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MDPI

*Systematic Review*

# Use of Local Anesthetic Agents and Conscious Sedation in Intrauterine Device Insertion: A Systematic Review

**Reem Altamimi [1,*], Rawan Bin Salamah [1], Ebtesam Almajed [1], Alya AlZabin [1], Lama Alzelfawi [1], Wijdan AlMutiri [1], Amer Alkinani [2] and Lamya Almusharaf [1]**

[1] College of Medicine, Princess Nourah Bint Abdulrahman University, Riyadh 11671, Saudi Arabia; 439000602@pnu.edu.sa (R.B.S.); 439003552@pnu.edu.sa (E.A.); 439001489@pnu.edu.sa (A.A.); 439001449@pnu.edu.sa (L.A.); 439002980@pnu.edu.sa (W.A.); laalmusharaf@pnu.edu.sa (L.A.)
[2] King Abdulaziz Medical City, Riyadh 14611, Saudi Arabia; dr.kinani@gmail.com
* Correspondence: reemaltamimi24@gmail.com

**Abstract:** Intrauterine devices (IUDs) are highly effective long-acting contraceptives. However, pain associated with insertion deters some women and impacts satisfaction. This systematic review critically evaluates the effectiveness of local anesthetics, misoprostol, nonsteroidal anti-inflammatory drugs (NSAIDs), and conscious sedation for managing pain associated with IUD insertion. A comprehensive database search including PubMed, Web of Science, Google Scholar, ClinicalTrials.gov, and ProQuest was conducted from inception to July 2023 for randomized controlled trials (RCTs). RCTs assessing interventions for IUD insertion pain were included. Case reports, non-randomized studies, and non-English papers were excluded. Two independent reviewers extracted data on pain outcomes and adverse effects. The risk of bias was assessed using Cochrane tools. Thirty-nine RCTs ($n$ = 12,345 women) met the inclusion criteria. Topical lidocaine effectively reduced pain on consistent findings across multiple high-quality RCTs. Misoprostol pretreatment facilitated easier insertions through cervical ripening. However, evidence for NSAIDs was inconclusive, with some RCTs finding no additional benefits versus placebo. Results also remained unclear for nitrous oxide conscious sedation due to variability in protocols. Nulliparity predicted higher reported pain consistently. Lidocaine and misoprostol show promise for minimizing IUD insertion pain and difficulty. Further optimization is required to standardize conscious sedation and fully evaluate NSAIDs. Improving pain management may increase favorable experiences and uptake of this reliable method.

**Keywords:** intrauterine devices; IUD insertion; pain management; local anesthetics; conscious sedation



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## 1. Introduction

Intrauterine devices (IUDs) have become one of the most popular and highly efficient long-acting reversible contraceptive methods for women [1]. The exceptional effectiveness of IUDs has been demonstrated to be extremely high, making them cost-effective and suitable for a wide variety of women, leading to an overall high user satisfaction rate [2]. IUDs are available either as a copper-based or as a levonorgestrel-releasing intrauterine system (NG-IUS) [3]. The reliability of IUDs is considered high across all types, with copper-based and NG-IUS having an efficacy rate of more than 99% [4]. Beyond their role in preventing unwanted pregnancies, IUDs have other non-contraceptive benefits that include decreased menstrual blood loss, improved dysmenorrhea, improved pelvic pain associated with endometriosis, and protection of the endometrium from hyperplasia [5,6].

However, despite the numerous advantages of IUDs, increased pain and anxiety are still considered significant barriers. Studies have shown that increased anticipated pain is associated with increased perceived pain with IUD insertion [7,8]. Moreover, pain during insertion has been linked to failed insertions, syncope, and vasovagal reactions [9]. A participants-blinded randomized trial conducted in Brazil from 2021 to 2022 to compare different IUD types with varying pain outcomes revealed that a higher Visual Analog Scale (VAS) was associated with levonorgestrel 52 mg IUD [10]. Similarly, a Swedish study on LNG-IUS insertions in nulliparous women revealed that nearly 90% of participants experienced moderate to severe pain during the procedure [11]. A review paper that provided practical advice for avoidance of pain associated with the insertion of intrauterine contraceptives mentioned that for women who experience severe anxiety before obtaining an IUD inserted, after cervical priming, it may be helpful to consider undergoing conscious sedation accompanied by proper monitoring to reduce the anticipated pain [12]. On the contrary, a clinical trial was performed on nulliparous women who received an IUD insertion. The results showed that using 50% nitrous oxide and 50% oxygen ($N_2O/O_2$) did not reduce the pain, in contrast to using only oxygen as a placebo [13]. Further research and interventions focusing on pain management during IUD insertions may enhance the overall acceptance and utilization of this highly effective contraceptive method. To date, no definitive evidence supports an effective strategy for minimizing pain during IUD placement. A Cochrane review conducted in 2015 concluded that while some lidocaine formulations, tramadol, and naproxen had some effect on reducing insertion-related pain in specific groups, NSAIDs, lidocaine 2% gel, and misoprostol were ineffective in decreasing pain during IUD insertion [14]. Moreover, a more recent meta-analysis of randomized clinical trials conducted in 2018 concluded that lidocaine was associated with reduced pain levels during and after IUD replacement [15]. Furthermore, a systematic review and meta-analysis of RCTs in 2018, which evaluated different pain-lowering medications during IUD placement, concluded that lidocaine-pilocarpine cream statistically significantly reduced pain at tenaculum placement compared with the placebo [16]. This systematic review compares the evidence available on local anesthetic agents and conscious sedation in intrauterine device insertion.

## 2. Materials and Methods

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [17]. The literature search and screening plan were pre-established. The protocol for this systematic review has been registered on PROSPERO (CRD42023445050). Because this study was a systematic review, formal ethical approval was not required.

### *2.1. Inclusion and Exclusion Criteria*

The present review included randomized control trials that fulfilled the following criteria: (1) trials that examined conscious sedation for the management of IUD-insertion-related pain and discomfort, (2) trials that examined local anesthetic agents for IUD-insertion related to pain and discomfort, (3) trials that compared conscious sedation with standard pain management (local anesthetic agents). Case reports, series, and studies published in languages other than English were excluded.

To guide our research question and subsequent literature review, we employed a PICOS strategy. Our PICOS components were as follows: the population of interest is women undergoing intrauterine device (IUD) insertion; the intervention is conscious sedation administered during the procedure; the comparison group consists of those receiving local anesthetic agents for pain management during IUD insertion; and the

primary outcome of interest is the reduction in pain and discomfort experienced by women during the procedure.

### *2.2. Literature Search Strategy*

Articles were systematically searched within journals indexed in PubMed, Web of Science, Google Scholar (PERSONALIZATION), Clinical trials, and ProQuest, from inception to July 2023, using the following terms: ("IUD") OR ("intrauterine device") AND ("conscious sedation") OR ("sedation") OR ("nitrous oxide") OR ("Entonox") OR ("Local anesthetics") OR ("opioid analgesics") OR ("lidocaine") OR ("misoprostol"). Retrieved citations were imported into an Excel Document.

### *2.3. Screening and Study Selection*

All records were imported into Rayyan Software 2025 to screen titles, abstracts, and select studies [18]. After removing duplicates using Rayyan software, two independent reviewers (E.M. and A.Z.) screened the title and abstract for relevance to the review. Disagreements concerning eligibility were discussed, and, when necessary, a third researcher was consulted and were resolved by consensus. In full-text, articles that met the eligibility criteria were retrieved and independently assessed for inclusion and exclusion criteria by two pairs of reviewers (R.T., A.Z., R.S., and E.M.). Both independent reviewers had to approve an article's eligibility for inclusion. A flowchart has been developed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (Figure 1).

