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ORIGINAL ARTICLE

Perioperative intravenous lidocaine infusion for reduction of chronic postsurgical pain: A systematic review and meta-analysis.

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ABSTRACT… Objective: To assess perioperative intravenous lidocaine's effectiveness in reducing chronic and acute postoperative pain, opioid use, and adverse events versus control. **Study Design:** Systematic review and meta-analysis. **Setting:** Department of Anesthesiology and Perioperative Medicine, through a systematic review of RCTs identified from PubMed, Cochrane CENTRAL, and Web of Science. **Period:** Jan 2015 to 2026. **Methods:** Studies published between January 2015 and May 07, 2026 that met the inclusion criteria were included. A total of 16 studies were included in the final analysis. Data analysis was conducted using RevMan 5.4. **Results:** Perioperative intravenous lidocaine significantly reduced chronic postsurgical pain at ≥3 months compared with control (RR = 0.33, 95% CI: 0.18–0.60, p = 0.0003; I^2 = 0%). Acute postoperative pain at 24 hours was also significantly reduced (MD = -0.69, 95% CI: -1.26 to -0.12, p = 0.02; I^2 = 61%), with greater benefit in studies using Visual Analog Scale outcomes (MD = -0.96, 95% CI: -1.31 to -0.62, p < 0.00001). No significant reduction in opioid consumption was observed (MD = -1.06, 95% CI: -2.46 to 0.35, p = 0.14; I^2 = 97%). No significant increase in cardiovascular or neurological adverse events was found (RR = 0.55, 95% CI: 0.21–1.43, p = 0.22). **Conclusion:** Perioperative intravenous lidocaine significantly reduces chronic postsurgical pain and improves early postoperative analgesia without increasing adverse events, supporting its role in multimodal perioperative pain management.

Key words: Chronic Postsurgical Pain, Intravenous Lidocaine, Multimodal Analgesia, Opioid Consumption, Perioperative Analgesia, Postoperative Pain.

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INTRODUCTION

Chronic postsurgical pain (CPSP) is a major and frequently under-recognized complication after surgical procedures. The median incidence of chronic pain at 6–12 months following surgery is 20–30%, with a slight decline over time among patients depending on the type of surgery and individual patient-related risk factors.[1] CPSP is defined as pain persisting beyond three months after surgery that cannot be explained by other causes such as infection or malignancy. It imposes a substantial burden on patients' quality of life and healthcare systems, contributing to long-term disability, psychological distress, and increased healthcare utilization.[2] Recent advancements in perioperative care have emphasized multimodal analgesia strategies to minimize acute pain and prevent the transition to chronic pain states.[3,4]

Among these strategies, perioperative intravenous lidocaine infusion has emerged as a promising adjunct due to its analgesic, anti-inflammatory, and antihyperalgesic properties. Lidocaine, a widely used amide local anesthetic, exerts systemic effects when administered intravenously, including sodium channel blockade, modulation of N-methyl-D-aspartate (NMDA) receptors, and suppression of inflammatory cytokines. These mechanisms contribute to reduced peripheral and central sensitization, which are key drivers in the development of chronic pain.[5]

Over the past decade, numerous randomized controlled trials (RCTs) and systematic reviews have evaluated the role of intravenous lidocaine in perioperative settings. Evidence suggests that lidocaine infusion can reduce acute postoperative pain, opioid consumption, and recovery time, particularly in abdominal and laparoscopic surgeries.[6]

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Its opioid-sparing effect is particularly relevant in the context of the global opioid crisis, where minimizing opioid exposure is a key clinical priority.

However, the role of intravenous lidocaine in preventing CPSP remains controversial. Some studies have reported a reduction in the incidence of chronic pain following surgery, suggesting a potential long-term benefit of perioperative lidocaine administration.[7,8] For example, subgroup analyses in earlier systematic reviews indicated a reduced risk of persistent pain at six months after breast surgery. Conversely, more recent high-quality meta-analyses have demonstrated inconsistent or negligible effects on CPSP, particularly in specific surgical populations such as breast cancer surgery patients.[9]

This inconsistency may be attributed to heterogeneity in study designs, variations in lidocaine dosing regimens, duration of infusion, surgical procedures, and outcome measurements. Furthermore, the complex pathophysiology of CPSP encompassing peripheral nerve injury, central sensitization, and psychosocial factors suggests that a single pharmacological intervention may not be universally effective.[10]

Despite these uncertainties, intravenous lidocaine remains an attractive intervention due to its low cost, favorable safety profile, and multiple mechanisms of action. Emerging evidence from recent trials and systematic reviews (2020–2026) continues to refine our understanding of its efficacy and optimal use. For instance, ongoing and recent studies highlight its role in reducing opioid requirements and improving early postoperative outcomes, while also exploring its long-term effects on chronic pain development.[11]

Given the growing body of literature and conflicting findings, there is a need for an updated systematic review and meta-analysis that synthesizes the latest evidence regarding the effectiveness of perioperative intravenous lidocaine infusion in reducing CPSP. Such an analysis will help clarify its role in clinical practice, identify patient populations that may benefit most, and inform future research directions.

