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RESEARCH ARTICLE

A COMPARATIVE STUDY BETWEEN EPIDURAL NALBUPHINE AND FENTANYL WITH BUPIVACAINE FOR POST OPERATIVE ANALGESIA IN LOWER LIMB SURGERIES

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Abstract

Background: The shorter duration of action of typical local anaesthetics used for spinal anaesthesia demands the early need for postoperative analgesia. Epidural analgesic administration reduces the stress reaction to pain and surgery, reduces the requirement for systemic analgesics, and promotes early rehab.[1] It was discovered that using opioids as an adjuvant to local anaesthetics has synergistic effects. The advantages of this combination were improved pain alleviation, motor sparing, and less toxicity.[2]

Objective: To compare the efficacy of epidural analgesia by using fentanyl and nalbuphine as adjuvants along with bupivacaine following lower limb surgeries with respect to Onset, Duration, and side effects.

Meterials and Methods: Prospective randomized doubled blind comparative study would be conducted on 60 adult patients of ASA grade I & II in the age group of 18 to 59 years of either sex, posted for lower limb surgeries after taking informed written consent. Patients were randomly divided on an alternative basis into 2 groups of 30 each. In study conducted in AL-AMEEN MEDICAL COLLEGE. VIJAYAPUR, KARNATAKA during the period of April 2021 to December 2022. If visual analogue score is more than one ,GROUP A: Patient received 50ug of fentanyl + 2.5 ml 0.5% bupivacaine diluted to 10ml with distilled water given epidurally (0.125%). GROUP B: Patient received 5mg of nalbuphine +2.5 ml 0.5% bupivacaine diluted to 10ml with distilled water given epidurally (0.125%). . Noting onset and duration analgesia also monitoring of patients SBP,DBP,SpO2,RR,VAS score till 15 min followed by 30 min,1hr ,2hr,4hr ,6hr,8hr is done and asked for any side effects like nausea ,vomiting, pruritis ,sedation and urinary retention.

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Conclusion: Epidural fentanyl has faster onset of action compared to nalbuphine and has longer duration of action compared to nalbuphine , for post operative epidural analgesia. There was no any statistically significant side effects in any of the two groups.

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Introduction:-

"It is the duty of the anaesthesiologist to study the wellbeing of the patient as well as the convenience of the surgeon"

-Ralph Waters

According to the International Association For The Study Of Pain, pain is "an unpleasant sensory or emotional experience related to either existing harm or potential tissue damage, or defined in terms of such damage".[3]Numerous pathophysiologic reactions that may be triggered or maintained by nociceptive input are linked to the perioperative phase. The same responses to the iatrogenic character of modern surgery may be deleterious, even though they may have served a positive teleologic purpose in the past. Patient morbidity and death may rise as a result of unmanaged perioperative pain and some of these are perioperative pathophysiology. Therefore, postoperative pain management is crucial to enhancing the quality of the patient's treatment throughout the perioperative period.

James Leonard Corning performed the first neuraxial blockade in 1885 by administering 111 mg of cocaine into the epidural spaces of a dog and ten healthy male volunteers. As a result, he is regarded as the father of epidural anaesthesia.[4]

Although it can be used as a primary anaesthetic, it is most frequently a pain management adjuvant. For long-term pain treatment, either a single shot or a continuous infusion can be used. Along with perhaps offering superior analgesia, using it minimizes administered doses of localanaesthetics and analgesics, which minimizes side effects. Additionally, it has been demonstrated to shorten hospital stays, lower cortisol levels, speed up the recovery of bowel function, and reduce the risk of Pulmonary embolism and DVT following surgery.[5–7]

In 1975 , Snyder demonstrated opioid receptors in the brain and substantia gelatinosa .The use of epidural opioids for intraoperative, postoperative, and obstetrical purposes has been enlarged by the understanding of opiate receptor subtypes (mu1 & mu2, kappa, and delta), as well as the development of medications with receptor-specific agonist and antagonist qualities. Such opioids are beneficial in providing effective analgesia and extending the time that analgesia lasts when combined with local anaesthetics. The synthetic opioid fentanyl is highly lipid soluble and a pure mu receptor agonist. The mu receptor agonism causes a number of adverse consequences, including drowsiness, physical dependency, respiratory depression, nausea, and vomiting. Due to this requirement for opioids with fewer side effects but still effective analgesic qualities, agonist-antagonist opioids like nalbuphine were considered as supplements to local anaesthesia (administered via the epidural route) for surgical procedures.

The pure opioid agonist oxymorphone and the pure opioid antagonist naloxone share structural similarities with nalbuphine, a synthetic mu-receptor antagonist and kappa-receptor agonist opioid. The reduction of adverse effects like nausea/vomiting, respiratory depression, and pruritus is brought about by the antagonism at the mu receptor. For these reasons, compared to other opioid-local anaesthetic combinations, the use of epidural Nalbuphine combined with 0.125% Bupivacaine for post-operative analgesia in lower limb procedures should result in less respiratory depression and a lower occurrence of these side effects.

Our proposed research aims to evaluate the effectiveness of the aforementioned adjuvants in epidural analgesia in our facility and to compare the findings with previous research carried out at other hospitals.

Method:-

Prospective randomized doubled blind comparative study conducted on 60 adult patients of ASA grade I & II in the age group of 18 to 59 years of either sex, posted for lower limb surgeries after taking informed written consent. Patients were randomly divided on an alternative basis into 2 groups of 30 each.

GROUP A: Patient receiving 50ug of fentanyl + 2.5 ml 0.5% bupivacaine diluted to 10ml with distilled water given epidurally.
GROUP B: Patient receiving 5mg of nalbuphine +2.5 ml 0.5% bupivacaine diluted to 10ml with distilled water given epidurally.

