

Efficacy and Potency of Dexamethasone In Comparison With Ketamine and Tramadol in the Prevention of Post-Operative Shivering

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Abstract : Shivering is uncomfortable, may aggravate post-operative pain by stretching the surgical incision and occasionally impedes monitoring techniques. It may increase intra ocular and intra cranial pressures. Shivering can double or triple oxygen consumption, may increase metabolic requirement and predispose difficulties in patients with existing intra pulmonary shunts, fixed cardiac output, limited respiratory reserve.

Aim : To study the efficacy and potency of dexamethasone in comparison with ketamine and tramadol in the prevention of shivering in the postoperative shivering in patients receiving general anaesthesia.

Keywords – Dexamethasone, General Anesthesia, Ketamine, Tramadol, Post-Operative shivering

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I. Introduction

Perioperative shivering is a common experience for the patients undergoing general anaesthesia. The incidence is estimated to be around 60 %. The impairment of autonomic thermoregulatory control while patient is under anesthesia, cold environment of the theatre and cold intravenous fluids may contribute to fall in body temperature and leads to shivering. It is not only unpleasant to the patient but also physiologically results in increased oxygen consumption by up to 300%, increase in intraocular and intracranial pressure and other sympathetic over activity.

Tramadol hydrochloride , a centrally acting analgesic drug, is effective in treatment of shivering via modulatory effect while ketamine acts by antagonising the NMDA receptor mediated shivering and dexamethasone acts through its anti inflammatory effect. The present study was designed to evaluate the efficacy of tramadol, ketamine and dexamethasone for control of shivering.

II. Materials and Methods

II.a. Method

All patients were randomly allocated into 3 groups of 30 each by computer generate numbers . The same standard protocol was used for anaesthetic management of the patients in all three groups.

The operating room temperature was maintained at 22-24°C.

Premedication Inj. glycopyrrolate 5 mcgs/kg, inj. Midazolam 0.3mg/kg, inj.ranitidine 50 mg, inj. ondansetron 0.1mg/kg and inj. Fentanyl 1mcg/kg

Preoxygenation with 100% oxygen was given for 5 minutes.

Anaesthesia was induced using inj. thiopental sodium 3-5 mg/kg and succinylcholine 2mg/kg.

After orotracheal intubation, anaesthesiaismaintainedwith nitrousoxide 60%in

oxygen and sevoflurane. Neuromuscular blockade was done with nondepolarising muscle blockers like vecuronium was used.

All vitals were monitored and recorded at regular intervals.

The ETCO₂ was maintained between 30-35mm Hg. Warmed intravenous fluids were used intraoperatively.

Just when the closure was about to begin, the study drug was administered:---

Group K:- receive intravenous ketamine in the dose of 0.5 mg/kg

Group D:- receive intravenous Dexamethasone in the dose of 0.6 mg/kg and

Group T:- receive intravenous tramadol in the dose of 1mg/ kg

The core temperature was measured at the tympanic membrane using Braun tympanometer.

After the surgery, residual neuromuscular blockade was antagonized using 0.04 mg/kg neostigmine and 0.02mg/kg glycopyrrolate at the end of the surgery and patients were extubated after the extubation criteria was met.

Patients were monitored and observed until recovery

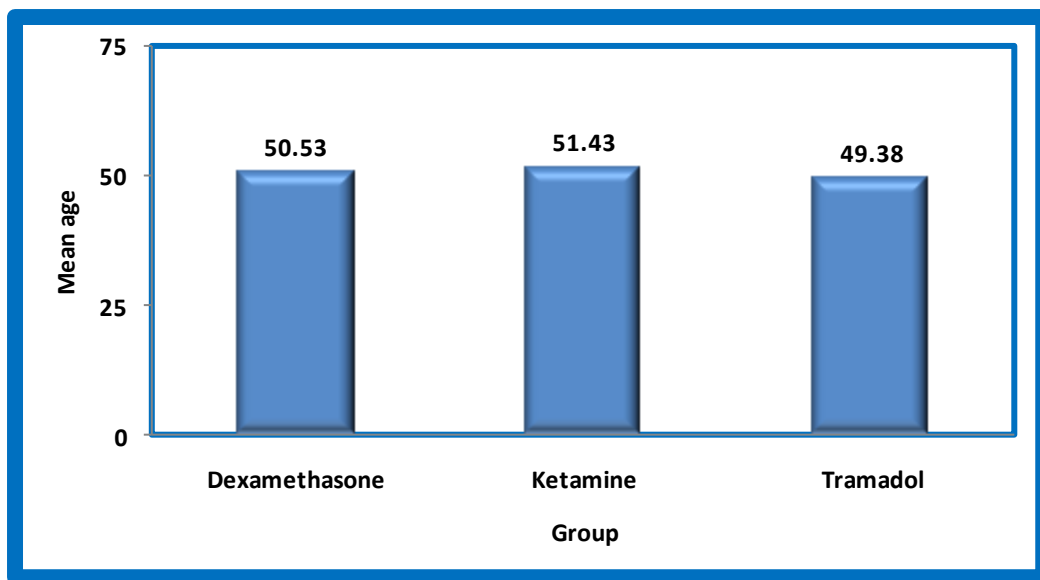
Results of the three groups were analysed and occurrence of shivering was observed and graded using a four point scale as shown.

