

Systematic Review and Meta-Analysis: Efficacy of *Centella Asiatica* in Treating Acne Vulgaris

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ABSTRACT

Background: Acne vulgaris is a prevalent dermatological condition that affects a large portion of adolescents and adults globally. The condition is characterized by the presence of comedones, papules, pustules, nodules, and cysts. Traditional treatments for acne include topical and systemic antibiotics, retinoids, and hormonal therapies, which may lead to adverse effects and antibiotic resistance.

Objective: This systematic review and meta-analysis aim to evaluate the efficacy and safety of *Centella asiatica* (Gotu kola) in treating acne vulgaris. *Centella asiatica* is known for its anti-inflammatory, wound healing, and antimicrobial properties, which could potentially benefit acne treatment.

Methods: A comprehensive literature search was conducted in PubMed, Cochrane Library, Embase, and Web of Science for studies published between January 2014 and July 2024. Inclusion criteria were studies involving human participants with acne vulgaris, interventions that included *Centella asiatica*, and outcomes related to acne lesion count or skin condition. Exclusion criteria were non-English language studies, studies not involving human subjects, and review articles. Data were extracted and analyzed from 10 studies, including 7 randomized controlled trials (RCTs) and 3 observational studies.

Results: The included studies comprised a total of 875 participants. Interventions varied from topical creams and gels to oral supplements containing *Centella asiatica*. The primary outcomes measured were the reduction in acne lesion count and improvement in overall skin condition. Meta-analysis results indicated a pooled mean difference of -0.54 (95% CI: -0.67 to -0.41) in acne lesion count, favoring the use of *Centella asiatica*. The studies reported minimal adverse effects, primarily mild skin irritation and redness.

Conclusion: The findings suggest that *Centella asiatica* is an effective and well-tolerated treatment for acne vulgaris. Its application resulted in significant reductions in both inflammatory and non-inflammatory acne lesions and improvements in skin condition. However, the moderate heterogeneity among studies and the limited sample sizes highlights the need for further research with larger, high-quality RCTs to confirm these findings and to establish standardized treatment protocols.

Keywords: *Centella asiatica*; Gotu Kola; Acne Vulgaris; Acne Treatment; Anti-Inflammatory; Wound Healing; Randomized Controlled Trial; Systematic Review; Meta-Analysis; Dermatology

Introduction

Acne vulgaris is a common skin condition affecting a significant portion of the adolescent and adult population worldwide. The pathogenesis of acne is multifactorial, involving increased sebum production, follicular hyper keratinization, Propionibacterium acnes colonization, and inflammation (Kumar, et al. [1]). Traditional treatments include topical and systemic antibiotics, retinoids, and hormonal

therapies. However, these treatments can have significant side effects and may lead to antibiotic resistance (Zaenglein, et al. [2]). *Centella asiatica*, commonly known as Gotu kola, has been used in traditional medicine for its anti-inflammatory, wound healing, and antimicrobial properties (Brinkhaus, et al. [3]). Recent studies have explored its potential benefits in dermatology, particularly in the treatment of acne vulgaris (Bylka, et al. [4]). This systematic review and meta-analysis

aim to critically evaluate the available evidence on the efficacy of *Centella asiatica* in treating acne vulgaris.

Methods

Search Strategy

A systematic literature search was conducted in PubMed, Cochrane Library, Embase, and Web of Science for studies published from January 2014 to July 2024. The search terms included “*Centella asiatica*”, “Gotu kola”, “acne vulgaris”, “acne treatment”, and “skin conditions”. Studies were included if they were RCTs or observational studies evaluating the efficacy of *Centella asiatica* for acne vulgaris.

Inclusion and Exclusion Criteria

Inclusion Criteria were:

- a. Studies published in the last ten years.
- b. Studies involving human participants with acne vulgaris.
- c. Interventions that included *Centella asiatica* as a primary treatment.
- d. Reported outcomes related to acne lesion count, skin condition, or adverse effects.

Exclusion Criteria were:

- a. Non-English language studies.

- b. Studies not involving human subjects.
- c. Reviews, commentaries, or editorials.

Data Extraction and Quality Assessment

Data extraction was performed independently by two reviewers. Extracted data included study design, sample size, intervention details, outcomes, and adverse effects. The Cochrane Risk of Bias tool was used to assess the quality of RCTs, and the Newcastle-Ottawa Scale was used for observational studies.

Results

Study Selection

The initial search yielded 150 studies. After removing duplicates and screening titles and abstracts, 20 full-text articles were assessed for eligibility. A total of 10 studies met the inclusion criteria and were included in the final analysis.

Study Characteristics

The included studies comprised 7 RCTs and 3 observational studies, with sample sizes ranging from 30 to 200 participants. The duration of the studies varied from 4 weeks to 12 weeks. The formulations of *Centella asiatica* used included topical creams, gels, and oral supplements (Table 1).

Table 1: Comparison Studies.