### *2.4. Critical Appraisal*

Bias Assessment

The Cochrane risk tool for bias was used to evaluate the quality of RCTs. The tool encompasses various domains, with each domain's judgments contributing to an overall RoB2 judgment that spans five main domains. These domains are fixed, focusing on aspects of trial design, conduct, and reporting using a series of 'signaling questions' to elicit information relevant to the risk of bias. It is then judged using an algorithm, and the judgments can be 'low' (for all domains, the risk of bias is low), 'some concerns' (for at least one of the domains, there is some concern), or 'high' (for at least one domain, there is a high risk or some concerns for multiple domains). Two authors (E.M. and A.Z.) independently conducted the risk of bias assessment, and after consulting with senior authors (R.T. and R.S.), they resolved disagreements through consensus.

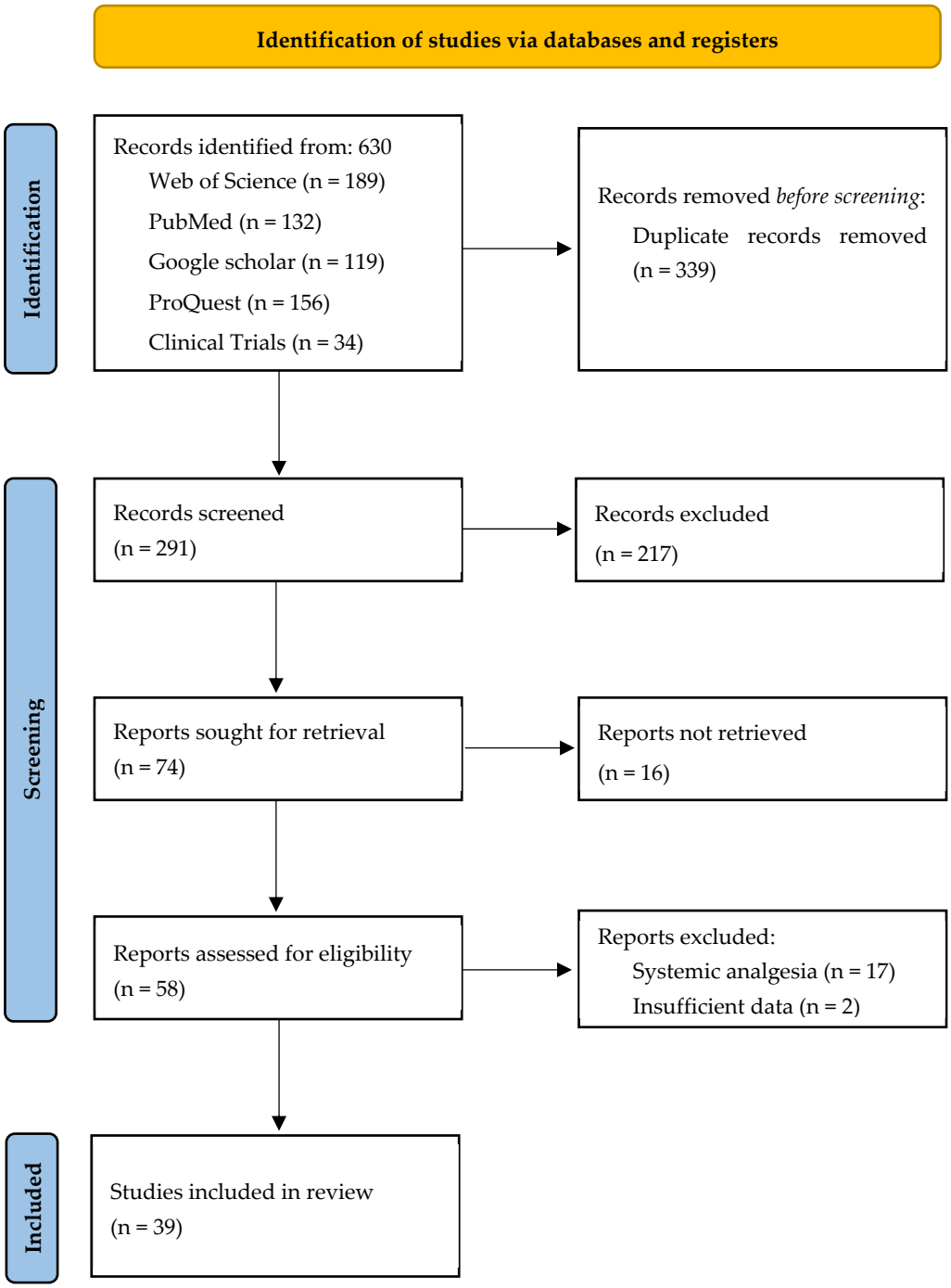


**Figure 1.** PRISMA flowchart.

## 3. Results

The risk of bias was assessed for all 39 articles included in this review, as shown in Figure 2. The studies conducted by Cirik et al. (2013), Mohammed et al. (2020), Saad et al. (2022), Salama et al. (2022), Hajiesmaello et al. (2019), Hassan et al. (2023), Abbas et al. (2018), El-Sayed et al. (2021), Bayoumy et al. (2018), Sakna et al. (2021), Elsafty et al. (2015), de Oliveira et al. (2021), Panichyawat et al. (2020), Mody et al. (2018), Karasu et al. (2017), Abdellah et al. (2017), Abbas et al. (2017), Singh et al. (2016), Aksoy et al. (2016), Tornblom-Paulander et al. (2014), Tavakolian et al. (2015), and Sakna et al. (2023) exhibited commendably low risks of bias across key domains [13,19–37].

