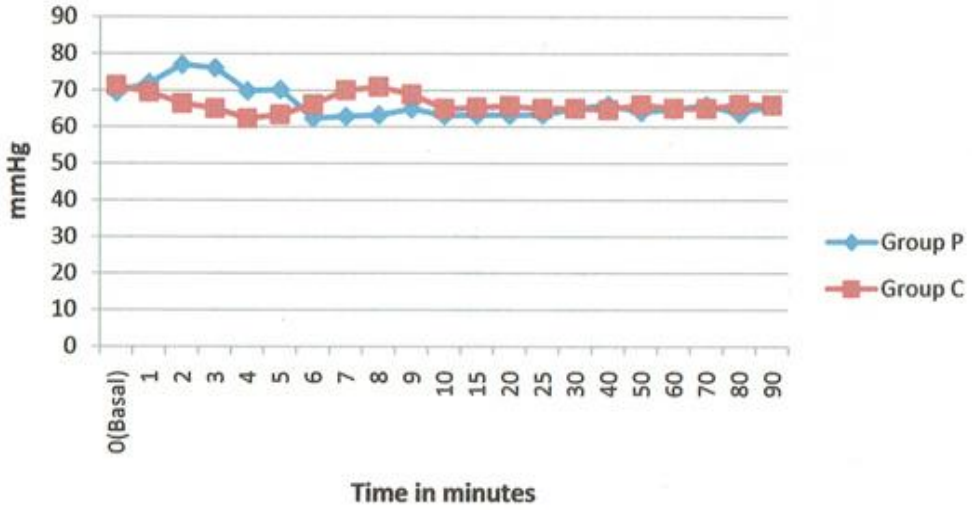


Figure No 5: comparison of Mean Arterial Pressure

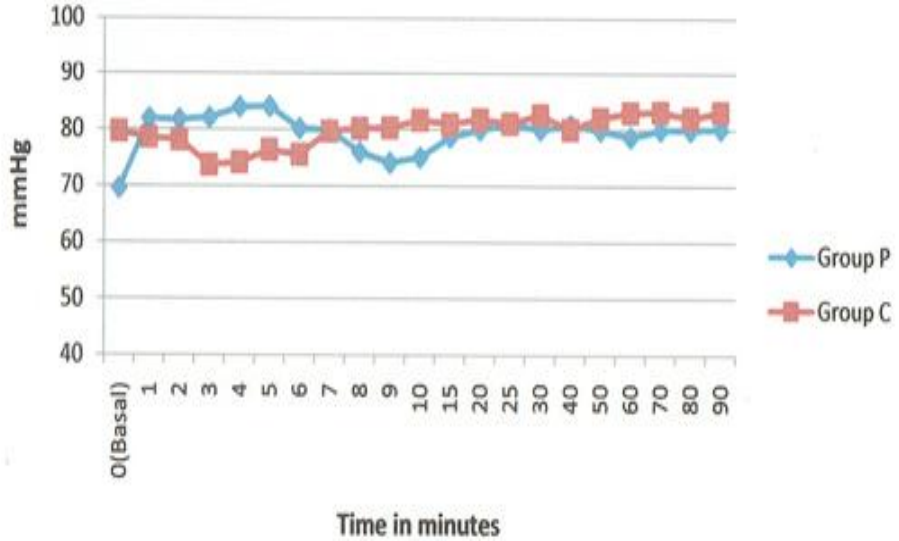


Figure No 6: comparison of number of episodes of hypotension

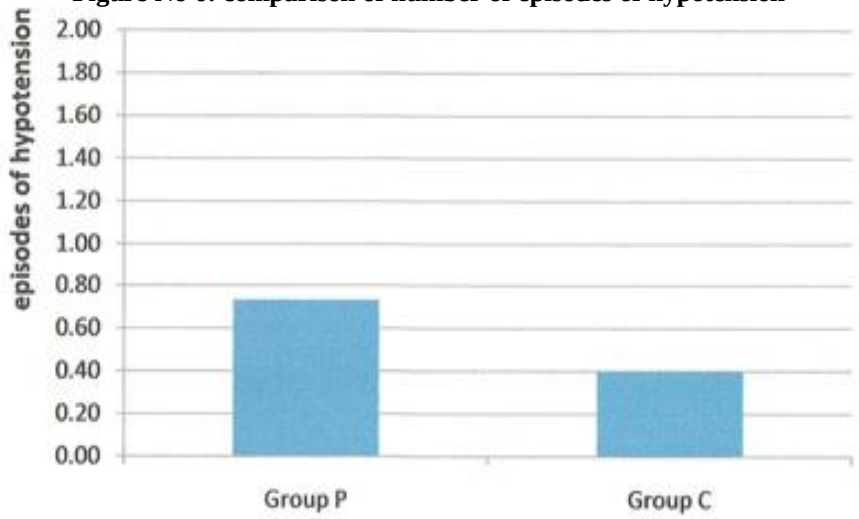


Figure No 7: Comparison of use of Ephedrine (6mg)