OBJECTIVES

The objective of this systematic review and meta-analysis was to evaluate the effectiveness of perioperative intravenous lidocaine infusion in reducing chronic postsurgical pain (≥3 months) compared with placebo or standard care, and to assess its effects on acute postoperative pain, opioid consumption, recovery outcomes, and adverse events. Additionally, subgroup analyses were performed based on type of surgery, lidocaine regimen, and outcome measures.

METHODS

Study Design

This study was conducted as a systematic review and meta-analysis in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A predefined protocol guided all stages of the review process, including literature search, study selection, data extraction, and statistical analysis to ensure transparency, reproducibility, and methodological rigor.

Data Sources and Search Strategy

A comprehensive literature search was performed across major electronic databases, including PubMed/MEDLINE, Cochrane CENTRAL, and Web of Science, to identify all relevant studies evaluating perioperative intravenous lidocaine infusion. The search included studies published between January 2015 and May 07, 2026. The final search was conducted on 07 May 2026.

A combination of Medical Subject Headings (MeSH) terms and free-text keywords was used: "Lidocaine" OR intravenous lidocaine OR lidocaine infusion OR lignocaine AND "perioperative" OR intraoperative OR postoperative AND "chronic postsurgical pain" OR persistent postoperative pain OR CPSP OR PPSP OR chronic pain. Boolean operators (AND, OR) were applied to refine the search strategy and ensure comprehensive retrieval of relevant studies. In addition, reference lists of included studies and relevant reviews were manually screened to identify any additional eligible publications.

Eligibility Criteria

Inclusion Criteria

- Randomized controlled trials (RCTs)
- Adult patients (≥18 years) undergoing surgical procedures
- Studies comparing intravenous lidocaine infusion with placebo, standard care, or alternative analgesic strategies
- Studies reporting at least one of the following outcomes:
  - Chronic postsurgical pain (≥3 months follow-up)
  - Acute postoperative pain scores (24–72 hours)
  - Opioid consumption
  - Recovery outcomes
  - Adverse events
- Articles published in the English language between 2015 and 2026

Exclusion Criteria

- Non-randomized studies, observational designs, case reports, and reviews
- Pediatric or animal studies
- Studies without extractable quantitative outcome data
- Protocol-only publications without reported outcomes

Study Selection

All identified records were imported into a reference management system, and duplicates were removed. Two independent reviewers screened studies in three sequential stages: title screening, abstract screening, and full-text assessment. Any disagreements regarding study inclusion were resolved through discussion or consultation with a third reviewer.

Data Extraction

Data extraction was performed independently using a standardized and pre-piloted data extraction form to ensure consistency and reduce reporting bias. The extracted information included study characteristics such as author, year, and country, along with sample size for intervention and control groups. In addition, participant demographic details such as age were recorded where available. Key clinical variables were also extracted, including type of surgical procedure, lidocaine administration protocol (bolus dose, infusion rate, or alternative formulations), and comparator interventions such as placebo or standard care. Outcome data were collected for chronic postsurgical pain incidence, acute postoperative pain scores measured using VAS or NRS, opioid consumption, recovery-related outcomes, and adverse events including cardiovascular, neurological, and postoperative nausea and vomiting. Any discrepancies in extracted data between reviewers were resolved through discussion and consensus.

Risk of Bias Assessment

The methodological quality of the included randomized controlled trials was assessed using the Cochrane Risk of Bias 2.0 (RoB 2) tool. Each study was evaluated across key domains including random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, completeness of outcome data, and selective outcome reporting. Based on these domains, each study was classified as having low risk of bias, some concerns, or high risk of bias.

Data Synthesis and Statistical Analysis

Statistical analysis was conducted using RevMan 5.4 software. Dichotomous outcomes, including incidence of chronic postsurgical pain and adverse events, were expressed as risk ratios (RR) with 95% confidence intervals (CI), while continuous outcomes such as pain scores, opioid consumption, and recovery outcomes were expressed as mean differences (MD) with 95% CI. Given the expected clinical and methodological heterogeneity across studies, a random-effects model was applied for all meta-analyses to provide more conservative pooled estimates. Statistical heterogeneity was assessed using the Chi-square test and quantified with the I^2 statistic, with higher values indicating greater variability between studies. Subgroup analyses were conducted based on outcome type, including cardiovascular and neurological adverse events versus postoperative nausea and vomiting, as well as pain measurement scales such as VAS and NRS. Sensitivity analyses were considered to assess the robustness of findings by evaluating the influence of individual studies on overall results. Publication bias was planned to be assessed using funnel plots;

however, this was limited by the number of studies available for certain outcomes.

RESULTS

A total of 2,432 records were identified from database searching: PubMed (903), Cochrane CENTRAL (874), and Web of Science (655). After removal of duplicates (340), 2,092 records remained for screening. During title and abstract screening, 1,870 records were excluded, leaving 222 reports for retrieval. From these, records were excluded due to wrong study design (58), wrong outcome (31), and wrong intervention (24). A total of 109 full-text articles were assessed for eligibility. Of these, 72 studies were excluded due to no CPSP outcome, 11 due to non-surgical or pediatric populations, and 10 due to protocol-only design. Finally, 16[12–27] studies were included.