Inclusion Criteria
1. ASA 1 and 2 patients
2. Lower limb surgery patients
3. Age 18 to 59 years
4. Patients within +/- 50% of their ideal body weight

Exclusion criteria
1. patient refusal
2. ASA 3 and 4
3. Local infection
4. known Allergy to the study drug
5. Coagulopathies
6. Vertebral anomalies
7. Neurological disease
8. Pregnant women
9. Breastfeeding women

Pre Operative Preperation
A detailed pre-anaesthetic check-up (PAC) including history, physical examination and routine investigations as guided by age will be carried out in all patients.

The anaesthetic procedure will be explained to the patient and informed written consent will be obtained in a language that is understood by the patient. All patients were kept nil per oral overnight for eight hours, tab pantoprazole 40mg and tab alprazolam 0.5mg HS were given .

Pre-operatively:
NPM status confirmed
Boyle's anaesthesia machine checked

Appropriate size endotracheal tubes with laryngoscopes of MAC 3 and 4 kept ready along with stylet, bougie, Magill's forceps, suction apparatus and emergency drugs .

Procedure:-
Under all aseptic precaution using an 18G Tuohy needle with bevel facing upwards, epidural space will be located with the loss of resistance technique in the L2-3, L3-4 interspace. With the hub of epidural needle pointed in the cephalad direction, an Epidural catheter will be inserted up to a depth of 4 cm into the epidural space. After secured fixation on the back, the catheter will be activated with 3ml of 2% lignocaine with adrenaline.

Following this, Subarachnoid block will be performed using a 25gauge spinal needle through the midline approach in the space below. After confirming the free flow of CSF, 2.5 ml of hyperbaric Bupivacaine 0.5% will be injected intrathecally in all patients. Following this, the patient will be returned to the supine position. The surgery will be allowed to proceed once the sensory level reaches T10 determined by the pin prick method. Further intraoperative management will be as per discretion of the anaesthesiologist. Intra op vitals including SBP, DBP, MAP, PR, RR, SpO_2 monitored 1min, 2min, 5min, 10min, 15min, further followed by every 10 min.

Postoperatively patient will be monitored in the postoperative ward. The visual analogue scale (0-10 scale)will be explained to all patient (0 indicating an absolute lack of pain and 10 indicating level of unbearable pain),When the patient first complains of pain of VAS score 1 or more than 1 epidural top up of any of the group (A/B) given which will be prepared by the resident doctor not taking part in the study, where the researchers are kept blind to which drug group the participants belongs to, followed by recording the vitals of the patient. Further monitoring of patients

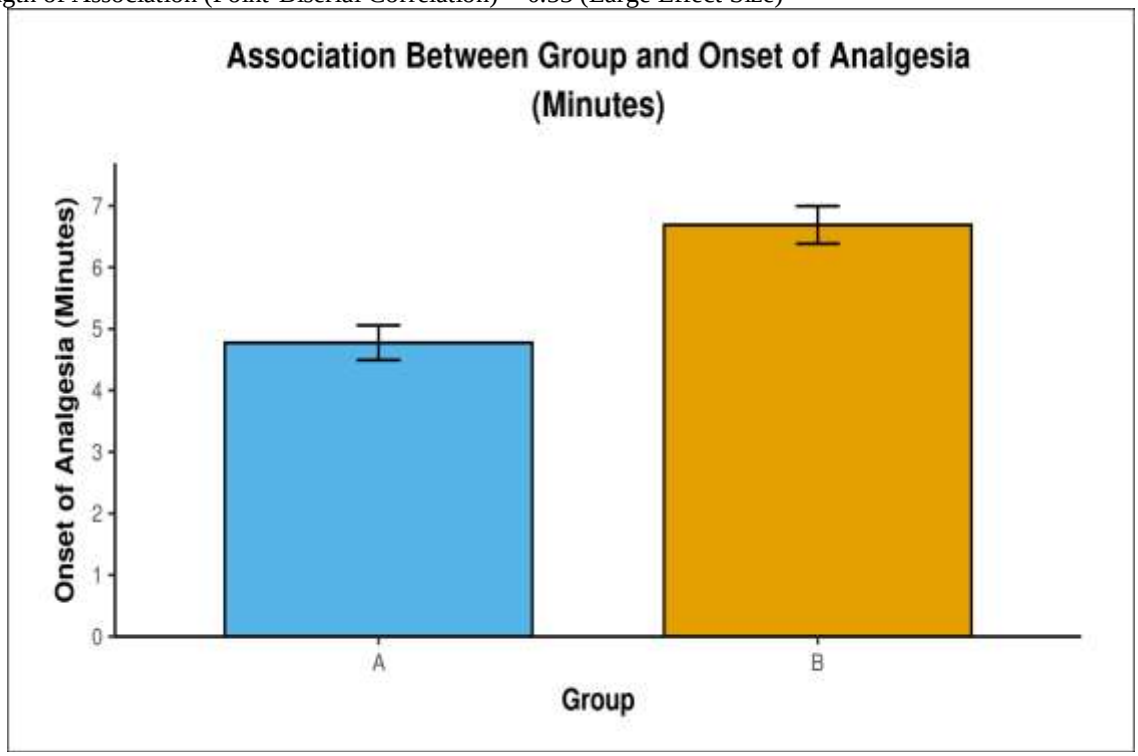
SBP,DBP,SpO2,RR,VAS score till 15 min followed by 30 min,1hr ,2hr,4hr ,6hr,8hr is done and asked for any side effects like nausea ,vomiting, pruritis ,sedation and urinary retention.

If the VAS score is > 4, rescue analgesia will be given with Injection Diclofenac 75mg intravenously. If the pain persists even after administration of Diclofenac, second rescue analgesia will be given with Injection Tramadol 100mg IV. In case the patient is sleeping then she /he will be considered pain free (i.e., VAS = 0) and the patient will not be disturbed. Ondansetron 4 mg IV will be given if patient complains of persistent nausea or vomiting. Level of sedation will be assessed by modified Ramsay sedation score.

