

The Influence of Common Cold Massage Combined with Lavender Oil on Sleep Quality in Toddlers with Acute Respiratory Infections: A One-Group Pretest-Posttest Study

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Abstract: Background: Acute respiratory infections (ARI) are common in young children and may disrupt sleep through respiratory symptoms and discomfort. Massage and aromatherapy have been investigated as complementary approaches, but evidence specific to toddlers with ARI remains limited. Objective: To evaluate the change in sleep quality before and after common cold massage combined with lavender oil in toddlers with ARI. Methods: A quantitative pre-experimental one-group pretest-posttest study was conducted at the Independent Midwifery Practice of Farida Rina, Kebumen, Central Java, from February to March 2025. Twenty eligible participants were recruited using total sampling. Sleep quality was assessed before and after the intervention using the Brief Infant Sleep Questionnaire (BISQ), and paired change was analyzed using the Wilcoxon signed-rank test. Results: Before the intervention, 19 participants (95%) had mild sleep problems and 1 (5%) had no sleep problem. After the intervention, 1 participant (5%) had a mild sleep problem and 19 (95%) had no sleep problem. The Wilcoxon signed-rank test indicated a statistically significant pre-post change ($Z = -4.123$, $p < 0.001$; effect size $r = 0.92$). Conclusion: Sleep quality improved substantially after the intervention in this sample. However, because the study had no control group and involved a small single-site sample, the observed improvement cannot be attributed exclusively to common cold massage combined with lavender oil. The findings should therefore be regarded as preliminary and hypothesis-generating.

Keywords: acute respiratory infections; common cold massage; lavender oil; sleep quality; toddlers

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Introduction

Acute respiratory infections (ARI) are a major cause of illness among children under five and can interfere with sleep through cough, nasal symptoms, discomfort, and repeated nighttime awakenings. Adequate sleep is important for physical growth, neurodevelopment, emotional regulation, and daytime functioning. Consequently, sleep disturbance during an acute respiratory illness is clinically relevant, particularly in toddlers who depend on caregivers for symptom management. Indonesian studies have also explored massage as a complementary approach for children with ARI and sleep problems (Umah & Samiasih, 2022). The 2023 Indonesian Health Survey reported a medically recorded ARI prevalence of 4.8% among children under five nationally, while Central Java reported a prevalence of 6.7% (Kementerian Kesehatan RI, 2023; Dinas Kesehatan Provinsi Jawa Tengah, 2023). These data demonstrate the continuing public-health relevance of ARI in early childhood. However, disease prevalence does not establish the effectiveness of a complementary intervention. Intervention studies therefore require transparent descriptions of participant selection, intervention delivery, outcome measurement, and potential sources of bias.

For children with non-pneumonia ARI, supportive management is generally focused on symptom relief and maintaining comfort. Complementary approaches such as massage have been investigated in pediatric populations. An umbrella review of systematic reviews found potential benefits of pediatric massage for several outcomes in children under five but also reported substantial variation in methodological quality and emphasized the need for better-designed studies and more complete reporting of safety and intervention characteristics (Chen et al., 2024).

Massage may promote relaxation through tactile stimulation, whereas lavender oil is used in aromatherapy because of its proposed calming effects. Nevertheless, the biological plausibility of an intervention does not establish clinical effectiveness. The combined intervention should therefore be evaluated using a reproducible protocol, a

clearly defined outcome measure, and an analysis appropriate for paired observations. In a one-group pretest-posttest study, any observed improvement may also reflect the natural course of ARI, regression to the mean, caregiver behavior, concurrent treatment, or other time-related factors.

The specific evidence gap addressed by this study is the observed change in sleep quality among toddlers with ARI following a combined common cold massage and lavender-oil intervention in a primary-care midwifery setting. Previous reports have examined pediatric massage or massage combined with other oils, but the evidence remains heterogeneous and does not establish whether the present combined intervention has a causal effect on sleep. The current study therefore aims to provide preliminary empirical data while explicitly accounting for the limitations of its non-comparative design.

The study was conducted at PMB Farida Rina Purwanti in Ori Village, Kuwarasan District, Kebumen Regency. Preliminary data from January to November 2024 indicated that 368 toddlers visited the facility, including 219 with ARI symptoms, with an average of 19 ARI cases per month. These local data provided the practical rationale for evaluating a complementary approach to sleep-related symptoms in children with ARI. Based on this background, this study aimed to evaluate the change in sleep quality before and after common cold massage combined with lavender oil among children with ARI and to determine whether the paired change was statistically significant. The prespecified analytical hypothesis was that sleep-quality scores would differ between the pre-intervention and post-intervention assessments.

