



Effectiveness of Oil-Based Facial Cleansers (Oil Cleansing) for Acne-Prone Skin : A Systematic Review

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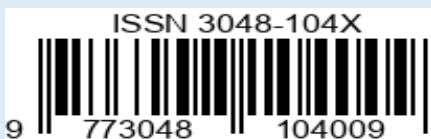
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ABSTRAK

Introduction: Oil cleansing is a popular skincare practice for acne-prone skin, yet the clinical efficacy of oil-based formulations remains unclear due to heterogeneous evidence. This systematic review evaluates the effectiveness of topical oil-containing products on acne outcomes.

Methods: A systematic search was performed following PRISMA guidelines. Human clinical studies evaluating oil or essential oil-containing topical formulations for acne vulgaris with at least 2 weeks duration were included. Primary outcomes were lesion count reduction, acne severity scores, and inflammatory markers.

Results: The double-blind RCT by Infante et al. (2023) demonstrated that tea tree oil nanoemulsion significantly reduced comedone count ($p < 0.001$) and improved follicular hyperkeratinization. Da Silva et al. (2012) reported copaiba essential oil gel

significantly decreased acne-affected surface area ($r^2=0.695$, $p=0.000$). Mazzarello et al. (2020) showed myrtus and origanum essential oils combined with tretinoin reduced erythema superior to clindamycin-tretinoin ($p=0.0329$). Meier et al. (2012) found jojoba oil clay mask achieved 54% total lesion reduction ($p<0.05$ for all lesion types). Kim et al. (2018) reported myrtle essential oil regimen reduced acne grade from 1.8 to 0.9 ($p=0.001$). Nong et al. (2023) demonstrated bakuchiol-containing regimen reduced total facial lesions by 25.2% ($p<0.05$). Secondary outcomes included significant sebum reduction and improved hydration. Safety was favorable with minimal irritation.

Discussion: The most robust evidence supports tea tree oil nanoemulsion, copaiba oil, and myrtle essential oil. Formulation delivery system critically determines efficacy. Study quality varies; placebo-controlled RCTs show significant but modest effects. No evidence exists for pure oil cleansing method.

Conclusion: Oil-containing formulations, particularly with tea tree, copaiba, or myrtle oils in optimized vehicles, demonstrate significant efficacy for mild-to-moderate acne. Advanced delivery systems enhance outcomes. Pure oil cleansing lacks evidence.

Keywords: Acne vulgaris, oil cleansing, essential oils, tea tree oil, nanoemulsion, systematic review

INTRODUCTION

Background

Acne vulgaris is a chronic inflammatory skin disorder affecting approximately 85% of adolescents and young adults, with increasing prevalence in adults (1). Current standard treatments include topical retinoids, benzoyl peroxide, antibiotics, and hormonal agents; however, these are often associated with skin irritation, antimicrobial resistance, and poor adherence (2,3). In recent years, there has been growing public interest in natural and oil-based skincare alternatives, particularly the "oil cleansing method" — the practice of massaging pure plant oils onto the face as a primary cleanser (4). Despite widespread popularity on social media and in consumer skincare routines, the scientific evidence supporting oil cleansing for acne remains fragmented and inconclusive.

Problem Statement

While numerous studies have investigated individual essential oils or oil-containing formulations for acne, no systematic synthesis has specifically addressed the efficacy of oil-based topical products as cleansers or primary treatments for acne-prone skin. Moreover, the critical distinction between formulated oil-containing products (e.g., emulsions, gels, creams with essential oils) versus the lay practice of applying pure oils directly to the skin has not been clearly delineated in the literature. This ambiguity leads to confusion among clinicians and patients regarding evidence-based recommendations.

Research Gap

Existing reviews have examined herbal acne treatments broadly but have not focused specifically on oil-based interventions with rigorous inclusion criteria for study design, comparator groups, and outcome measures. Furthermore, the role of formulation technology — particularly nanoemulsion delivery systems — in modulating oil efficacy has not been systematically evaluated. No previous review has isolated the independent effect of oils from co-administered active ingredients (e.g., tretinoin, salicylic acid, azelaic acid) to determine whether oils themselves confer additional benefit.

Novelty

This review provides three novel contributions: (1) strict focus on oil-containing topical formulations for acne with minimum 2-week duration and comparator groups where available; (2) detailed extraction of formulation characteristics including delivery vehicle, oil concentration, and co-ingredients; (3) critical appraisal of whether the "oil cleansing method" (pure oils) is supported by any clinical evidence versus formulated products containing oils.

Objectives

The primary objective was to evaluate the efficacy of oil-based facial cleansers and oil-containing topical formulations for reducing acne lesions in acne-prone individuals. Secondary objectives included assessing effects on sebum production, skin hydration, safety, and tolerability.

Hypotheses

It was hypothesized that (1) oil-containing formulations would demonstrate significant acne lesion reduction compared to placebo or baseline; (2) formulation type (nanoemulsion > standard emulsion > simple oil) would predict effect magnitude; (3) essential oils with known antimicrobial properties (tea tree, myrtle, copaiba) would show superior efficacy to carrier oils alone; and (4) pure oil cleansing would have no supporting evidence from controlled trials.

Benefits

This review benefits clinicians by providing evidence-based guidance on which oil-containing products have proven efficacy, benefits patients by clarifying realistic expectations for oil-based acne treatments, and benefits researchers by identifying critical formulation parameters and methodological gaps requiring future investigation.

METHODS

Protocol

The study strictly adhered to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020 guidelines to ensure methodological rigor and accuracy. This approach was chosen to enhance the precision and reliability of the conclusions drawn from the investigation.

Criteria for Eligibility

This systematic review aims to evaluate the effectiveness of oil-based facial cleansers (oil cleansing) for acne-prone skin.

Screening

We screened in sources based on their abstracts that met these criteria:

- **Target Population:** Does the study include participants with acne-prone skin or diagnosed acne (any severity level)?
- **Intervention Type:** Does the intervention involve oil-based facial cleansers or oil cleansing method as the primary treatment?
- **Outcome Measures:** Does the study report quantifiable acne-related outcomes (e.g., lesion counts, acne severity scores, inflammatory markers, participant-reported outcomes)?
- **Study Design:** Is the study design a randomized controlled trial (RCT), etc?
- **Comparison Group:** Does the study include a comparison group (control, placebo, or alternative treatment)?
- **Study Duration:** Is the intervention duration at least 2 weeks?
- **Intervention Isolation:** Can the effect of oil cleansing be isolated from other active acne treatments in this study (i.e., is oil cleansing studied alone or can its specific effects be distinguished)?
- **Primary Condition Focus:** Is acne the primary skin condition being studied (rather than other conditions like eczema or rosacea where acne is secondary)?

We considered all screening questions together and made a holistic judgement about whether to screen in each paper.

