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Herbal Medicine for Pediatric Procedural Pain: A Systematic Review Protocol

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - The review has not yet started.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 15 May 2026 and was last updated on 15 May 2026.

INTRODUCTION

Review question / Objective To evaluate the effectiveness of herbal medicine in intervention related pain in pediatric patients.

Rationale Medical procedures are a major source of pain and distress in children and adolescents. Vaccine injections alone contribute substantially to childhood distress, and common diagnostic and therapeutic procedures such as venipuncture, intravenous catheter placement, wound care, and dental extraction are frequently associated with significant acute pain that is often inadequately managed. Younger children, in particular, tend to receive less effective analgesic support 1,2.

The effects of insufficiently treated procedural pain extend beyond the immediate experience. Anticipatory distress during medical procedures is influenced by previous painful experiences, parental distress-promoting behaviors, and child psychopathology, potentially leading to healthcare avoidance and poorer long-term outcomes3. Consequently, current recommendations emphasize combining simple evidence-based strategies to minimize pain and distress whenever painful procedures are unavoidable4.

In this context, complementary and alternative medicine (CAM) approaches have gained increasing attention. A survey of accredited pediatric anesthesia fellowship programs in the United States showed that 86% offered at least one CAM therapy, with some programs also incorporating herbal remedies alongside conventional treatments5. Evidence for non-pharmacological interventions is growing: psychological interventions can reduce needle-related pain and distress6, while virtual reality distraction, vibratory stimulation, and cold devices have shown promising effects during immunizations, blood draws, and other procedures7–9. In infants, interventions such as sucking, positioning, and parental involvement are also effective, although not consistently implemented in routine care10.

Herbal medicines are widely used in pediatric populations for a variety of indications11.

Systematic reviews have examined herbal medicine for gastrointestinal disorders, respiratory tract infections, attention-deficit/hyperactivity disorder, and atopic dermatitis, among others12–15. Overall, these studies indicate growing scientific interest in pediatric herbal medicine, although the quality and quantity of evidence remain heterogeneous. Importantly, none of the existing reviews address procedural or intervention-related pain.

To date, no systematic review has specifically evaluated the efficacy and safety of herbal medicinal products for procedural pain in children and adolescents. This represents an important evidence gap given the high prevalence of procedure-related pain, the limitations of current analgesic strategies, and the widespread use of herbal medicine in pediatric care. The present review aims to systematically synthesize the available evidence on phytotherapeutic interventions for procedural pain in pediatric populations.

Condition being studied The study will focus on herbal medicine for intervention related pain.

METHODS

Search strategy For literature search, search terms were created and modified upon requirements of other databases. As an example, the search term for PubMed is presented:

("Pediatrics"[Mesh] OR "Child"[Mesh] OR "Infant"[Mesh] OR "Adolescent"[Mesh] OR "Pediatric*"[Title/Abstract] OR "Child*"[Title/Abstract] OR "Infant*"[Title/Abstract] OR "Adolescent*"[Title/Abstract]).