Method

This quantitative study used a pre-experimental one-group pretest-posttest design. The study was conducted at the Independent Midwifery Practice (TPMB) of Farida Rina in Ori Village, Kuwarasan District, Kebumen Regency, Central Java, from February to March 2025. The population comprised children with ARI who attended the practice during the study period. Total sampling was used, and 20 participants who met the reported eligibility criteria were included. The eligibility criteria were non-pneumonia cough, parental willingness to participate, and no known allergy to lavender oil; high fever and skin disease were exclusion criteria. The participant table contains one child in the 36–47-month category; because an earlier version of the manuscript specified an upper age limit of 36 months, the age eligibility and source record should be verified before submission. The independent variable was the combined common cold massage and lavender-oil intervention, and the primary outcome was sleep quality. Sleep quality was assessed with the Brief Infant Sleep Questionnaire (BISQ). The original manuscript reports validity coefficients of 0.41–0.88 and reliability of 0.82; these values should be linked to the specific validation study and the exact BISQ version used. The assessment schedule, scoring procedure, and category cut-offs should also be stated explicitly in the final submission. The intervention was documented using an observation sheet. Because the source manuscript does not provide sufficient information on massage sequence, duration per session, oil concentration, application method, treatment fidelity, or adverse-event monitoring, these parameters must be verified from the intervention record and added before submission; they should not be inferred retrospectively. Descriptive statistics were used to summarize participant characteristics and sleep-quality categories. The Wilcoxon signed-rank test was selected because the pre- and post-intervention observations were paired and the outcome was analyzed as an ordinal/non-normally distributed measure. The test statistic (Z), two-sided p -value, and effect size r were reported. Statistical significance was set at $p < 0.05$. The study received approval from the Research Ethics Committee of Universitas Muhammadiyah Gombong, and informed consent was obtained from the parents or legal guardians of all participants. The manuscript should include the formal ethics approval number if required by the target journal. Reporting was strengthened with reference to the TREND principles for transparent reporting of nonrandomized intervention evaluations.

Results and Discussion

Participant characteristics were summarized by sex, age group, ARI type, and massage exposure during the three-day intervention period. All 20 participants were retained for the pre-post analysis, and no missing outcome observations were reported.

Table 1. Participant Characteristics (n = 20)

Number	Gender	Frequency	Percentage (%)
1.	Male	15	75%
2.	Female	5	25%
	Total	20	100%
No	Age group	Frequency	Percentage (%)
1.	12–23 months	18	90%
2.	24–35 months	1	5%
3.	36–47 months	1	5%
	Total	20	100%
No	Type of ARI	Frequency	Percentage (%)
1.	Cough without pneumonia	20	100%
2.	Pneumonia cough	0	0%
	Total	20	100%
No	Common cold massage frequency	Frequency	Percentage (%)
1.	Received on 3 consecutive days	12	60%
2.	Not received on 3 consecutive days	8	40%
	Total	20	100%

Table 1 shows that 15 participants (75%) were male and 5 (25%) were female. Eighteen participants (90%) were aged 12–23 months, one (5%) was aged 24–35 months, and one (5%) was aged 36–47 months. All participants were classified as having cough without pneumonia. During the three-day intervention period, 12 participants (60%) received the massage on three consecutive days, whereas 8 (40%) did not receive it on all three consecutive days. The latter finding indicates variation in intervention exposure and should be considered when interpreting the pre-post result. The reason for incomplete three-day exposure and whether all participants received at least one session should be reported from the intervention log before submission.

Table 2. Sleep-Quality Categories Before and After the Intervention (n = 20)

No.	Sleep-quality category	Pre-test		Post-test	
		Frequency	Percentage	Frequency	Percentage
1.	Marked sleep problems (1–5)	0	0%	0	0%
2.	Mild sleep problems (6–10)	19	95%	1	5%
3.	No sleep problems (11–15)	1	5%	19	95%
	Total	20	100%	20	100%

Table 3. Wilcoxon Signed-Rank Test for Pre- and Post-Intervention Sleep-Quality Scores

Outcome	N	Z	p-value
Sleep-quality pre-test vs post-test	20	-4.123	<0.001

Table 2 demonstrates a marked shift in sleep-quality categories after the intervention. Before the intervention, 19 participants (95%) had mild sleep problems and 1 (5%) had no sleep problem. After the intervention, 1 participant (5%) had a mild sleep problem and 19 (95%) had no sleep problem. No participant was classified as having marked sleep problems at either assessment. These descriptive findings indicate improvement in the distribution of sleep-quality categories, but they do not by themselves establish that the intervention caused the change.