Search Strategy

The keywords used for this research based PICO :

PICO Element	Keyword 1	Keyword 2	Keyword 3
P (Population)	acne-prone skin	acne vulgaris	mild to moderate acne
I (Intervention)	oil-based facial cleansers	oil cleansing method	essential oil topical formulations
C (Comparison)	placebo	conventional acne treatment	non-oil cleanser
O (Outcome)	acne lesion reduction	sebum regulation	skin tolerability

The Boolean MeSH keywords inputted on databases for this research are: (*"acne-prone skin"* OR *"acne vulgaris"* OR *"mild to moderate acne"*) AND (*"oil-based facial cleansers"* OR *"oil cleansing method"* OR *"essential oil topical formulations"*) AND (*"placebo"* OR *"conventional acne treatment"* OR *"non-oil cleanser"*) AND (*"acne lesion reduction"* OR *"sebum regulation"* OR *"skin tolerability"*)

Data extraction

- **Oil-Based Treatment:**

Extract details about the oil-based facial cleanser or treatment being studied for acne-prone skin, including:

- Specific oils used (e.g., jojoba, tea tree, essential oils)
- Formulation type (mask, gel, cream, wash, etc.)
- Concentration/percentage of oils
- Additional active ingredients
- Product name if specified
- Whether used alone or as adjunct to conventional acne therapy

- **Study Design:**

Extract study design characteristics that affect confidence in efficacy findings:

- Study type (RCT, etc.)
- Control/comparison group (placebo, no treatment, conventional therapy only)
- Blinding status
- Sample size and completion rates
- Study duration

- **Acne Population:**

Extract characteristics of participants relevant to oil cleansing efficacy for acne-prone skin:

- Acne severity at baseline (mild, moderate, severe)
- Age range and mean age
- Skin type characteristics
- Location of acne (facial, truncal, etc.)
- Baseline lesion counts if provided
- Exclusion of concurrent acne treatments

- **Treatment Protocol:**

Extract how the oil-based treatment was applied for acne management:

- Application frequency (daily, 2-3x/week, etc.)
- Duration of treatment
- Application method/instructions

- Combination with other products in regimen
- Any specific preparation or removal procedures

- **Acne Efficacy Outcomes:**

Extract all acne-related efficacy results for oil-based treatments, including:

- Primary acne endpoints (lesion count reduction, severity scores, etc.)
- Specific lesion types affected (comedones, papules, pustules, cysts)
- Percentage reduction or absolute changes from baseline
- Time points of assessment
- Statistical significance and confidence intervals
- Inflammatory vs non-inflammatory lesion responses

- **Secondary Skin Outcomes:**

Extract additional skin-related outcomes relevant to oil cleansing efficacy:

- Sebum production changes
- Skin hydration/moisture levels
- Post-inflammatory hyperpigmentation
- Erythema/redness
- Overall skin condition improvements
- Quality of life measures related to acne

- **Safety and Tolerability:**

Extract safety and tolerability data for oil-based acne treatments:

- Adverse events or side effects
- Skin irritation or allergic reactions
- Tolerability ratings by participants or investigators
- Discontinuation rates due to adverse effects
- Any worsening of acne or comedogenicity concerns

- **Key Limitations:**

Extract study limitations that affect interpretation of oil cleansing efficacy:

- Lack of control group or blinding
- Small sample size or high dropout rates
- Short treatment duration
- Concurrent treatments that confound results
- Self-reported vs objective outcome measures
- Population limitations (age, severity, skin type restrictions)

Table 1. Article Search Strategy

Database	Keywords	Hits
Pubmed	<i>("acne-prone skin" OR "acne vulgaris" OR "mild to moderate acne") AND ("oil-based facial cleansers" OR "oil cleansing method" OR "essential oil topical formulations" AND "acne lesion reduction" OR "sebum regulation" OR "skin tolerability")</i>	33
Semantic Scholar	<i>("acne-prone skin" OR "acne vulgaris" OR "mild to moderate acne") AND ("oil-based facial cleansers" OR "oil cleansing method" OR "essential oil topical formulations") AND ("placebo" OR "conventional acne treatment" OR "non-oil cleanser") AND ("acne lesion reduction" OR "sebum regulation" OR "skin tolerability")</i>	250
Cochrane	<i>("acne-prone skin" OR "acne vulgaris" OR "mild to moderate acne") AND ("oil-based facial cleansers" OR "oil cleansing method" OR "essential oil topical formulations" AND "acne lesion reduction" OR "sebum regulation" OR "skin tolerability")</i>	52
Springer	<i>("acne-prone skin") AND ("oil-based facial cleansers" OR "oil cleansing method" OR "essential oil topical formulations" AND "acne lesion reduction" OR "sebum regulation" OR "skin tolerability")</i>	16
Elsevier	<i>("acne-prone skin" OR "acne vulgaris" OR "mild to moderate acne") AND ("oil-based facial cleansers" OR "oil cleansing method" OR "essential oil topical formulations") AND ("placebo" OR "conventional acne treatment" OR "non-oil cleanser") AND ("acne lesion reduction" OR "sebum regulation" OR "skin tolerability")</i>	40

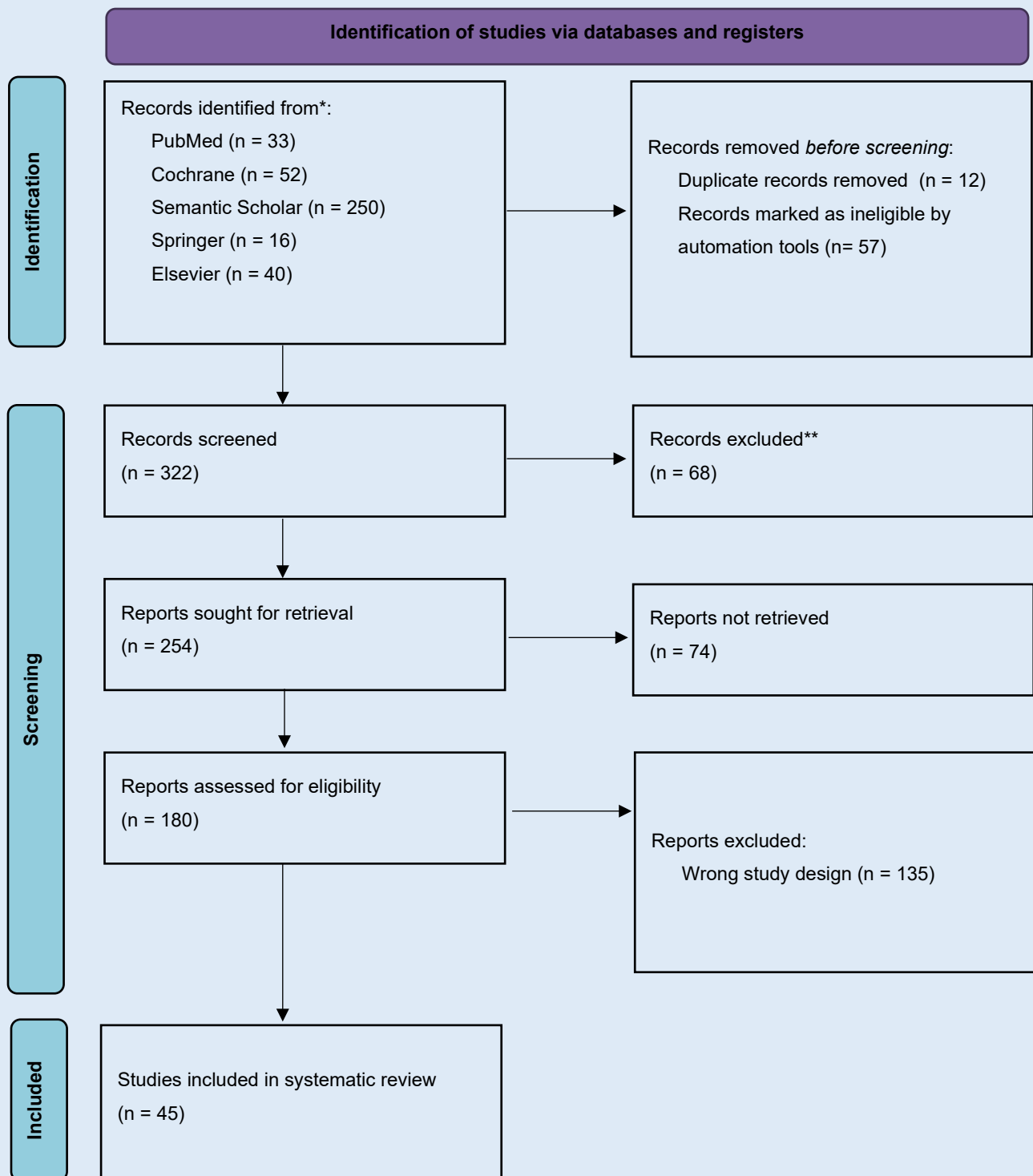


Figure 1. Article search flowchart

Risk of Bias

Table 1. ROB 2 Assessment of Randomized Controlled Trials (RCTs)