- Grade 0 – no shivering
- Grade 1 – piloerection but no visible shivering
- Grade 2 – muscular activity in only one muscle group
- Grade 3 – muscular activity in more than one muscle group but not generalised
- Grade 4 – shivering involving whole body

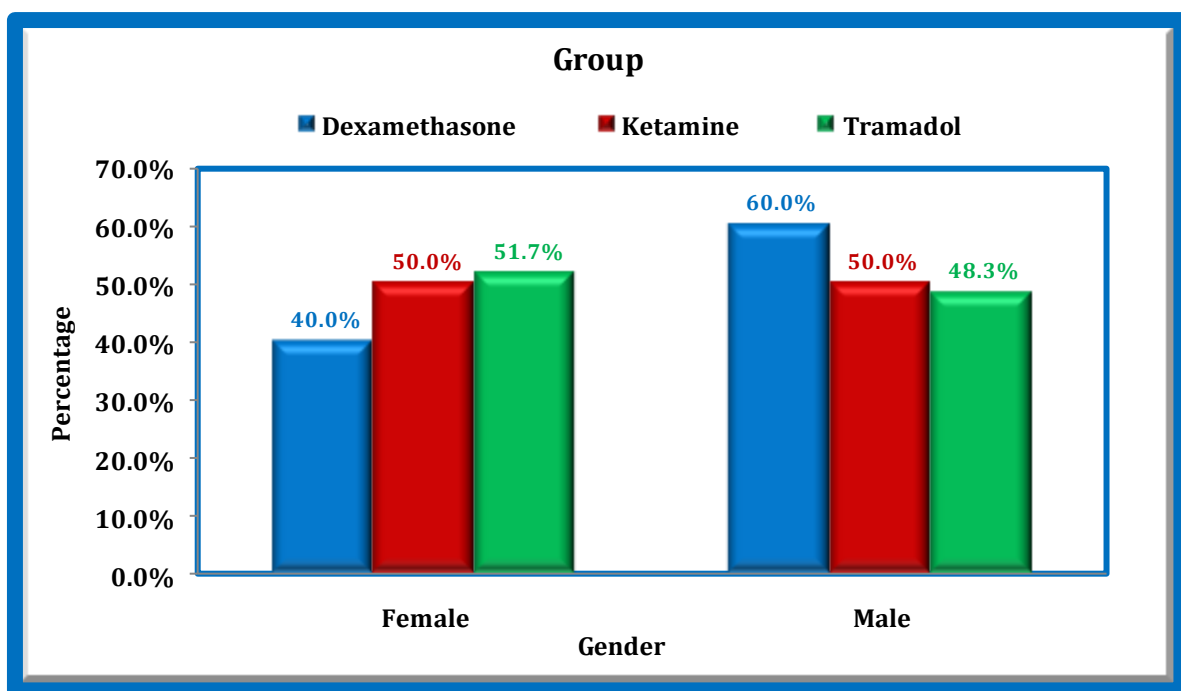
Inj Pethidine 25 mg was given as rescue drug to the patients who had shivering of more than or equal to grade 3.

