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TO EVALUATE INCIDENCE OF SHIVERING IN LOWER SEGEMENT CAESAREAN SECTION (LSCS) PATIENTS UNDER SPINAL ANAESTHESIA USING BUPIVACAINE HYDROCHLORIDE IN DEXTROSE WITH AND WITHOUT FENTANYL

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ABSTRACT

Shivering is common in women undergoing caesarian section under spinal anaesthesia and can interfere with patients monitoring. It can cause discomfort to patient and also increases tissue oxygen demand.

AIM AND OBJECTIVE: The aim of the study was to evaluate the incidence of shivering using bupivacaine with and without fentanyl in patients undergoing LSCS under spinal anaesthesia. Our objective was to study the incidence of shivering with addition of 20 mcg of fentanyl to bupivacaine in spinal anaesthesia for LSCS surgeries.

MATERIAL AND METHOD: A total of 60 healthy women belonging to ASA grade I and II were enrolled in our study that were scheduled for both elective as well as emergency caesarian section under spinal anaesthesia. They were randomly divided into 2 groups. Group C with 30 patients were given 0.5% hyperbaric bupivacaine (3ml) and group F with 30 patients were given 0.5% hyperbaric bupivacaine (3ml) with 20 mcg fentanyl.

OBSERVATIONS AND RESULTS: The overall incidence of shivering in group F was lower (5 out of 30 patients) as compared to group C (13 out of 30 patients). There was significant difference in the incidence of shivering between group F and group C, (16.66% in group F; 43.33% in group C, $P<0.012$). The severity of shivering was also reported less in group F as compared to group C.

CONCLUSION: Patients who received 20 mcg fentanyl with bupivacaine had less incidence and severity of shivering than those who did not receive fentanyl with bupivacaine.

I. INTRODUCTION

Shivering is a skeletal muscular action that occurs involuntarily. It is a common postoperative complication. It is a physiological response to hypothermic condition that aims to elevate basic metabolic heat production [1]. In about 55% of women undergoing caesarian section under spinal anaesthesia the incidence of shivering has been reported. It has various adverse effects and causes disturbances in early child mother relationship. It is therefore important that initially some measures should be taken either by using medications or by physical methods to control shivering [2, 14].

The shivering mechanism under spinal anaesthesia is difficult to dictate but it may be due to dip in core temperature due to widening of blood vessels within the body, raised passage of blood via skin, frequent loss of heat through skin, cold conditions in the room or sometimes due to cold anaesthetic solutions that affects the thermosensitive receptorslocated in the spinal cord [3].

Shivering may cause the alterations with anaesthesia monitoring like electrocardiogram (ECG) and Pulse oximetry (SpO2). It is related with various patient's complications like oxygen consumption may be increased up to 600% and carbon dioxide production is also elevated, increase in HR and BP and elevation in production of lactic acid. Intracranial pressure, intraocular pressure and wound pain is also increased due to shivering [4].

Bupivacaine hydrochloride is 2-Piperidinecarboxamide, 1-butyl- N-(2,6- dimethylphenyl)-, monohydro-chloride, monohydrate, a white crystalline powder that is freely soluble in 95 percent ethanol, soluble in water, and slightly soluble in chloroform or acetone. Bupivacaine Hydrochloride in Dextrose Injection, USP is available in sterile hyperbaric solution for subarachnoid injection (spinal block). Bupivacaine hydrochloride is related chemically and pharmacologically to the aminoacyl local anesthetics. It is a homologue of mepivacaine and is chemically related to lidocaine. All three of these anesthetics contain an amide linkage between the aromatic

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nucleus and the amino or piperidine group. They differ in this respect from the procaine-type local anesthetics, which have an ester linkage. Each mL of Bupivacaine Hydrochloride in Dextrose Injection, USP contains 7.5 mg bupivacaine hydrochloride (anhydrous) and 82.5 mg dextrose (anhydrous). The pH of this solution is adjusted to between 4.0 and 6.5 with sodium hydroxide or hydrochloric acid. The specific gravity of Bupivacaine Hydrochloride in Dextrose Injection, USP is between 1.030 and 1.035 at 25°C and 1.03 at 37°C. Bupivacaine Hydrochloride in Dextrose Injection, USP does not contain any preservatives.

II. REVIEW OF LITERATURE

Anchalee Techanivate et al (2015) carried out a controlled and randomized trial on 60 patients under spinal anaesthesia who were planned for C- section and were randomized into two groups. Group F was given 2.2 ml bupivacaine and morphine 0.2ml with addition of 20 mcg fentanyl. Group S was administered without fentanyl. It was concluded that after 3 hours of spinal anaesthesia the shivering was seen in 6 patients in group F and 15 patientsin group S. So with addition of 20 mcg fentanyl to 0.5% hyperbaric bupivacaine postoperative and intra operative chances of shivering was reported less [8].