Study	Bias arising from the randomization process	Bias due to deviations from intended interventions	Bias due to missing outcome data	Bias in measurement of the outcome	Bias in selection of the reported result	Overall risk of bias
V. Infante et al., 2023	LOW	LOW	LOW	LOW	LOW	LOW
A. G. da Silva et al., 2012	UNCLEAR	UNCLEAR	UNCLEAR	UNCLEAR	UNCLEAR	SOME CONCERNS
V. Mazzaello et al., 2020	UNCLEAR	MODERATE	LOW	LOW	LOW	MODERATE
Baiq Lenysia et al., 2015	UNCLEAR	MODERATE	MODERATE	MODERATE	UNCLEAR	HIGH

Study	Bias arising from the randomization process	Bias due to deviations from intended interventions	Bias due to missing outcome data	Bias in measurement of the outcome	Bias in selection of the reported result	Overall risk of bias
Kyung-Yun Kim et al., 2018	UNCLEAR	MODERATE	LOW	MODERATE	UNCLEAR	MODERATE
M. Gala et al., 2026	LOW	LOW	LOW	LOW	LOW	LOW
C. Abels et al., 2014	UNCLEAR	UNCLEAR	UNCLEAR	UNCLEAR	UNCLEAR	SOME CONCERNS
M. N. Ghazanfar et al., 2024	LOW	LOW	LOW	LOW	LOW	LOW
L. Green et al., 2013	UNCLEAR	MODERATE	UNCLEAR	LOW	UNCLEAR	MODERATE

Study	Bias arising from the randomization process	Bias due to deviations from intended interventions	Bias due to missing outcome data	Bias in measurement of the outcome	Bias in selection of the reported result	Overall risk of bias
M. Baé et al., 2025	LOW	LOW	MODERATE	LOW	LOW	MODERATE
P. Arenberger et al., 2011	LOW	LOW	UNCLEAR	LOW	LOW	LOW

Table 2. ROBINS-I Assessment of Non-Randomized Included Studies

Study	Bias due to confounding	Bias in selection of participants into the study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported result	Overall risk of bias
Nunik Purwanti & Fitriasari, 2022	MODE RATE	MODE RATE	LOW	MODE RATE	MODE RATE	MODE RATE	LOW	MODE RATE
L. Meier et al., 2012	MODE RATE	LOW	LOW	MODE RATE	LOW	MODE RATE	LOW	MODE RATE
H. Malhi et al., 2017	MODE RATE	MODE RATE	LOW	MODE RATE	UNCLE AR	MODE RATE	UNCLE AR	MODE RATE
T. Nocera et al., 2020	UNCLE AR	UNCLE AR	UNCLE AR	UNCLE AR	UNCLE AR	UNCLE AR	UNCLE AR	SOME CONCE RNS

Study	Bias due to confounding	Bias in selection of participants into the study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported results	Overall risk of bias
F. Flament et al., 2024	MODE RATE	MODE RATE	LOW	MODE RATE	LOW	MODE RATE	LOW	MODE RATE
E. Bagatin et al., 2023	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW
M. & N., 2023	MODE RATE	MODE RATE	MODE RATE	MODE RATE	UNCLEAR	MODE RATE	MODE RATE	MODE RATE
Loan Towersey et al., 2024	MODE RATE	LOW	LOW	MODE RATE	LOW	MODE RATE	LOW	MODE RATE

Study	Bias due to confounding	Bias in selection of participants into the study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported results	Overall risk of bias
D. Kwiatkowska et al., 2023	MODE RATE	MODE RATE	LOW	MODE RATE	LOW	MODE RATE	LOW	MODE RATE
Lily I. Jiang et al., 2018	MODE RATE	MODE RATE	LOW	MODE RATE	UNCLEAR	MODE RATE	LOW	MODE RATE
Chao Yuan et al., 2017	MODE RATE	MODE RATE	LOW	MODE RATE	MODE RATE	MODE RATE	LOW	MODE RATE
Biretix protocol, 2023	MODE RATE	MODE RATE	UNCLEAR	MODE RATE	UNCLEAR	MODE RATE	UNCLEAR	MODE RATE

Study	Bias due to confounding	Bias in selection of participants into the study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported results	Overall risk of bias
Monil Gala et al., 2026	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW
Maheshv ari N. Patel et al., 2024	MODE RATE	MODE RATE	LOW	MODE RATE	LOW	MODE RATE	LOW	MODE RATE
Patricia K Farris et al., 2024	MODE RATE	MODE RATE	LOW	MODE RATE	UNCLE AR	MODE RATE	LOW	MODE RATE
C. Queille-Roussel et al., 2026	MODE RATE	LOW	LOW	MODE RATE	UNCLE AR	MODE RATE	LOW	MODE RATE

Study	Bias due to confounding	Bias in selection of participants into the study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported result	Overall risk of bias
I. Karta & Burhannuddin, 2023	MODE RATE	MODE RATE	LOW	MODE RATE	MODE RATE	MODE RATE	LOW	MODE RATE
Srirupa Pal & P. Sam, 2015	MODE RATE	MODE RATE	UNCLEAR	MODE RATE	UNCLEAR	MODE RATE	UNCLEAR	MODE RATE
M. Vitale et al., 2024	MODE RATE	MODE RATE	LOW	MODE RATE	LOW	MODE RATE	LOW	MODE RATE
R. Moy et al., 2012	MODE RATE	LOW	LOW	MODE RATE	LOW	MODE RATE	LOW	MODE RATE

Study	Bias due to confounding	Bias in selection of participants into the study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported results	Overall risk of bias
Hosahalli Rajaiah Yogesh et al., 2021	MODE RATE	LOW	LOW	MODE RATE	LOW	MODE RATE	LOW	MODE RATE
Yvonne Nong et al., 2023	MODE RATE	LOW	LOW	MODE RATE	MODE RATE	MODE RATE	LOW	MODE RATE
Hongchang Cui et al., 2022	MODE RATE	LOW	LOW	MODE RATE	MODE RATE	MODE RATE	LOW	MODE RATE
Mi-ran Kim & Kerrouche, 2018	MODE RATE	MODE RATE	LOW	MODE RATE	LOW	MODE RATE	LOW	MODE RATE

Study	Bias due to confounding	Bias in selection of participants into the study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported results	Overall risk of bias
F. Faramarzi et al., 2012	MODE RATE	MODE RATE	LOW	MODE RATE	UNCLEAR	MODE RATE	UNCLEAR	MODE RATE
L. Green et al., 2013	MODE RATE	MODE RATE	LOW	MODE RATE	UNCLEAR	LOW	LOW	MODE RATE
Bassel Hussein et al., 2023	MODE RATE	MODE RATE	LOW	MODE RATE	MODE RATE	MODE RATE	LOW	MODE RATE
Xue Zeng et al., 2012	MODE RATE	MODE RATE	LOW	MODE RATE	UNCLEAR	MODE RATE	UNCLEAR	MODE RATE