III. Observations

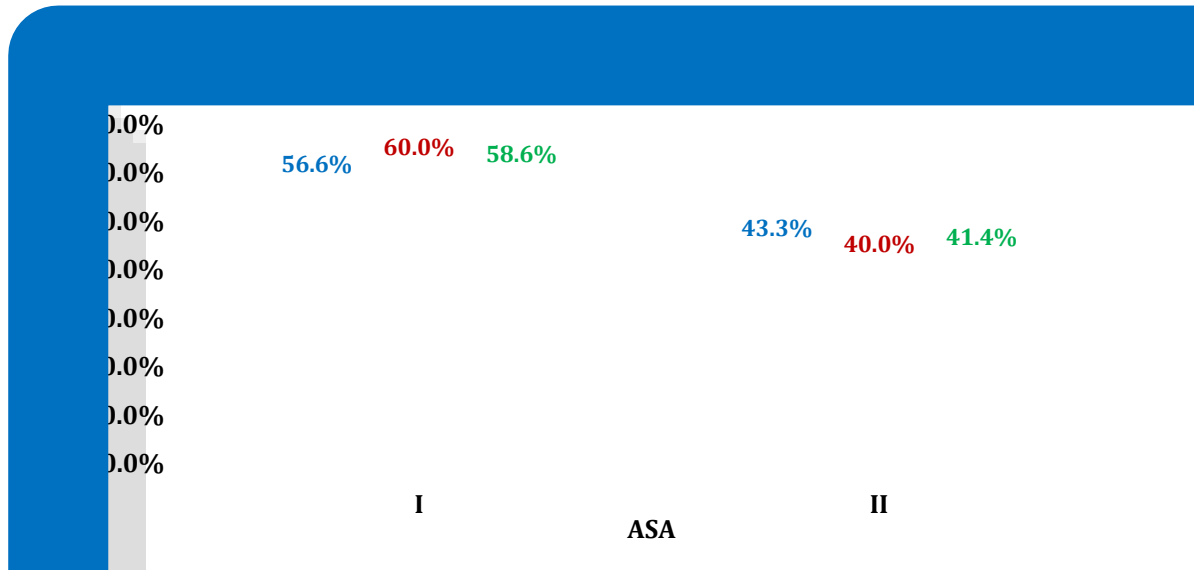
Bar diagram showing the age distribution among the study groups



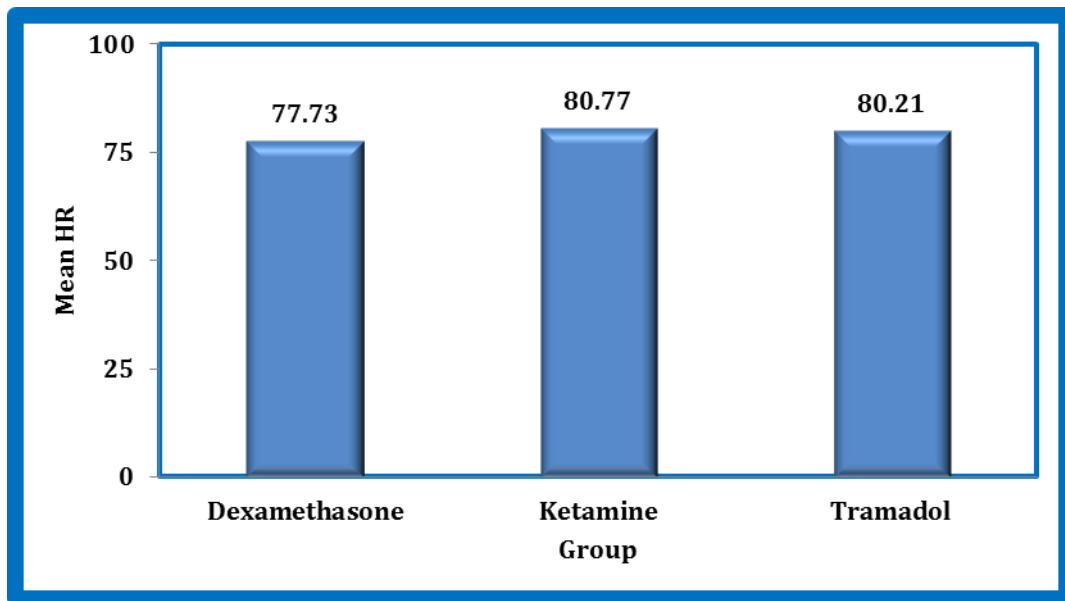
Bar diagram showing the sex distribution among the study groups.