Ali Sadegh et al (2011) conducted a randomized double blinded study on 80 women who were enrolled and patients were divided into two equal groups with 40 patients in each group. The 40 patients of group F was given 2.5 ml bupivacaine with fentanyl 25 mcg and the 40 patients in Group S were given 2.5 ml bupivacaine with 0.5 ml normal saline. After giving spinal anesthesia the emergence of shivering almost started in all patients. In both groups the shivering was higher in 2nd 30 minutes as compared to ist 30 minutes. During recovery in first 30 minutes none of patients in group F reported shivering and 22 patients (55%) in group S reported shivering. So it was observed and concluded that the incidence and occurrence of shivering is less when fentanyl is added to intrathecal bupivacaine [9].

Wareerat Kaikosol et al (2012) carried out study on the effect of fentanyl on shivering in Caesarian Section. 90 women who were enrolled for caesarean section under SA and were divided into 3 different groups. Group F1 was given 2.0 ml bupivacaine with morphine 0.2 mg with additional 0.2 ml (10 mcg) fentanyl and 0.2 ml NS. In Group F2 0.4 ml (20 mcg) fentanyl was given and in Group S 0.4 ml normal saline was added. Their findings manifests that in group F1 and F2 there was less occurrence of shivering as compared to Group S in ist hour. There was seen significant decrease in chances of shivering in both intra operative and postoperative period by addition of 10 mcg or 20 mcg fentanyl to Bupivacaine [10].

Yi Wei Zhang and Juan Zhang et al (2019) carried out a network meta-analysis and systemic review on the effect of neuraxial adjuvant drugs for preventing perioperative shivering during LSCS. Under PRISMA guidelines they carried out 26 studies with 2054 patients that reported occurrence of shivering. In these studies, three types of anaesthesia were used. In 17 studies spinal anaesthesia was used (65.4%), in 3 studies epidural anesthesia was used (11.5%) and in 6 studies combined spinal and epidural anesthesia was used (23.1%). Ropivacaine, lidocaine and bupivacaine were three kinds of local anaesthetics used in the study. The comparison was made between placebo and 9 neuraxial adjuvants. At the end their findings reveal that 4 among the 9 adjuvants used hasdecreased chances of shivering when compared with placebo. They also concluded that pethidine is most effective in controlling and preventing shivering followed by fentanyl [11].

Yamini Subramani and Mahesh Nagappa et al (2020) conducted a systemic review and network meta-analysis on effect of opioids on shivering in LSCS patients under SA. A total of 1433 patients were considered and splitted into 4 groups. In control group 590 patients were included in 21 studies; group fentanyl with total of 199 patients were taken in 7 studies; group sufentanil with total of 156 patients were taken in 5 studies and group meperidine with total of 488 patients were included in 10 studies. Their findings manifests that in fentanyl group the emergence of shivering was relatively lower as comparison with control group. In sufentanil group the occurrence of shivering was not relatively lower as comparison with control group. In meperidine group the shivering emergence was lower as comparison with Control group [12].

Dr Sarita Gohiya et al (2014) carried out a randomized study on intrathecal fentanyl in prevention of intraoperative shivering. 120 patients within the age group between 18-60 were planned for lower abdomen surgeries under SA and divided into two groups each with60 patiens. Patients in Group F were given 0.5% heavy bupivacaine (3.5 ml) with addition of 25 mcg fentanyl and patients of Group C were given only 0.5% heavy bupivacaine (4 ml). After data analysis, in Group F it was seen, in 9 patients out of 60 patients (15%)

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shivering was reported and in Group C shivering was seen in 24 out of 60 patients (40%). So shivering chance was minimized with 25 mcg fentanyl added to 0.5% bupivacaine [13].

Yashwant Singh Payal and Nand Kishore et al (2013-2014) conducted a randomized prospective study on the incidence is not affected but onset of shivering is affected with tempearuture of bupivacaine in caesarean patients under SA. 105 pregnant ladies were enrolled for study and randomized into 3 groups with 35 patients in each group. In all groups. Bupivacaine 2.2 ml was used for spinal anaesthesia. In group T4 temperature of bupivacaine was adjusted to 4°C, in group T22 it was adjusted to 22°C and in group T37 it was adjusted at 37°C. Upon data analysis 51.42% occurrence of shivering was reported in T4 group, 51.42% in T22 group and 45.71% in T37 group (P=0.858). In Group T4 the onset of shivering was fast (9.87±1.82 min) as comparison with group T22 (14.27±3.02 min) and group T37(12.16±2.89 min). So it was concluded that the early onset of shivering is due to cold bupivacaine in pregnant ladies undergoing Caesarian section with spinal anaesthesia [14].

Mitra Golmohammadi et al (2020) carried out a clinical trial on occurrence of shivering during Caesarian Section in patients under spinal anaesthesia with or without fentanyl. 90 patients were enrolled for study and divided into intervention group (Fentanyl) [n=45] and placebo group (without fentanyl) [n=45]. Upon data analysis the intervention group has a comparative difference in incidence of shivering as compared to placebo group (P<0.0001). So at last it was concluded that the patients who received Fentanyl has less chances of shivering intraoperatively and postoperatively than those who were not administered with Fentanyl [15].