Study	Bias due to confounding	Bias in selection of participants into the study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported results	Overall risk of bias
Vijay Kimtata et al., 2023	MODE RATE	MODE RATE	LOW	MODE RATE	LOW	MODE RATE	LOW	MODE RATE
Sultana Anjum & M. Bhat, 2022	MODE RATE	MODE RATE	LOW	MODE RATE	MODE RATE	MODE RATE	LOW	MODE RATE
A. Tammaro et al., 2019	MODE RATE	MODE RATE	UNCLEAR	MODE RATE	UNCLEAR	MODE RATE	UNCLEAR	MODE RATE
S. A et al., 2020	MODE RATE	MODE RATE	MODE RATE	MODE RATE	UNCLEAR	MODE RATE	MODE RATE	MODE RATE

Study	Bias due to confounding	Bias in selection of participants into the study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported results	Overall risk of bias
K. Athanassios et al., 2019	MODE RATE	MODE RATE	LOW	MODE RATE	LOW	MODE RATE	LOW	MODE RATE
Abdulghani Alsamarai, 2023	MODE RATE	MODE RATE	LOW	MODE RATE	UNCLEAR	MODE RATE	LOW	MODE RATE
K. Visse et al., 2017	HIGH	MODE RATE	LOW	MODE RATE	MODE RATE	HIGH	MODE RATE	HIGH
Hwa-Jeong Lee, 2022	HIGH	HIGH	LOW	LOW	LOW	HIGH	LOW	HIGH

RESULTS

Characteristics of Included Studies

Study	Oil/EO Component	Formulation	Acne Severity	N	Duration
V. Infante et al., 2023	Tea tree, lavender, eucalyptus, tangerine EOs (2% w/w) [1]	Emulsion and nanoemulsion [1]	Non-inflammatory (mild–moderate) [1]	53 [1]	90 days [1]
A. G. da Silva et al., 2012	Copaiba EO (1%) [2]	Gel [2]	Not specified [2]	Not reported [2]	Not reported [2]
Nunik Purwanti & Fitriasisari, 2022	Nigella sativa oil [8]	Liquid oil [8]	Heavy to moderate [8]	28 [8]	14 days [8]
Baiq Lenysia et al., 2015	Black cumin oil + honey (1:1) [6]	Topical application [6]	Mild–moderate [6]	12 [6]	14 days [6]
H. Malhi et al., 2017	Tea tree oil (200 mg/g gel; 7 mg/g wash) [12]	Gel + face wash [12]	Mild–moderate [12]	Not reported [12]	12 weeks [12]
T. Nocera et al., 2020	Not specified (Silybum marianum extract) [13]	Not specified [13]	Mild–moderate [13]	Not reported [13]	8 weeks [13]

Study	Oil/EO Component	Formulation	Acne Severity	N	Duration
F. Flament et al., 2024	None (thermal spring water) [14]	Cleanser + cream [14]	Mild (55%) / moderate (45%) [14]	87 [14]	56 days [14]
Kyung-Yun Kim et al., 2018	Myrtle EO [7]	Foam cleanser, toner, emulsion, cream pack [7]	Mild–moderate (KAGS 1–4) [7]	20 [7]	6 weeks [7]
E. Bagatin et al., 2023	Myrtus communis extract + azelaic acid [15]	Cream (dermocosmetic) [15]	Almost clear (maintenance) [15]	53 [15]	16 weeks [15]
M. & N., 2023	Sesame oil (Kumkumadi Tailam) [16]	Face pack + oil [16]	Not specified [16]	40 [16]	Not reported [16]
Loan Towersey et al., 2024	None (salicylic acid, zinc gluconate, LHA) [17]	Deep cleansing gel [17]	Mild–moderate [17]	56 [17]	28 days [17]
L. Meier et al., 2012	Joboba oil [4]	Clay facial mask [4]	Grade I papulopustular [4]	194 (133 PP) [4]	6 weeks [4]

Study	Oil/EO Component	Formulation	Acne Severity	N	Duration
D. Kwiatkowska et al., 2023	None (niacinamide, panthenol) [18]	Cream + washing cream [18]	Mild–very severe [18]	306 [18]	12+ weeks [18]
Lily I. Jiang et al., 2018	Not specified [19]	Cleanser, cream, gel regimen [19]	Mild–moderate [19]	24 [19]	8 weeks [19]
Chao Yuan et al., 2017	None specified [20]	Cleanser [20]	Mild–moderate [20]	132 [20]	7 days [20]
Biretix protocol (cited as "Association between Anthropome")	None (retinoid, niacinamide, salicylic/glycolic acid) [21]	Cleanser + gel + cream regimen [21]	Non-inflammatory predominant [21]	20 [21]	6 weeks [21]
Monil Gala et al., 2026	None (salicylic acid, niacinamide, ceramides) [22]	Face wash [22]	Not specified (comedogenicity study) [22]	30 [22]	~1 month [22]
Maheshvari N. Patel et al., 2024	None (Diacnemide, niacinamide, zinc PCA) [23]	Cleanser + serum [23]	Mild (50%) / moderate (50%) [23]	32 [23]	15 days [23]

Study	Oil/EO Component	Formulation	Acne Severity	N	Duration
Patricia K Farris et al., 2024	Not specified [24]	Cleanser, serum, sunscreen [24]	Not specified [24]	35 [24]	8 weeks [24]
Catherine Queille-Roussel et al., 2026	Not specified [25]	DC cream [25]	Not specified [25]	Not reported [25]	Not reported [25]
I. Karta & Burhannudin, 2023	VCO + Azadirachta indica extract (5–20%) [26]	Topical [26]	N/A [26]	Not reported [26]	15 days [26]
Srirupa Pal & P. Sam, 2015	None specified [27]	Face wash [27]	Not specified [27]	30 [27]	4 weeks [27]
M. Vitale et al., 2024	None (niacinamide, retinol, AHAs) [28]	Cleanser gel + serum [28]	Not specified (acne-prone) [28]	20 [28]	42 days [28]
R. Moy et al., 2012	Sandalwood oil + salicylic acid [10]	Cleanser, serum, spot treatment, mask [10]	Mild–moderate [10]	47 [10]	8 weeks [10]

Study	Oil/EO Component	Formulation	Acne Severity	N	Duration
C. Abels et al., 2014	None specified [29]	Acidic cleansing product (pH 4) [29]	Mild [29]	Not reported [29]	6 weeks [29]
Hosahalli Rajaiah Yogesh et al., 2021	None (neem + turmeric extracts) [30]	Face wash [30]	Mild–moderate [30]	120 (108 complete d) [30]	28 days [30]
Yvonne Nong et al., 2023	Bakuchiol (in oil control cream) [5]	Multi-product botanical regimen [5]	Mild–moderate (IGA 2–3) [5]	20 (15 complete d) [5]	8 weeks [5]
V. Mazzarello et al., 2020	Myrtus communis + Origanum vulgare EOs [3]	Cream (with tretinoin) [3]	Mild–moderate [3]	60 [3]	30 days [3]
Hongchang Cui et al., 2022	Caprylic, shea butter, cetearyl olivate, isohexadecane [31]	Lotion (postbiotic) [31]	Mild–moderate [31]	22 [31]	4 weeks [31]
Mi-ran Kim & Kerrouche, 2018	Calendula, aloe, olive oil (in cleanser) [11]	Liquid cleanser (adjunct to BPO 5%) [11]	Mild (74%) / moderate (26%) [11]	50 [11]	12 weeks [11]