AND

("Plants, Medicinal"[Mesh] OR "Herb*"[Title/Abstract] OR Angelica[Mesh] OR Angelica[Title/Abstract] OR Iberogast[Supplementary Concept] OR Iberogast[Title/Abstract] OR "STW 5"[Title/Abstract] OR Pimpinella[Mesh] OR Pimpinella[Title/Abstract] OR Anise[Title/Abstract] OR Arnica[Mesh] OR Arnica[Title/Abstract] OR Retterspitz[Supplementary Concept] OR Euphrasia[Mesh] OR Euphrasia[Title/Abstract] OR Eyebright[Title/Abstract] OR Valeriana[Mesh] OR Valeriana[Title/Abstract] OR Valerian[Title/Abstract] OR Arctostaphylos[Mesh] OR Arctostaphylos[Title/Abstract] OR Bearberr*[Title/Abstract] OR Comfrey[Mesh] OR Comfrey[Title/Abstract] OR Comfrey[Title/Abstract] OR Traumaplant[Supplementary Concept] OR Traumaplant[Title/Abstract] OR Betula [Mesh] OR Betula[Title/Abstract] OR “Menyanthes trifoliate” [Title/Abstract] OR Solanum[Mesh] OR Solanum[Title/Abstract] OR Bittersweet[Title/Abstract] OR "bitter nightshade"[Title/Abstract] OR “Cinnamomum camphora"[Mesh] OR "Cinnamomum camphora"[Title/Abstract] OR camphor[Title/Abstract] OR Cinchona[Mesh] OR Cinchona[Title/Abstract] OR "China bark"[Title/Abstract] OR Hedera[Mesh] OR Hedera[Title/Abstract] OR Ivy[Title/Abstract] OR Bronchipret[Supplementary Concept] OR Bronchipret[Title/Abstract] OR Prospan[Supplementary Concept] OR Prospan[Title/Abstract] OR Althaea[Mesh] OR Althaea[Title/Abstract] OR "Marsh Mallow"[Title/Abstract] OR Imupret[Supplementary Concept] OR Imupret[Title/Abstract] OR Quercus[Mesh] OR Quercus[Title/Abstract] OR "Oak bark"[Title/Abstract] OR Verbena[Mesh] OR Verbena[Title/Abstract] OR Vervain[Title/Abstract] OR Gentiana[Mesh] OR Gentian*[Title/Abstract] OR Sinupret[Supplementary Concept] OR Sinupret[Title/Abstract] OR Eucalyptus[Mesh] OR Eucalyptus[Title/Abstract] OR Pinimenthol[Supplementary Concept] OR Pinimenthol[Title/Abstract] OR Gelomyrtol[Supplementary Concept] OR Gelomyrtol[Title/Abstract] OR Foeniculum[Mesh] OR Foeniculum[Title/Abstract] OR Fennel[Title/Abstract] OR Picea[Mesh] OR Picea[Title/Abstract] OR Spruce[Title/Abstract] OR Psyllium[Mesh] OR Psyllium[Title/Abstract] OR Plantago[Title/Abstract] OR Alchemilla[Mesh] OR Alchemilla[Title/Abstract] OR "Lady's Mantle"[Title/Abstract] OR Eugenia[Mesh] OR Eugenia[Title/Abstract] OR Clove[Title/Abstract] OR Solidago[Mesh] OR Solidag*[Title/Abstract] OR Goldenrod[Title/Abstract] OR Grindelia[Mesh] OR Grindelia[Title/Abstract] OR Gumweed[Title/Abstract] OR Ononis[Title/Abstract] OR Ononidis[Title/Abstract] OR Restharrow[Title/Abstract] OR "Vaccinium myrtillus extract"[Supplementary Concept] OR Vaccinium[Mesh] OR Vaccinium[Title/Abstract] OR Blueberr*[Title/Abstract] OR Capsella[Mesh] OR Capsella[Title/Abstract] OR Cress[Title/Abstract] OR Galeopsis[Title/Abstract] OR "Hemp nettle"[Title/Abstract] OR “Sambucus nigra”[Mesh] OR "Sambucus nigra"[Title/Abstract] OR Sinupret[Supplementary Concept] OR Humulus[Mesh] OR Humulus[Title/Abstract] OR Kytta[Title/Abstract] OR Tussilago[Mesh] OR Tussilago[Title/Abstract] OR Coltsfoot[Title/Abstract] OR Ginger[Mesh] OR Ginger[Title/Abstract] OR Zingiber[Title/Abstract] OR “Cetraria islandica”[Title/Abstract] OR “Icelandic moss”[Title/Abstract] OR Hypericum[Mesh] OR Hypericum[Title/Abstract] OR "St. John's Wort"[Title/Abstract] OR Tropaeolum[Mesh] OR Tropaeolum[Title/Abstract] OR "angocin Anti-Infekt