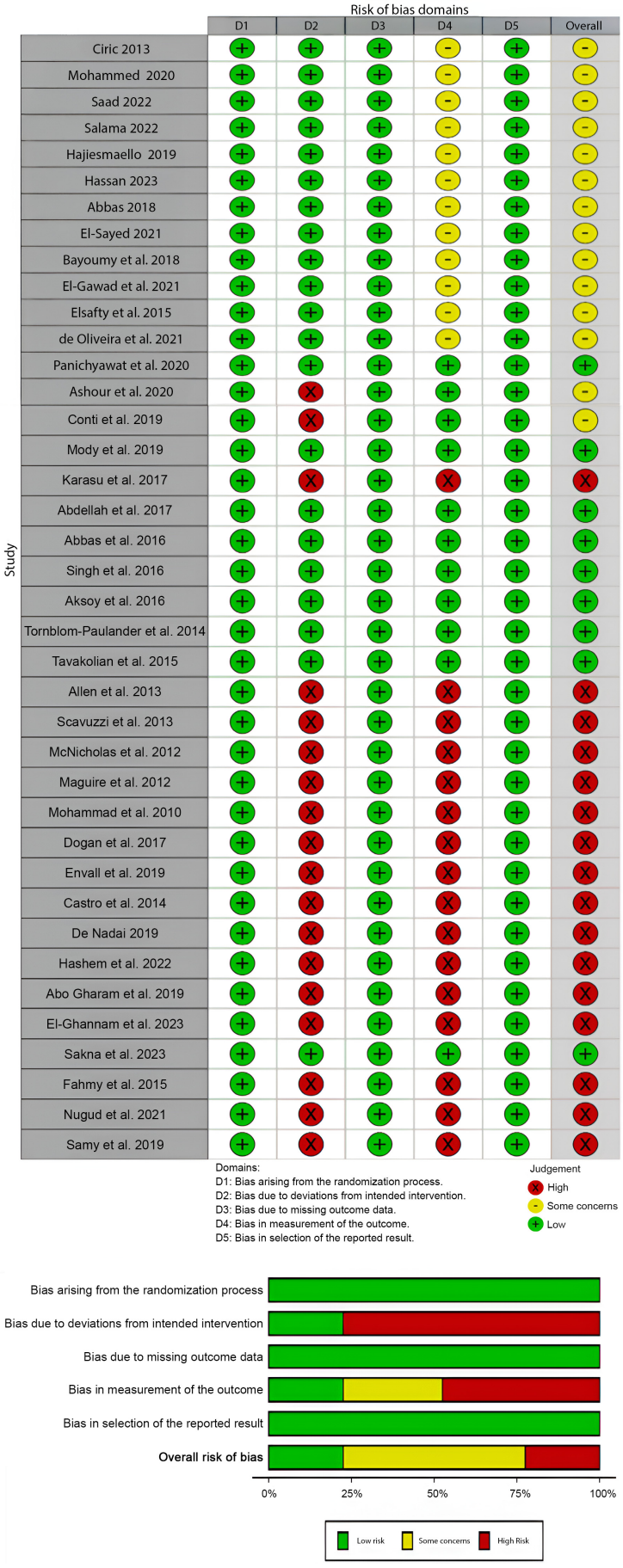


**Figure 2.** Risk of bias assessment (ROB2) of included studies.

These studies have meticulously managed their randomization processes, ensuring a fair allocation of participants to intervention groups. They have adhered closely to the intended interventions, minimizing deviations that could affect the outcomes. Additionally, these studies have robust strategies for handling missing outcome data, reducing potential bias in result interpretation. The measurement of outcomes in these studies is well-defined and appropriately executed, minimizing the risk of biased assessments. Moreover, their reporting of results appears transparent and comprehensive, maintaining integrity in the reporting process. These studies stand out for their methodological rigor, contributing reliable evidence to the field.

Several studies, such as those from Ashour et al. (2020), Conti et al. (2019), Allen et al. (2013), Scavuzzi et al. (2013), McNicholas et al. (2012), Maguire et al. (2012), Charandabi et al. (2010), Dogan et al. (2017), Envall et al. (2019), Castro et al. (2014), De Nadai (2019), Hashem et al. (2022), EL-Gharib et al. (2019), El-Ghannam et al. (2023), Fahmy et al. (2015), Nugud et al. (2021), and Samy et al. (2019) display generally low risks of bias but raise some concerns in specific domains [16,38–53]. While these studies maintain sound randomization processes, deviations from the intended interventions or variations in execution might affect outcome assessments. However, they have managed missing outcome data well, ensuring a minimal impact on the overall results. Despite these concerns, these studies maintain robust methodologies in outcome measurements, fostering reasonable confidence in their reported findings. It is crucial to note these concerns, but they do not significantly compromise the overall credibility of their results.

A subset of studies, including Karasu et al. (2017), Allen et al. (2013), Scavuzzi et al. (2013), McNicholas et al. (2012), Maguire et al. (2012), Charandabi et al. (2010), Dogan et al. (2017), Envall et al. (2019), Castro et al. (2014), De Nadai et al. (2019), Hashem et al. (2022), EL-Gharib et al. (2019), El-Ghannam et al. (2023), Fahmy et al. (2015), Nugud et al. (2021), and Samy et al. (2019), exhibit high risks of bias, primarily due to deviations from intended interventions and potential issues in outcome measurements [16,32,40–53]. These studies encountered challenges in adhering strictly to the planned interventions or in precisely measuring outcomes, influencing their reported findings. Additionally, there are indications of potential biases in the selection of reported results, which could impact the interpretation of their conclusions. Consequently, these studies require careful consideration due to the higher likelihood of biased outcomes or interpretations.

Overall, while most of the studies uphold robust methodologies with low risks of bias, there is a subset with varying levels of concern or higher risks in specific domains. These nuances highlight the importance of critically appraising each study's methodological approach, emphasizing the need to weigh evidence from studies with lower versus higher risks of bias when drawing conclusions or making recommendations regarding local anesthetic agents and conscious sedation in intrauterine device insertion.

The included studies, totaling 39, investigated various interventions to reduce pain during intrauterine device (IUD) insertion. The studies reflected a diverse geographic distribution, with research conducted in Turkey, Egypt, Iran, Brazil, Thailand, Japan, Sweden, and the United States. The research spanned from 2010 to 2023, and the study designs primarily comprised randomized controlled trials (RCTs), with a few employing double-blind, placebo-controlled trial designs. Sample sizes varied across studies, ranging from 60 to 302 participants, encompassing women within different age groups.

The participants' characteristics in the included studies varied across interventions and comparisons, encompassing a diverse range of pain management strategies during IUD insertion. Sample sizes and age groups differed, reflecting the heterogeneous nature of the study populations. The interventions explored in these studies included the use of various medications such as lidocaine, misoprostol, naproxen, nitrous oxide, and diclofenac,

administered through different routes, including vaginal, sublingual, spray, cream, and injection. The studies also evaluated the effectiveness of interventions in specific populations, including nulliparous women, women with a history of cesarean section, and those with anticipated complex loop application during copper IUD insertion. Additionally, the investigations compared different pain management strategies, such as lidocaine spray versus oral ibuprofen tablets and diclofenac versus misoprostol (Table 1).

**Table 1.** General characteristics of the included studies (N = 39).

| Authors | Year of Publication | Country | Title | Sample Size | Age | Study Design |
|---|---|---|---|---|---|---|
| Cirik et al. [19] | 2013 | Turkey | Paracervical block with 1% lidocaine for pain control during intrauterine device insertion: a prospective, single-blinded, controlled study | 95 | 18–45 | RCT |
| Mohammed et al. [20] | 2020 | Egypt | Vaginal or sublingual misoprostol before insertion of an intrauterine device in women who have previously had a cesarean section | 200 | 18–45 | RCT |
| Saad et al. [21] | 2022 | Egypt | Role of vaginal misoprostol before intrauterine device insertion | 80 | >18 | RCT |
| Salama et al. [54] | 2022 | Egypt | Role of vaginal misoprostol prior to levonorgestrel-releasing IUD insertion | 113 | 25–45 | RCT |
| Hajiesmaello et al. [22] | 2019 | Iran | Evaluation of the effect of 10% lidocaine spray on reducing the pain of intrauterine device insertion: A randomized controlled trial | 80 | 18–45 | RCT |
| Hassan et al. [23] | 2023 | Egypt | Efficacy and safety of Vaginal Misoprostol in reducing pain during Levonorgestrel Intrauterine Device insertion. | 130 | 20–45 | RCT |
| Abbas et al. [24] | 2018 | Egypt | Does lidocaine gel produce an effective analgesia prior to copper IUD insertion? Randomized clinical trial | 100 | 18–50 | RCT |
| El-Sayed et al. [25] | 2021 | Egypt | Using of Misoprostol Vaginally Prior To Intrauterine Contraceptive Device Insertion Following Previous Insertion Failure: Randomized Clinical Trial | 100 | 20–35 | RCT |
| Bayoumy et al. [26] | 2018 | Egypt | Lidocaine for Pain Control during Intrauterine Contraceptive Device Insertion: A Randomized Clinical Trial | 123 | >18 | RCT |
| Sakna et al. [27] | 2021 | Egypt | Vaginal Misoprostol Prior to Intrauterine Contraceptive Device Insertion in Women Who Delivered Only by Elective Caesarean Section: Randomized Clinical Trial | 210 | 20–40 | RCT |
| Elsafty, et al. [28] | 2015 | Egypt | Does lidocaine 10% spray reduce pain during intrauterine contraceptive device insertion? a pilot randomized controlled clinical trial | 200 | 18–45 | RCT |
| de Oliveira et al. [29] | 2021 | Brazil | Use of naproxen versus intracervical block for pain control during the 52 mg levonorgestrel-releasing intrauterine system insertion in young women: a multivariate analysis of a randomized controlled trial. | 100 | 15–24 | RCT |
| Panichyawat et al. [30] | 2020 | Thailand | 10% lidocaine spray for pain control during intrauterine device insertion: a randomized, double-blind, placebo-controlled trial. | 124 | 18–45 | RCT |
| Ashour et al. [38] | 2020 | Egypt | Comparative efficacy of vaginal misoprostol vs. vaginal dinoprostone administered 3 hours prior to copper T380A intrauterine device insertion in nulliparous women: a randomized controlled trial. | 129 | 18–25 | RCT |
| Conti, et al. [39] | 2019 | USA | Self-administered vaginal lidocaine gel for pain management with intrauterine device insertion: a blinded, randomized controlled trial. | 215 | ≥18 | RCT |
| Mody et al. [31] | 2018 | USA | Paracervical block for intrauterine device placement among nulliparous women: a randomized controlled trial. | 64 | 18–45 | RCT |