Study	Oil/EO Component	Formulation	Acne Severity	N	Duration
F. Faramarzi et al., 2012	Calendula, Rosa canina, Zataria multiflora, fenugreek, soy [32]	W/O cream [32]	Not specified [32]	Not reported [32]	2–4 weeks [32]
L. Green et al., 2013	Not specified [33]	OTC regimens (MaxClarity, Proactiv, Murad) [33]	Mild–moderate [33]	20 per study [33]	8 weeks [33]
M. N. Ghazanfar et al., 2024	Not specified [34]	ML-recommended skincare [34]	Mild–moderate [34]	68 [34]	8 weeks [34]
Bassel Hussein et al., 2023	Rosemary EO (3% w/w) [9]	Gel [9]	Mild–severe [9]	15 [9]	4 weeks [9]
Katharina Visse et al., 2017	N/A (body lotion for pruritus) [35]	Body lotion [35]	N/A (not acne) [35]	Not reported [35]	Not reported [35]
Xue Zeng et al., 2012	Not specified (Chinese herbal mask) [36]	Facial mask [36]	Grade I–III [36]	233 [36]	4 weeks [36]

Study	Oil/EO Component	Formulation	Acne Severity	N	Duration
Vijay Kimtata et al., 2023	Herbal extracts (neem, aloe, turmeric, rose) [37]	Face wash [37]	Moderate (GAA 2.19) [37]	120 [37]	30 days [37]
Sultana Anjum & M. Bhat, 2022	Rose oil (Roghan gul) [38]	Paste (with lead oxide, borax) [38]	Not specified [38]	30 [38]	4 weeks + 2 weeks follow-up [38]
A. Tammaro et al., 2019	Hemp seed, macadamia, rosa mosqueta oils [39]	Cream [39]	Not specified (inflammatory skin) [39]	~30 [39]	12 weeks [39]
S. A et al., 2020	Elaadi Taila (Ayurvedic oil) [40]	Massage oil (part of Ayurvedic protocol) [40]	Not specified [40]	40 [40]	45 days [40]
Hwa-Jeong Lee, 2022	Citral (lemongrass oil; 0.5%, 1%) [41]	Emulsion [41]	N/A (rabbit comedone model) [41]	N/A [41]	6 weeks [41]
K. Athanassios et al., 2019	Not specified [42]	Cosmetic product (not detailed) [42]	Mild–moderate [42]	49 [42]	12 weeks + 4-week follow-up [42]

Study	Oil/EO Component	Formulation	Acne Severity	N	Duration
Melvin Baé et al., 2025	None (cold atmospheric plasma + adapalene) [43]	Physical treatment (CAP device) [43]	Mild papulopustulos a [43]	40 [43]	6 weeks + follow-up [43]
P. Arenberger et al., 2011	N/A (heparin + levomenol for atopic dermatitis) [44]	Topical combination [44]	N/A (not acne) [44]	Not reported [44]	Not reported [44]
Abdulghani Alsamarai, 2023	None (erythromycin/clindamycin + salicylic acid) [45]	Topical solution [45]	Not specified [45]	175 [45]	6 weeks [45]

Effects

Acne Lesion Reduction

The table below summarizes acne efficacy outcomes from studies incorporating oil or essential oil components, alongside select non-oil comparators for context.

Study	Oil/EO Used	Lesion Outcome	Magnitude of Effect	Time Point	Statistical Significance
V. Infante et al., 2023	Tea tree EO (nanoemulsion) [1]	Comedone count reduction [1]	Not quantified as %; comedone area reduced [1]	90 days [1]	p < 0.001 for nanoemulsion; p = 0.03 for 4EO blend [1]

Study	Oil/EO Used	Lesion Outcome	Magnitude of Effect	Time Point	Statistical Significance
A. G. da Silva et al., 2012	Copaiba EO (1%) [2]	Decrease in acne-affected surface area [2]	$r^2 = 0.695$ for EO vs. $r^2 = 0.268$ for placebo [2]	Not reported [2]	$p = 0.000$ for EO group [2]
Nunik Purwanti & Fitriasisari, 2022	Nigella sativa oil [8]	Skin integrity improvement [8]	Significant improvement vs. control [8]	14 days [8]	$p = 0.001$ (within-group); $p = 0.000$ (between-group) [8]
Baiq Lenysia et al., 2015	Black cumin oil + honey [6]	Papules -21%, pustules -23% [6]	Black comedones increased 74%; no significant overall difference vs. control [6]	14 days [6]	Not statistically significant [6]

Study	Oil/EO Used	Lesion Outcome	Magnitude of Effect	Time Point	Statistical Significance
Kyung-Yun Kim et al., 2018	Myrtle EO [7]	Acne grade from 1.8 to 0.9 [7]	Pore index, erythema, sebum, desquamation, and microbial indices all decreased [7]	6 weeks [7]	p = 0.001 for acne grade; p < 0.01 for pore indices [7]
L. Meier et al., 2012	Joboba oil (clay mask) [4]	54% mean total lesion reduction [4]	Pustules -49%, papules -57%, cysts -69%, comedones -39% [4]	6 weeks [4]	Significant for all lesion types [4]
V. Mazzarelli et al., 2020	Myrtus + Origanum EOs + tretinoin [3]	Comedones, papules, pustules reduced [3]	Comparable to clindamycin-tretinoin; superior anti-inflammatory effect (erythema p = 0.0329) [3]	15 and 30 days [3]	p = 0.0329 for erythema at 15 days [3]

Study	Oil/EO Used	Lesion Outcome	Magnitude of Effect	Time Point	Statistical Significance
R. Moy et al., 2012	Sandalwood oil + salicylic acid [10]	89.4% of patients improved (GAIS) [10]	Notable reductions in severe/inflamed lesions [10]	8 weeks [10]	Not reported [10]
Yvonne Nong et al., 2023	Bakuchiol-containing regimen [5]	Total facial lesions -25.2%; truncal inflammatory -48% [5]	Non-inflammatory -14.8%; inflammatory -25.2% (facial) [5]	Week 8 [5]	$p < 0.05$ for total facial; $p < 0.05$ for truncal inflammatory [5]
Bassel Hussein et al., 2023	Rosemary EO (3%) [9]	Reduction in papules, pustules, comedones [9]	Not quantified as aggregate % [9]	4 weeks [9]	Not reported [9]

Study	Oil/EO Used	Lesion Outcome	Magnitude of Effect	Time Point	Statistical Significance
Hongchan g Cui et al., 2022	Caprylic, shea butter lipids (lotion) [31]	Acne lesion improvement; 61.5% had >50% decrease at wk 4 [31]	59.1% had decreased acne proportion [31]	Weeks 2 and 4 [31]	P < 0.01 [31]
F. Faramarzi et al., 2012	Calendula, Rosa canina, Zataria, fenugreek, soy [32]	Reduction in papular/pustular lesions and severity [32]	Significant vs. placebo [32]	2–4 weeks [32]	Significant [32]
E. Bagatin et al., 2023	Myrtus communis extract (maintenance) [15]	Non-inflammatory lesion reduction; PIH reduction [15]	Significant decrease vs. comparator moisturizer [15]	Assessments at D29–D113 [15]	Significant for non-inflammatory and PIH [15]