N"[Supplementary Concept] OR Angocin[Title/Abstract] OR "Anti-Infekt N"[Title/Abstract] OR Nasturtium[Title/Abstract] OR Matricaria[Mesh] OR Matricaria[Title/Abstract] OR Chamomile[Title/Abstract] OR Kamillosan[Supplementary Concept] OR Kamillosan[Title/Abstract] OR Kamillosan Liquidum [Supplementary Concept] OR Kamillosan Liquidum[Title/Abstract] OR Pinus[Mesh] OR Pinus[Title/Abstract] OR Pine[Title/Abstract] OR Coriandrum[Mesh] OR Coriandrum[Title/Abstract] OR Coriander[Title/Abstract] OR Carum[Mesh] OR Carum[Title/Abstract] OR Caraway[Title/Abstract] OR Lavandula[Mesh] OR Lavandula[Title/Abstract] OR Lavender[Title/Abstract] OR Thuja[Mesh] OR Thuja[Title/Abstract] OR Cedar[Title/Abstract] OR Esberitox[Supplementary Concept] OR Esberitox[Title/Abstract] OR Flax[Mesh] OR Flax[Title/Abstract] OR Tilia[Mesh] OR Tilia[Title/Abstract] OR Taraxacum[Mesh] OR Taraxacum[Title/Abstract] OR Dandelion[Title/Abstract] OR "Oenothera biennis"[Mesh] OR "Oenothera biennis"[Title/Abstract] OR "evening primrose"[Title/Abstract] OR Efamol[Supplementary Concept] OR Efamol[Title/Abstract] OR Malva[Mesh] OR Malva[Title/Abstract] OR “Milk Thistle”[Mesh] OR “Milk Thistle”[Title/Abstract] OR Thistle[Title/Abstract] OR Filipendula[Mesh] OR Filipendula[Title/Abstract] OR meadowsweet[Title/Abstract] OR Armoracia[Mesh] OR Armoracia[Title/Abstract] OR horseradish[Title/Abstract] OR Melissa[Mesh] OR Melissa[Title/Abstract] OR Commiphora[Mesh] OR Commiphora[Title/Abstract] OR myrrh[Title/Abstract] OR Myrtus[Mesh] OR Myrtus[Title/Abstract] OR Agrimonia[Mesh] OR Agrimonia[Title/Abstract] OR Orthosiphon[Mesh] OR Orthosiphon[Title/Abstract] OR Passiflora[Mesh] OR Passiflora[Title/Abstract] OR "Mentha piperita"[Mesh] OR "Mentha piperita"[Title/Abstract] OR peppermint[Title/Abstract] OR Pelargonium[Mesh] OR Pelargonium[Title/Abstract] OR "Balsanum Peruvianum"[Title/Abstract] OR "Balsam of Peru"[Title/Abstract] OR Citrus[Mesh] OR Citrus[Title/Abstract] OR "bitter orange"[Title/Abstract] OR Primula[Mesh] OR Primula[Title/Abstract] OR cowslip[Title/Abstract] OR "Thymus serpyllum"[Title/Abstract] OR "Wild Thyme"[Title/Abstract] OR Rheum[Mesh] OR "Rheum palmatum"[Title/Abstract] OR "Rhei radix"[Title/Abstract] OR Pieplant[Title/Abstract] OR "pyralvex berna"[Supplementary Concept] OR "pyralvex berna"[Title/Abstract] OR Calendula[Mesh] OR Calendula[Title/Abstract] OR Rosmarinus[Mesh] OR Rosmarinus[Title/Abstract] OR Rosemary[Title/Abstract] OR "Salvia officinalis"[Mesh] OR “Salvia officinalis”[Title/Abstract] OR Salvia[Title/Abstract] OR Sage[Title/Abstract] OR Rumex[Mesh] OR Rumex[Title/Abstract] OR Sorrel[Title/Abstract] OR Achillea[Mesh] OR Achillea[Title/Abstract] OR Yarrow[Title/Abstract] OR Equisetum[Mesh] OR Equisetum[Title/Abstract] OR horsetail[Title/Abstract] OR "Iberis amara"[Title/Abstract] OR "Bitter Candytuft"[Title/Abstract] OR Chelidonium[Mesh] OR Chelidonium[Title/Abstract] OR celandine[Title/Abstract] OR Echinacea[Mesh] OR Echinacea[Title/Abstract] OR echinacin[Supplementary Concept] OR echinacin[Title/Abstract] OR Drosera[Mesh] OR Drosera[Title/Abstract] OR sundew[Title/Abstract] OR "Plantago lanceolata"[Title/Abstract] OR Ribwort[Title/Abstract] OR "Viola tricolor"[Title/Abstract] OR Heartsease[Title/Abstract] OR Glycyrrhiza[Mesh] OR Glycyrrhiza[Title/Abstract] OR liquorice[Title/Abstract] OR Centaurium[Mesh] OR Centaurium[Title/Abstract] OR centaury[Title/Abstract] OR Melaleuca[Mesh] OR Melaleuca[Title/Abstract] OR "Thymus Plant"[Mesh] OR "Thymus Plant"[Title/Abstract] OR thyme[Title/Abstract] OR "Balsanum tolutanum"[Title/Abstract] OR "Tolu balsam"[Title/Abstract] OR Potentilla[Mesh] OR Potentilla[Title/Abstract] OR "Xysmalobium undulatum"[Title/Abstract] OR "Milk bush"[Title/Abstract] OR Milkwort[Title/Abstract] OR “Artemisia absinthium”[Mesh] OR “Artemisia absinthium”[Title/Abstract] OR Artemisia[Title/Abstract] OR wormwood[Title/Abstract] OR Salix[Mesh] OR Salix[Title/Abstract] OR Assalix[Supplementary Concept] OR Assalix[Title/Abstract] OR "willow bark"[Title/Abstract] OR Triticum[Mesh] OR Triticum[Title/Abstract] OR Verbascum[Mesh] OR Verbascum[Title/Abstract] OR mullein[Title/Abstract] OR Hamamelis[Mesh] OR Hamamelis[Title/Abstract] OR "Witch hazel"[Title/Abstract] OR “Cinnamomum zeylanicum”[Mesh] OR “Cinnamomum zeylanicum” [Title/Abstract] OR Cinnamon[Title/Abstract] OR Garlic[Mesh] OR Garlic*[Title/Abstract] OR “Allium sativum”[Title/Abstract] OR “Ginkgo biloba”[Mesh] OR “Ginkgo biloba”[Title/Abstract] OR “Vaccinium macrocarpon”[Mesh] OR “Vaccinium macrocarpon”[Title/Abstract]).