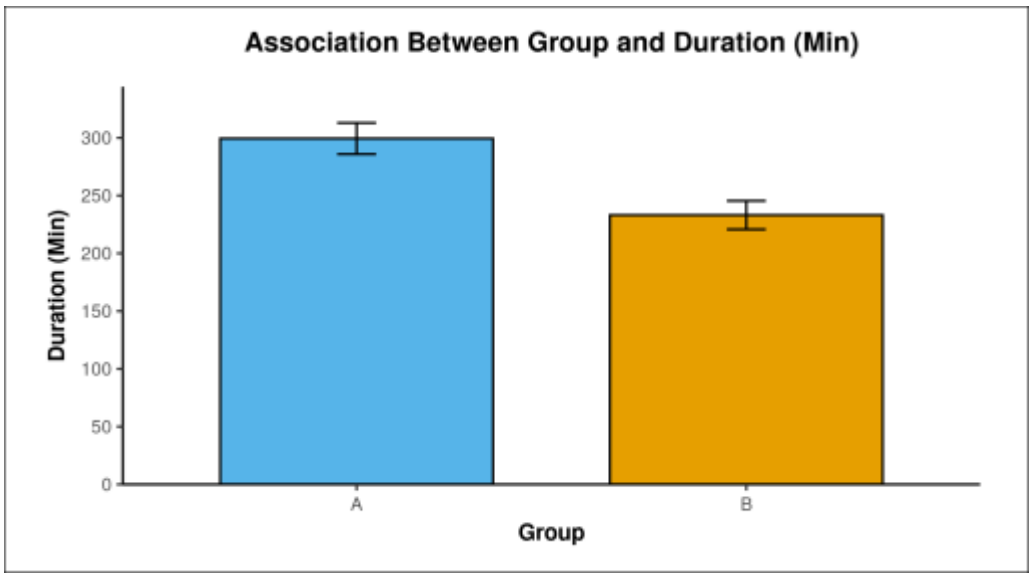
Results:-

Comparison of the 2 Subgroups of the Variable Group in Terms of Onset of Analgesia (Minutes) (n = 57)
There was a significant difference between the 2 groups in terms of Onset of Analgesia (Minutes) (W = 129.000, p = <0.001), with the median Onset of Analgesia (Minutes) being highest in the Group: B group.

Strength of Association (Point-Biserial Correlation) = 0.53 (Large Effect Size)



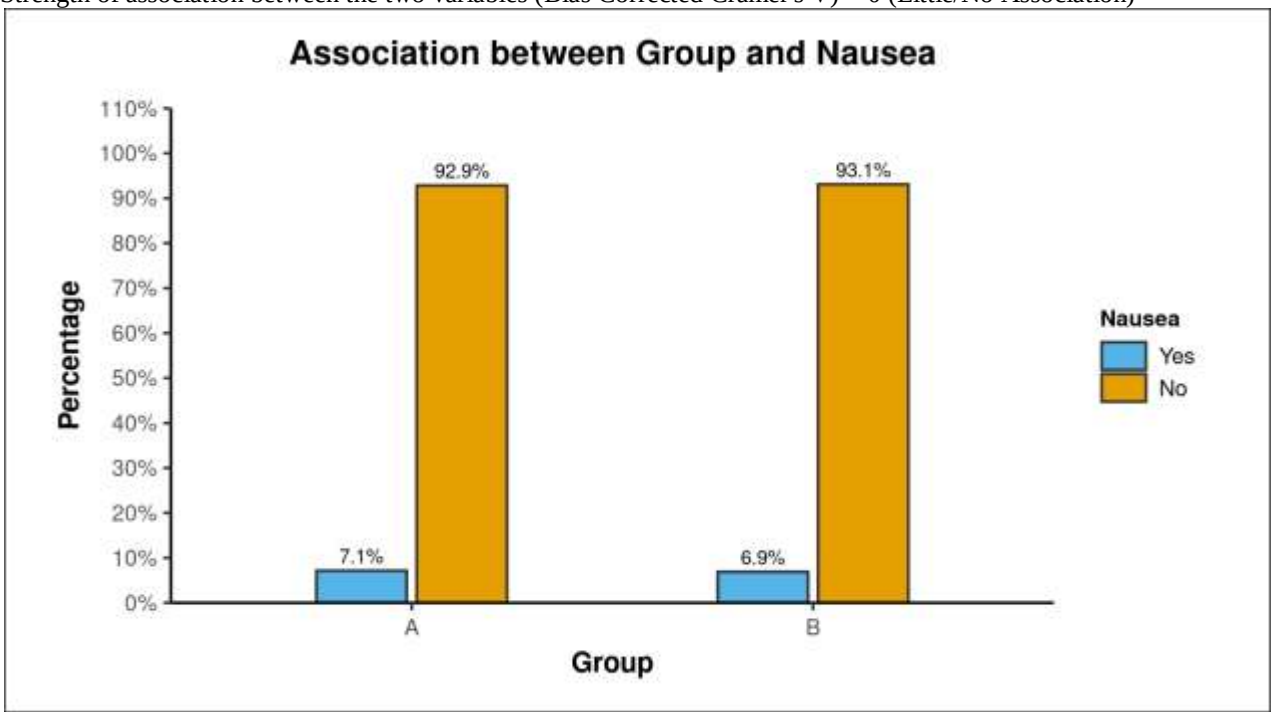
Comparison of the 2 Subgroups of the Variable Group in Terms of Duration (Min) (n = 57)
There was a significant difference between the 2 groups in terms of Duration (Min) (W = 615.000, p = 0.001), with the median Duration (Min) being highest in the Group: A group.
Strength of Association (Point-Biserial Correlation) = 0.44 (Large Effect Size)