FIGURE-1

PRISMA flow diagram of study selection

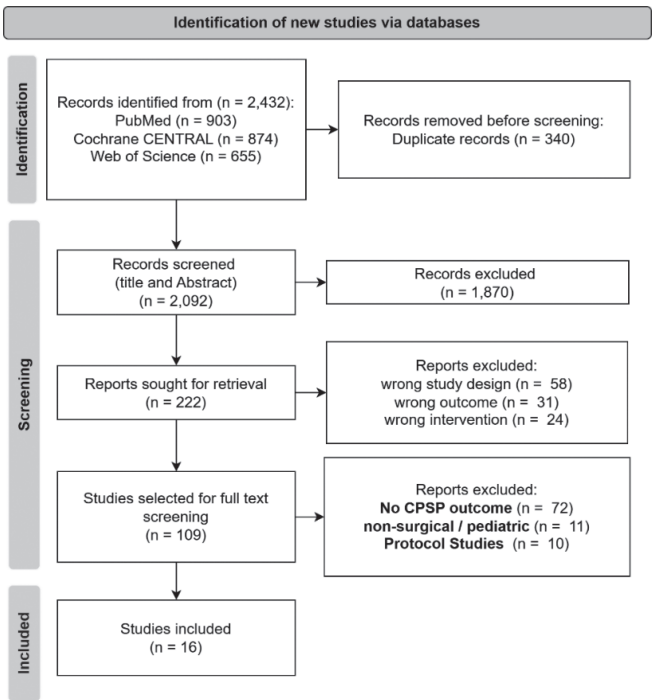


TABLE-I summarizes the characteristics of the 16 studies were included in the systematic review and meta-analysis evaluating perioperative intravenous lidocaine infusion across different surgical populations. The studies were conducted across multiple countries including Greece, India, Iran, Egypt, South Korea, Switzerland, USA, Tunisia, and Nepal. Sample sizes ranged from small pilot studies to larger randomized controlled trials, with intervention groups varying between 16 and 50 patients and control groups of similar size.

The included studies comprised a range of surgical procedures, including gynecological, abdominal, breast, hernia, spinal, thoracic, head and neck, and oral and maxillofacial surgeries. Lidocaine administration protocols varied, including intravenous bolus and continuous infusion regimens, as well as local or transdermal formulations in selected studies. Control groups primarily received placebo or standard anesthetic care, including opioid-based or multimodal analgesia regimens.

Follow-up duration varied substantially across studies, ranging from 24 hours to 6 months, with most chronic pain outcomes assessed at 3 to 6 months postoperatively. This variation in study design, surgical type, lidocaine dosing, and follow-up duration contributed to methodological heterogeneity across the included evidence base.

FIGURE-2 presents a meta-analysis of four randomized controlled trials evaluating the effect of perioperative intravenous lidocaine infusion on the incidence of chronic postsurgical pain (≥3 months). A total of 120 patients in the lidocaine group and 115 patients in the control group were included across the studies. The pooled analysis demonstrated a statistically significant reduction in the risk of chronic postsurgical pain in patients receiving intravenous lidocaine compared with control (RR = 0.33, 95% CI: 0.18–0.60, Z = 3.58, p = 0.0003). Individual study estimates consistently favored lidocaine, with the strongest effect observed in Jendoubi et al. 2017 and Rekatsina et al. 2022. There was no observed statistical heterogeneity among studies ($Tau^2 = 0.00$; $Chi^2 = 2.41$, df = 3, p = 0.49; $I^2 = 0\%$), indicating high consistency across included trials.

FIGURE-3 presents a subgroup meta-analysis of five randomized controlled trials evaluating the effect of perioperative intravenous lidocaine infusion on acute postoperative pain scores at 24 hours, measured using Visual Analog Scale (VAS) and Numerical Rating Scale (NRS). In the VAS subgroup, three studies demonstrated a statistically

TABLE-I

Characteristics of included studies evaluating perioperative intravenous lidocaine infusion for chronic postsurgical pain

