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A Scoping Review: Ketamine for the Prevention of Perioperative Shivering in Patients Undergoing Spinal Anesthesia

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Background

- Shivering is a frequently encountered perioperative complication in patients undergoing spinal anesthesia.
- Numerous different pharmacological agents have been employed to mitigate this issue.
- When selecting a pharmacologic agent to prevent shivering the effects of the drugs on hemodynamics should also be considered.
- Data has yet to demonstrate a superior agent to control perioperative shivering
- Ketamine has received increasing attention as possible pharmacological means to prevent perioperative shivering.

Objective

- This scoping review aims to evaluate the efficacy of ketamine in mitigating the incidence of shivering in patients undergoing spinal anesthesia.
- The effects of ketamine on hemodynamics were also examined as a secondary objective.

Methods

- *Information Sources:* The medical databases used for ascertaining data included PubMed, JAMA, and Cochrane.
- *Search Terms:* Using search terms “ketamine” AND “shivering” AND “spinal”, “ketamine shivering spinal”, “ketamine” AND “hypothermia” AND “spinal”, and “ketamine shivering”, a total of 104 articles were collected, 52 from PubMed, 4 from JAMA, and 48 from Cochrane. 13 articles were used in this review after filtering for duplicates and inclusion criteria.
- *Data Extraction:* Studies published during the years 2018 to 2023 were used for data gathering. From the collected literature, results, conclusions, and methodology were extracted.

Results

- In ketamine versus control, three out of five studies found ketamine to be more effective ($p<0.05$, $p<0.001$, $p<0.001$) in the prevention of shivering than saline control **(Table 1)**.[1,2,3]
- When compared with tramadol, two studies found ketamine to be more effective ($p<0.001$, $p<0.001$),[4,5] one found no difference ($p=0.261$),[6] and one found tramadol to be more effective ($p<0.001$).[7]
- Two studies found dexmedetomidine more effective ($p<0.022$, $p<0.027$)[8,9] than ketamine and tramadol.
- When comparing ketamine, ondansetron, and pethidine, all three were effective ($p<0.001$) versus saline, with no significant difference between the three.[10]
- Meperidine demonstrated more efficacy ($p<0.05$) in reducing the intensity of shivering than ketamine.[11]
- Ketamine's effects on hemodynamics were shown to be equivocal or more favorable across several studies.[1,6,10,12,13]

Ketamine Versus Saline							
First Author	**Administration**	**N, Saline**	**N, Ketamine**	**Dose Ketamine**	**Shivering Saline**	**Shivering Ketamine**	**P Value**
Sarshivi	IV	45	45	0.3 mg/kg bolus	24 (53.3%)	15 (33.3%)	0.08
Xue*	Epidural	30	30	0.5 mg/kg bolus	10 (33.3%)	2 (6.67%)	< 0.05
Aboelsed	IV	63	63	0.3 mg/kg bolus 0.1 mg/kg*hr infusion	22 (38.1%)	5 (7.94%)	< 0.01
Adhikari	IV	40	40	0.25 mg/kg bolus	8 (20%)	5 (12 %)	0.36
Thangavelu**	IV	31	29	0.2 mg/kg bolus 0.1 mg/kg*hr infusion	18 (58.06%)	4 (13.79%)	< 0.01

*At 30-minute mark
**Ketamine group continued to have statistically significant ($P<0.01$) shivering prevention postoperatively

Table 1. Ketamine compared to saline in reduction of postoperative shivering.

Discussion

- Ketamine consistently demonstrates efficacy in the prevention of perioperative shivering, but has not proven itself a superior agent.
- When choosing an agent patient population, comorbidities, and procedure being performed should be considered to mitigate risks.
- One advantage of ketamine is that it shows no detrimental effects to the fetus when used in spinal anesthesia for cesarean section.[5]
- Other studies suggested that ketamine in combination with tramadol may be superior,[14]or that it may be effective in treating shivering opposed to prevention.[15]

Conclusion

- Ketamine is one of several drugs that may be beneficial in the prevention of perioperative shivering.
- While there is mixed evidence on whether it is better than other treatments, ketamine may have advantages from a hemodynamics standpoint.
- Doctors should be cautious when prescribing it to patients who might be prone to delirium due to its association with hallucinations.
- Overall, ketamine is a safe and effective drug for the prevention of perioperative shivering.

References

References