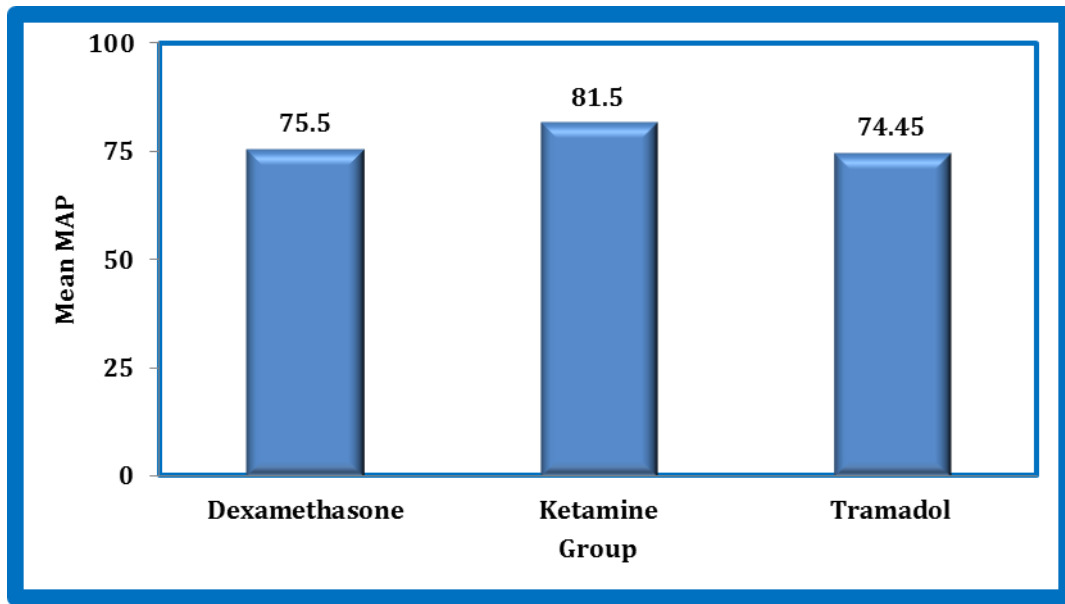
Bar diagram showing the distribution of the patients physical status classification among the study groups



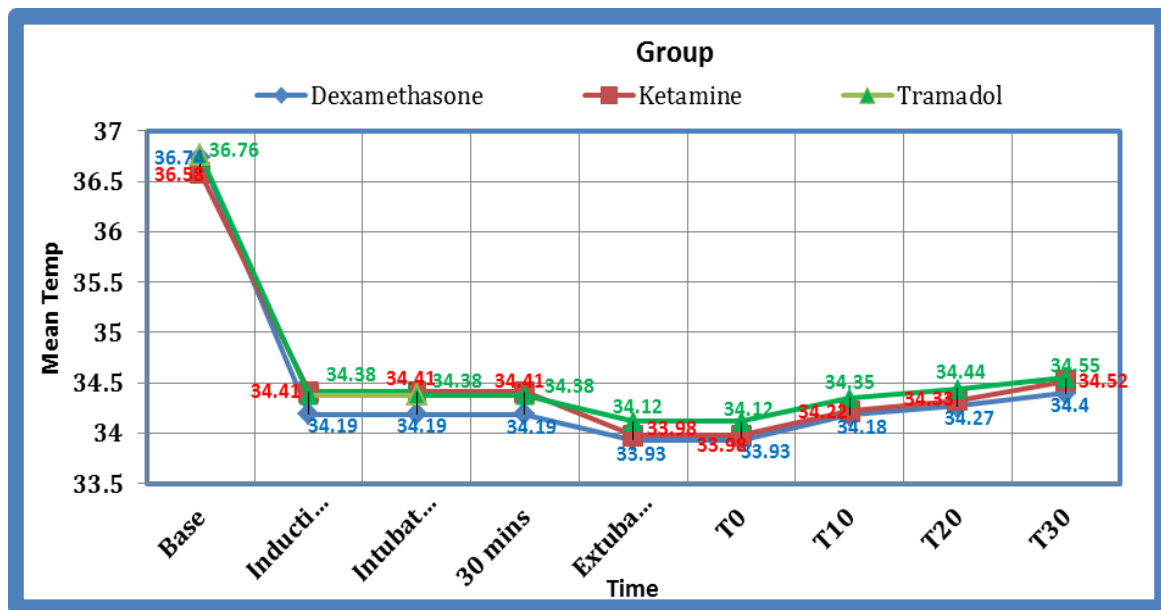
Bar diagram showing the mean baseline heart rate among the study groups