Author's	Country	Sample Size (I/C)	Age Mean ± SD (I/C)	Type of surgery	Lidocaine Dose	Control treatment	Follow-up
Rekatsina et al. 2022	Greece	25/25	48.48 ± 10.89/ 50.16 ± 10.14	Gynecological	1.5 mg/kg bolus + 1–1.5 mg/kg/h infusion	0.9% normal saline (placebo)	3 months
Akhtar et al. 2025	India	50/50	55.3 ± 10.2/ 54.8 ± 9.8	Hernia	1% lidocaine + 0.5% bupivacaine infiltration	General anesthesia	3 months
Saadat Fakhr et al. 2024	Iran	29/29	46.8±13.1/ 48.1±13.4	Abdominal	2% IV lidocaine	IV ketorolac 30 mg + Nasocalcin spray	24 hours
Sorouri et al. 2020	Iran	20/20	47.95 ± 3.44/ 48.20 ± 6.55	Gynecological	0.8% lidocaine + epinephrine (50 mL)	50 mL 0.9% normal saline	24 hours
Ramakrishna 2021	India	50/50	45.2 ± 12.3/ 44.8 ± 11.9	Abdominal	1.5 mg/kg bolus + 1–1.5 mg/kg/h infusion	Dexmedetomidine + opioid (fentanyl)	24 hours
Koo et al. 2026	South Korea	16/16	67.1 ± 8.2/ 64.2 ± 7.4	Hernia	5% lidocaine patch (700 mg/12 h)	Placebo	1 week
Rekatsina M et al. 2021	Greece	29/26	47.79 ± 10.40/ 49.77 ± 10.13	Gynecological	1.5 mg/kg bolus + 1–1.5 mg/kg/h infusion	Normal saline (NaCl 0.9%)	24 hours
Hadavi et al. 2026	Iran	45/45	70.32 ± 13.79/ 67.08 ± 14.74	Breast	2 mg/kg IV bolus + 1.5 mg/kg/hour infusion	Normal saline (placebo)	24 hours
Ghoneim et al. 2024	Egypt	15/15	55.7 ± 7.6/ 56.0 ± 6.8	Abdominal	1.5 mg/kg bolus + 2 mg/ kg/h infusion	0.9% normal saline (matched volume)	4 days
Awal et al. 2022	India	23/27	28.22 ± 4.59/ 29.59 ± 4.49	Gynecological	1.5 mg/kg bolus + 2 mg/ kg/h infusion	Normal saline infusion	24 hours
Mahato et al. 2024	Nepal	20/20	25.55 ± 5.52/ 29.30 ± 11.87	Oral and Maxillofacial	1.5 mg/kg bolus + 2 mg/ kg/h infusion	0.9% Normal saline infusion	24 hours
Hojski et al. 2024	Switzerland	28/24	52.71 ± 18.50/ 57.54 ± 17.93	Thoracic	2 mg/kg bolus + 1.5 mg/ kg/h infusion	Placebo	6 months
Ibrahim et al. 2018	Egypt	20/20	41.20 ± 7.60/ 42.50 ± 5.20	Spinal	2 mg/kg bolus + 3 mg/ kg/h infusion	0.9% normal saline (equal volume)	3 months
Terkawi AS et al. 2015	USA	34/27	55.0 ± 13.7/ 55.2 ± 10.9	Breast	1.5 mg/kg bolus + 2 mg/ kg/h infusion	0.9% normal saline (placebo infusion)	6 months
Choi et al. 2017	Korea	41/43	34.0 ± 7.3/ 34.4 ± 8.4	Head and neck	2 mg/kg bolus + 3 mg/ kg/h infusion	Equivalent volume of 0.9% normal saline	3 months
Jendoubi et al. 2017	Tunisia	20/20	47.6 ± 12.5/ 48.3 ± 13.5	Abdominal	1.5 mg/kg bolus + 1 mg/ kg/h infusion	Normal saline 0.9%	3 months

significant reduction in pain scores in the lidocaine group compared with control (pooled MD = -0.96, 95% CI: -1.31 to -0.62, Z = 5.46, $p < 0.00001$), with no observed heterogeneity ($I^2 = 0\%$).

In the NRS subgroup, two studies showed no statistically significant difference between groups (pooled MD = 0.07, 95% CI: -1.36 to 1.50, Z = 0.10, p = 0.92), with substantial heterogeneity observed ($I^2 = 68\%$). Overall pooled analysis across all studies demonstrated a significant reduction in acute postoperative pain in the lidocaine group compared with control (MD = -0.69, 95% CI: -1.26 to -0.12, Z = 2.36, p = 0.02), with moderate heterogeneity ($I^2 = 61\%$). Subgroup differences were not statistically significant ($Chi^2 = 1.89$, p = 0.17).

FIGURE-4 presents a meta-analysis of seven studies evaluating the effect of perioperative intravenous lidocaine infusion on postoperative opioid consumption within 24 hours. A total of 212 patients in the lidocaine group and 205 patients in the control group were included. The pooled analysis showed no statistically significant difference in opioid consumption between the lidocaine and control groups (MD = -1.06, 95% CI: -2.46 to 0.35,

Z = 1.48, p = 0.14). Individual study results were highly variable, with some studies demonstrating significant opioid-sparing effects of lidocaine, while others showed no significant difference or opposite direction of effect. There was substantial heterogeneity among studies (Tau^2 = 3.46; Chi^2 = 216.13, df = 6, p < 0.00001; I^2 = 97%), indicating high variability in opioid measurement scales, surgical types, and analgesic protocols across included trials.

Figure-5 presents a subgroup meta-analysis of adverse events associated with perioperative intravenous lidocaine infusion compared with control. The analysis includes two predefined subgroups: cardiovascular and neurological adverse events, and postoperative nausea, vomiting, and PONV. In the cardiovascular and neurological subgroup, four studies showed no statistically significant increase in adverse events with lidocaine compared with control (RR = 2.40, 95% CI: 0.57–10.08, Z = 1.19, p = 0.23), with no heterogeneity observed (I^2 = 0%).