**Table 1.** *Cont.*

| Authors | Year of Publication | Country | Title | Sample Size | Age | Study Design |
|---|---|---|---|---|---|---|
| Karasu et al. [32] | 2017 | Japan | Lidocaine for pain control during intrauterine device insertion | 200 | >18 | RCT |
| Abdellah et al. [33] | 2017 | Egypt | Vaginal misoprostol prior to intrauterine device insertion in women delivered only by elective cesarean section: a randomized double-blind clinical trial. | 140 | 18–45 | RCT |
| Abbas et al. [34] | 2017 | Egypt | Effect of cervical lidocaine–prilocaine cream on pain perception during copper T380A intrauterine device insertion among parous women: A randomized double-blind controlled trial. | 120 | 18–49 | RCT |
| Singh et al. [13] | 2016 | USA | A randomized controlled trial of nitrous oxide for intrauterine device insertion in nulliparous women. | 80 | 13–45 | RCT |
| Aksoy et al. [35] | 2016 | Turkey | Lidocaine 10% spray to the cervix reduces pain during intrauterine device insertion: a double-blind randomized controlled trial. | 200 | ≥18 | RCT |
| Tornblom-Paulander et al. [36] | 2015 | Sweden | Novel topical formulation of lidocaine provides significant pain relief for intrauterine device insertion: pharmacokinetic evaluation and randomized placebo-controlled trial. | 218 | ≥18 | RCT |
| Tavakolian et al. [37] | 2015 | Iran | Lidocaine–prilocaine cream as analgesia for IUD insertion: a prospective, randomized, controlled, triple blinded study. | 92 | ≥18 | RCT |
| Allen et al. [40] | 2013 | USA | Higher dose cervical 2% lidocaine gel for IUD insertion: a randomized controlled trial. | 145 | 18–49 | RCT |
| Scavuzzi et al. [41] | 2013 | Brazil | Misoprostol prior to inserting an intrauterine device in nulligravidas: a randomized clinical trial. | 179 | ≥18 | RCT |
| McNicholas et al. [42] | 2012 | USA | Cervical lidocaine for IUD insertional pain: a randomized controlled trial. | 199 | 18–45 | RCT |
| Maguire et al. [43] | 2012 | USA | Intracervical lidocaine gel for intrauterine device insertion: a randomized controlled trial | 200 | 18–45 | RCT |
| Charandabi et al. [44] | 2010 | Iran | Effect of lidocaine gel on pain from copper IUD insertion: A randomized double-blind controlled trial | 96 | 18–45 | RCT |
| Dogan et al. [45] | 2017 | Turkey | Paracervical block and paracetamol for pain reduction during IUD insertion: a randomized controlled study | 118 | ≥18 | RCT |
| Envall et al. [46] | 2019 | Sweden | Intrauterine mepivacaine instillation for pain relief during intrauterine device insertion in nulliparous women: a double-blind, randomized, controlled trial | 86 | ≥18 | RCT |
| Castro et al. [47] | 2014 | Brazil | Effect of intracervical anesthesia on pain associated with the insertion of the levonorgestrel-releasing intrauterine system in women without previous vaginal delivery: a RCT | 98 | 18–45 | RCT |
| De Nadai et al. [48] | 2019 | Brazil | Intracervical block for levonorgestrel-releasing intrauterine system placement among nulligravid women: a randomized double-blind controlled trial | 302 | ≥18 | Randomized, double-blind, parallel, controlled trial |
| Hashem et al. [49] | 2022 | Egypt | Comparative efficacy of lidocaine–prilocaine cream and vaginal misoprostol in reducing pain during levonorgestrel intrauterine device insertion in women delivered only by cesarean delivery: a randomized controlled trial | 210 | ≥18 | RCT |
| EL-Gharib et al. [50], | 2019 | Egypt | Effect of diclofenac versus misoprostol on pain perception during copper IUD insertion in cases of stenosed cervix | 60 | 18–40 | RCT |

**Table 1.** *Cont.*

| Authors | Year of Publication | Country | Title | Sample Size | Age | Study Design |
|---|---|---|---|---|---|---|
| El-Ghannam et al. [51] | 2023 | Egypt | Vaginal misoprostol versus Dinoprostone before copper IUD application in women with anticipated difficult loop application | 100 | ≥18 | RCT |
| Sakna et al. [55] | 2023 | Egypt | Lidocaine spray 10% versus oral ibuprofen tablets in pain control during copper intrauterine device insertion (a randomized controlled trial) | 140 | ≥18 | prospective, randomized clinical study |
| Fahmy et al. [52] | 2015 | Egypt | Comparison of 1% lidocaine paracervical block and NSAIDs in reducing pain during intrauterine device insertion | 150 | ≥18 | RCT |
| Nugud, et al. [53] | 2021 | Egypt | Effect of diclofenac versus misoprostol on pain perception during intrauterine contraceptive device insertion | 64 | ≥18 | Randomized double-blind controlled trial. |
| Samy et al. [16] | 2019 | Egypt | Benefits of vaginal Dinoprostone administration prior to levonorgestrel-releasing intrauterine system insertion in women delivered only by elective cesarean section: a randomized double-blinded clinical trial. | 200 | ≥18 | RCT |

IUD, Intrauterine Device; USA, United States of America; RCT, Randomized Controlled Trial; NSAIDs, Non-Steroidal Anti-inflammatory Drugs.

For instance, Cirik et al. (2013) evaluated the impact of 10 mL of 1% lidocaine for paracervical block compared to a placebo (0.9% NaCl solution) and a no-treatment group, focusing on pain perception during the paracervical block [19]. Mohammed et al. (2020) assessed different outcomes of IUD insertion with varying misoprostol doses administered vaginally or sublingually [20]. Saad et al. (2022) examined the effects of vaginal misoprostol on cervical ripening and successful IUD insertion compared to a placebo group [21]. Salama et al. (2022) explored the difficulty of Mirena IUD insertion and pain scores with different misoprostol doses, comparing them to a placebo group for Mirena IUD insertion [54].