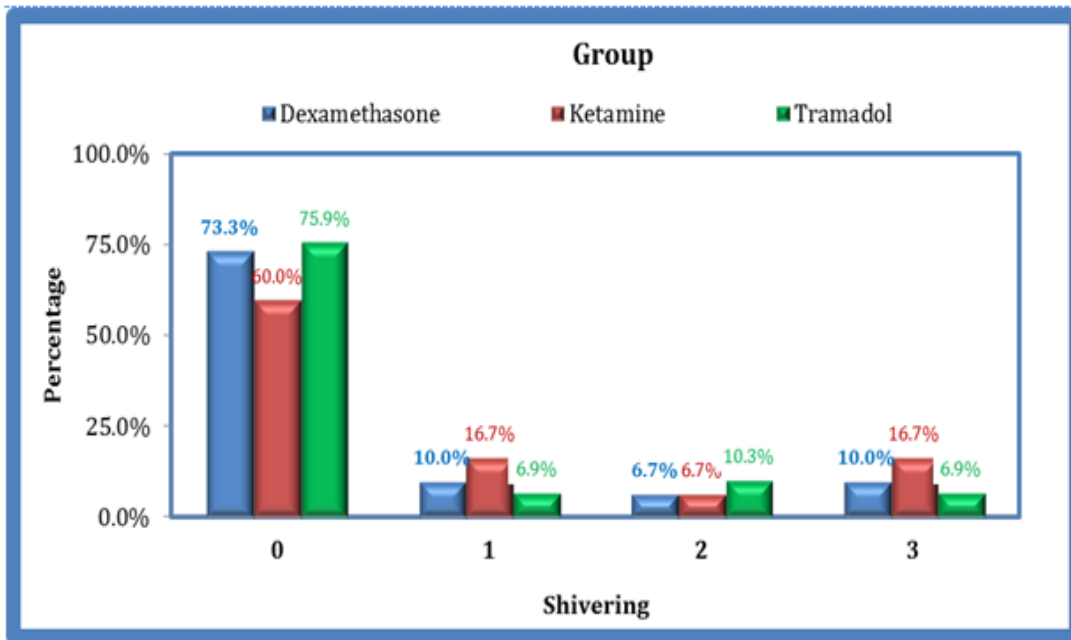
Bar diagram showing the mean arterial pressure among the three study groups



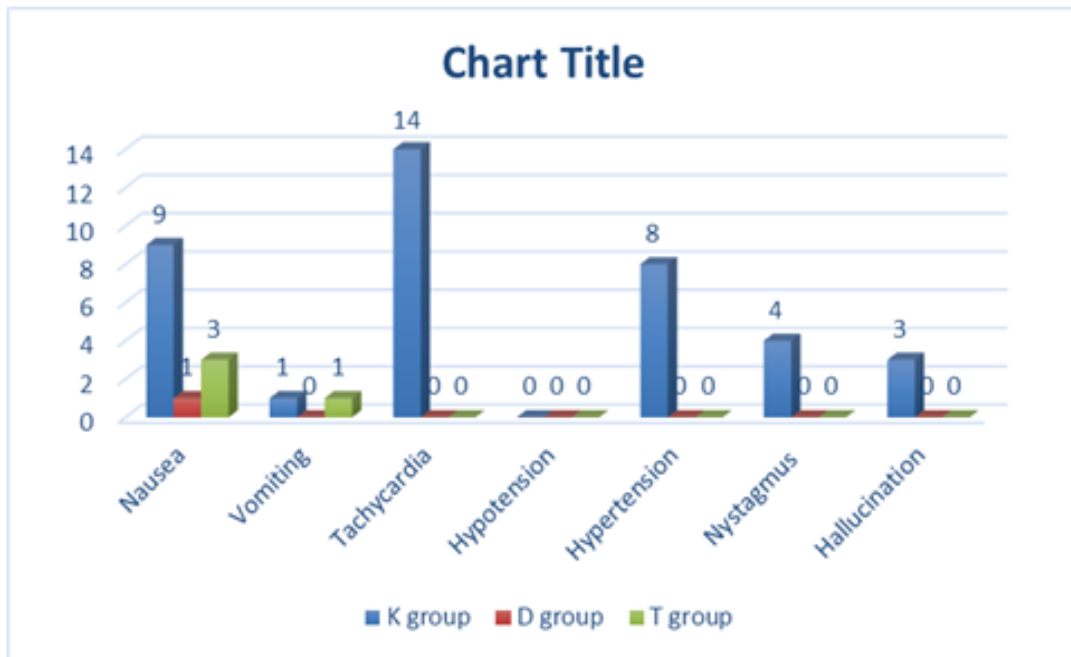
Line diagram showing the pattern of perioperative core temperature changes among study groups