In the PONV subgroup, seven studies demonstrated a non-significant reduction in postoperative nausea, vomiting, and related outcomes in the lidocaine group compared with control (RR = 0.30, 95% CI: 0.09–1.02, Z = 1.93, p = 0.05). However, substantial heterogeneity was observed (I^2 = 72%). Overall pooled analysis across both subgroups showed no statistically significant difference in total adverse events between groups (RR = 0.55, 95% CI: 0.21–1.43, Z = 1.23, p = 0.22), with moderate heterogeneity (I^2 = 59%). A statistically significant subgroup difference was observed between cardiovascular/neurological outcomes and PONV outcomes (Chi^2 = 4.68, p = 0.03).

FIGURE-2

Forest Plot Showing the Effect of Perioperative Intravenous Lidocaine Infusion on Incidence of Chronic Postsurgical Pain (≥3 Months)

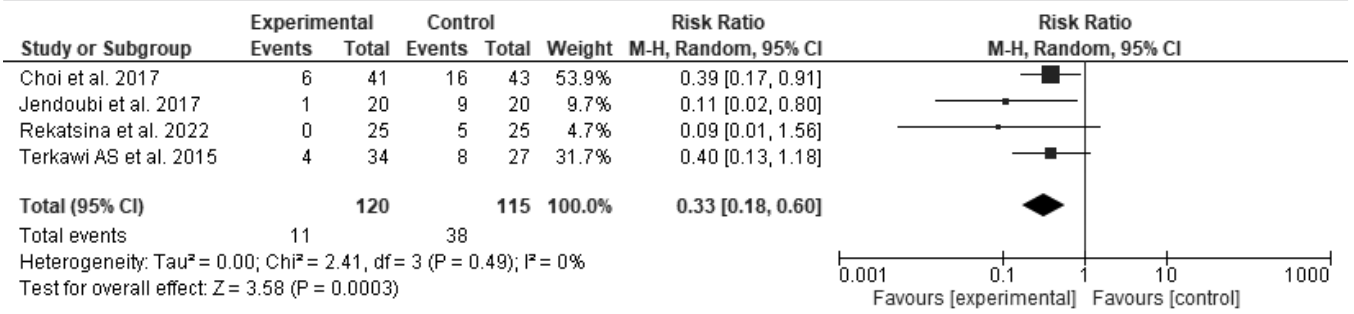


FIGURE-3

Forest plot comparing perioperative intravenous lidocaine vs control on acute postoperative pain scores (24 Hours)

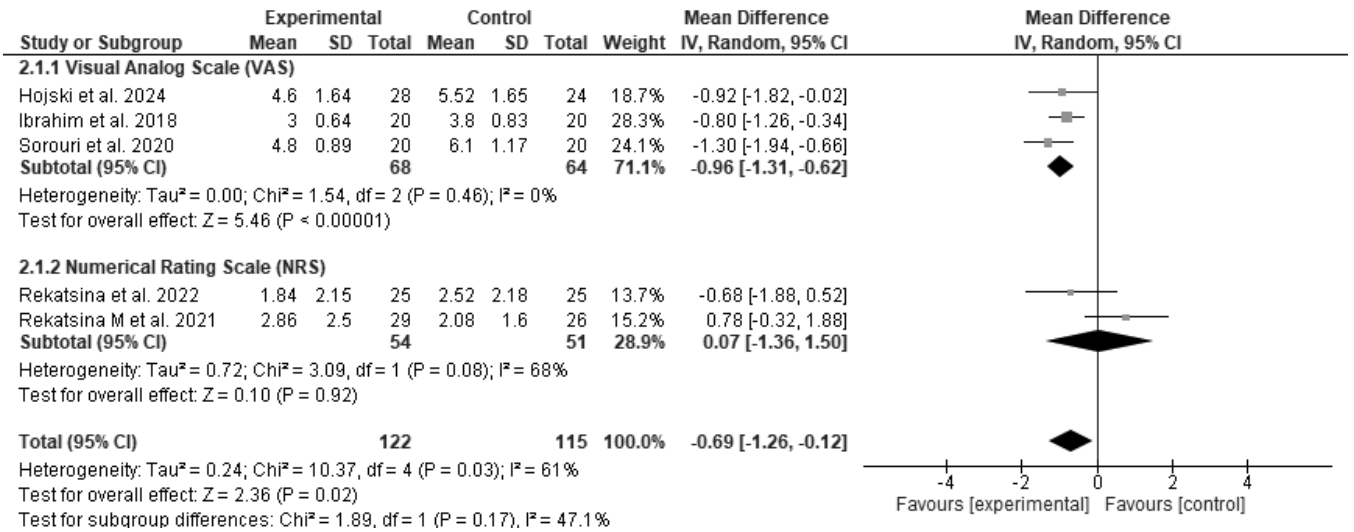


FIGURE-4

Forest Plot showing the effect of perioperative intravenous lidocaine on postoperative opioid consumption (24 Hours)