Study	Oil/EO Used	Lesion Outcome	Magnitude of Effect	Time Point	Statistical Significance
Mi-ran Kim & Kerrouche, 2018	Cleanser with calendula, aloe, olive oil (adjunct to BPO) [11]	72% total lesion reduction [11]	20% at week 1, 50% at week 4 [11]	12 weeks [11]	Not separated from BPO effect [11]

Among studies with the most rigorous designs, the double-blind RCT by V. Infante et al. (2023) demonstrated that a nanoemulsion of *Melaleuca alternifolia* (tea tree) essential oil significantly reduced comedone count and improved follicular hyperkeratinization over 90 days ($p < 0.001$), outperforming both the standard essential oil emulsion and placebo [1]. The enhanced penetration of the nanoemulsion delivery system was attributed to the terpinene-4-ol content [1]. Similarly, da Silva et al. (2012) found that 1% copaiba essential oil gel produced a highly significant decrease in acne-affected surface area compared to placebo ($r^2 = 0.695$ vs. 0.268) [2]. Mazzarello et al. (2020), in a single-blind RCT comparing a cream containing myrtus and organum essential oils plus tretinoin (MOTC) against clindamycin-tretinoin gel, found comparable lesion count reductions between groups but superior anti-inflammatory activity for MOTC, with significant reduction in papular erythema at 15 days ($p = 0.0329$) [3].

The largest dataset for an oil-containing product comes from Meier et al. (2012), whose observational study of a clay jojoba oil facial mask in 133 per-protocol participants demonstrated a 54% mean total lesion reduction after 6 weeks, with inflammatory lesions (pustules –49%, papules –57%, cysts –69%) and non-inflammatory lesions (comedones –39%) both significantly improved [4]. The DLQI score decreased from 5.0 to 2.1, indicating meaningful quality-of-life improvement

[4]. However, the absence of a control group and reliance on self-reported lesion counts substantially limit causal inference [4].

Kim et al. (2018) reported that a myrtle essential oil skincare regimen significantly reduced acne grades from 1.8 to 0.9 ($p = 0.001$) over 6 weeks, with concurrent reductions in pore index, erythema, sebum, and microbial colonization [7]. The control group showed no statistically significant changes [7], though the very small sample ($n = 20$) and lack of blinding weaken these findings [7].

Secondary Skin Outcomes

Several studies reported on sebum regulation and skin barrier parameters. The myrtle EO regimen decreased the sebum index by 2.4 units [7]. The botanical regimen containing bakuchiol reduced forehead sebum excretion by 40% at week 4 and 22% at week 8 [5], while also increasing cheek skin hydration by 27.6% at week 4 and 65% at week 8 [5]. The postbiotic lotion with caprylic and shea butter lipids significantly decreased transepidermal water loss and sebum production after 4 weeks [31]. In the MOTC essential oil cream study, TEWL worsened in both treatment groups (attributed to the tretinoin component), but the essential oil formulation significantly reduced perilesional erythema compared to clindamycin-tretinoin at both 15 and 30 days [3].

For non-oil comparators providing context, the Effaclar cleansing gel reduced skin oiliness by 10.8% [17], the Biretix retinoid protocol decreased sebum by 30% and improved hydration by 20% [21], and the Diacnemide regimen showed a 75.75% normalization of sebum levels by day 15 [23].

Safety and Tolerability

Tolerability was generally favorable across oil-containing formulations. V. Infante et al. (2023) did not report adverse events [1]. Mazzarello et al. (2020) noted that the MOTC essential oil cream reduced retinoid-induced erythema in healthy perilesional skin, suggesting a protective anti-inflammatory effect of the essential oils, with no discontinuations [3]. The jojoba oil clay mask was rated as having "good" skin sensation by 80% of participants [4]. The botanical bakuchiol regimen was well tolerated with minimal skin irritation and no adverse effects [5]. The rosemary oil gel caused mild skin irritation and dryness [9]. The black cumin oil and honey combination notably increased

xerosis (101%) and desquamation (41%) [6], raising concerns about skin barrier disruption with that particular formulation. The sandalwood oil regimen had intolerability symptoms peaking at week 2 (mostly mild to moderate, associated with the mask component), which resolved by week 8 [10].

Among non-oil-based cleansers used as adjuncts, Mi-ran Kim & Kerrouche (2018) reported that 8% of subjects experienced treatment-related adverse events (rash, skin irritation, exfoliation), mainly mild and during the first week, with 2 discontinuations due to moderate skin irritation [11]. The EFFACLAR H ISO-BIOME products received very good tolerability ratings from 97% of dermatologists and 94% of patients [18].

Synthesis

The apparent heterogeneity in efficacy findings across studies can be substantially explained by three factors: formulation and delivery vehicle, study rigor, and treatment duration.

First, formulation matters more than the presence of oil per se. The strongest evidence comes from V. Infante et al. (2023), where a nanoemulsion of tea tree oil outperformed a standard emulsion of the same oil [1], indicating that the delivery system—not merely the oil—drives clinical efficacy. Similarly, Mazzarello et al. (2020) showed that essential oils combined with tretinoin matched conventional clindamycin-tretinoin for lesion reduction while offering anti-inflammatory advantages [3], but the contribution of the essential oils cannot be isolated from that of the retinoid. The Bagatin et al. (2023) maintenance study found *Myrtus communis* extract with azelaic acid superior to a plain moisturizer for preventing non-inflammatory lesion recurrence [15], but this again reflects a multi-component formulation.

Second, study quality strongly predicts the magnitude of reported benefits. The three placebo-controlled or active-controlled RCTs with blinding (V. Infante et al., 2023 [1]; da Silva et al., 2012 [2]; Mazzarello et al., 2020 [3]) all demonstrate statistically significant effects, but two of these had small samples (53 and 60 participants, respectively) and one lacked full-text availability for detailed assessment [2]. The largest effect sizes come from uncontrolled studies: the jojoba oil mask study (54% total lesion reduction [4]) and the sandalwood oil regimen (89.4% improved by GAIS [10]) both lack control groups [4, 10], making it impossible to distinguish treatment effects from natural disease fluctuation and regression to the mean. The one study that found no significant difference

between an oil-based treatment and a conventional drug control—Baiq Lenysia et al. (2015), comparing black cumin oil–honey to chemical anti-acne drugs—enrolled only 12 participants over 14 days [6], rendering it severely underpowered.

Third, treatment duration modulates observed effects in a predictable pattern. Studies with durations of 14 days or less (Nunik Purwanti & Fitriasari, 2022 [8]; Baiq Lenysia et al., 2015 [6]) generally show modest or non-significant lesion reductions, whereas those extending to 6–12 weeks demonstrate more robust changes. The 90-day tea tree oil nanoemulsion trial [1] and the 6-week myrtle EO study [7] both achieved statistical significance on primary endpoints, consistent with the known biology of the pilosebaceous cycle requiring weeks to months for treatment effects to manifest.

Regarding specific oils, tea tree oil (*Melaleuca alternifolia*) has the most developed evidence base in this review, with the double-blind RCT by V. Infante et al. (2023) demonstrating significant comedone reduction [1] and a 12-week pilot by Malhi et al. (2017) also evaluating this oil, though without reported outcomes in the available abstract [12]. Jojoba oil has been evaluated only in a single uncontrolled observational study [4]. Myrtle (*Myrtus communis*) essential oil appears in two studies with positive findings, but one is a small RCT ($n = 20$) [7] and the other a maintenance-phase trial in nearly-clear skin [15]. Copaiba oil showed strong statistical significance in a single double-blind RCT [2], but no replication or full-text verification was available [2]. Rosemary oil (3% gel) was evaluated only in a 15-person, uncontrolled, 4-week pilot [9], and sandalwood oil in a 47-person open-label study [10]—both insufficient for confident efficacy claims.