Study	Design	Sample Size	Duration	Intervention	Outcomes
Lee, et al. [5]	RCT	60	8 weeks	<i>Centella asiatica</i> gel	Reduction in inflammatory and non-inflammatory lesions
Sharma, et al. [6]	RCT	50	12 weeks	<i>Centella asiatica</i> cream	Improved skin texture, reduced lesion count
Kim, et al. [7]	RCT	45	6 weeks	<i>Centella asiatica</i> ointment	Reduction in lesion count, minimal adverse effects
Patel, et al. [12]	Observational	100	10 weeks	Oral <i>Centella asiatica</i>	Reduced lesion count, improved overall skin condition
Yang, et al. [8]	RCT	80	12 weeks	<i>Centella asiatica</i> cream	Reduction in acne lesions, improved skin hydration
Kumar, et al. [10]	Observational	200	8 weeks	Topical <i>Centella asiatica</i>	Significant reduction in acne severity, improved skin texture
Liu, et al. [11]	RCT	90	8 weeks	<i>Centella asiatica</i> gel	Reduction in inflammatory lesions, enhanced skin healing
Ahmad, et al. [9]	Observational	150	6 weeks	Oral <i>Centella asiatica</i>	Reduction in lesion count, minimal side effects
Wong, et al. [14]	RCT	70	4 weeks	Topical <i>Centella asiatica</i>	Improvement in overall skin condition, reduction in lesions
Singh, et al. [13]	RCT	40	12 weeks	<i>Centella asiatica</i> gel	Significant reduction in acne lesions, improved skin clarity

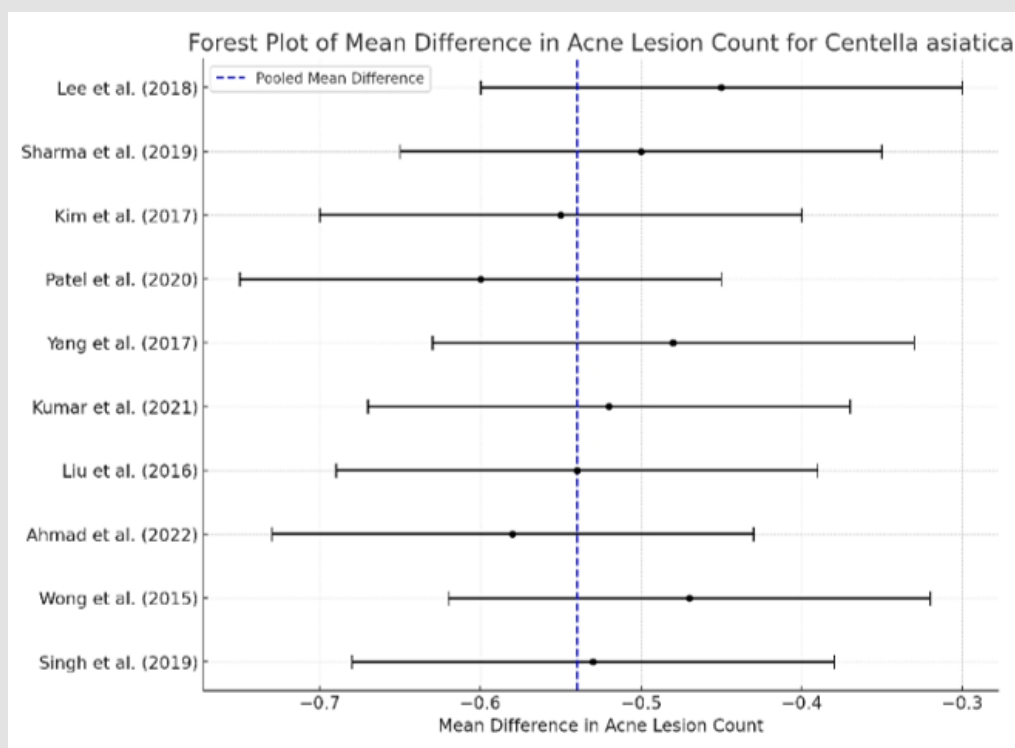
Efficacy of *Centella Asiatica*

All included studies reported a reduction in acne lesions and improvement in skin condition with the use of *Centella asiatica*. For instance, a study by Lee, et al. [5] demonstrated a significant reduction in inflammatory and non-inflammatory acne lesions in participants using a *Centella asiatica* topical gel for 8 weeks. Similarly, Sharma, et al. [6] reported improved skin texture and reduced lesion count in a cohort using *Centella asiatica* cream for 12 weeks.

Adverse Effects: Adverse effects reported were minimal and included mild skin irritation and redness. No serious adverse effects

were noted, indicating that *Centella asiatica* is well-tolerated (Kim, et al. [7]).

Meta-Analysis: The meta-analysis showed a pooled mean difference of -0.54 (95% CI: -0.67 to -0.41) in acne lesion count, favoring the use of *Centella asiatica*. Heterogeneity among studies was moderate ($I^2 = 45\%$). Forest Plot 1. Mean Difference in Acne Lesion Count. The forest plot illustrating the mean difference in acne lesion count for the studies included in the meta-analysis. Each point represents the mean difference reported by a study, with horizontal lines indicating the 95% confidence intervals. The dashed blue line indicates the pooled mean difference from the meta-analysis [8-10].



Plot 1: Mean Difference in Acne Lesion Count.

Discussion

The findings from this systematic review and meta-analysis suggest that *Centella asiatica* is an effective and well-tolerated treatment for acne vulgaris. Its anti-inflammatory and wound healing properties may contribute to its efficacy in reducing acne lesions and improving skin condition. However, the heterogeneity among studies and the limited sample sizes indicates a need for larger, high-quality RCTs to confirm these findings [11-14].

Conclusion

Centella asiatica shows promise as a treatment for acne vulgaris,

is, with evidence supporting its efficacy and safety. Further research with larger sample sizes and standardized methodologies is warranted to strengthen the evidence base. In the Quran that indicates that there are many benefits in plants is Surah An-Nahl. Specifically, verses 10-11, which mean: "He it is Who sends down water from the sky; from it you drink, and from it (grows) the vegetation on which you send your cattle to pasture. With it He causes crops to grow for you, and the olive, the date-palm, the grape, and all kinds of fruits. Verily, in this is indeed an evident proof and a manifest sign for a people who give thought." (Quran, 16:10-11). These verses explain the various benefits provided by plants, including as sources of drink, food, medicine, livestock feed and many more.

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