Dr. Naresh Kaul et.al (2019) carried out a prospective study on 100 patients undergoing elective or emergency caesarian sections of age group 20-35yrs were enrolled for study and classified into two equal groups with 50 patients both in room temperature group and body temperature group. Body temperature group was injected with 2ml bupivacaine with 20 mcg fentanyl at body temperature (37.5°c) and room temperature group was injected with 2ml bupivacaine with 20mcg fentanyl at room temperature (22-23°c).upon data analysis 7(14%) in BT group and 31(62%) patients in RT group reported shivering.in RT group core temperature was also 1° less as compared to BT group.so 0.5% heavy bupivacaine when administered at body temperature as compared to room temperature has less chance of shivering [16].

Giovani de Figueiredo (2010-2011) conducted a randomized prospective study on shivering in caesarean patients under SA with or without sufentanil. Total of 80 patients divided into 2 groups were taken into consideration for study. Spinal anaesthesia was given in sitting position with quincke needle (27G) at L3-L4 space. Group 1 with 40 patients was administered with 10mg bupivacaine with morphine 80 mcg with addition of sufentanil 2.5mcg. Group 2 with 40 patients administered with 10mg bupivacaine with addition of Morphine 80mcg. After data analysis it was observed that the patients in Group 1(Those received sufentanil) had shivering incidence less in post anaesthesia care unit as compared to group 2. The occurrence of shivering was 32.5% in Group 1 and 62.5% in Group 2.

AIM AND OBJECTIVE

1. To evaluate incidence of shivering in LSCS patients under SA using bupivacaine with and without fentanyl.
2. To study effect of intrathecal fentanyl 20 mcg in Caesarian patients on incidence of intraoperative and postoperative shivering.

III. METHODOLOGY & PHARMACOKINETICS

The rate of systemic absorption of local anesthetics is dependent upon the total dose and concentration of drug administered, the route of administration, the vascularity of the administration site, and the presence or absence of epinephrine in the anesthetic solution. A dilute concentration of epinephrine (1:200,000 or 5 mcg/mL usually reduces the rate of absorption and peak plasma concentration of Bupivacaine Hydrochloride in Dextrose.

Injection, USP, permitting the use of moderately larger total doses and sometimes prolonging the duration of action. The onset of action with Bupivacaine Hydrochloride in Dextrose Injection, USP is rapid and anesthesia is long lasting. The duration of anesthesia is significantly longer with Bupivacaine Hydrochloride in Dextrose Injection, USP than with any other commonly used local anesthetic. It has also been noted that there is a period of analgesia that persists after the return of sensation, during which time the need for strong analgesics is

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reduced. The onset of sensory blockade following spinal block with Bupivacaine Hydrochloride in Dextrose Injection, USP is very rapid (within one minute); maximum motor blockade and maximum dermatome level are achieved within 15 minutes in most cases. Duration of sensory blockade (time to return of complete sensation in the operative site or regression of two dermatomes) following a 12 mg dose averages 2 hours with or without 0.2 mg epinephrine. The time to return of complete motor ability with 12 mg Bupivacaine Hydrochloride in Dextrose Injection, USP averages 3 1/2 hours without the addition of epinephrine and 4 1/2 hours if 0.2 mg epinephrine is added. When compared to equal milligram doses of hyperbaric tetracaine, the duration of sensory blockade was the same but the time to complete motor recovery was significantly longer for tetracaine. Addition of 0.2 mg epinephrine significantly prolongs the motor blockade and time to first postoperative narcotic with Bupivacaine Hydrochloride in Dextrose Injection, USP. Local anesthetics appear to cross the placenta by passive diffusion. The rate and degree of diffusion is governed by (1) the degree of plasma protein binding, (2) the degree of ionization, and (3) the degree of lipid solubility. Fetal/maternal ratios of local anesthetics appear to be inversely related to the degree of plasma protein binding, because only the free, unbound drug is available for placental transfer. Bupivacaine Hydrochloride in Dextrose Injection, USP with a high protein binding capacity (95%) has a low fetal/maternal ratio (0.2 to 0.4). The extent of placental transfer is also determined by the degree of ionization and lipid solubility of the drug. Lipid soluble, nonionized drugs readily enter the fetal blood from the maternal circulation. Depending upon the route of administration, local anesthetics are distributed to some extent to all body tissues, with high concentrations found in highly perfused organs such as the liver, lungs, heart, and brain. Pharmacokinetic studies on the plasma profiles of Bupivacaine Hydrochloride in Dextrose Injection, USP after direct intravenous injection suggest a three-compartment open model. The first compartment is represented by the rapid intravascular distribution of the drug. The second compartment represents the equilibration of the drug throughout the highly perfused organs such as the brain, myocardium, lungs, kidneys, and liver. The third compartment represents an equilibration of the drug with poorly perfused tissues, such as muscle and fat. The elimination of drug from tissue distribution depends largely upon the ability of binding sites in the circulation to carry it to the liver where it is metabolized. Various pharmacokinetic parameters of the local anesthetics can be significantly altered by the presence of hepatic or renal disease, addition of epinephrine, factors affecting urinary pH, renal blood flow, the route of drug administration, and the age of the patient. The half-life of Bupivacaine Hydrochloride in DextroseInjection, USP in adults is 2.7 hours and in neonates 8.1 hours. In clinical studies, elderly patients exhibited a greater spread and higher maximal level of analgesia than younger patients. Elderly patients also reached the maximal level of analgesia more rapidly than younger patients, and exhibited a faster onset of motor blockade. The total plasma clearance was decreased and the terminal half-life was lengthened in these patients. Amide-type local anesthetics such as Bupivacaine Hydrochloride in Dextrose Injection, USP are metabolized primarily in the liver via conjugation with glucuronic acid. Patients with hepatic disease, especially those with severe hepatic disease, may be more susceptible to the potential toxicities of the amide-type local anesthetics. Pipecolylxylidine is the major metabolite of Bupivacaine Hydrochloride in Dextrose Injection, USP. The kidney is the main excretory organ for most local anesthetics and their metabolites. Urinary excretion is affected by urinary perfusion and factors affecting urinary pH. Only 6% of bupivacaine is excreted unchanged in the urine. When administered in recommended doses and concentrations, Bupivacaine Hydrochloride in Dextrose Injection, USP does not ordinarily produce irritation or tissue damage.