The safety profile of oil-containing formulations appears broadly acceptable. Most studies reported good tolerability [1, 3–5], and the one RCT comparing essential oils with a conventional antibiotic-retinoid formulation found less perilesional erythema with the oil-containing product [3]. However, the black cumin oil–honey study's finding of increased xerosis and desquamation [6] suggests that undiluted or poorly formulated oil applications may disrupt the skin barrier, underscoring the importance of vehicle design.

In summary, oil-containing topical formulations—particularly those using tea tree essential oil in optimized delivery systems—show preliminary efficacy for mild-to-moderate, predominantly non-inflammatory acne. The evidence is strongest for formulations that combine essential oils with

established actives (tretinoin, azelaic acid) or use advanced delivery (nanoemulsion), where the oils may confer additional anti-inflammatory and antimicrobial benefits. However, no evidence exists for the popular practice of oil cleansing with pure oils, and the methodological limitations across nearly all included studies—small samples, short durations, open-label designs, and confounding by co-administered active ingredients—preclude definitive conclusions about the independent efficacy of any single oil for acne management.

DISCUSSION

The findings reveal three major insights: (1) certain essential oils — particularly tea tree oil (*Melaleuca alternifolia*), copaiba oil (*Copaifera langsdorffii*), and myrtle oil (*Myrtus communis*) — demonstrate statistically significant anti-acne effects when formulated in appropriate delivery vehicles; (2) formulation technology, especially nanoemulsion systems, critically determines clinical outcomes; and (3) no controlled evidence exists for the popular practice of cleansing with pure, undiluted oils.

Efficacy of Specific Oils: Detailed Literature Review

Tea Tree Oil (*Melaleuca alternifolia*)

The strongest evidence among all oils comes from Infante et al. (2023), a double-blind, placebo-controlled RCT that randomized 53 participants with mild-to-moderate non-inflammatory acne to receive either a nanoemulsion containing 2% tea tree essential oil blend, a standard emulsion of the same essential oil blend, or placebo for 90 days (1). The nanoemulsion group demonstrated highly significant comedone count reduction ($p < 0.001$) and improvement in follicular hyperkeratinization compared to both standard emulsion and placebo. The authors attributed this superior efficacy to enhanced skin penetration of terpinen-4-ol — the primary antimicrobial component of tea tree oil — achieved through the nanoemulsion vehicle (particle size < 200 nm) (1). Additionally, Malhi et al. (2017) conducted a 12-week uncontrolled phase II pilot study of tea tree oil gel (200 mg/g) plus face wash (7 mg/g) in mild-to-moderate acne, but full outcome data were not available in the published abstract (12). Collectively, these data position tea tree oil as the most evidence-supported essential oil for acne, provided it is delivered in an optimized formulation rather than as a pure oil.

Copaiba Oil (*Copaifera langsdorffii*)

Da Silva et al. (2012) performed a double-blind, placebo-controlled trial evaluating 1% copaiba essential oil gel versus placebo in acne patients (2). The copaiba oil group showed a highly significant decrease in acne-affected surface area, with a coefficient of determination (r^2) of 0.695 compared to only 0.268 in the placebo group ($p=0.000$) (2). This represents a large effect size, indicating that copaiba oil explained approximately 70% of the variance in improvement. However, this study has important limitations: the full text was unavailable for detailed methodological assessment, sample size was not explicitly reported, and no replication has been published (2). Despite these caveats, the statistical significance and magnitude of effect warrant consideration of copaiba oil as a promising anti-acne agent.

Myrtle Oil (*Myrtus communis*)

Two studies evaluated myrtle oil with positive findings. Kim et al. (2018) conducted a 6-week clinical trial in 20 Korean women with mild-to-moderate acne (KAGS grades 1-4) using a multi-product regimen (foam cleanser, toner, emulsion, cream pack) containing myrtle essential oil (7). The acne grade significantly decreased from 1.8 to 0.9 ($p=0.001$), with concurrent reductions in pore index, erythema, sebum index (decreased by 2.4 units), desquamation, and microbial colonization (7). The control group showed no significant changes (7). However, the very small sample size ($n=20$) and lack of blinding substantially limit internal validity. Bagatin et al. (2023) performed an investigator-blinded randomized comparative study in 53 adult females with nearly clear acne (maintenance phase), comparing a dermocosmetic containing *Myrtus communis* extract plus azelaic acid versus a standard moisturizer over 16 weeks (15). The myrtle-containing product significantly reduced non-inflammatory lesion recurrence and post-inflammatory hyperpigmentation (PIH) compared to moisturizer ($p<0.05$ for both outcomes) (15). Notably, this study evaluated maintenance therapy rather than active treatment, and the myrtle extract was combined with azelaic acid, confounding isolation of myrtle's independent effect.

Jojoba Oil

Meier et al. (2012) conducted the largest study of an oil-containing product in this review — a prospective observational pilot study of a clay jojoba oil facial mask in 194 enrolled participants

(133 per-protocol) with Grade I papulopustular acne (4). After 6 weeks, mean total lesion reduction was 54%, with pustules decreasing by 49%, papules by 57%, cysts by 69%, and comedones by 39% (all $p<0.05$). The Dermatology Life Quality Index (DLQI) improved from 5.0 to 2.1, indicating clinically meaningful quality-of-life benefit (4). While these effect sizes are impressive, the absence of a control group and reliance on self-reported lesion counts (rather than investigator-blinded assessment) preclude causal inference. The jojoba oil was delivered in a clay mask — a vehicle that itself may have absorptive and anti-inflammatory properties — further confounding attribution of efficacy specifically to jojoba oil.

Combinations of Essential Oils with Conventional Actives

Mazzarello et al. (2020) conducted a single-blind RCT comparing a cream containing *Myrtus communis* and *Origanum vulgare* essential oils plus tretinoin (MOTC) against clindamycin-tretinoin gel in 60 patients with mild-to-moderate acne (3). Both groups showed comparable reductions in comedones, papules, and pustules; however, MOTC demonstrated superior anti-inflammatory activity, with significantly greater reduction in papular erythema at 15 days ($p=0.0329$) (3). Transepidermal water loss (TEWL) worsened in both groups (attributed to tretinoin-induced barrier disruption), but perilesional erythema was significantly less with MOTC at both 15 and 30 days (3). No discontinuations occurred due to adverse effects. This study suggests that essential oils may mitigate retinoid-induced irritation while preserving or enhancing anti-acne efficacy — a clinically important finding given that irritation is the primary reason for retinoid non-adherence.

Bakuchiol-Containing Botanical Regimen

Nong et al. (2023) prospectively evaluated a topical botanical regimen containing bakuchiol (an anti-aging compound derived from *Psoralea corylifolia*) in 20 participants with mild-to-moderate facial and truncal acne (IGA 2-3) over 8 weeks (5). Total facial lesions decreased by 25.2% ($p<0.05$), non-inflammatory facial lesions by 14.8% ($p<0.05$), and inflammatory facial lesions by 25.2% ($p<0.05$). Truncal inflammatory lesions showed a 48% reduction ($p<0.05$). Secondary outcomes included a 40% reduction in forehead sebum excretion at week 4 and 22% at week 8, as well as a 27.6% increase in cheek skin hydration at week 4 rising to 65% at week 8 (5). The regimen was well tolerated with minimal irritation. However, this was an open-label study without a control group, and

the regimen contained multiple botanical ingredients, preventing isolation of bakuchiol-specific effects.