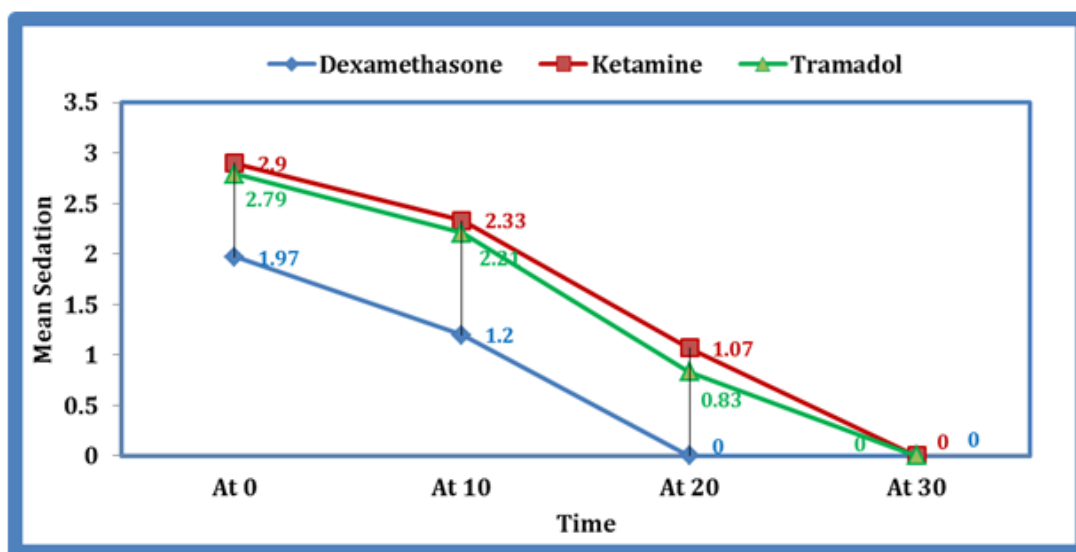
Bar diagram showing the incidence of postoperative shivering in the three study groups



Bar diagram comparing the occurrence of complications in the study groups.



Line diagram depicting the sedation scores among the three study groups



IV. Discussion

The maintenance of normothermia is an important function of the autonomic nervous system in homeothermic mammals such as man, as cellular and tissue dysfunction become evident at even minor deviations from normal core body temperature. In man, core temperature is normally maintained within narrow limits of 36.5- 37.5 ° C, even in the presence of an adverse environmental temperature, by a combination of behavioural and physiologic responses. Anaesthesia abolishes behavioural mechanisms and has a potential to disrupt the physiologic mechanisms of thermoregulation. Adverse perioperative outcomes, including wound infection, increased surgical bleeding and morbid cardiac events are being associated with mild perioperative hypothermia (33.0 – 36.4 ° C).

The present study was conducted to compare the use of prophylactic dexamethasone, ketamine and tramadol in the prevention of postoperative shivering due to hypothermia after general anaesthesia.

A total of 90 ASA grade I and II patients were randomly allocated into 3 groups. Group D (n=30) received inj dexamethasone 0.6 mg/kg, group K (n = 30), received inj ketamine 0.5 mg/ kg and group T (n=30) received inj tramadol 1 mg/ kg just when the closure started. The occurrence of shivering was noted in the postoperative period.

V. Conclusion

- Dexamethasone, ketamine and tramadol are equally effective in preventing post anaesthesia shivering with no statistically significant difference.
- Ketamine has a higher incidence of unwanted complications like sedation, tachycardia and hallucinations when compared to dexamethasone and tramadol.
- Tramadol and dexamethasone had similar rates of complications.
- The sedation scores of ketamine and tramadol were statistically significantly higher than that of dexamethasone.
- Among the three study drugs, dexamethasone has the least incidence of side effects and sedation scores.
- Thus, even though ketamine, dexamethasone and tramadol are equally effective in preventing the occurrence of postoperative shivering in patients receiving general anaesthesia, in view of the overall complication rate and sedation, dexamethasone is superior to ketamine and tramadol.
- Tramadol has a better profile than ketamine in terms of unwanted complications although both are equally efficacious in preventing postoperative shivering.

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