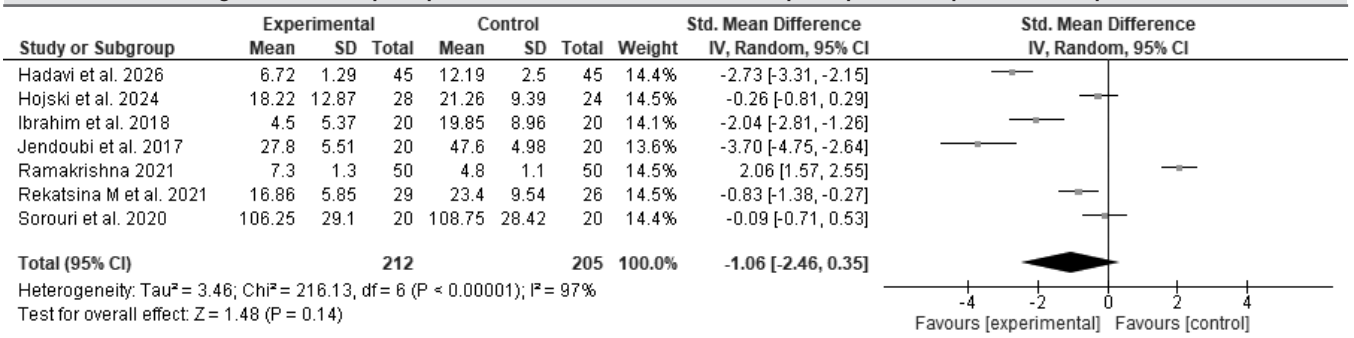


FIGURE-5

Forest plot of adverse events associated with perioperative intravenous lidocaine infusion, with subgroup analysis for cardiovascular/neurological events and postoperative nausea and vomiting (PONV)

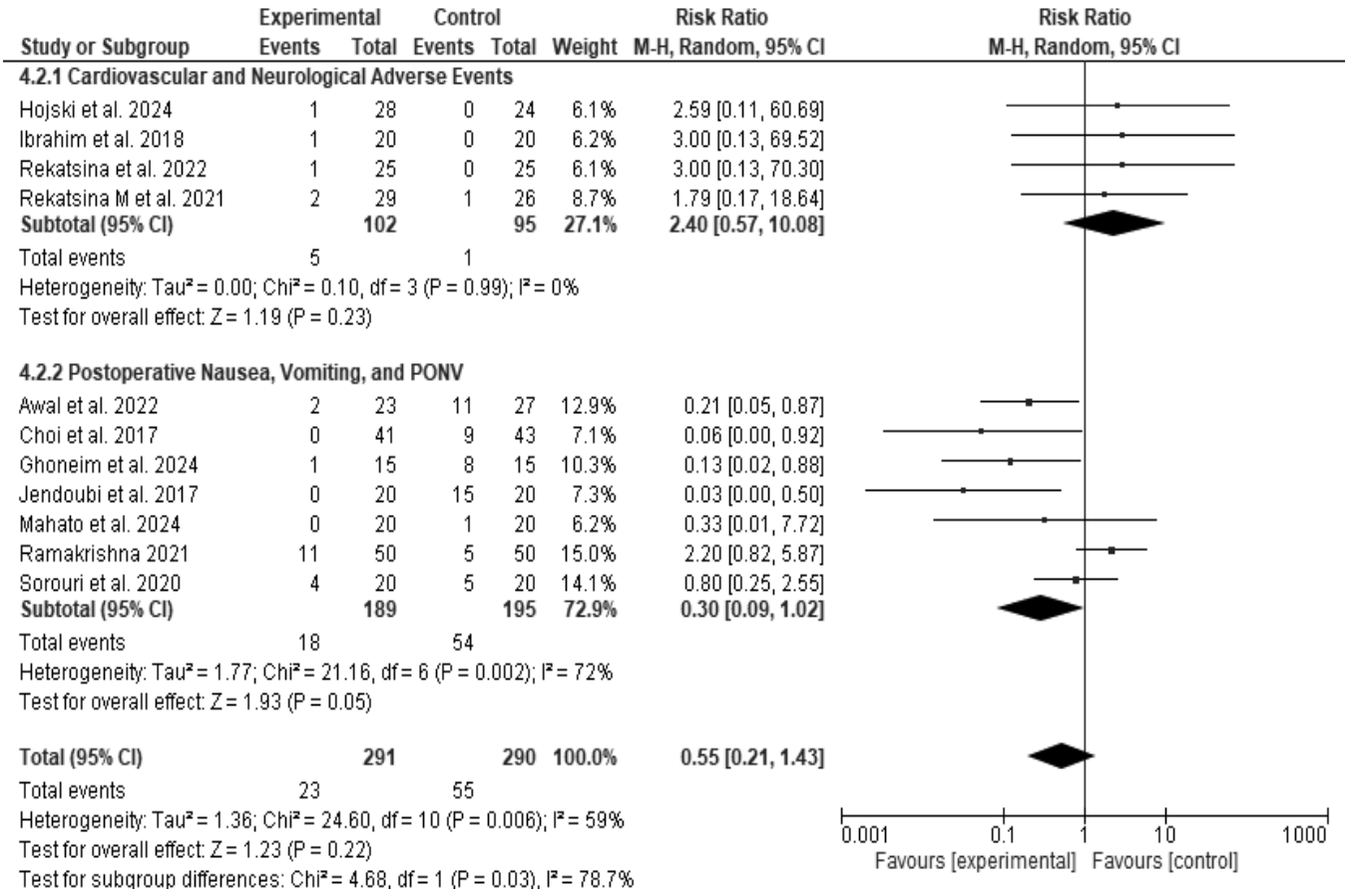
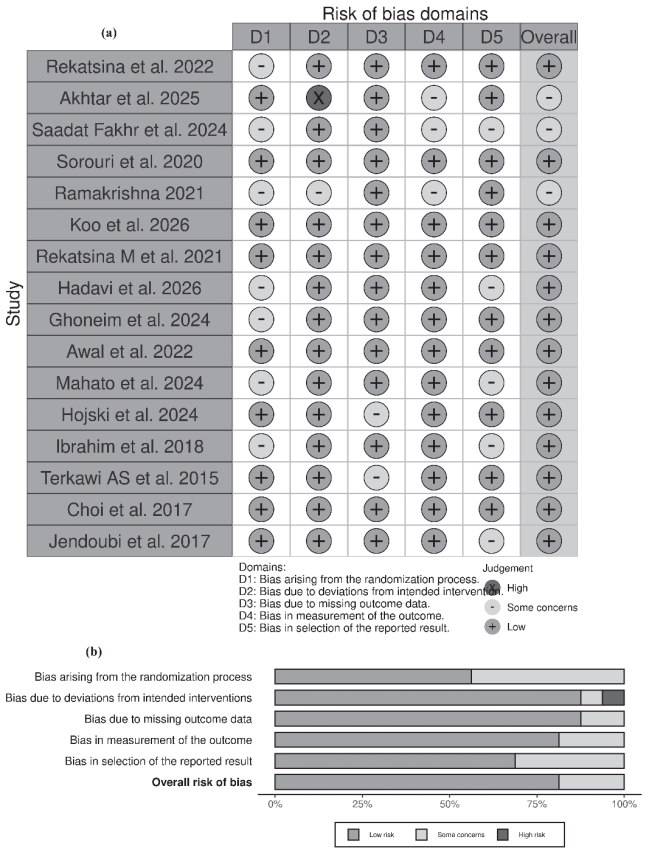