Other studies investigated the effectiveness of lidocaine preparations, such as Bayoumy et al. (2018), who compared different local lidocaine formulations, i.e., lidocaine injection, lidocaine cream, and lidocaine spray for reducing pain sensation during IUCD insertion [26]. The study by Tornblom-Paulander et al. (2015) evaluated a novel lidocaine formulation against a placebo, measuring significantly lower pain scores with lidocaine [36]. Furthermore, studies like Aksoy et al. (2016) focused on the efficacy of 10% lidocaine spray compared to a placebo in reducing pain during IUD insertion [35]. (Table 2).

The included studies on pain management during intrauterine device (IUD) insertion demonstrated varied outcomes across success rate, ease of insertion, pain scores, and side effects. Several studies reported a significant reduction in pain perception during IUD insertion with different interventions. For instance, misoprostol, when administered vaginally, was associated with lower pain scores and increased success rates in studies conducted by Mohammed et al. (2020), Saad et al. (2022), and Salama et al. (2022) [20,21,54]. As a paracervical block, spray, or gel, lidocaine consistently demonstrated efficacy in reducing pain during IUD insertion, as reported by Cirik et al. (2013) and Hajiesmaello (2019) [19,22]. Moreover, a lidocaine intracervical block also reduced pain, according to De Nadai et al. (2019) [48].

**Table 2.** The participants' characteristics in the included studies.

| Authors | Intervention | Comparison | Main Outcomes |
|---|---|---|---|
| Cirik [19] | 10 mL 1% lidocaine for paracervical block | A group received 10 mm 0.9% NaCl solution as placebo and another group received no analgesia | Pain scores during IUD insertion in paracervical block group compared to placebo and no treatment groups |
| Mohammed [20] | 400 µg misoprostol tablets vaginally | 400 µg misoprostol sublingually | The proportion of failed IUD insertions defined as an unsuccessful insertion, regardless of the reason |
| Saad [21] | 400 µg misoprostol vaginally | Placebo group with two tablets of folic acid | Effect of misoprostol on cervical ripening and successful IUD insertion |
| Salama [54] | 200 mcg or 400 mcg misoprostol vaginally | Placebo vaginal tablet | Difficulty of Mirena IUD insertion and pain score assessment between the three groups |
| Hajiesmaello [22] | Four puffs of 10% lidocaine spray, with each containing 10 mg lidocaine | Routine IUD insertion with no analgesia | Pain score before, during and after IUD insertion process |
| Hassan [23] | 400 µg misoprostol vaginally | Placebo control group with contraceptive tablets | Level of discomfort after IUD insertion following vaginal misoprostol or placebo |
| Abbas [24] | Lidocaine gel | Placebo (an inert gel) | Difference in mean pain VAS scores during IUD insertion. |
| El-Sayed [25] | 200 mg misoprostol vaginally | Placebo | To investigate the possible effect of vaginal administration of misoprostol to insertion of IUCDs in women with previous IUCD insertion failure. |
| Bayoumy et al. [26] | Different local lidocaine preparations (spray, cream, injection) | No comparison group | Pain scores assessed by 10-point VAS scale at three different points; baseline after application of speculum and analgesic administration, after grasping cervix with tenaculum, then following hysterometry and IUCD insertion. |
| Sakna et al. [27] | Vaginal misoprostol 400 µg | Placebo | Proportion of failed IUCD insertions and degree of difficulty of the IUCD insertion |
| Elsafty, et al. [28] | 10% lidocaine spray | Placebo | Pain assessment during different stages of IUD insertion |
| de Oliveira et al. [29] | 550 mg Naproxen Sodium for pain control during 52 mg LNG-IUS insertion | 2% lidocaine intracervical block | Pain assessment during different stages of IUD insertion |
| Panichyawat et al. [30] | 10% lidocaine spray | Placebo | VAS score immediately after Cu-IUD placement |
| Ashour et al. [38] | Vaginal misoprostol | Vaginal Dinoprostone | Pain assessment during different stages of IUD insertion |
| Conti et al. [39] | 2% lidocaine gel | Placebo | Pain assessment during different stages of IUD insertion, procedure time, ease of insertion |
| Mody et al. [31] | 1% lidocaine paracervical block | No block | Pain assessment during different stages of IUD insertion |
| Karasu et al. [32] | Topical lidocaine spray, cream, and injection | No comparison group | Pain assessment during different stages of IUD insertion |
| Abdellah et al. [33] | Vaginal misoprostol | Placebo | Ease of IUD insertion, number of successful insertions, pain intensity scores, satisfaction, need for analgesics |
| Abbas et al. [34] | Lidocaine–prilocaine cream | Placebo | Pain assessment during different stages of IUD insertion |
| Singh et al. [13] | Nitrous oxide | Oxygen | Pain assessment during different stages of IUD insertion |
| Aksoy et al. [35] | 10% lidocaine spray | Placebo | IUD insertion pain score, as measured by the 10 cm VAS. |

**Table 2.** *Cont.*

| Authors | Intervention | Comparison | Main Outcomes |
|---|---|---|---|
| Tornblom-Paulander et al. [36] | Lidocaine formulation | Placebo | To investigate the pharma- cokinetics, efficacy, and safety of this formulation of lidocaine as an anesthetic for IUD insertion. |
| Tavakolian et al. [37] | Local anesthetic that contains 25 mg lidocaine and 25 mg of prilocaine per gram. | Placebo | To determine the effect of the used anesthetic on IUD insertion pain. |
| Allen et al. [40] | 2% lidocaine gel | Placebo | Pain during IUD insertion on a 0 to 100 mm visual analog scale. |
| Scavuzzi et al. [41] | Vaginal misoprostol | Placebo | Effectiveness of vaginal misoprostol in dilating the cervix prior to IUD insertion in nulligravidas. |
| McNicholas et al. [42] | Intracervical 2% lidocaine gel | Placebo | To evaluate the efficacy of intracervical 2% lidocaine gel for pain relief with IUD insertion. |
| Maguire et al. [43] | 2% lidocaine gel | Placebo | Effect of intracervical 2% lidocaine gel prior to IUD insertion on pain during sounding and IUD insertion as measured by the 100 mm VAS |
| Charandabi et al. [44] | 2% lidocaine gel | Lubricant gel or no intervention | Effect of lidocaine gel on pain from copper IUD insertion. |
| Dogan et al. [45] | Paracervical block and Oral Paracetamol (500 mg) | No intervention. | Pain levels using VAS during and after insertion of IUD. |
| Envall et al. [46] | Mepivacaine 1% | Placebo | Difference in VAS score between intervention and placebo at the time of IUD insertion |
| Castro et al. [47] | NSAID (ibuprofen, 400 mg) | Injectable local anesthetic (2% lidocaine without vasoconstrictor) | Effect of intracervical anesthesia compared with NSAIDs on pain scores following LNG-IUS insertion in women without a previous vaginal delivery who had not previously used any IUCD |
| De Nadai et al. [48] | Intracervical block (3.6 mL 2% lidocaine (72 mg) | Placebo | Pain measurement immediately after LNG-IUS insertion. |
| Hashem et al. [49] | 5 mL of 5% lidocaine–prilocaine cream | Placebo | The difference in pain scores during IUD insertion |
| EL-Gharib et al. [50] | Vaginal misoprostol | IM diclofenac sodium 75 mg | Assessment of the analgesic effect of vaginal misoprostol versus intramuscular diclofenac sodium and in facilitating IUCD insertion in women with cervical stenosis. |
| El-Ghannam et al. [51] | Vaginal misoprostol | 3 mg dinoprostone | The measured the success rate of IUD insertion of both groups. |
| Sakna et al. [55] | 10% local lidocaine spray, Ibuprofen | Ibuprofen | Self-reported pain score |
| Fahmy et al. [52] | 1% lidocaine paracervical block | Naproxen | Pain on speculum placement, tenaculum placement, intrauterine device insertion, and after procedure |
| Nugud et al. [53] | (400 mcg) of misoprostol | Placebo | Effect of vaginal misoprostol and intramuscular diclofenac sodium in decreasing pain and facilitating IUCD insertion. |
| Samy et al. [16] | Vaginal dinoprostone 3 mg | Vaginal placebo | the mean difference in pain scores during LNG-IUD insertion between both groups. |