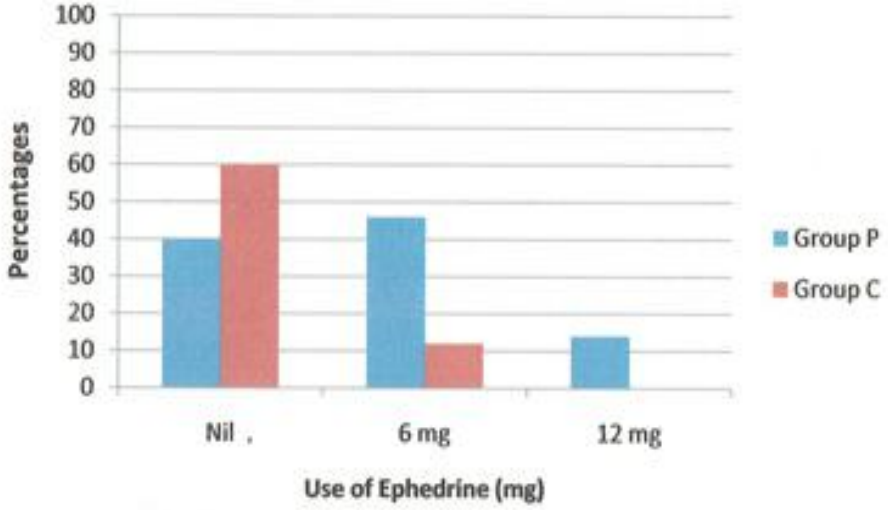


Figure No 8: Comparison of Total fluid use

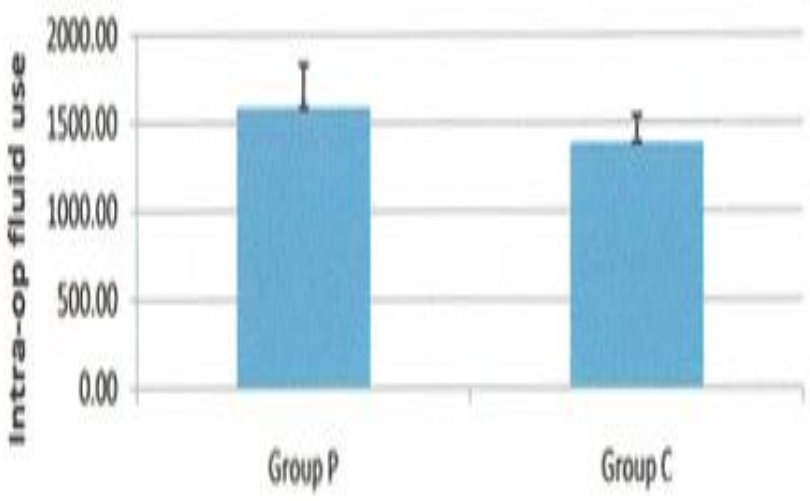
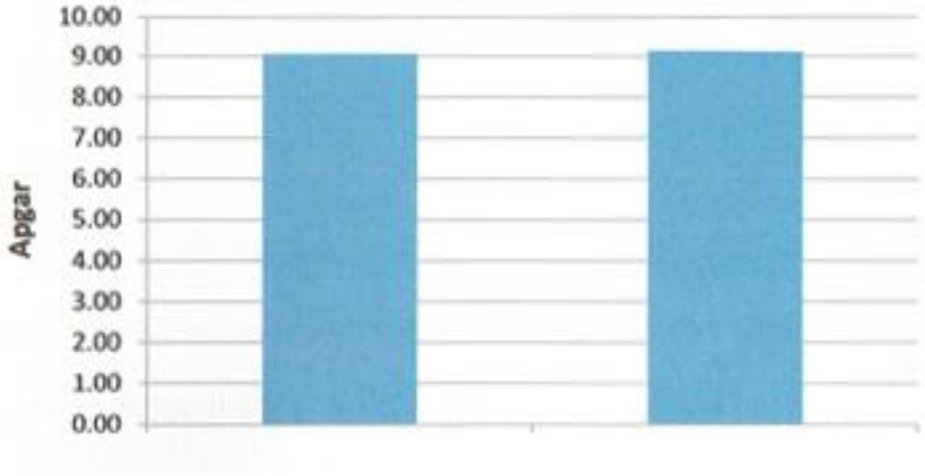