Participant or population Pediatric population aged from 0 to 18 years, with no restrictions regarding gender and ethnicity.

Intervention This review will include only studies investigating the treatment with herbal medicine. Traditional Chinese, Korean, Indian, and Kampo medicine will be excluded due to their frequently unclear compositions and the potential risk of heavy metal contamination. Furthermore, studies examining highly diluted herbal preparations will also be excluded.

Comparator 1. placebo 2. active control options (e.g. other herbs; treatment as usual).

Study designs to be included Only randomizedcontrolled trials will be considered for inclusion.

Eligibility criteria Inclusion:
- Age group 0-18 years
- topical or systemic herbal medicine

Exclusion:
- traditional Chinese medicine
- traditional Indian medicine
- traditional Korean medicine
- traditional Kampo medicine
- highly diluted / homeopathic preparations.

Information sources Electronic databases (cochrane, scopus, pubmed), contact with authors, trial registers.

Main outcome(s) Pain intensity.

Additional outcome(s) Safety.

Data management A reference management software (e.g., Zotero) will be used to organize the literature and document the study selection process. Titles and abstracts will first be screened independently by two reviewers, followed by full-text assessment of potentially eligible studies. Any disagreements will be resolved through discussion, and, if necessary, by consultation with a third reviewer until consensus is reached.

Data extraction will be performed using Microsoft Excel, while statistical analyses will be conducted in R and RStudio.

Quality assessment / Risk of bias analysis Risk of bias will be assessed using the Cochrane Risk of Bias 2 (RoB 2) tool. Two reviewers will independently evaluate all included studies. Discrepancies will be resolved through discussion and, if required, by consultation with a third reviewer until consensus is achieved.