IUD, Intrauterine Device; IUCD, Intrauterine Contraceptive Device; VAS, Visual Analog Scale; LNG-IUS, Levonorgestrel-releasing Intrauterine System; NSAIDs, Non-Steroidal Anti-inflammatory Drugs; IM, intramuscular; Cu-IUD, copper intrauterine device.

In contrast, Singh et al. (2016) did not find significant pain reduction with nitrous oxide [13,33]. The study by Tornblom-Paulander et al. (2015) on a novel lidocaine formulation reported lower pain scores but noted similar adverse events in both the lidocaine and

placebo groups [36]. Regarding the ease of insertion, interventions like misoprostol were associated with easier Mirena insertion in studies by Salama et al. (2022) and Hassan et al. (2023) [23,54].

However, El-Sayed (2021) noted a significant effect of timing on IUD insertion success with misoprostol [25]. Success rate was reported in six studies [20,21,25–27,51], in which success rate was significantly higher among those with interventional tools compared to control groups. Regarding side effects, studies consistently reported adverse events associated with certain interventions. For example, misoprostol was linked to increased nausea and vomiting in studies by Salama (2022), Sakna et al. (2021), and Hashem et al. (2022) [27,49,54]. Lidocaine, in its various forms, was associated with mild complications, including vasovagal reactions, nausea, vomiting, and dizziness, as reported by Aksoy et al. (2016), Panichyawat et al. (2020), and Tornblom-Paulander et al. (2015) [30,35,36] (Table 3).

**Table 3.** The summary of the outcomes of the included studies.

| Authors | Success Rate | Ease of Insertion | Pain Scores | Side Effect |
|---|---|---|---|---|
| Cirik [19] | NA | NA | This study demonstrated significantly lower pain perception in the paracervical block group when compared to the placebo and no treatment groups. | There were 5 patients who had vasovagal syncope, one in the paracervical group, 2 in saline group and 2 were in the no treatment group ($p = 0.36$). No bleeding or uterine perforation reported |
| Mohammed [20] | There was no statistically significant difference between the vaginal misoprostol group and sublingual misoprostol group regarding the success rate from first and second attempts. | NA | There is a highly statistically significant increase in pain during IUD applications in sublingual misoprostol group than vaginal misoprostol group ($p = 0.001$). | No significant difference in postinsertion US follow-up, infection, or changes in postinsertion menstruation between the two groups. |
| Saad [21] | Misoprostol group: 70% success vs. Placebo group: 25% success ($p < 0.001$) | Vaginal administration of 400 µg misoprostol 3 h before IUD insertion was significantly associated with less difficulty of insertion | Using misoprostol before IUD insertion decreases pain during uterine sounding significantly | Vaginal misoprostol (400 µg) had significantly reduced complications of IUD insertion such as pain and bleeding. |
| Salama [54] | NA | Mirena insertion significantly easier in Misoprostol groups compared to placebo | Pain score during Mirena IUD insertion in group 2 and group 3 (misoprostol groups) is significantly lower than in group 1 (placebo group) ($p = 0.031$ and 0.035, respectively). | Nausea and/or vomiting, uterine cramps significantly more frequent with misoprostol 400 mcg compared to placebo and misoprostol 200 mcg. Diarrhea was presented only in misoprostol groups, Making a significant difference when compared with placebo. No significant differences in fever or perforation |
| Hajiesmaello [22] | All participants had successful IUD insertions. | NA | Significant reduction in pain scores during hysterometer and during the IUD insertion ($p < 0.001$). There was also a significant difference in pain score at 15 min after IUD insertion between the control and intervention groups | No systemic adverse effects were observed |
| Hassan [23] | 4 failed insertions and 126 were successful (96.9 success rate) | IUD insertion is significantly easier in Misoprostol groups compared to the placebo ($p < 0.001$) | There were no statistically significant terms of anticipated pain speculum, pain after 20 min, and insertion time $p$-value > 0.05. | There was no statistically significant spotting, abdominal cramps, nausea, vomiting, shivering, fever, and need additional analgesia $p$-value > 0.05. On the other hand, there was a statistical difference in diarrhea < 0.001. |
| Abbas [24] | All participants had successful IUD insertion | There was no statistical significant differences between both groups (lidocaine gel group and placebo group) in regard to the ease of insertion. | Lower pain scores during vulsellum placement and uterine sounding in lidocaine group ($p < 0.001$). No statistical significant differences between both groups in other steps of IUD insertion. | No cases of uterine perforation or vasovagal reactions were observed in both groups |