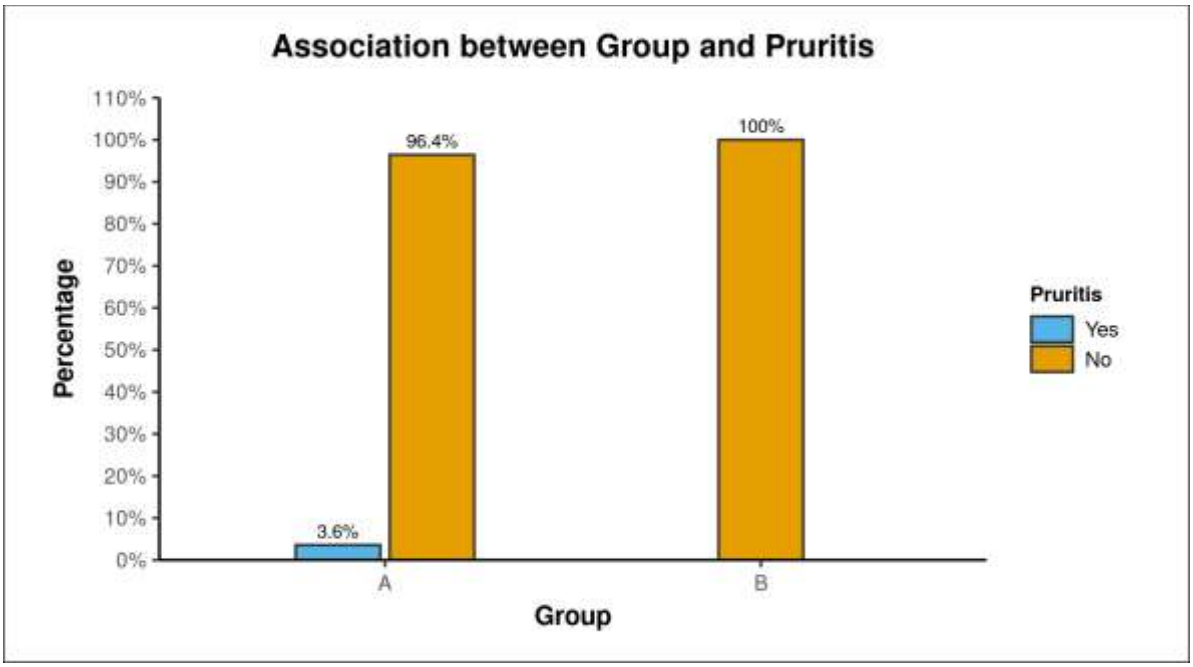
Association Between Group and Nausea (n = 57)
There was no significant difference between the various groups in terms of distribution of Nausea ($\chi 2 = 0.001$, $p = 1.000$).

Strength of association between the two variables (Cramer's V) = 0 (Little/No Association)

Strength of association between the two variables (Bias Corrected Cramer's V) = 0 (Little/No Association)



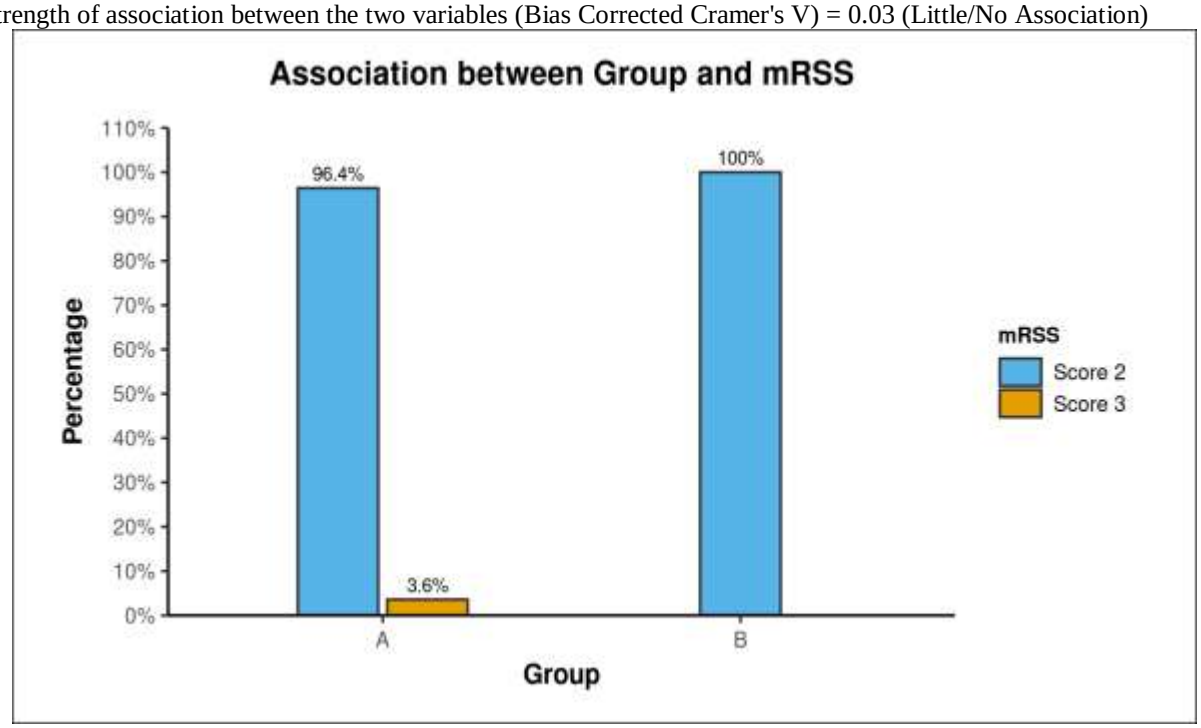
Association Between Group and Pruritis (n = 57)
There was no significant difference between the various groups in terms of distribution of Pruritis ($\chi 2 = 1.054$, $p = 0.491$).
Strength of association between the two variables (Cramer's V) = 0.14 (Low Association)Strength of association between the two variables (Bias Corrected Cramer's V) = 0.03



Association Between Group and Modified Ramsey Sedation Score (n = 57)
There was no significant difference between the various groups in terms of distribution of mRSS ($\chi 2 = 1.054$, $p = 0.491$).