Figure no 9: comparison of neonatal APGAR Score



VI. Discussion:

Caesarean section under spinal block require sensory block from T^4 to T^6 this level of high block induces wide spread vasodilation with resultant hypotension with the incidence of upto 80%. The sympathetic blockade after spinal anaesthesia causes arterial and venodilation resulting in hypotension, this is further aggrevated by aorto caval compression.

Several preventive measures like use of mechanical or pneumatic compression of lower limbs to reduce the peripheral pooling and increase venous return, a slight head down tilt after giving spinal anaesthesia, prophylactic use of vasopressors, infusion of crystalloid or colloid, preload or co-load have been used to reduce the incidence of hypotension following spinal anaesthesia.

Group P received 15ml/kg of ringer lactate as preload over 20 minutes period before spinal anaesthesia, group C received 15ml/kg of identical fluid at the time of appearance of CSF during SAB, as fast as possible. We measured the hemodynamic variables like heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure. The base line values were not significantly different in both groups.

Our study revealed that the incidence of hypotension was lesser in co-load group (40%) as compared to the preload group (60%) and the difference was statistically significant (p-0.023)

There are high chances of hemodynamic changes like hypotension and bradycardia in spinal anaesthesia. Preloading before commencement of spinal anaesthesia may be effective but with considerable risk of volume overload but co-loading makes available extra fluid in intravascular space during period of highest risk of hemodynamic changes due to spinal anaesthesia

Findings in our study correlated with Williamson.W et al [2009] study ,which was a randomised control study with 87 patients undergoing caesarean section. 43 were preload group [control], 44 [preload/coload] experimental group. Supplemental vasopressors, iv bolus, fluids were higher in the preload group and statistically significant they hypothesized that administering 10ml/kg crystalloid before and 10ml/kg immediately following injection of the SAB would provide benefit.

Banerjee et al.(2010) did a meta-analysis to determine the timing of the fluid infusion before (preload) or during (co-load) induction of spinal anaesthesia for caesarean delivery. They retrieved eight randomized controlled trials comprised of 518 patients that compared a fluid preload with co-load in patients undergoing spinal anaesthesia for elective caesarean delivery. They graded the articles and recorded the incidence of hypotension, lowest blood pressure, incidence of maternal nausea and vomiting unbilical cord PH and APGAR scores. Incidence of hypotension in co-load group is less [59.3%] compared to preload group.

Jacob JJ ,William A, Verghese, M Afzal L,(2012) studied 100 patients scheduled for caesarean section under spinal anaesthesia randomized to two groups one group receiving 15ml/kg RL as preload and other group receiving 15ml/kg RL as co-load. Secondary outcomes studied included requirement of ephedrine, maternal nausea and vomiting, neonatal APGAR score and acid base status. Number of patients developing hypotension in preload group is significantly higher compared to co-load group. Ephedrine requirement is high in preload group and statistically significant.

Bajwass, ,kulshrestha A, Jindal R (2013) published a review article on effect of co-loading and preloading for prevention of hypotension after spinal anaesthesia, they concluded that colloids appear to be more efficient than crystalloids in preloading in prevention of hypotension after spinal anaesthesia .preloading is not superior to co-loading irrespective of the type of fluid used.

However in a study by Park GE et al, in 1996 to assess the effect of varying volumes of crystalloid administration before caesarean delivery on maternal haemodynamics it was found that increasing the volume of i.v. Crystalloid administered to 30ml/kg in the healthy parturient did not significantly alter the maternal

haemodynamics or ephedrine requirements after spinal anaesthesia and has no apparent benefit. Hence in our study we used 15ml/kg of ringer lactate.