Strategy of data synthesis If at least two studies report on the same outcome, a meta-analysis will be performed. For continuous outcomes, standardized mean differences (SMDs) with 95% confidence intervals (CIs) will be calculated using Hedges' g to account for small sample sizes 16,17. When standard deviations are not directly reported, they will be derived from available standard errors, confidence intervals, or t values. For dichotomous outcomes, odds ratios (ORs) with 95 % CIs will be calculated 16,17 Missing data will be requested from study authors whenever possible.
Random-effects models will be applied throughout, using the inverse variance method for continuous outcomes and the Mantel–Haenszel method for dichotomous outcomes 18 In cases of non-significant heterogeneity, fixed-effect estimates will additionally be presented in the forest plots to facilitate comparison. The Hartung–Knapp adjustment for small sample sizes will also be applied 19.
Statistical heterogeneity will be assessed using the I^2 and τ^2 statistics. Where substantial heterogeneity is identified, subgroup analyses and, if at least 10 studies are available, meta-regression analyses will be conducted to explore potential sources of heterogeneity 16–18.

Subgroup analysis Not planned.

Sensitivity analysis Sensitivity analyses will be conducted for studies with high risk of bias versus low risk of bias in respective domains.

Language restriction Englishand German.

Country(ies) involved Germany.

Keywords complementary medicine, integrative medicine, pediatrics, herbal medicine, systematicreview, children, adolescents, intervention related pain, pain.

Dissemination plans The review is intended to be published in a peer reviewed scientific journal.
Results of this review will be presented at scientific congresses.

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References
1. A. Taddio, M. Appleton, R. Bortolussi, et al. Reducing the pain of childhood vaccination: an evidence-based clinical practice guideline. Canadian Medical Association Journal. 2010;182(18):E843-E855
2. Stefan J. Friedrichsdorf, Liesbet Goubert. Pediatric pain treatment and prevention for hospitalized children. PAIN Reports. 2020;5(1):e804
3. Nicole M. Racine, Rebecca R. Pillai Riddell, Maria Khan, Masa Calic, Anna Taddio, Paula Tablon. Systematic Review: Predisposing, Precipitating, Perpetuating, and Present Factors

Predicting Anticipatory Distress to Painful Medical Procedures in Children. Journal of Pediatric Psychology. 2015;41(2):159-181
4. Evelyne D Trottier, Marie-Joëlle Doré-Bergeron, Laurel Chauvin-Kimoff, Krista Baerg, Samina Ali. Managing pain and distress in children undergoing brief diagnostic and therapeutic procedures. Paediatrics & Child Health. 2019;24(8):509-521
5. Yuan-Chi Lin, Anne C. C. Lee, Kathi J. Kemper, Charles B. Berde. Use of Complementary and Alternative Medicine in Pediatric Pain Management Service: A Survey: Table 1. Pain Medicine. 2005;6(6):452-458
6. Kathryn A Birnie, Melanie Noel, Christine T Chambers, Lindsay S Uman, Jennifer A Parker. Psychological interventions for needle-related procedural pain and distress in children and adolescents. Cochrane Database Syst. Rev. 2018;2020(10)
7. Ariane Ballard, Christelle Khadra, Samara Adler, Evelyne D. Trottier, Sylvie Le May. Efficacy of the Buzzy Device for Pain Management During Needle-related Procedures. The Clinical Journal of Pain. 2019;35(6):532-543
8. Shingo Ueki, Yuki Yamagami, Kiyoko Makimoto. Effectiveness of vibratory stimulation on needle-related procedural pain in children: a systematic review. JBI Database of Systematic Reviews and Implementation Reports. 2019;17(7):1428-1463
9. Robin Eijlers, Elisabeth M. W. J. Utens, Lonneke M. Staals, et al. Systematic Review and Meta-analysis of Virtual Reality in Pediatrics: Effects on Pain and Anxiety. Anesthesia & Analgesia. 2019;129(5):1344-1353
10. Rebecca R Pillai Riddell, Nicole M Racine, Hannah G Gennis, et al. Non-pharmacological management of infant and young child procedural pain. Cochrane Database Syst. Rev. 2015;2017(7)
11. Karen Nieber, Esther Raskopf, Johanna Möller, et al. Pharmaco-epidemiological