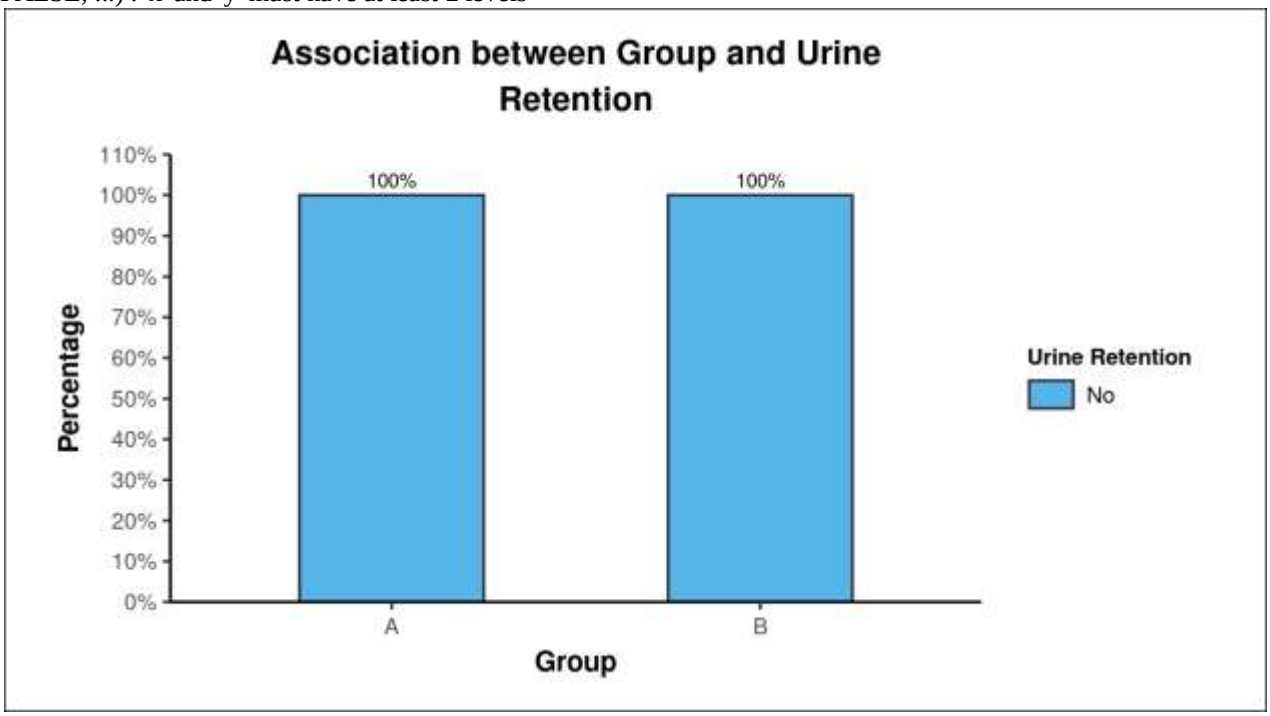
Strength of association between the two variables (Cramer's V) = 0.14 (Low Association)

Strength of association between the two variables (Bias Corrected Cramer's V) = 0.03 (Little/No Association)



Association Between Group and Urine Retention (n = 56)
There was no significant difference between the various groups in terms of distribution of Urine Retention ($\chi 2 = -$, $p = -$).

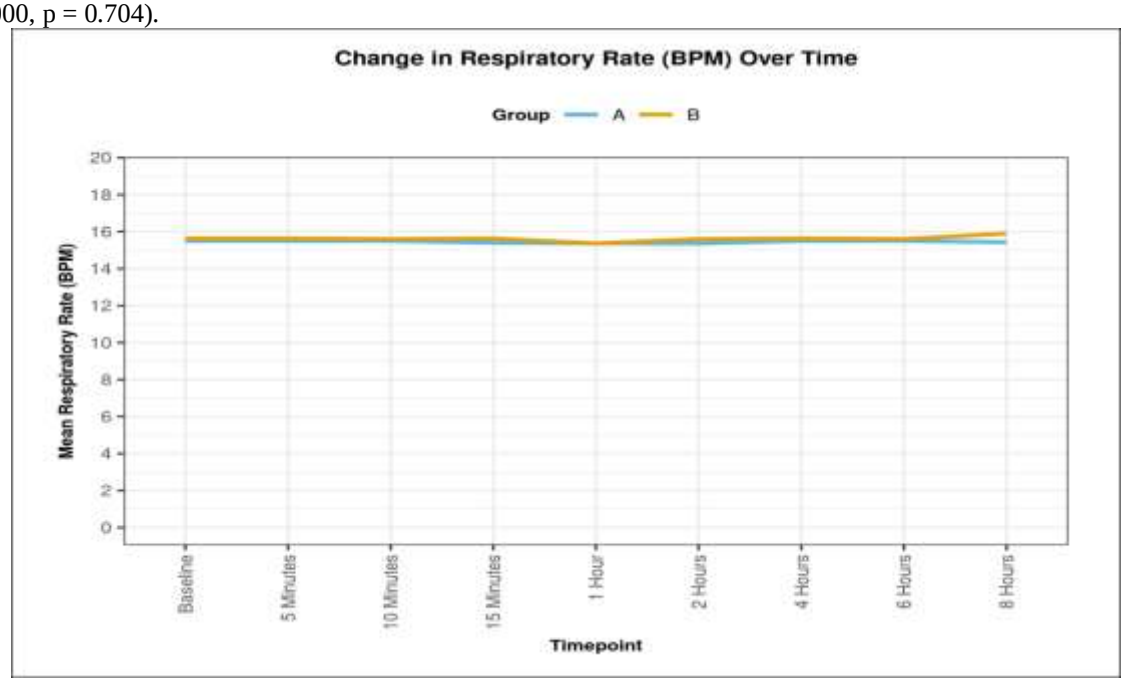
Strength of association between the two variables (Cramer's V) = Error in chisq.test(x, y, correct = FALSE, ...) : 'x' and 'y' must have at least 2 levels



Comparison of the two Groups in Terms of change in Respiratory Rate (BPM) over time (n = 60)
In Group: A, the mean Respiratory Rate (BPM) decreased from a maximum of 15.50 at the Baseline timepoint to a minimum of 15.37 at the 1 Hour timepoint, and then increased to 15.43 at the 8 Hours timepoint.