IV. INDICATIONS AND USAGE

Bupivacaine Hydrochloride in Dextrose Injection, USP is indicated for the production of subarachnoid block (spinal anesthesia). Standard textbooks should be consulted to determine the accepted procedures and techniques for the administration of spinal anesthesia. Bupivacaine is amide local anaesthetic drug frequently used inanaesthetic practice. For spinal anaesthesia it is used in the concentration of 0.5% (Heavy). For painless labor and pain relief in postoperative period it is drug of choice.

Information for Patients

When appropriate, patients should be informed in advance that they may experience When appropriate, patients should be informed in advance that they may experience temporary loss of sensation and motor activity, usually in the lower half of the body, following proper administration of spinal anesthesia. Also, when

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appropriate, the physician should discuss other information including adverse reactions in the Bupivacaine Hydrochloride in Dextrose Injection, USP package insert. Inform patients that use of local anesthetics may cause methemoglobinemia, a serious condition that must be treated promptly. Advise patients or caregivers to seek immediate medical attention if they or someone in their care experience the following signs or symptoms: pale, gray, or blue colored skin (cyanosis); headache; rapid heart rate; shortness of breath; lightheadedness; or fatigue.

OVERDOSAGE

Acute emergencies from local anesthetics are generally related to high plasma levels encountered during therapeutic use or to underventilation (and perhaps apnea) secondary to upward extension of spinal anesthesia. Hypotension is commonly encountered during the conduct of spinal anesthesia due to relaxation of sympathetic tone, and sometimes, contributory mechanical obstruction of venous return.

FENTANYL: Fentanyl is a powerful synthetic narcotic drug. As compared to morphine fentanyl is 100 times more powerful. Fentanyl like other opioids also acts on μ receptors present in brain, spinal cord and other tissues. Like other opioids it also causes various complications such as nausea, vomiting, sedation, fatigue, dizziness, respiratory depression, decrease in heart rate and unconsciousness. For intra operative analgesia fentanyl launched more than 50 years ago has become most frequently used opioid [6]. It has been reported that the incidence of shivering is decreased due to fentanyl because of its sedative action onbrain. A small fentanyl dose of 10-25 mcg is found to be very beneficial for caesarian patients both intra operatively and post operatively when injected directly into the cerebrospinal fluid in reducing discomfort in patients without elevating major side effects.

MATERIAL AND METHODS

A comparative study was carried out at Govt. Medical College Jammu and Kashmir. After obtaining permission from the ethical committee the study was done. A total of 60 Lower Segment Caesarian Section patients (LSCS) belonging to ASA category I and II were enrolled in study and they were in the age group between 19 -40 yrs. Before including patients in the study informed consent was approved from them. The patients were splitted into two groups and 30 patients were kept in each group.

INCLUSION CRITERIA:

1. Patients belonging to ASA Category I and II.
2. Patients in the age group between 19-40 yrs.
3. Patients of both Elective and Emergency procedures.
4. Patients with BMI up to 35.

EXCLUSION CRITERIA:

1. Patients with allergy to Bupivacaine or Fentanyl.
2. Patients with Fetal distress.
3. Less than 35 weeks pregnancy.
4. Febrile Patients.

Group F (Fentanyl group): n=30; were given 0.5% hyperbaric Bupivacaine 3ml with 20 mcg Fentanyl.

Group C (Control group): n=30; were given 0.5% hyperbaric Bupivacaine 3ml without Fentanyl.