Crystalloid co-load has been reported to decrease ephedrine requirement to maintain the maternal blood pressure[31]. In our study, the mean number of supplemental ephedrine doses(6mg boluses) administered and the mean total dose of ephedrine administered was more in the preload group than in the co-load group and the differences in the mean number of bolus doses and the total dose of ephedrine used were statistically significant among the groups (p value = 0.023). Our study findings correlate well with the study done by M Khan, Waqar-ul-Nisai,A Farooqi, N Ahmad, S Qaz (2013)

VII. Conclusion:

Crystalloid co-loading is more effective than preloading in prevention of spinal anaesthesia induced hypotension in elective caesarean cases. In busy operating room schedules with rapid turn over of cases co-loading would be more efficient method than preloading to prevent spinal hypotension. Valuable time need not be wasted in preloading parturients as preloading alone is not effective for the prevention of maternal hypotension during a caesarean section under spinal anaesthesia.

Bibliography:

[1]. Shnider SM, Levinson G**.** anaesthesia caesarean section, chapter 12, anaesthesia for obstetrics, 3rd, william' and wilkins 1993: pp 211-239.

[2]. Rout CC, Rocke DA, Levin L, Gouws E, Reddy D. A reevaluation of the role of crystalloid preload in the prevention of hypotension associated with spinal anaesthesia for effective caesarean section. Anaesthesiology 1993; 79: 262-269.

[3]. Jackson R Reid JA, Thorburn J. Volume preloading is not essential to prevent spinal induced hypotension in caesarean section. Br. J Anaesth 1995; 75: 262-265

[4]. Chan WS, Irwin MG, Tong WN. Prevention of hypotension during spinal anaesthesia for caesarean section: ephedrine infusion versus fluid preload .Anaesthesia 1997; 52: 908-13

[5]. French GWG, White JB, Howel HJ, Popat M. Comparison of pentastarch and hartmann's solution for volume preloading in spinal anaesthesia for elective caesarean section. Br J Anaesth 1999; 83: 475-77

[6]. Ueyama H, He YL, Tanigami H, Mashimo T, Yoshia I. Effects of crystalloid and colloid preload on blood volume in the parturient undergoing spinal anaesthesia for elective caesarean section. Anaesthesiology 1999; 91: 1571-76.

[7]. Dyer RA, Farina Z, Joubert IA, Du Toit P, Meyer M, Torr G, Wells K , James MF. Crystalloid preload versus rapid crystalloid administration after induction of spinal anaesthesia (co-load) for elective caesarean section. Anaesth Intensive Care. 2004;32:351-7

[8]. Lee A, Ngan Kee, Gin T.A quantitative, systemic review of RCT'S of ephedrine versus phenylepherine for the management of hypotension during spinal anaesthesia for caesarean delivery. Anaesth Analg. 2002; 94:920-926

[9]. Somboonviboon W, Kyokong O, Charuluxananan S, Narasethakamol A. Incidence and risk factors of hypotension and bradycardia after spinal anaesthesia for caesarean section. J Med Assoc Thai. 2008; 91:181-187.

[10]. Monica Maria, Sandra Bliacherience, Claudia R C et al, Preload during spinal anaesthesia for caesarean section. comparison between crystalloid and colloid solution. Rev Bras Anaesthesiology. 2004; 54:6:781-787.

[11]. Manu Bose Kini, Hurudas And Krishna, HM et al. Comparison of crystalloid preloading versus crystalloid co-loading to prevent hypotension and bradycardia following spinal anaesthesia. J Anaesth Clin Pharmacol. 2008; 24(1):53-56

[12]. M Khan, Waqar-ul-Nisai, A Farooqi, N Ahmad, S Qaz. Crystalloid co-load: a better option than crystalloid pre-load for prevention of post spinal hypotension. in elective caesarean section. The Internet Journal Of Anaesthesiology. 2013 Volume 32 Number 1.

[13]. Williamson W, Burks D, Pipkin J, Burkard JF, Osborne LA, Pellegrini JE. Effect of timing of fluid bolus on reduction of spinal-induced hypotension in patients undergoing elective caesarean delivery. AANA J 2009;77:130-6.

[14]. Banerjee A, Stocche RM, Angle P, Halpern SH. Preload or co-load for spinal anaesthesia for elective caesarean delivery: A Meta-Analysis. Can J Anaesth 2010;57:24-31

[15]. Jacob JJ, Williams A, Verghese M, Afzal L. Crystalloid preload versus crystalloid co-load for parturients undergoing caesarean section under spinal anaesthesia. J Obstet Anaesth Crit Care 2012;2:10-5

[16]. Bajwa SS, Kulshrestha A, Jindal R. Co-loading or preloading for prevention of hypotension after spinal anaesthesia, A Therapeutic Dilemma Anaesth Essays Res 2013;7:155-9