In Group: B, the mean Respiratory Rate (BPM) decreased from 15.63 at the Baseline timepoint to a minimum of 15.37 at the 1 Hour timepoint, and then increased to 15.90 at the 8 Hours timepoint.

There was no significant difference between the groups in terms of Respiratory Rate (BPM) (Baseline) (W = 424.000, p = 0.704).



Discussion:-

CSE is widely used nowadays in orthopaedic, urologic and gynaecologicsurgeries . Spinal anaesthesia gives quick and dependable dense anaesthesia with low toxicity while long acting perioperative analgesia can be given with epidural anaesthesia.

Intrathecal opioids when used as adjuvants along with local anaesthetics are capable of producing early onset of sensory blockade and prolonged postoperative analgesia. They also allow early ambulation of patients due to their sympathetic and motor sparing activities.

This double blinded, prospective, randomised study was conducted in Patients undergoing elective lower limb surgeries under combined spinal epidural anaesthesia at AL-AMEEN MEDICALCOLLEGE, BIJAPUR from **APRIL 2021 to DECEMBER 2022.** Our aim is to compare the efficacy of epidural analgesia by using fentanyl and nalbuphine as adjuvants along with bupivacaine with respect to

1. Onset of analgesia
2. Duration of analgesia
3. To know incidence of side effect

Our study included two groups of 30 patients each belonging to the age group of 18-59 years of both sexes of ASA grade 1 and 2 scheduled to undergo elective lower limb surgeries.

GROUP A: Comprised of 13 females and 17 male patients (total n =30)of mean age 36.3 + 11.18 years ,mean weight 67.17 + 9.77 , mean height 165.13 + 10.90 and mean BMI 24.56 + 2.02 receiving 50ug of fentanyl + 2.5 ml 0.5% bupivacaine diluted to 10ml (0.125%) with distilled water given epidurally.

GROUP B: Comprised of 12 females and 18 male patients of mean age 37.0 + 11.97 , mean weight 64.9 + 11.75 , mean height 165.47 + 9.67 and mean BMI 23.56 + 3.04 receiving 5mg of nalbuphine + 2.5 ml 0.5% bupivacaine diluted to 10ml (0.125%) with distilled water given epidurally.

Onset of analgesia

The mean (SD) of Onset of Analgesia (Minutes) in the Group: A group was 4.78 (+1.49) min. The mean (SD) of Onset of Analgesia (Minutes) in the Group: B group was 6.69 (+1.65) min .

There was a significant difference between the 2 groups in terms of Onset of Analgesia (Minutes) ($p = <0.001$), being early onset in group A , which is statistically significant.

Study conducted by **Bura et al (2019)** [32] studied comparison between epidural butorphanol, nalbuphine, and fentanyl as adjuvants for postoperative analgesia in lower abdominal surgeries by dividing into 3 groups Fentanyl-100ug**,** butorphanol 2mg , nalbuphine 10mg they came to a result that fentanyl has faster onset of action followed by butorphanol then nalbuphine ($P <0.05$). The present study of ours correlated with the above study results which showed early onset in fentanyl gropup.

Our study also correlate with study of **Karthik et al (2019)** [33] in his study he compared epidural bupivacaine-fentanyl v/s bupivacaine-nalbuphine v/s bupivacaine-butorphanol 60 parturients who undergoing elective LSCS which reported faster onset of analgesia in fentanyl group 4.2 min than nalbuphine group with 5.42 min. The study conducted by **Banerjee et al (2017)** [35] of comparison epidural fentanyl , butorphanol and nalbuphine as adjuvants to bupivacaine for the post caesarean section pain reported faster onset of analgesia in fentanyl 6.32 min compared to nalbuphine of 14.64 min. which also correlates with our study finding of faster onset in fentanyl group than nalbuphine group.Results of our study does not correlate with study conducted by

Chakravarthy et al (2015 – 2017) [31] in his comparative study of epidural bupivacaine with fentanyl vs epidural bupivacaine nalbuphine mean time of onset of analgesia of nalbuphine group was 5.76 min and fentanyl group was - 5.80 min. The time of onset of analgesia was not significant ($p> 0.05$). Nalbuphine group onset was found to be less than what we observed since they haven't compared with equipotent doses of both drugs .Thus it was obvious that 50ug fentanyl have faster onset of analgesia compared with nalbuphine 5mg epidurally which is statistically significant ($p = <0.001$).

Duration of analgesia

The mean (SD) of Duration of analgesia (Min) in the Group: A group was 299.39 (+71.65) min.The mean (SD) of Duration (Min) in the Group: B group was 233.10 (+66.43)min. There was a significant difference between the 2 groups in terms of Duration (Min) (p = 0.001), with the mean Duration of analgesia (Min) being highest in the Group: A group.

Karthik et al (2019) [33] in his study he compared epidural fentanyl v/s nalbuphine v/s butorphanol 60 parturients who undergoing elective LSCS .The duration of analgesia between Fentanyl group (mean of 279 min approx.) and of Nalbuphine group (mean of 246 min approx) was statistically significant . which found to be similar to that of our study. Also observed in their study that the early post operative VAS was quite higher and there was also great percentage of patient requiring rescue analgesia in early post operative period in nalbuphine group compared to fentanyl group.

Umesh N et al 2017[45], they compared intrathecal nalbuphine and fentanyl as adjuvants to bupivacaine in lower abdominal surgeries in 60 patients of 30 group each. They observed in their study that the duration of post operative analgesia in fentanyl group was prolonged (198.67 + 34.58 min) compared to nalbuphine group (180 .50 + 34.58 min) , 18 patients received rescue analgesia in nalbuphine group within 6 h postoperatively, whereas 7 patients received in fentanyl group. even though it is statistically insignificant it correlate with our study of prolonged duration of post operative analgesia in fentanyl group.

