



ACUTE PAIN MANAGMENT IN ED: KETAMINE VS MORPHINE FOR MUSCULOSKELETAL TRAUMA

A Systematic Review and Meta-Analysis

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BACKGROUND

- Nebulized Ketamine is emerging as a viable substitute for morphine in acute pain management..
- Previous studies indicate similar biochemical safety profiles for ketamine and morphine.
- No comprehensive evaluation comparing efficacy and adverse effects in emergency settings.
- This meta-analysis assesses pain relief and adverse outcomes of nebulized ketamine vs. morphine in emergency departments.

METHODS

- Systematic search: PubMed, EMBASE, and Cochrane Database were searched for RCTs and controlled observational studies comparing nebulized ketamine and morphine in acute pain management.
- Outcomes assessed: Pain relief (e.g., pain score changes) and adverse events (e.g., dizziness, nausea, vomiting).
- Statistical analysis: Standardized mean difference (SMD) and risk ratio (RR) were calculated using a random-effects model, with heterogeneity assessed by the I² statistic. Analyses were conducted in R.

RESULTS

- Pain reduction: At 90 minutes, morphine showed a slightly greater decrease in pain scores (SMD = 0.23, 95% CI: -0.04 to 0.49).
- Dizziness risk: 38% higher with ketamine (RR = 1.38, 95% CI: 1.06 to 1.79, p < 0.05).
- Nausea and vomiting: No significant difference between ketamine and morphine (RR = 0.86, 95% CI: 0.64 to 1.17, p > 0.05).

Patients undergoing acute pain management with nebulized ketamine or morphine in the emergency department.

Study	Design	Country	Blinding	Groups	(M/F)	Mean age
Tongbua, 2022	RCT	Thailand	Double-blind	Ketamine Morphine	8/29 // 8/29	74.1 // 72.7
Shimonovich, 2016	RCT	United Kingdom.	Double-blind	Ketamine Morphine	17/7 // 18/6	37.9 // 42.9
Cornec, 2024	RCT	France	single-blind	Ketamine Morphine	67/59 // 69/52	50 // 52
Kampan, 2024	RCT	Thailand	Double-blind	Ketamine Morphine	12/34 // 14/32	73.5 // 73.5
Esfahani, 2021	RCT	Iran	Double-blind	Ketamine Morphine	30/6 // 29/8	32.5 // 33.4
Eddie, 2024	RCT	Malaysia	single-blinded,	Ketamine Morphine	28/3 // 24/3	NA
Jahanian, 2018	RCT	Iran	Double-blind	Ketamine Morphine	56/22 // 55/23	35.87 // 36.38
Miller, 2015	RCT	United States	Double-blind	Ketamine Morphine	14/10 // 9/12	29 // 31
Motov, 2015	RCT	United States	Double-blind	Ketamine Morphine	15/30 // 17/28	35 // 36
Azizkhani, 2019	RCT	Iran	Double-blind	Ketamine Morphine	37/7 // 38/6	36.11// 31.60
Mahshidfar 2017	RCT	Iran	Double-blind	Ketamine Morphine	126/24 // 123/27	34.4 // 34.1

Table 1 - Characteristics of studies comparing Ketamine (left side) and Morphine (right side) in randomized controlled trials (RCTs). It includes the study author and year, study design, country, blinding type, groups, male/female distribution (M/F), and the mean age of participants for each treatment group. The Ketamine group is always presented on the left, and the Morphine group is on the right.

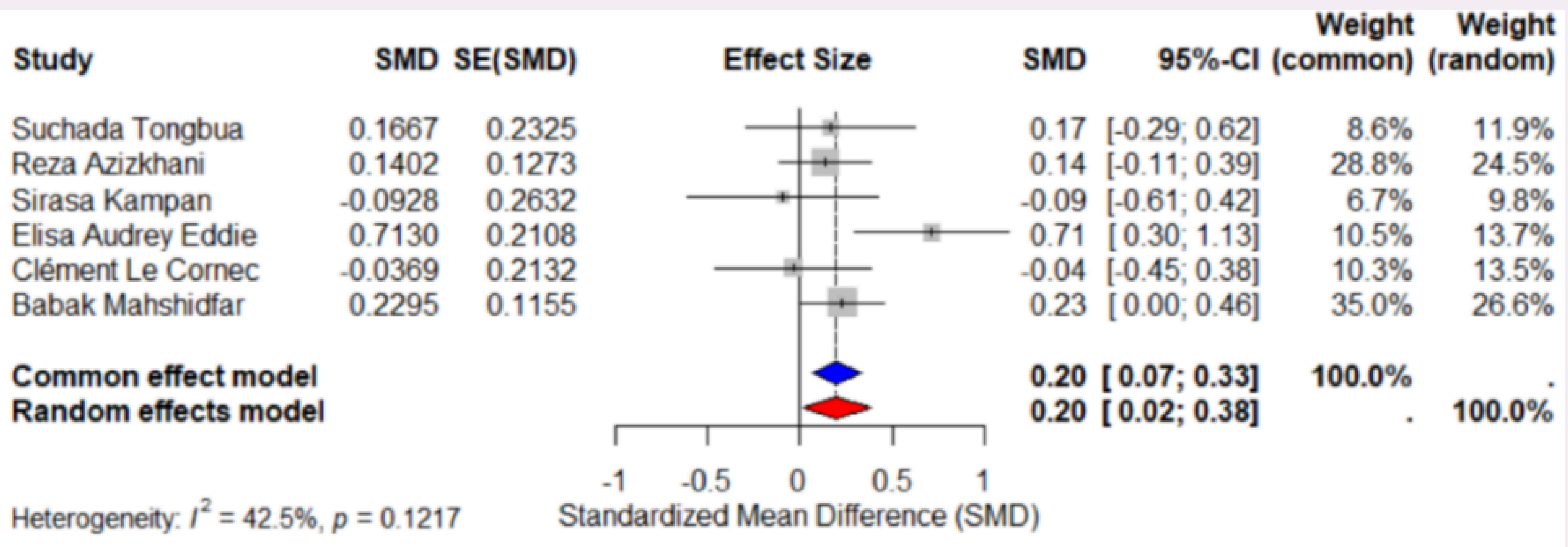
CONCLUSION

- Efficacy comparison: Morphine slightly reduced pain at 90 minutes, but the difference was not significant.
- Adverse effects: Ketamine had a higher risk of dizziness, while nausea and vomiting were similar between groups.
- Clinical implications: Both options are viable, with selection based on patient tolerance and side effect profiles.

DISCUSSION

Nebulized ketamine and morphine offer similar pain relief for musculoskeletal trauma, with morphine showing a slight, non-significant advantage at 90 minutes. Ketamine increased dizziness risk, while nausea/vomiting rates were similar. With low heterogeneity, results are consistent. Both drugs are viable; choice depends on patient tolerance and side effect profile.

SMD with 95% confidence intervals for pain reduction in 30 minutes comparing Ketamine and Morphine.



SMD with 95% confidence intervals for pain reduction in 90 minutes comparing Ketamine and Morphine.