**Table 3.** *Cont.*

| Authors | Success Rate | Ease of Insertion | Pain Scores | Side Effect |
|---|---|---|---|---|
| El-Sayed [25] | Misoprostol increased the success rate from 60.6% to 91.4% in the group with previous cesarean section, and from 29.4% to 80% in the group with previous vaginal delivery with a $p$ value 0.037. | NA | NA | NA |
| Bayoumy et al. [26] | All procedures were successful (100%) | NA | Pain score after grasping of cervix with tenaculum and pain score after hysterometry and IUCD insertion by VAS signify that lidocaine spray 10% decreases pain felt during the process of IUCD insertion | No flushing or metallic taste adverse effects were observed in any of the 3 study groups. whereas $n = 3$ (7.3%) participants reported redness of skin with lidocaine spray and $n = 5$ (12.2%) participants with lidocaine cream. |
| Sakna et al. [27] | Administration of misoprostol prior to IUCD insertion was significantly associated with an almost 2-fold increase in the success rate of IUCD insertion. | Insertion was significantly easier among the Misoprostol group ($p < 0.001$) | Pain perception was significantly lower among Misoprostol group than among control group. | Nausea, vomiting, and shivering significantly more frequent in Misoprostol group compared to control |
| Elsafty et al. [28] | NA | NA | The lidocaine group had significantly lower pain scores during cervical grasping and traction than the placebo (saline) group ($p < 0.001$) | Severe burning sensation in 2 participants in lidocaine group; Vasovagal syncope in 1 participant in saline group; Excluded from the study |
| de Oliveira et al. [29] | Women in the intracervical group presented high proportion of malpositioned IUS on transvaginal US compared to naproxen group. (11.8% vs. 0%, respectively; $p < 0.05$) | The difficulty of insertion was statistically similar between the two groups | Lower pain perception in intracervical block using 2% lidocaine compared to naproxen group ($p < 0.001$) | Vasovagal-like responses (dizziness, nausea, vomiting) observed during LNG-IUS insertion; 3 in naproxen group versus 4 in the intracervical group |
| Panichyawat et al. [30] | NA | NA | The 10% lidocaine spray group had significantly lower VAS score compared to placebo during and immediately after IUD insertion | Significantly more women in the 10% lidocaine group reported vaginal irritation side effect than women in placebo group (34 versus 1, respectively; $p < 0.001$) |
| Ashour et al. [38] | NA | Significantly easier IUD insertion with misoprostol and dinoprostone groups compared to the placebo ($p = 0.001$ and $p < 0.001$, respectively) | Misoprostol and Dinoprostone groups had significantly lower pain scores during copper IUD insertion than placebo group ($p = 0.02$ and $p < 0.001$, respectively) | Side effects did not differ among the three groups |
| Conti, et al. [39] | NA | NA | Only median pain scores at speculum insertion were significantly different between the lidocaine and placebo group (7 mm vs. 11 mm, respectively; $p = 0.046$) | NA |
| Mody et al. [31] | NA | NA | Women who received the paracervical block reported less pain with IUD placement compared to women who received no block (median VAS score of 33 mm compared with 54 mm, $p = 0.002$). | There was no difference in patient reported adverse effects between the two groups |
| Karasu et al. [32] | NA | NA | Pain related to IUD insertion was lower in the lidocaine spray and injection groups ($p < 0.001$). | NA |
| Abdellah et al. [33] | Higher number of successful IUD insertions in the misoprostol group than the placebo group (69 [98.6%] vs. 61 [87.1%], $p = 0.009$). | The ease of insertion score was lower in the misoprostol group ($2.2 \pm 0.5$ vs. $4.2 \pm 0.5$, $p = 0.0001$). | Lower pain score in the misoprostol group compared to the placebo group ($2.7 \pm 0.6$ vs. $4.3 \pm 0.8$, $p = 0.001$) | Abdominal cramping and shivering occurred more in misoprostol group (22.9% vs. 4.3% and 14.3% vs. 2.9%, respectively), with no difference between both groups in other side effects. |
| Abbas et al. [34] | NA | A lower ease of insertion score among lidocaine–prilocaine cream group compared to placebo group ($p = 0.001$). | Lower pain perception in the lidocaine–prilocaine cream group | NA |
| Singh et al. [13] | NA | NA | Nitrous oxide did not significantly reduce pain | Adverse effects in $N_2O/O_2$ and $O_2$ groups; dizziness, nausea, headache, vomiting reported; no significant difference between groups ($p = 0.32$) |

**Table 3.** *Cont.*

| Authors | Success Rate | Ease of Insertion | Pain Scores | Side Effect |
|---|---|---|---|---|
| Aksoy et al. [35] | All procedures were successfully completed without severe complications or serious adverse reactions. | NA | A significantly lower score for overall pain during the procedure was found in the treatment group compared to controls ($p < 0.001$). | Successful procedures without severe complications; mild complications with vasovagal reactions (nausea, vomiting, dizziness); no systemic side effects with 10% lidocaine spray |
| Tornblom-Paulander et al. [36] | NA | NA | Pain scores on the VAS were low, with mean values of <9 mm at all time points after IUD insertion. | Adverse events were similar in the placebo and lidocaine groups. No serious adverse events were reported. At least one adverse event occurred for 32 women who received the lidocaine (29.1%), and for 36 (33.3%) of those who received the placebo. The most common adverse events were nausea and gastrointestinal problems. |
| Tavakolian et al. [37] | NA | NA | There was a significant difference between the two groups in the third stage (inserting IUD and removing the insertion tube) as it was $4.61 \pm 2.55$ in the placebo group and $2.65 \pm 2.53$ in the intervention group ($p < 0.001$). | NA |
| Allen et al. [40] | NA | There was no difference between the groups in procedure difficulty as rated by the provider. | no difference in pain scores between the lidocaine and placebo groups. | No participants reported systemic lidocaine side effects. |
| Scavuzzi et al. [41] | NA | Less difficulty in IUD insertion when misoprostol was used prior to insertion. | 44% reduction in moderate-to-severe pain during IUD insertion compared with the placebo group. | No significant differences in complications during IUD insertion; similar frequency of bleeding, vasovagal reaction, cramps, nausea, vomiting, and insertion failures; no uterine perforation reported. |
| McNicholas et al. [42] | NA | NA | No significant difference in pain between groups. | Adverse events considered: 5 total expulsions (4 in placebo arm, 1 in lidocaine arm); 1 perforation in parous postpartum participant; 1 case of pelvic inflammatory disease. |
| Maguire et al. [43] | One hundred ninety-seven women had successful IUD insertions. One IUD was not inserted due to suspicion of perforation during uterine sounding, and two were not inserted due to inappropriate IUD insertion into the cervical canal. | NA | No significant difference in pain between groups. | Side effects including nausea, vomiting, and dizziness highly similar between groups |
| Charandabi et al. [44] | NA | NA | No significant difference in pain between groups. | NA |
| Dogan et al. [45] | All patients had successful IUD insertion at first attempt. | All patients had successful IUD insertion at first attempt. | Lower pain perception | Procedural complications such as vasovagal symptoms and syncope, bleeding, immediate expulsion or mispositioning and uterine perforation did not occur. |
| Envall et al. [46] | NA | NA | Lower pain perception | NA |
| Castro et al. [47] | NA | Majority of the insertions were easy in both groups. | No significant difference in pain between groups | NA |
| De Nadai et al. [48] | 99.3% success rate in the insertion of the levonorgestrel-releasing intrauterine system among nulligravid women (300 out of 302). | Similar among all groups | Significant pain reduction during and after the insertion of the LNG-IUS compared to the placebo, no-intervention groups. | NA |
| Hashem et al. [49] | NA | Similar among all groups | Pain scores were significantly lower in the LP group compared to the placebo group. | Comparable drug-side effects between groups; Vomiting and abdominal cramps higher in misoprostol group ($p = 0.039$ and $p = 0.093$, respectively) |
| EL-Gharib et al. [50] | NA | Misoprostol facilitated IUD insertion | Insignificant differences between misoprostol and diclofenac groups as regards pain score | Side effects of IUD insertion: Misoprostol group—nausea and vomiting (36.7%), syncopal attack (3.3%), bleeding (0%), perforation (0%), gastritis (0%); Diclofenac group—nausea and vomiting (0%), syncopal attack (0%), bleeding (0%), perforation (0%), gastritis (20%) |

**Table 3.** *Cont.*

| Authors | Success Rate | Ease of Insertion | Pain Scores | Side Effect |
|---|---|---|---|---|
| El-Ghannam et al. [51] | 92% in the misoprostol group and 86% in the dinoprostone group. | Both misoprostol and dinoprostone were effective in easing the insertion of copper IUDs. | No significance difference between the two studied groups during IUD insertion | More side effects in group A (Misoprostol) than group B (Dinoprostone); no significant difference in side effects ($p > 0.05$) |
| Sakna et al. [55] | 97.1% in the lidocaine spray group and 95.7% in the ibuprofen tablet group. The failure of insertion was statistically non-significant between the two groups. | Similar among all groups | Patients' pain perception statistically was significantly lower among lidocaine spray group | NA |
| Fahmy et al. [52] | NA | NA | No significance difference between two studied group during IUD insertion | Complications in two participants: small vaginal hematoma resolved with paracervical block; dyspepsia, heartburn, headache, and vaginal spotting with NSAIDs; no significant difference ($p > 0.05$) |
| Nugud et al. [53] | NA | Misoprostol facilitated IUD insertion | No significance difference between two studied group during IUD insertion | Side effects in IUD insertion: nausea and vomiting in 37.5% and syncopal attack in 6.3% among the misoprostol |
| Samy et al. [16] | NA | Dinoprostone facilitated IUD insertion | Pain scores were significantly lower in dinoprostone group compared to placebo group. | Side effects were not significantly different in Dinoprostone group versus placebo group |

IUD, Intrauterine Device; IUCD, Intrauterine Contraceptive Device; IUS, Intrauterine System; VAS, Visual Analog Scale; LNG-IUS, Levonorgestrel-releasing Intrauterine System; NA, Not Assessed; US, Ultrasound; NSAIDs, Non-Steroidal Anti-inflammatory Drugs; $N_2O$, Nitrous Oxide; $O_2$, Oxygen; LP, Lidocaine–Prilocaine Cream.