In study of **Bura et al (2019)** [32] studied comparison between epidural butorphanol, nalbuphine, and fentanyl as adjuvants for postoperative analgesia in lower abdominal surgeries reported the mean duration of analgesia was 198.10 minutes in Group Fentanyl and 313.50 minutes in Group Nalbuphine Our study doesn't corelate with the study mentioned above. In our study where duration of fentanyl is more than that of nalbuphine when equipotent doses are considered.

Banerjee et al (2017) [35] in his study compared epidural fentanyl , butorphanol and nalbuphine in post operative lower abdominal surgery patients showed 178.60 minutes in Group fentanyl and 294.68 minutes in Group nalbuphine , which found to be different from what we observed in our study.

Chakravarthy et al (2015 – 2017) [31] in his comparative study of epidural fentanyl vs epidural nalbuphine for post operative analgesia in abdominal and lower limb surgery patients the duration of analgesia for fentanyl group was to be 247 +19.68 and of nalbuphine was 285.33 + 27.76 . This study conclusion differs from our study since here equipotent doses of opioid is not considered , the dose of nalbuphine double than that of our study , hence its showing longer duration of action than fentanyl compared to our study.

Veena Chatrath et al (2015) [30] in their study on comparative evaluation of bupivacaine with nalbuphine versus bupivacaine with tramadol for postoperative analgesia in lower limb orthopaedic surgeries showed duration of nalbuphine 380+ 11.49 min which far more than that of our study (233 +66.43 min) since the concentration of bupivacaine (0.25%) and nalbuphine (10mg) was more in epidural top up compared to our study (0.125% bupivacaine and 5mg nalbuphine).

Study conducted by **Pramila et al (2006)** [27] of comparative evaluation of epidural fentanyl and butorphanol for post operative analgesia in lower limb orthopaedic surgeries reported mean duration of analgesia in patients receiving 50 ug fentanyl is 201.36 +94.2 which was lower than what we observed in our study group receiving 50 ug fentanyl.

It was evident that in both groups A and B provided effective longer duration of analgesia . Group A had longer duration than group B and the difference is statistically significant when equipotent doses of drugs are considered.

3) Incidence of side effects

Nausea and vomiting

7.1% of the participants in the fentanyl group had Nausea and 6.9% of the participants in the nalbuphine group had nausea none of the group had case of vomiting

There was no significant difference between the various groups in terms of distribution of Nausea ($\chi 2 = 0.001$, p = 1.000).

In study of **Bura et al (2019)** [32] on comparison between epidural butorphanol, nalbuphine, and fentanyl as adjuvants for postoperative analgesia in lower abdominal surgeries reported 26.3% patients in fentanyl

Group and 47.4% patients in nalbuphine group had nausea , which was statistically insignificant of p value 0.344. which contradicts to our findings where in our study we found number of nausea more in fentanyl even though statistically insignificant.

Karthik et al (2019) [33] in his study he compared epidural fentanyl v/s nalbuphine v/s butorphanol 60 parturients who undergoing elective LSCS reported Fentanyl group had slight more nausea and vomiting than nalbuphine group which statistically insignificant . This study correlated with our present study.

Study conducted by **Pramila et al (2006)** [27] of comparative evaluation of epidural fentanyl and butorphanol for post operative analgesia in lower limb orthopaedic surgeries had incidence of nausea and vomiting was 26% in fentanyl group which is higher than in our study (7.1%).our results correlate with **Veena Chatrath et al (2015)** [30] in their study on comparative evaluation nalbuphine versus tramadol for postoperative analgesia in lower limb orthopaedic surgeries reported lesser incidence of nausea in nalbuphine group which is statistically insignificant.

Pruritis

In our study 3.6% (1 patient) of the participants in the fentanyl group had Pruritis and none of the patients nalbuphine group had pruritis. There was no significant difference between the various groups in terms of distribution of Pruritis ($\chi2 = 1.054$, $p = 0.491$).

In study of **Bura et al (2019)** [32] on comparison between epidural butorphanol, nalbuphine, and fentanyl as adjuvants for postoperative analgesia in lower abdominal surgeries reported 3 patients in fentanyl group with pruritis and no patients in nalbuphine group with pruritis. This is comparable with our study .

Also in the study conducted by **Karthik et al (2019)** [33] where he compared epidural fentanyl v/s nalbuphine v/s butorphanol in elective LSCS patients found that none of the nalbuphine group had pruritis only few fentanyl group patients had pruritis. Our results correlate with **Veena Chatrath et al (2015)** [30] in their study on comparative evaluation of nalbuphine versus tramadol for postoperative analgesia in lower limb orthopaedic surgeries found none of her patients with nalbuphine complained of pruritis .

Sedation

In the fentanyl group 96.4% of the participants had modified Ramsay sedation score 2 . 3.6% of the participants of score 3 . 100.0% of the participants in the nalbuphine group had mRSS: Score 2.

There was no significant difference between the various groups in terms of distribution of mRSS ($\chi2 = 1.054$, $p = 0.491$).

In study of **Bura et al (2019)** [32] on comparison between epidural butorphanol, nalbuphine, and fentanyl as adjuvants for postoperative analgesia in lower abdominal surgeries reported a case of sedation in fentanyl group and no case of sedation in nalbuphine group which is comparable to our study. Our results also correlate with **Veena Chatrath et al (2015)** [30] , in their study on comparative evaluation, nalbuphine versus tramadol for postoperative analgesia in lower limb orthopaedic surgeries found none of her patients with nalbuphine complained of sedation.

Banerjee et al (2017) [35] in his study compared epidural fentanyl , butorphanol and nalbuphine post operative Lower abdominal surgery patients showed more number sedation in fentanyl group compared to nalbuphine group which correlate with our study .

Study conducted by **Pramila et al (2006)** [27] of comparative evaluation of epidural fentanyl and butorphanol for post operative analgesia in lower limb orthopaedic surgeries reported sedation in fentanyl group but less compared with butorphanol.