All the patients were cannulated and Ringer's Lactate 10-15 ml /kg (500-1000 ml) was administered preoperatively. All the intravenous fluids administered was stored at room temperature. Patients were taken to the operation room (OR) and before giving spinal various vital parameters were noted via monitors (SpO2, BP, HR). The ambient temperature in the OR was adjusted in between 22-25°C. Under strict aseptic guidelines theSA was given to patients in the sitting position by using Quincke's needle (25G) into the L3-L5 space. Local anaesthetic (as per group F & C) was injected in subarachnoid space after observing free flow of CSF through spinal needle. The patients were kept in supine position after performing spinal block. Patients were given oxygen at flow rate of 4-5 L/min.

Prior to surgery, sensory block was accessed by pin prick and motor blockade was evaluated by Bromage scale.

Crossley and Mahajan scale was used to evaluate severity and incidence of shivering in patients in which scores

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are as;

0= No shivering

1= No visible muscle activity but piloerection, peripheral vasoconstriction or both are present 2= Muscular activity in only one muscle group

3= Moderate muscular activity in more than one muscle group but not generalized shaking 4= Violent muscular activity that involves whole body

Severity and incidence of shivering was recorded at every 30 mins intraoperatively and postoperatively for 1.5 hrs. The body temperature in all the patients was measured via probe kept under axilla.

mg atropine injection was used to treat bradycardia (HR<60). Ondansteron 0.1 mg /kg was used in patients who developed nausea and vomiting. Intravenous mephentermine (6 mg) was used to treat hypotension (systolic BP < 90 mmHg).

Sedation and other post-operative complications in the patients during post-operative period were examined by Brussels sedation scale and modified Aldrete scoring system.

Brussels sedation scale:

1 = Unrousable

2 = Responds to pain stimulation but not to auditory stimulation

3 = Responds to auditory stimulation

4 = Awake and calm 5 = Agitated

Demographic data, shivering incidence and severity, temperature etc was recorded, tabulated and analyzed statistically.

V. STATICAL ANALYSIS

The data was coded and entered into MS excel and statistically Analysed by using SPSS software version 20.

The results obtained from both the groups were compared by using repeated measures ANOVA

Chi-square test was used for qualitative data and quantitative data chi-square test and t-test was used respectively when comparison was made in between two groups.

VI. RESULT

In the current study the occurrence of shivering in LSCS patients under SA with bupivacaine or with addition of 20 mcg fentanyl with bupivacaine was compared and evaluated in 60 patients. Patients were in the age group of 19-40 and were splitted into 2 groups each with 30 patients.

Table 1- Patients Data

	Mean ± SD (Group C)	**Mean ± SD (Group F)**	**t-value**	**p-value**
Age (in Years)	24.77 ± 3.62	26.33 ± 3.31	1.75	0.086
Weight (in Kgs)	69.53 ± 7.26	76.13 ± 5.41	3.99	0.001**
Gestational Age (in Weeks)	38.37 ± 1.45	38.23 ± 1.55	0.344	0.732

**=p<0.01 i.e., significant

In our study, in age, gestational age & ASA grading there was no static significant difference seen among the groups however statistically body weight was found significant ,though clinically it was insignificant.

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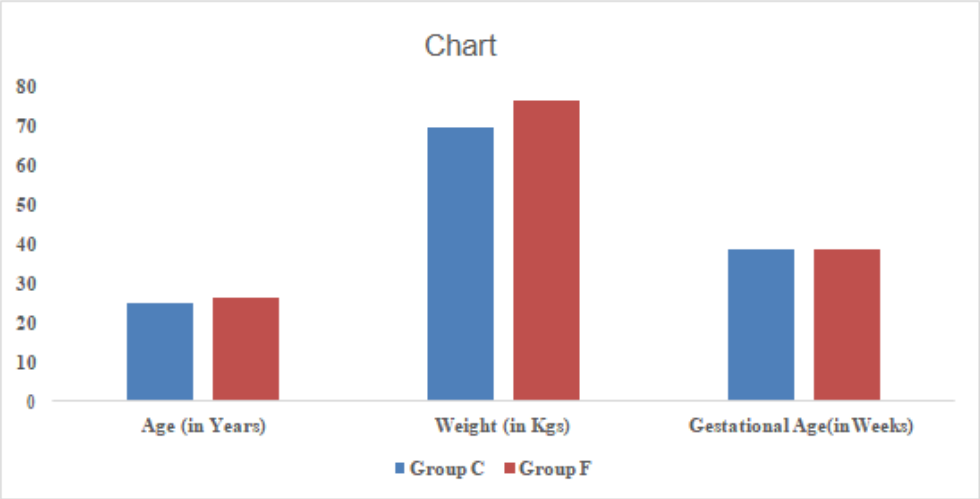

Graph 1:-

GROUP C

Table 2:- Parameters

	Preop (Mean ± SD)	Intraop (Mean ± SD)	Post-op (Mean ± SD)	F-value	p-value
Temperature	98.43 ± 0.19	98.29 ± 0.30	98.29 ± 0.25	4.01	0.023*
SPo2	98.10 ± 1.03	97.87 ± 1.22	98.20 ± 1.21	0.674	0.514
RR	17.73 ± 2.73	18.10 ± 2.06	17.60 ± 2.03	0.646	0.528
HR	81.73 ± 4.70	81.03 ± 8.04	83.96 ± 5.83	2.628	0.081
BP Systolic	122.17 ± 11.28	121.70 ± 13.80	123.77 ± 10.49	0.462	0.632
BP Diastolic	77.87 ± 6.34	78.27 ± 10.93	79.37 ± 748	0.405	0.669

*=p<0.05 i.e., significant

Current study revealed that patient vital parameters like BP, HR, RR was not statistically significant at every interval in control group.

