© APR 2026 | IRE Journals | Volume 9 Issue 10 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I10-1716899

Phytochemistry and Cosmeceutical Applications of Selected Crude Drugs: A Review on Lemongrass, Daruharidra, Reetha and Goat Milk

HARSHITHA A. H.[1], SUCHITRA G. S. M[2], BIBI AYESHA[3], GOWTHAM RAJ P[4], GOLLA BHARGAVI[5], RAMYA SHREE[6], SHRUSHTI NIDAGUNDI[7], THASMIYA[8], ZOYA MAHIYA[9]
[1, 2, 3, 4, 5, 6, 7, 8, 9]*Golla Bhargavi, Ramya Shree, Shrushti Nidagundi, Thasmiya, Zoya Mahiya Hillside College of Pharmacy and Research Centre*

Abstract- ***Herbal cosmetics have gained widespread acceptance due to their safety, biocompatibility, and multifunctional benefits. Plant- and animal-derived ingredients contain diverse bioactive constituents that impart antimicrobial, antioxidant, cleansing, moisturizing, and anti-inflammatory effects. The present review compiles and analyzes the phytochemistry and cosmeceutical applications of selected crude drugs—Cymbopogon citratus (lemongrass), Berberis aristata (daruharidra), Sapindus mukorossi (reetha), and goat milk. Key constituents such as citral, berberine, saponins, lactic acid, and lipid fractions are discussed in relation to their mechanisms of action in skin and hair care. The review also highlights formulation considerations, current trends, challenges in standardization, and future prospects of these natural ingredients in modern cosmeceuticals. The integration of pharmacognosy and pharmaceutical chemistry provides a rational basis for their effective and safe use.***

Keywords- ***Herbal Cosmetics, Phytochemistry, Cosmeceuticals, Lemongrass, Daruharidra, Reetha, Goat Milk***

I. INTRODUCTION

Cosmetics derived from natural sources have re-emerged as a major segment of the personal care industry owing to consumer preference for safer and eco-friendly products. Herbal cosmetics utilize bioactive constituents from plants and other natural materials to enhance appearance and maintain skin and hair health. Unlike conventional cosmetics, these products often provide additional therapeutic benefits, positioning them within the realm of cosmeceuticals.

Pharmacognosy contributes knowledge on crude drugs, their identification, and quality control, while pharmaceutical chemistry explains the structure–activity relationships and mechanisms of action of bioactive compounds. The convergence of these disciplines supports rational selection and application of natural ingredients. This review focuses on four widely used materials—lemongrass, daruharidra, reetha, and goat milk—summarizing their phytochemistry and relevance in cosmetic science.

II. OVERVIEW OF HERBAL COSMETICS

Herbal cosmetics are formulations containing natural ingredients derived from plant, animal, or mineral sources intended for cleansing, beautifying, or altering appearance. They are commonly used in creams, lotions, gels, shampoos, and soaps.

© APR 2026 | IRE Journals | Volume 9 Issue 10 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I10-1716899

Advantages

- Better compatibility with skin
- Reduced incidence of adverse effects
- Biodegradability and environmental safety
- Multifunctional activity (antioxidant, antimicrobial, etc.)

Limitations

- Variability in composition
- Stability challenges
- Need for standardization and quality control

III. PHYTOCHEMISTRY RELEVANT TO COSMECEUTICALS

Phytochemicals are naturally occurring compounds responsible for biological activity:

- Alkaloids (e.g., berberine): antimicrobial, anti-inflammatory
- Terpenoids (e.g., citral): fragrance, antimicrobial
- Saponins: surface-active agents, cleansing
- Phenolics/Flavonoids: antioxidant, anti-aging

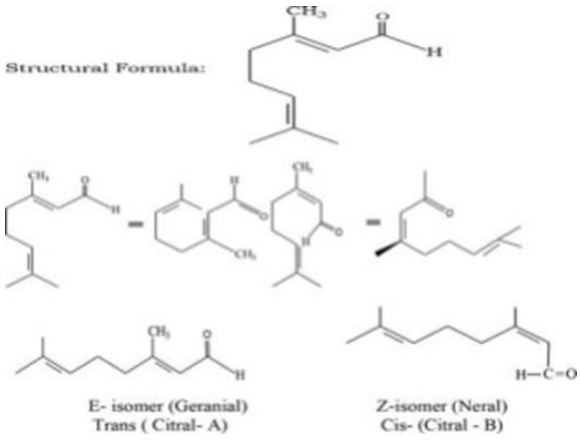
These constituents underpin the functional properties of herbal cosmetic ingredients.