Urine retention

None of the group had case of urine retention in our study There was no significant difference between the various groups in terms of distribution of Urine

Retention ($\chi 2$ = -, p = -).

In study of **Bura et al (2019)** [32] studied comparison between epidural butorphanol, nalbuphine, and fentanyl as adjuvants for postoperative analgesia in lower abdominal surgeries reported no cases of urine retention in any of the patients which is similar to our study.

Our study also correlated with study of **Banerjee et al (2017)** [35] in their study compared epidural fentanyl , butorphanol and nalbuphine post lscs patients reported no case of urine retention in any of the groups.

Our study correlates with **Chakravarthy et al (2015 – 2017)** [31] in his comparative study of epidural fentanyl vs epidural nalbuphine for post operative analgesia in abdominal and lower limb surgery no case of urine retention in any of the groups.

Respiratory depression
None of the group had respiratory depression in our study.

There was no significant difference between the two groups in terms of change in Respiratory

Rate (BPM) from the Baseline to any timepoints.

In the study of **Bura et al (2019)** [32] studied comparison between epidural butorphanol, nalbuphine, and fentanyl as adjuvants for postoperative analgesia in lower abdominal surgeries reported no cases of respiratory depression . this study corelates with the our present study along with study conducted by

Karthik et al (2019) [33] where he compared epidural fentanyl v/s nalbuphine v/s butorphanol in elective LSCS patients also reported no cases of respiratory depression in any of the groups.

Also study conducted by **Banerjee et al (2017)** [35] in their study compared epidural fentanyl , butorphanol and nalbuphine post lscs patients found no cases of respiratory depression in any of the groups.

4) Haemodynamic parameters
Systolic blood pressure
Post operative mean systolic blood pressure was 120.67 + 10.64 mm hg in group A and 119.10 + 11.25 mm hg in Group B . In our study, in the post operative period systolic blood pressure remained stable throughout after epidural top up. And there was no significant difference between the groups in terms of Systolic BP from the mean baseline (120.23 + 10.78 mm hg in group A and121.43 + 12.72 mm hg in group B) (p = 0.582).

In study of **Bura et al (2019)** [32] studied comparison between epidural butorphanol, nalbuphine, and fentanyl as adjuvants for postoperative analgesia in lower abdominal surgeries reported stable systolic blood pressure in all groups.

Study conducted by **Karthik et al (2019)** [33] where he compared epidural fentanyl v/s nalbuphine v/s butorphanol in elective LSCS patients also reported stable systolic blood pressure.

Banerjee et al (2017) [35] in their study compared epidural fentanyl , butorphanol and nalbuphine post lscs patients reported stable mean arterial pressure in all groups.

Above all studies correlates with our study of stable systolic blood pressure.

Diastolic blood pressure;
Post operative mean diastolic pressure in group A was 74.63 + 9.85 mm hg and in group B was 73.27 + 10.08. In our study in the post operative period, diastolic lood pressure remained stable throughout after epidural top up. There was no significant difference between the groups in terms of mean diastolic BP from the baseline (73.80 + 9.93 mm hg in group A and 74.80 + 12.10 mm hg in group B) (p = 0.540).

In study of **Bura et al (2019)** [32] studied comparison between epidural butorphanol, nalbuphine, and fentanyl as adjuvants for postoperative analgesia in lower abdominal surgeries reported stable diastolic blood pressure in all groups.

Study conducted by **Karthik et al (2019)** [33] where he compared epidural fentanyl v/s nalbuphine v/s butorphanol in elective LSCS patients also reported stable diastolic blood pressure in all groups.

Banerjee et al (2017) [35] in their study compared epidural fentanyl , butorphanol and nalbuphine post lscs patients reported stable mean arterial pressure in all groups.

Above all studies correlates with our study of stable diastolic blood pressure.

Heart rate

Post operative mean HR in group A was 68.27 + 9.56 bpm and of group B was 70.97 + 11.94 bpm, there was no significant difference between the groups in terms of Heart Rate from base line (BPM) (Baseline) ($t = -0.508$, $p = 0.613$) and the heart remained stable throughout post operatively after epidural top up.

In study of **Bura et al (2019)** [32] studied comparison between epidural butorphanol, nalbuphine, and fentanyl as adjuvants for postoperative analgesia in lower abdominal surgeries reported stable heart rate in all groups.

Study conducted by **Karthik et al (2019)** [33] where he compared epidural fentanyl v/s nalbuphine v/s butorphanol in elective LSCS patients also reported stable heart rate in all groups .**Banerjee et al (2017)** [35] in their study compared epidural fentanyl , butorphanol and nalbuphine post lscs patients reported stable heart rate in all groups.

Above all studies correlates with our study of stable heart rate in all groups .

Spo_2

There was no significant difference in the trend of SpO2 (%) over time between the two groups (p = -).**Jasleen et al (2014)** [29] in their comparison of epidural butorphanol and fentanyl as adjuvants in lower abdominal surgery showed no statistically significant change in spo2 and stable spo2 in any group throughout the study period .Our results also correlate with **Veena Chatrath et al (2015)** [30] in their study on comparative evaluation nalbuphine versus tramadol for postoperative analgesia in lower limb orthopaedic surgeries found no significant change in spo2 in the two group

Conclusion:-

Based on the results of the study following conclusions were drawn

1. Onset of analgesia is early in fentanyl compared to equipotent dose of nalbuphine which is statistically significant.
2. Duration of analgesia is prolonged in fentanyl compared to equipotent dose of nalbuphine which is statistically significant.
3. No statistically significant side effects in fentanyl group compared nalbuphine group.
4. Both fentanyl and nalbuphine as adjuvants to bupivacaine are comparable in terms of hemodynamic stability.
5. Fentanyl is a better drug than nalbuphine on comparing equipotent doses for post operative epidural analgesia in lower limb surgeries.

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None declared

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The study was approved by the Institutional Ethics Committee

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