Temperature was seen significant statistically.

GROUP F

Table 3:- Parameters

	Preop (Mean ± SD)	Intraop (Mean ± SD)	Post-op (Mean ± SD)	F-value	p-value
Temperature	98.43 ± 0.22	98.34 ± 0.39	98.42 ± 0.27	1.33	0.272
SPo2	98.17 ± 0.79	97.60 ± 1.35	98.13 ± 1.14	2.49	0.092
RR	15.53 ± 1.83	16.63 ± 2.72	15.17 ± 1.70	4.55	0.015*
HR	79.00± 3.62	82.57 ± 9.86	78.30 ± 5.40	4.93	0.011*
BP Systolic	123.67 ± 6.64	121.77 ± 17.44	119.40 ± 10.05	2.4	0.099
BP Diastolic	78.77 ± 5.19	77.63 ± 11.09	76.33 ± 5.76	1.54	0.224

*=p<0.05 i.e., significant

Current study revealed that patient vital parameters like heart rate and respiratory rate were statistically significant while blood pressure, spo2 and body temperature were not statistically significant at every interval in fentanyl group.

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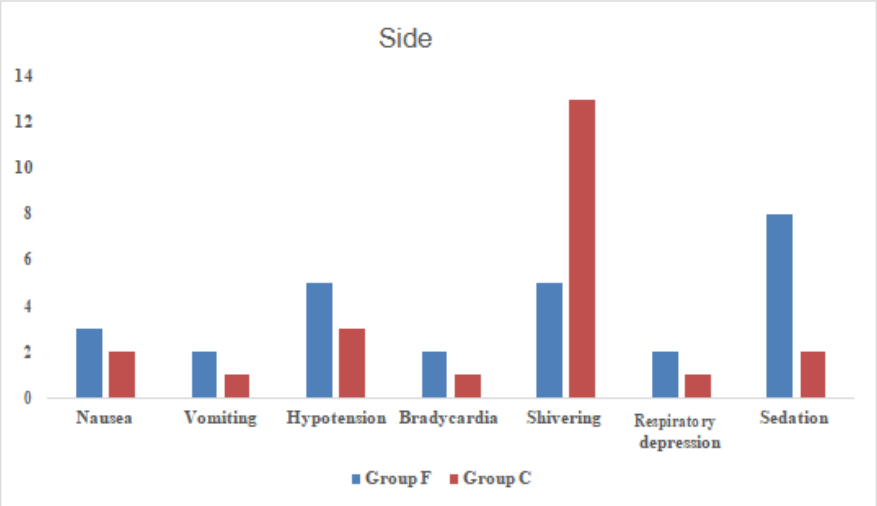
Table 4:- Adverse effects

Adverse effects	Group F (n=30)	Group C (n=30)	p value
Nausea	3 (10%)	2 (6.66%)	0.512
Vomiting	2 (6.66%)	1 (3.33%)	0.399
Hypotension	5 (16.66%)	3 (10%)	0.343
Bradycardia	2 (6.66%)	1 (3.33%)	0.399
Shivering	5 (16.66%)	13 (43.33%)	0.012*
Respiratory depression	2 (6.66%)	1 (3.33%)	0.399
Sedation	8 (26.66%)	2 (6.66%)	0.010*

*=p<0.05 i.e., significant

Our study manifested that the adverse effects like bradycardia, nausea, low BP, respiratory depression and vomiting was not statistically significant in two groups. However, sedation and shivering was seen significant statistically between two groups.



Graph 2:-

Table 5:- Incidence of shivering.

	Group F (n=30)	Group C (n=30)	p value
Incidence (%)	5 (16.66%)	13 (43.33%)	0.012*
Intra-operatively	3 (10.00%)	8 (26.66%)	0.043*
First 30 min	2 (6.66%)	5 (16.66)	0.130
Second 30 min	1 (3.33%)	3 (10.00%)	0.175
Post-operatively	2 (6.66%)	5 (16.66%)	0.130
First 30 min	1 (3.33%)	3 (10.00%)	0.175
Second 30 min	1 (3.33%)	1 (3.33%)	1.000
Third 30 min	0 (0.00%)	1 (3.33%)	0.052

*=p<0.05 i.e., significant

In our study in group F, 5 out of 30 patients (16.66%) reported shivering out of which 3 patients reported shivering intraoperatively and 2 patients postoperatively. In group C 13 patients reported shivering out of which 8 reported intraoperatively and 5 postoperatively. The overall shivering occurrence was significant statistically in two groups.