## 4. Discussion

The present systematic review aimed to evaluate local anesthetic agents and conscious sedation use in intrauterine device (IUD) insertion. IUDs are highly effective long-acting reversible contraceptive methods that offer various advantages beyond contraception. However, pain and anxiety associated with IUD insertion remain significant barriers to their widespread acceptance and utilization. Therefore, this review sought to assess the available evidence on pain management strategies during IUD placement. In this comprehensive discussion, we explore various approaches to alleviate pain during IUD insertion, including conscious sedation, local anesthetics, misoprostol, nonsteroidal anti-inflammatory drugs (NSAIDs), and the association between reproductive factors and elevated pain.

### *4.1. Pain Reduction with Conscious Sedation*

Conscious sedation is the administration of nitrous oxide or a combination of lidocaine and naproxen [56]. The use of conscious sedation during IUD insertion has been explored as a potential strategy to alleviate procedural discomfort. Studies, such as Singh et al. (2016) [13], investigated the efficacy of nitrous oxide and a combination of lidocaine and naproxen, respectively. However, the results were inconclusive, with no significant reduction in pain reported in these studies. Similar results were reported in studies not included in this systematic review [56–58]. This lack of consistent evidence raises questions about the effectiveness of conscious sedation in achieving optimal pain reduction during IUD insertion. It suggests that alternative approaches may need to be considered or that further research is required to refine the use of conscious sedation in this context.

### *4.2. Pain Reduction with Local Anesthetics*

Local anesthetics, particularly lidocaine in various formulations, have been extensively studied for their potential in pain reduction during IUD insertion. Studies conducted by Cirik (2013), and Hajiesmaello (2019) consistently reported a significant decrease in pain perception with Lidocaine [19,22]. The findings highlight the efficacy of local anesthetics in achieving analgesia during IUD insertion [16,59]. The majority of included studies demonstrated lidocaine's ability to reduce procedural pain when applied topically. The inclusion

of multiple large, rigorous, randomized controlled trials provides compelling evidence that lidocaine effectively reduces pain from IUD insertion when applied topically [42]. Moreover, Aksoy et al. (2016) randomized 200 participants in their trial comparing lidocaine and placebo sprays. The sample sizes of these studies strengthen the validity and generalizability of their findings, demonstrating lidocaine spray's analgesic properties [35].

Whether administered as a spray, gel, or injection, lidocaine has demonstrated its potential to enhance patient comfort during IUD insertion [32]. The choice of lidocaine formulation may depend on patient preference, procedural requirements, and the specific steps of IUD insertion that generate the most discomfort. Clinicians should consider these factors when tailoring pain management strategies to individual patient needs.

Misoprostol, a prostaglandin E1 analog, has been explored for its potential role in reducing pain during IUD insertion by promoting cervical ripening [41,60]. Studies conducted by Mohammed (2020), Saad (2022), and Salama (2022) reported a significant reduction in pain scores and increased success rates with the use of vaginal misoprostol [20,21,54].

However, achieving an optimal balance between efficacy and tolerability remains an area of active investigation since contradictory findings from studies such as Ashour et al. (2020) and Abdellah et al. (2017) raise questions about the consistent efficacy of misoprostol in pain reduction during IUD insertion since they observed potential for adverse effects like cramping [33,38]. Further research is warranted to establish standardized protocols and address the variability in outcomes.

### *4.3. The Effect of NSAIDs on IUD Insertion*

Nonsteroidal anti-inflammatory drugs (NSAIDs), such as naproxen, have been investigated for their potential in reducing pain during IUD insertion. Studies like de Oliveira et al. (2021) reported the effectiveness of naproxen in lowering pain scores during levonorgestrel-releasing intrauterine system insertion [29]. However, Fahmy et al. (2015) found no significant difference in pain intensity during IUD insertion compared to a placebo group [52]. A previous systematic review and meta-analysis showed that NSAIDs were not effective in reducing IUD-insertion-related pain, regardless of their type or dose [61]. While NSAIDs present a promising avenue for pain management, further research is needed to determine optimal dosages and their effectiveness in diverse populations.

### *4.4. Association Between Reproductive Factors and Elevated Pain in IUD Insertion*

Various studies explored the association between reproductive factors and elevated pain during IUD insertion. El-Ghannam et al. (2023) suggested that the success of IUD insertion might be more influenced by the selected intervention, such as the use of vaginal misoprostol versus Dinoprostone, than solely reproductive factors [51]. Understanding the nuanced interplay between reproductive factors and pain perception during IUD insertion is crucial for tailoring pain management strategies to individual patient needs. Further research could provide valuable insights for personalized care during IUD insertion.

## 5. Limitations

Despite the valuable insights provided by the included studies, it is crucial to acknowledge several limitations that may impact the generalizability and interpretation of the findings. The heterogeneity in methodologies, including variations in interventions, routes of administration, and outcome measures, challenges direct comparisons across studies. The diverse study populations, with variations in age, parity, and gynecological history, hinder a comprehensive understanding of demographic influences on pain perception during IUD insertion. Limited long-term follow-up data on patient satisfaction and adverse events restrict the assessment of sustained intervention impact. Inconsistent reporting of

adverse events and the potential for publication bias raise concerns about the safety profile and potential overestimating specific interventions' efficacy. The lack of standardized pain assessment tools and exploration of patient preferences further highlight areas for improvement in future research. The lack of specific patient characteristics such as parity, timing of the last menstrual period, previous gynecological interventions, and insertion techniques could provide further insights. Moreover, no differences according to IUD type have been reported. Furthermore, the influence of different IUD types on pain and outcomes was not distinguished in our analysis. These factors are critical for comprehending variations in outcomes and warrant exploration in future research. Addressing these limitations is essential for refining pain management strategies during IUD insertion and ensuring patient-centered care.

## 6. Conclusions

In alignment with our findings, the Centers for Disease Control and Prevention (CDC) does not recommend the routine application of Misoprostol for intrauterine device (IUD) placement. It is recommended mainly for individuals with a history of unsuccessful insertions. Nevertheless, the CDC advocates for the use of lidocaine, whether delivered via a paracervical block or as a topical application, to alleviate patient discomfort. [62]

While conscious sedation has shown limited efficacy, local anesthetics, misoprostol, and NSAIDs present promising avenues for pain reduction during IUD insertion. Tailoring interventions based on patient characteristics and further investigation into standardized protocols are essential for optimizing pain management strategies in clinical practice. Additionally, exploring the interplay between reproductive factors and pain perception can provide valuable insights for personalized care during IUD insertion. Further studies should take patients' education into consideration as potential factors to reduce pain.

## 7. Suggestions

Future research is recommended to focus on the standardization of protocols, the conduction of direct comparisons, and the investigation of combination therapies to address existing evidence gaps and improve pain management during the insertion of intrauterine devices (IUDs).

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