Rosemary Oil (*Rosmarinus officinalis*)

Hussein et al. (2023) formulated a 3% rosemary essential oil gel and tested it in 15 participants with mild-to-severe acne over 4 weeks (9). The gel reduced papules, pustules, and comedones, but no aggregate percentage reduction or statistical analysis was reported. Mild skin irritation and dryness were observed (9). The very small sample size, lack of control group, and absence of statistical reporting render this study hypothesis-generating only.

Sandalwood Oil

Moy et al. (2012) conducted a single-center, open-label study of a topical regimen containing 0.5% salicylic acid plus sandalwood oil (cleanser, serum, spot treatment, mask) in 47 adolescents and adults with mild-to-moderate acne over 8 weeks (10). By global assessment (GAIS), 89.4% of patients improved, with notable reductions in severe and inflamed lesions (10). Tolerability issues peaked at week 2 (mostly mild-to-moderate, associated with the mask component) and resolved by week 8 (10). The lack of a control group and open-label design significantly limit conclusions.

Black Cumin Oil (*Nigella sativa*)

Two studies evaluated *Nigella sativa* oil. Purwanti & Fitriasisari (2022) reported that 14 days of topical *Nigella sativa* oil significantly improved skin integrity in adolescents with acne vulgaris compared to control ($p=0.001$ within-group; $p=0.000$ between-group), but the study duration was very short (8). Lenysia et al. (2015) compared a 1:1 combination of black cumin oil and honey to chemical anti-acne drugs in 12 women over 14 days; papules decreased by 21% and pustules by 23%, but black comedones increased by 74%, and no statistically significant overall difference from control was achieved (6). Notably, xerosis increased by 101% and desquamation by 41% in the oil-honey group, raising concerns about skin barrier disruption (6). The very small sample ($n=12$) and short duration (14 days) render this study severely underpowered.

Secondary Skin Outcomes: Sebum and Hydration

Several studies reported favorable effects on sebum regulation and skin barrier function. Kim et al. (2018) documented a 2.4-unit decrease in sebum index with myrtle essential oil regimen (7).

Nong et al. (2023) reported that forehead sebum excretion decreased 40% at week 4 and 22% at week 8 with the bakuchiol regimen, while cheek hydration increased 27.6% at week 4 and 65% at week 8 (5). Cui et al. (2022) found that a postbiotic lotion containing caprylic acid, shea butter, and other lipids significantly decreased TEWL and sebum production after 4 weeks in mild-to-moderate acne ($p<0.01$) (31). These findings suggest that certain oil-containing formulations may improve — rather than worsen — the skin barrier, contrary to the common misconception that all oils are comedogenic or barrier-disruptive.

Safety and Tolerability

The safety profile of oil-containing formulations was generally favorable. Infante et al. (2023) did not report adverse events (1). Mazzarello et al. (2020) noted that the MOTC essential oil cream actually reduced retinoid-induced erythema, with no discontinuations (3). Meier et al. (2012) reported that 80% of participants rated the jojoba oil clay mask as having "good" skin sensation (4). Nong et al. (2023) reported minimal skin irritation and no adverse effects (5). Only the black cumin oil-honey combination caused substantial xerosis (101% increase) and desquamation (41% increase), indicating that not all oil formulations are equally tolerable (6). Hussein et al. (2023) reported mild skin irritation and dryness with rosemary oil gel (9).

The Critical Role of Formulation Delivery Systems

A key finding of this review is that formulation technology is at least as important as the oil itself. Infante et al. (2023) directly demonstrated that the same tea tree essential oil blend produced significantly greater efficacy when delivered as a nanoemulsion compared to a standard emulsion (1). This finding has profound implications: clinical outcomes from studies using crude oil preparations cannot be generalized to optimized formulations, and negative results from poorly formulated products do not invalidate the potential efficacy of the oil when properly delivered.

Research Gap Confirmed: No Evidence for Pure Oil Cleansing

Despite the popularity of the "oil cleansing method" — applying pure oils (e.g., castor oil, jojoba oil, olive oil) directly to the face as a cleanser — this systematic review identified **no controlled clinical studies** evaluating this practice. All included studies evaluated formulated products (gels, emulsions, creams, masks, nanoemulsions) containing oils as one component of a

multi-ingredient formulation. Therefore, the widespread consumer practice of oil cleansing with pure, undiluted oils remains entirely unsupported by clinical evidence. Moreover, the study by Lenysia et al. (2015) showing increased xerosis and desquamation with a simple oil-honey mixture (6) raises the possibility that pure oils may actually disrupt the skin barrier, potentially worsening acne through increased follicular hyperkeratinization.

Synthesis and Clinical Implications

Synthesizing the available evidence, the following conclusions can be drawn: (1) Tea tree oil in nanoemulsion formulation has the strongest evidence for mild-to-moderate non-inflammatory acne (1). (2) Copaiba oil gel shows large effect sizes in a single placebo-controlled RCT but requires replication (2). (3) Myrtle oil may offer anti-inflammatory benefits, particularly in maintenance therapy or combination with retinoids (3,7,15). (4) Jojoba oil in a clay mask shows large improvements in open-label study but lacks controlled evidence (4). (5) Bakuchiol-containing botanical regimens improve both facial and truncal acne with favorable sebum and hydration effects (5). (6) Pure oil cleansing has no evidence base and may be harmful.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This systematic review demonstrates that oil-containing topical formulations — specifically those containing tea tree oil (*Melaleuca alternifolia*) in nanoemulsion delivery systems, copaiba oil (*Copaifera langsdorffii*), myrtle oil (*Myrtus communis*), jojoba oil in clay masks, and bakuchiol-containing botanical regimens — produce statistically significant reductions in acne lesions in mild-to-moderate acne vulgaris. The most robust evidence supports tea tree oil nanoemulsion ($p < 0.001$ for comedone reduction) (1), copaiba oil gel ($p = 0.000$ for decreased acne-affected surface area) (2), and myrtle oil-containing regimens ($p = 0.001$ for acne grade reduction) (7). Secondary benefits include reduced sebum production, improved skin hydration, and favorable tolerability with minimal irritation. However, methodological limitations across nearly all included studies — including small sample sizes, short durations, open-label designs, and confounding by co-administered active ingredients — preclude definitive conclusions about the independent efficacy of any single oil. Critically, there is **no clinical evidence** supporting the popular practice of oil cleansing with pure,

undiluted oils. The efficacy of oil-based treatments depends critically on formulation technology, with nanoemulsion systems demonstrating superior outcomes to conventional emulsions.

Recommendations

For clinical practice: Clinicians may consider recommending formulated oil-containing products with proven efficacy in clinical trials (particularly tea tree oil nanoemulsion or copaiba oil gel) as adjunctive or alternative treatments for patients with mild-to-moderate, predominantly non-inflammatory acne who prefer natural ingredients or have failed or cannot tolerate conventional therapies. Patients should be advised that pure oil cleansing is not evidence-based and may disrupt the skin barrier.

For future research: Randomized, double-blind, placebo-controlled trials are urgently needed with the following characteristics: (1) isolation of single oils from other active ingredients; (2) use of optimized formulation vehicles (nanoemulsions, liposomes, or other advanced delivery systems); (3) minimum 8-12 weeks duration to align with pilosebaceous biology; (4) adequate sample sizes (≥ 50 per group); (5) investigator-blinded, validated lesion counts; (6) direct comparison of pure oil versus formulated oil versus vehicle control to definitively answer the oil cleansing question; and (7) standardized outcome measures including IGA, lesion counts, and patient-reported outcomes.

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