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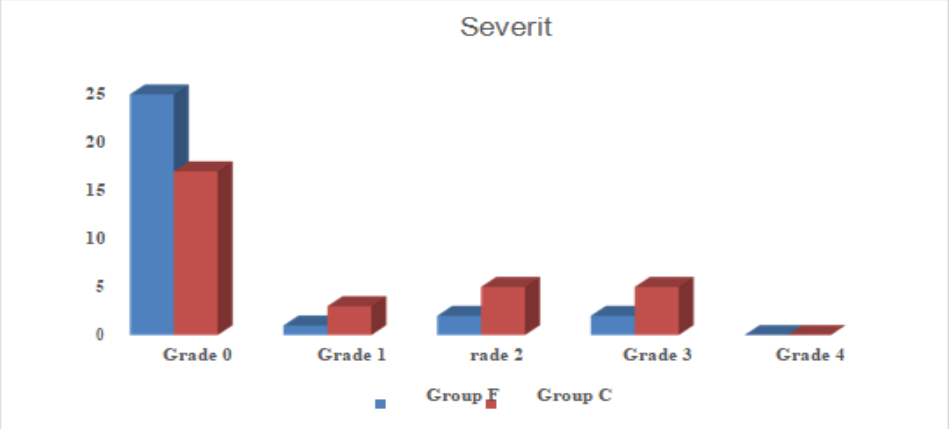
Table 6:- Severity Of Shivering As Per Crossley And Mahajan Scoring –0/1/2/3/4

Severity	Group F (n=30)	Group C (n=30)	p value
Grade 0	25 (83.3%)	17 (56.7%)	0.110
Grade 1	1 (3.33%)	3 (10%)	0.175
Grade 2	2 (6.66%)	5 (16.66%)	0.130
Grade 3	2 (6.66%)	5 (16.66%)	0.130
Grade 4	0 (0%)	0 (0%)	-

*=p<0.05 i.e., significant

shivering severity was not significant in two groups.



Graph 3:-

Sedation (Brussels sedation scale)			
SCORE	**GROUP F (n=30)**	**GROUP C (n=30)**	**p value**
1	0(0.00%)	0 (0.00%)	-
2	0(0.00%)	0 (0.00%)	-
3	2(7.00%)	0(0.00%)	0.03*
4	5(17.00%)	1(3.00%)	0.02*
5	1(3.00%)	1(3.00%)	1.00

VII. DISCUSSION

For LSCS surgeries spinal anaesthesia is favored over general anaesthesia because it is simple, easy to perform and has less risk of fetal respiratory suppression and aspiration pneumonia. Till today the shivering mechanism is not fully understood after giving spinal anaesthesia.

Our study results revealed that the incidence as well as severity of shivering was reduced after the addition of 20 mcg fentanyl to 0.5% bupivacaine in LSCS patients under SA. Our study manifests almost same result of incidence and shivering when compared with other studies. However, our study showed that significantly sedation was elevated in group F as contrast to group C. For other side effects like hypotension, nausea, vomiting, bradycardia the significant difference was less in two groups.

Ali sadegh et al study manifested that in caesarean patients under spinal anaesthesia the shivering occurrence was comparatively less when 25mcg of fentanyl was added with 0.5% hyperbaric bupivacaine [9]. In another study Anchalee techanivate et al concluded that the postoperative and intraoperative chances of shivering was less when 20mcg fentanyl was added to hyperbaric bupivacaine in women undergoing caesarean section under spinal anaesthesia [8].

Mitra Gul Mohammadi et al study on incidence of shivering during caesarian section in patients under spinal

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anaesthesia with or without fentanyl showed that the patients administered with fentanyl reported less shivering incidence intraopeatively and postoperatively [15]. In another randomized study by Dr sarita gohiya et al on intrathecal fentanyl in prevention of intraoperative shivering, their results manifests that 25 mcgaddition of fentanyl with bupivacaine minimizes the chances and incidence of shivering [13].

Manne VS et al in his study manifested that perioperative shivering was controlled more with fentanyl when compared to butarphanol and time taken to control shivering was also less with fentanyl. Recurrence of shivering, vomiting, sedation and nausea was more with butarphanol [7]. In caesarean deliveries under spinal anaesthesia, Jayaraj A et al in his study concluded that the onset time, incidence and severity of shivering was decreased with intravenous injection of fentanyl, mepiridine and tramadol, However tramadol in low dose 0.5mg/kg prevents shivering and has low sedation effects

In another study by Shakya S et al it was concluded by them that the incidence of shivering was significantly reduced with prophylatic low dose ketamine and ondansteron without elevating side effects in patients who were given spinal anaesthesia. At each time interval decline in temperature was seen less in ketamine group as comparable to saline and ondansteron groups In caesarean patients under spinal anaesthesia Bajaj et al study manifested that the dexmedetomidine adminstered intrathecally was more efficient and safe in controlling postspinal shivering than intrathecal fentan.

VIII. CONCLUSION

From our results it was concluded that the patients who were administered with bupivacaine with addition of 20 mcg fentanyl (Group F) had less incidence of shivering than those who were only administered with bupivacaine (Group C). The severity of shivering was also reported less in group F as comparison with group C.