The observed improvement should be interpreted in relation to the study design. All participants received the intervention and there was no untreated or usual-care comparison group. Therefore, the change may reflect the intervention, spontaneous improvement as the ARI resolved, regression to the mean, changes in caregiver practices, concurrent treatment, or other factors occurring during the three-day observation period. This limitation is particularly important because acute respiratory symptoms can improve over time.

From a clinical perspective, improved sleep may be meaningful for children experiencing respiratory discomfort. However, statistical significance and clinical importance are distinct concepts. The current study demonstrates a statistically significant paired change, but it does not establish the minimum clinically important difference in sleep quality or the independent contribution of lavender oil versus massage. Future controlled studies should prespecify a clinically interpretable primary outcome and measure relevant ARI symptoms concurrently.

The BISQ is an established caregiver-reported screening instrument for infant and toddler sleep. The original validation study demonstrated associations with sleep-diary and actigraphic measures and reported strong test-retest correlations for key measures (Sadeh, 2004). Subsequent work has also evaluated the BISQ in different populations (Del-Ponte et al., 2020). For reproducibility, the present manuscript should identify the exact BISQ version, language/translation used, scoring algorithm, cut-off definitions, and timing of administration. If the reported validity range of 0.41–0.88 and reliability coefficient of 0.82 were obtained from a local validation study, that source should be cited directly rather than presenting the values without provenance.

Association between the combined intervention and change in sleep quality

Table 3 shows a statistically significant paired difference in sleep-quality scores ($Z = -4.123$, $p < 0.001$). The effect size calculated from the Wilcoxon statistic was large ($r = 0.92$). The p-value is reported as <0.001 rather than 0.000 because a probability value of exactly zero is not an appropriate presentation of statistical results. The result supports the presence of a substantial pre-post change in this sample, but the effect size should not be interpreted as a causal treatment effect in the absence of a comparator group.

The present finding is compatible with the broader pediatric massage literature, but the evidence should be interpreted cautiously. An umbrella review of systematic reviews found benefits of pediatric massage for several outcomes in children under five, while also identifying variability in methodological quality and calling for more rigorous primary studies (Chen et al., 2024). The earlier study by Nurul et al. (2019) specifically examined baby massage with common cold massage oil in toddlers with ARI and included sleep quality among its outcomes. These studies provide contextual support for investigating massage in children with respiratory illness, but neither establishes that the lavender-oil component independently accounts for the improvement observed here.

Several limitations affect the internal and external validity of the present findings. First, the sample was small ($n = 20$) and drawn from a single practice using total sampling, limiting statistical precision and generalizability. Second, the one-group pretest-posttest design lacks a comparator and is vulnerable to history, maturation, regression to the mean, and spontaneous recovery. Third, the intervention was a combination treatment, so the independent effects of massage and lavender oil cannot be separated. Fourth, intervention exposure was not uniform: only 12 participants were reported to receive massage on all three consecutive days, and the reasons for incomplete exposure are not provided. Fifth, the outcome was caregiver-reported, which may introduce reporting and expectation bias. Sixth, the manuscript currently lacks sufficient information on the intervention protocol, including the massage sequence, session duration, lavender-oil concentration and application method, adherence/fidelity assessment, and adverse-event monitoring. These elements should be verified and reported before submission. Finally, no confidence interval or individual-level change distribution is available in the source manuscript, limiting assessment of precision. Future research should use a randomized or controlled design, define the intervention in sufficient detail for replication, monitor adherence and safety, and report effect estimates with measures of uncertainty.

Conclusion

In this single-site sample of 20 children with ARI, sleep quality improved from 19 participants (95%) with mild sleep problems before the intervention to 19 participants (95%) with no sleep problems after the intervention. The Wilcoxon signed-rank test indicated a statistically significant paired change ($Z = -4.123$, $p < 0.001$; $r = 0.92$). These findings support an association between the intervention period and improved sleep quality, but they do not demonstrate a definitive causal effect of common cold massage combined with lavender oil. Confirmation requires adequately powered controlled studies with standardized intervention protocols, complete reporting of adherence and adverse events, and validated outcome assessment.

Declaration of Generative AI

This manuscript was authored entirely independently by the researchers without relying on any generative AI platforms. No automated content-generation tools were utilized during the drafting or editing process.

Authors' Contribution

All authors contributed equally to the design, execution, and analysis of this study. Each author participated in drafting the text and approved the final manuscript for publication.

Conflict of Interests Statement

The authors affirm that they have no financial or personal relationships that could inappropriately influence this work. There are no competing interests to declare regarding the publication of this article.

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Data Availability

The datasets generated and analyzed during the current study are not publicly deposited due to privacy considerations. They are available from the corresponding author upon reasonable request.

Informed Consent

Prior to enrollment, written informed consent was obtained from all individual participants in the study. All procedures complied with the ethical standards of the institutional research committee.

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