Figure-6 presents the risk of bias assessment for 16 RCTs using the Cochrane Risk of Bias 2.0 tool. Panel (a) displays individual study judgments across five domains. The majority of studies demonstrated low risk of bias in domains D2 (94% low risk), D3 (87.5% low risk), and D4 (81.25% low risk), reflecting adequate blinding, minimal attrition, and standardized outcome assessment. Overall, twelve studies (75%) were classified as having low risk of bias, three studies (18.75%) raised some concerns, and one study (6.25%) was judged to be at high risk due to an open-label design, indicating that the overall methodological quality of the included evidence was moderate to good with most concerns related to reporting transparency rather than fundamental design flaws.

FIGURE-6

Risk of bias assessment of included RCTs using the cochrane risk of Bias 2.0 Tool



DISCUSSION

The present systematic review and meta-analysis demonstrated that perioperative intravenous lidocaine infusion significantly reduced the incidence of chronic postsurgical pain (CPSP) at ≥3 months after surgery. The pooled analysis showed an approximately 67% relative reduction in chronic pain risk among patients receiving lidocaine compared with placebo or standard care, with no significant statistical heterogeneity observed across studies. These findings suggest a consistent beneficial effect of lidocaine despite variations in surgical procedures and patient populations. The reduction in CPSP may be explained by lidocaine's antihyperalgesic and anti-inflammatory properties, which are thought to attenuate peripheral nociceptive signaling, suppress central sensitization, and reduce the transition from acute to chronic pain. The strongest benefits were observed in abdominal and gynecological surgeries, where tissue injury and inflammatory responses are typically more pronounced. Overall, perioperative lidocaine appears to be a promising adjunct within multimodal analgesia protocols for improving long-term postoperative pain outcomes.

These findings are consistent with previous evidence evaluating perioperative lidocaine for chronic pain prevention. The systematic review by Bharat G. Makwana reported a significant reduction in CPSP incidence following perioperative lidocaine infusion, particularly in abdominal and breast surgeries, while also demonstrating reductions in early postoperative pain and opioid use.[28] Similarly, Jia Li et al. found that perioperative intravenous lidocaine significantly reduced both acute postoperative pain and CPSP in patients undergoing breast surgery, with additional reductions in opioid consumption and hospital stay duration.[29] Mechanistically, the observed reduction in acute pain scores in our VAS subgroup is further supported by the review conducted by Xi Yang et al., which demonstrated that intravenous lidocaine exerts central analgesic effects through modulation of the central nervous system, inhibition of ectopic neuronal discharge, and attenuation of central sensitization associated with postoperative nociceptive transmission.[30]

