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INPLASY

Topical Centella asiatica–Containing Formulations for Postlaser Skin Recovery: A Systematic Review of Randomized Controlled Trials

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Preliminary searches.

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 31 October 2026 and was last updated on 31 October 2026.

INTRODUCTION

Review question / Objective This systematic review aims to evaluate the efficacy and safety of topical formulations containing Centella asiatica or its active constituents for skin recovery following dermatologic laser procedures.

The review question is: Among patients undergoing ablative or nonablative dermatologic laser procedures (P), do topical Centella asiatica–containing formulations (I), compared with placebo, vehicle, standard care, no additional treatment, or other active topical treatments without Centella asiatica constituents (C), improve postlaser erythema, skin barrier function, and wound healing time (O)?

Secondary outcomes include skin hydration, postprocedural symptoms, postinflammatory hyperpigmentation, and adverse events. Only randomized controlled trials, including parallel-group and split-face designs, will be included (S).

Condition being studied Dermatologic laser procedures, including ablative and nonablative laser treatments, are widely used for various cutaneous conditions and cosmetic indications. These procedures may induce transient skin injury, resulting in erythema, impaired skin barrier function, edema, crusting, discomfort, and postinflammatory hyperpigmentation. Topical formulations containing Centella asiatica or its active constituents, such as asiaticoside and madecassoside, have been investigated for their potential anti-inflammatory, skin barrier–restoring, and wound-healing effects. However, their clinical efficacy and safety in promoting postlaser skin recovery remain uncertain.

METHODS

Participant or population Patients undergoing dermatologic laser procedures, including ablative and nonablative laser treatments, for any cutaneous condition or cosmetic indication. Participants of any age or sex will be eligible, without restrictions on underlying skin conditions,

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Fitzpatrick skin phototype, or laser modality. Studies must evaluate skin recovery following laser treatment.

Intervention Topical formulations containing Centella asiatica, its standardized extracts, or active constituents (e.g., asiaticoside, madecassoside, asiatic acid, and madecassic acid), administered following dermatologic laser procedures. Eligible interventions may contain these ingredients alone or in combination with other active ingredients, regardless of formulation type, concentration, application frequency, or treatment duration.

Comparator Eligible comparators will include placebo, vehicle, standard postprocedural care, no additional treatment, or other active topical treatments that do not contain Centella asiatica or its active constituents.

Study designs to be included Randomized controlled trials (RCTs), including parallel-group and split-face randomized designs, will be included. Nonrandomized studies, observational studies, case reports, case series, reviews, animal studies, and in vitro studies will be excluded.

Eligibility criteria Studies published in English from database inception to November 1, 2026, will be eligible. Only original, peer-reviewed randomized controlled trials evaluating topical Centella asiatica–containing formulations for skin recovery following dermatologic laser procedures will be included. Studies involving ablative or nonablative laser treatments will be eligible regardless of laser modality, treatment indication, or follow-up duration.Studies involving nonlaser procedures, including intense pulsed light (IPL) alone, will be excluded. Studies evaluating Centella asiatica as a comparator to laser treatment rather than as a postlaser intervention will also be excluded. Conference abstracts without sufficient methodological or outcome data, non-peer-reviewed publications, and studies without extractable relevant outcomes will be excluded.

Information sources A systematic literature search will be conducted in PubMed/MEDLINE, Scopus, and Web of Science Core Collection from database inception to November 1, 2026. Additional relevant studies will be identified through backward and forward citation searching of included articles and relevant reviews. Reference lists will be screened manually, and corresponding authors will be contacted when necessary to clarify study eligibility or obtain missing data.

Main outcome(s) The primary outcomes will be (1) postlaser erythema, assessed by erythema index, clinical severity scores, or duration; (2) skin barrier function, assessed by transepidermal water loss (TEWL); and (3) wound healing time, assessed by time to complete re-epithelialization or clinical wound healing, where applicable.

Outcomes will be evaluated at early (days 1–7), intermediate (days 8–14), and late (beyond day 14) follow-up periods, as reported in the included studies.

For continuous outcomes, treatment effects will be expressed as mean differences (MDs) or standardized mean differences (SMDs) with 95% confidence intervals (CIs). For dichotomous outcomes, risk ratios (RRs) with 95% CIs will be calculated where appropriate. Time-to-event outcomes will be summarized using hazard ratios (HRs) when available, or descriptively if appropriate effect estimates cannot be obtained. Split-face trial data will be analyzed using methods that account for within-participant correlations.

Quality assessment / Risk of bias analysis Two reviewers will independently assess the risk of bias in included randomized controlled trials using the Cochrane Risk of Bias 2 (RoB 2) tool. Five domains will be evaluated: (1) bias arising from the randomization process, (2) bias due to deviations from intended interventions, (3) bias due to missing outcome data, (4) bias in measurement of outcomes, and (5) bias in selection of the reported result. Each assessed outcome will be classified as having low risk of bias, some concerns, or high risk of bias. For split-face trials, the paired design and potential within-participant effects will be considered. Disagreements will be resolved through discussion or consultation with a third reviewer. Risk-of-bias assessments will inform the interpretation of findings.

Strategy of data synthesis A systematic review and narrative synthesis will be conducted to summarize the characteristics and findings of included randomized controlled trials. Studies will be grouped according to laser modality (ablative or nonablative), intervention type (single-ingredient or multi-ingredient Centella asiatica–containing formulations), and comparator.

Where studies are sufficiently comparable in terms of interventions, comparators, outcomes, and assessment time points, a meta-analysis will be considered using a random-effects model. Continuous outcomes will be summarized using mean differences (MDs) or standardized mean

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differences (SMDs), and dichotomous outcomes using risk ratios (RRs), with 95% confidence intervals (CIs). Statistical heterogeneity will be assessed using the I^2 statistic and between-study variance (τ^2). Split-face trials will be analyzed using methods that account for within-participant correlations.

Outcomes will be synthesized according to early (days 1–7), intermediate (days 8–14), and late (beyond day 14) follow-up periods, where data permit. Subgroup analyses by laser modality and formulation type will be considered if sufficient studies are available.

If quantitative pooling is inappropriate because of clinical or methodological heterogeneity or insufficient data, findings will be summarized narratively, with study-specific effect estimates and 95% CIs where available. The certainty of evidence for primary outcomes will be assessed using the GRADE approach.

Subgroup analysis Subgroup analyses will be considered according to (1) laser modality (ablative versus nonablative) and (2) intervention type (formulations containing Centella asiatica or its active constituents alone versus multi-ingredient formulations). Differences in treatment effects across subgroups will be explored descriptively or statistically, where sufficient comparable studies are available. Given the anticipated small number of included trials, subgroup analyses will be considered exploratory and conducted only when supported by adequate data.

Sensitivity analysis Sensitivity analyses will be performed if meta-analysis is feasible and sufficient studies are available. These analyses will include (1) excluding studies judged to be at high risk of bias using the Cochrane RoB 2 tool and (2) assessing the impact of assumptions regarding within-participant correlations in split-face randomized trials when paired data are incomplete. The robustness of pooled estimates will be evaluated by comparing the results of sensitivity analyses with those of the primary analyses. If quantitative synthesis is not feasible, the potential influence of studies at high risk of bias will be considered narratively.

Language restriction English.

Country(ies) involved Thailand.

Keywords Centella asiatica; Madecassoside; Asiaticoside; Laser resurfacing; Postlaser skin recovery; Wound healing; Skin barrier function; Randomized controlled trials; Systematic review.

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