Sedation was seen more with group F as comparison with group C. There was less comparable difference in side effects like nausea, vomiting and bradycardia between two groups.

PROFORMA

Date:

Name of patient: Age:

CR. No: ASA grade:

Weight: Preop temperature:

BP: Pulse:

R.R: Duration of surgery:

Incidence and severity of shivering (Crossley and Mahajan 0,1,2,3,4)

INTRA-OPERATIVELY		POST-OPERATIVELY			
Ist 30 mins	2nd 30mins	Ist 30 mins	2nd 30 mins	3rd 30 mins	4th 30 mins

Side Effects

Nausea	Vomiting	Bradycardia	Hypotension	Shivering	Sedation	Respiratory depression

Parameters measured intraoperatively and postoperatively

	INTRA-OPERATIVELY	POST-OPERATIVELY
Temperature		
SpO2		
B.P		
H.R		
RR		

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IX. REFERENCE

[1] Mittal G, Gupta K, Katyal S, Kaushal S. Randomised double-blind comparative study of dexmedetomidine and tramadol for post-spinal anaesthesia shivering. Indian J Anaesth 2014; 58:257-62

[2] Ram Kiran KS, Sangineni KSDL. The Effect of Forced-Air Warmer, Ondansetron or their Combination on Shivering in Pregnant Women Coming for Elective Cesarean Section under Spinal Anesthesia: A Prospective, Randomized Controlled Comparative Study. Anesth Essays Res. 2019 Jan-Mar; 13(1):19-24. doi: 10.4103/aer.AER_198_18.

[3] Chan AM, Ng KF, Tong EW, Jan GS. Control of shivering under regional anesthesia in obstetric patients with tramadol. Can J Anaesth. 1999 Mar; 46(3):253- 8. doi: 10.1007/BF03012605.

[4] Khan ZH, Zanjani AP, Makarem J, Samadi S. Antishivering effects of two different doses of intrathecal meperidine in caesarean section: a prospective randomised blinded study. Eur J Anaesthesiol. 2011 Mar; 28(3):202-6. doi: 10.1097/EJA.0b013e3283430802.

[5] Ajay Yadav, short textbook of anaesthesia, 6th edition 2018, P 156.

[6] Stanley TH. The fentanyl story. J Pain. 2014 Dec; 15(12):1215-26. doi: 10.1016/j.jpain.2014.08.010.

[7] Mittal G, Gupta K, Katyal S, Kaushal S. Randomised double-blind comparative study of dexmedetomidine and tramadol for post-spinal anaesthesia shivering. Indian J Anaesth 2014; 58:257-62

[8] Ram Kiran KS, Sangineni KSDL. The Effect of Forced-Air Warmer, Ondansetron or their Combination on Shivering in Pregnant Women Coming for Elective Cesarean Section under Spinal Anesthesia: A Prospective, Randomized Controlled Comparative Study. Anesth Essays Res. 2019 Jan-Mar; 13(1):19-24. doi: 10.4103/aer.AER_198_18.

[9] Chan AM, Ng KF, Tong EW, Jan GS. Control of shivering under regional anesthesia in obstetric patients with tramadol. Can J Anaesth. 1999 Mar; 46(3):253- 8. doi: 10.1007/BF03012605.

[10] Khan ZH, Zanjani AP, Makarem J, Samadi S. Antishivering effects of two different doses of intrathecal meperidine in caesarean section: a prospective randomised blinded study. Eur J Anaesthesiol. 2011 Mar; 28(3):202-6. doi: 10.1097/EJA.0b013e3283430802.

[11] Ajay Yadav, short textbook of anaesthesia, 6th edition 2018, P 156.

[12] Stanley TH. The fentanyl story. J Pain. 2014 Dec; 15(12):1215-26. doi: 10.1016/j.jpain.2014.08.010.

[13] Manne VS, Gondi SR. Comparison of Butorphanol and Fentanyl for the Relief of Postoperative Shivering Associated with Spinal Anesthesia. Anesth Essays Res. 2017 Jan-Mar; 11(1):84-87. doi: 10.4103/0259-1162.186861.

[14] Anchalee Techanivate, Oraluxna Rodanant, Wasinee Tachawattanawisal, Terapol Somsiri JOURNAL-MEDICAL ASSOCIATION OF THAILAND 88 (9), 1214,2005

[15] Sadegh A, Tazeh-Kand NF, Eslami B. Intrathecal fentanyl for prevention of shivering in spinal anesthesia in cesarean section. Med J Islam Repub Iran. 2012 May; 26(2):85-

[16] Sadegh A, Tazeh-Kand NF, Eslami B. Intrathecal fentanyl for prevention of shivering in spinal anesthesia in cesarean section. Med J Islam Repub Iran. 2012 May; 26(2):85-

[17] Wareerat Kaikosol, Pattaraporm Jaicharat the Journal of Prapokklao Hospital Clinical Medical Education Center 24 (3), 190-199, 2007