Additionally, the molecular and colleagues emphasized that lidocaine possesses anti-inflammatory and antinociceptive effects beyond sodium channel inhibition, including suppression of toll-like receptor (TLR) and nuclear factor kappa-β (NF-kβ) signaling pathways and reduction of inflammatory mediators such as TNF-α and HMGB1. These anti-inflammatory actions may explain the improved postoperative pain control observed in our analysis.[31] However, similar to Zhang et al., our NRS subgroup analysis demonstrated inconsistent findings and substantial heterogeneity, likely related to differences in pain assessment methods, surgical populations, dosing regimens, and perioperative analgesic protocols. Collectively, these findings strengthen the evidence that perioperative intravenous lidocaine improves early postoperative analgesia through both central neural modulation and anti-inflammatory mechanisms, although greater standardization of outcome measures and infusion protocols is required in future trials.

Despite clear benefits in CPSP and acute pain outcomes, perioperative lidocaine did not significantly reduce opioid consumption within 24 hours. Although several trials showed opioid-sparing effects, the pooled analysis was limited by substantial heterogeneity. Differences in opioid protocols, conversion methods, rescue analgesia strategies, and multimodal analgesic use likely contributed to inconsistent results. Nevertheless, trends toward reduced opioid use remain clinically relevant in the context of opioid-related adverse effects and enhanced recovery pathways.

These findings are partially consistent with prior studies. A study reported reduced opioid consumption with lidocaine infusion in colorectal surgery[32], while another study observed lower nalbuphine requirements in ambulatory surgery.[33] Similarly, other studies demonstrated reduced opioid use within 24–48 hours after spinal surgery[34], whereas additional research reported a moderate opioid-sparing effect in ambulatory patients.[35] In contrast, one study found no significant reduction in opioid use within enhanced recovery pathways[36], while another reported that the association was no longer significant after statistical adjustment in bariatric surgery.[37] Overall, variability in surgical populations and analgesic protocols likely explains these inconsistencies, although lidocaine may still offer opioid-sparing benefits in selected settings.

Safety analysis confirmed that perioperative intravenous lidocaine is well tolerated, with no significant increase in overall adverse events compared with controls. Cardiovascular and neurological complications were rare. A trend toward reduced postoperative nausea and vomiting (PONV) was also observed, likely related to improved analgesia and reduced opioid exposure, although heterogeneity existed across studies. Overall, the findings support a favorable safety profile and feasibility of lidocaine as part of multimodal analgesia. The safety findings of the present meta-analysis are consistent with previous evidence supporting the favorable safety profile of perioperative intravenous lidocaine infusion when administered with appropriate dosing and monitoring protocols. Similar to our findings, a systematic review reported that lidocaine-related adverse events were infrequent, with only isolated cases of arrhythmia and mild neurological reactions observed across the included trials.[38] Our findings regarding reduced postoperative nausea and vomiting are also supported by a meta-analysis that demonstrated significantly lower PONV rates following hysterectomy in patients receiving intravenous lidocaine.[39]

Similarly, pediatric studies demonstrated that intravenous lidocaine significantly reduced postoperative vomiting without increasing severe adverse events, further supporting its antiemetic potential.[40] Furthermore, a review emphasized that perioperative intravenous lidocaine has a high safety margin in monitored perioperative settings and highlighted evidence from large reviews involving thousands of patients showing no increase in adverse events despite varying infusion doses.[41] The review also noted that lidocaine's multimodal mechanisms, including sodium channel blockade, NMDA receptor modulation, and anti-inflammatory effects, may contribute to improved recovery outcomes while maintaining safety. Nevertheless, moderate heterogeneity in adverse event reporting across studies likely reflects differences in patient populations, infusion durations, perioperative monitoring standards, and definitions of complications. Overall, the present findings strengthen the growing evidence that perioperative intravenous lidocaine infusion is a safe and feasible adjunct within multimodal analgesia protocols across diverse surgical populations.

LIMITATIONS

This review has several limitations. Only a limited number of studies evaluated chronic postsurgical pain, and considerable heterogeneity existed in surgical procedures, lidocaine regimens, pain assessment methods, and opioid reporting. In addition, several studies had relatively small sample sizes, and publication bias cannot be completely excluded.

Clinical Implications and Future Directions

Perioperative intravenous lidocaine may be incorporated into multimodal analgesia protocols, particularly for surgeries with a high risk of chronic postsurgical pain, given its favorable safety profile

and effectiveness in improving postoperative pain outcomes. Future multicenter randomized controlled trials with standardized dosing protocols, longer follow-up, and consistent outcome measures are needed to define optimal clinical use.

CONCLUSION

Perioperative intravenous lidocaine infusion significantly reduces chronic postsurgical pain and improves early postoperative analgesia without increasing serious adverse events. Although no significant reduction in opioid consumption was observed, intravenous lidocaine appears to be a safe and effective adjunct to multimodal perioperative pain management. Further large, well-designed multicenter trials are needed to confirm these findings and establish optimal dosing strategies.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION	
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3	**Ayesha Yousaf:** Data analysis.
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