IV. SELECTED CRUDE DRUGS: PHYTOCHEMISTRY AND APPLICATIONS

Lemongrass (Cymbopogon citratus)

Biological source: Leaves of C. citratus (Family: Poaceae)

Key constituents: Citral (geranial + neral), geraniol, limonene



Cosmeceutical applications:

- Antimicrobial activity supports use in anti-acne products
- Deodorizing and fragrance properties for soaps and perfumes
- Astringent/toning effects in skin care

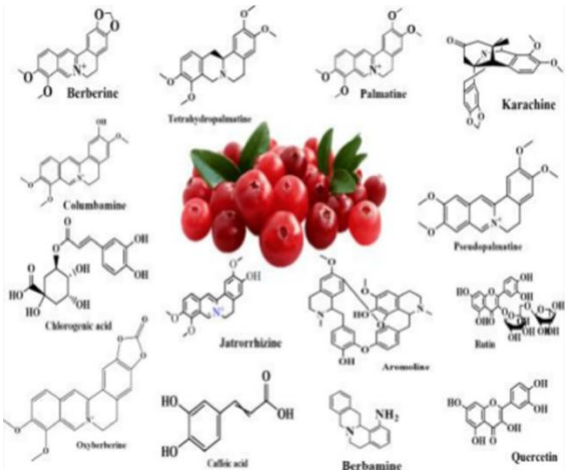
Mechanistic insight: Citral disrupts microbial membranes and inhibits growth; terpenoids contribute to anti-inflammatory effects.

© APR 2026 | IRE Journals | Volume 9 Issue 10 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I10-1716899

Daruharidra (Berberis aristata)

Biological source: Root and stem (Family: Berberidaceae)

Key constituents: Berberine (isoquinoline alkaloid), berbamine



Cosmeceutical applications:

- Anti-acne and antibacterial creams
- Skin cleansing and infection control
- Anti-inflammatory support for irritated skin

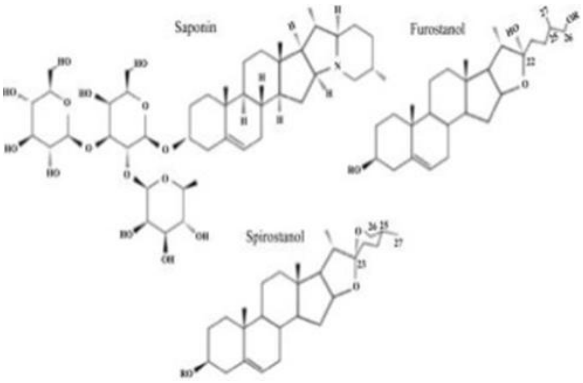
Mechanistic insight: Berberine interferes with bacterial cell function and exhibits anti-inflammatory activity via modulation of signaling pathways.

Reetha (Sapindus mukorossi)

Biological source: Dried fruits (Family: Sapindaceae)

Key constituents: Saponins (glycosidic surfactants)

© APR 2026 | IRE Journals | Volume 9 Issue 10 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I10-1716899



Cosmeceutical applications:

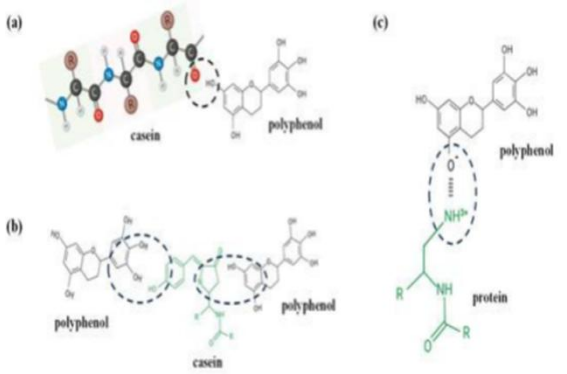
- Natural cleanser and foaming agent in shampoos and face washes
- Anti-dandruff and scalp care
- Replacement for synthetic surfactants

Mechanistic insight: Saponins reduce surface tension, enabling removal of dirt and oil; they also exhibit mild antimicrobial properties.

Goat Milk

Nature: Animal-derived ingredient used in topical formulations

Key constituents: Lactic acid, medium-chain fatty acids, vitamins (A, D, E), proteins



Cosmeceutical applications:

- Moisturizing creams and lotions
- Gentle exfoliation due to lactic acid
- Skin nourishment and barrier support

Mechanistic insight: Lactic acid promotes desquamation (removal of dead cells), while lipids and vitamins enhance hydration and skin repair.

Crude drug / source	Major bioactive constituents	Key biological activities	Representative cosmeceutical applications
Lemongrass (*Cymbopogon citratus*)	Citral (geranial + neral), geraniol, limonene, phenolics (e.g., apigenin, luteolin) jmb.or+2	Antimicrobial, antioxidant, anti-inflammatory, deodorant jmb.or+1	Anti-acne gels, toning lotions, fragranced soaps and cleansers

© APR 2026 | IRE Journals | Volume 9 Issue 10 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I10-1716899

Daruharidra (*Berberis aristata*)	Berberine, palmatine, jatrorrhizine, other isoquinoline alkaloids rjwave+1	Antibacterial (especially *Propionibacterium acnes*), anti-inflammatory, sebum-modulating, wound-healing rjwave+2	Anti-acne creams, medicated face washes, spot treatments
Reetha (*Sapindus mukorossi*)	Triterpenoid saponins (e.g., mukorossigenin-type glycosides) merlionnaturals+1	Surfactant, mild antimicrobial, scalp-cleansing merlionnaturals+1	Shampoos, herbal face washes, soap-free cleansers
Goat milk	Lactic acid, medium-chain fatty acids, phospholipids, vitamins A, D, E, and proteins (casein, whey) themilkywhey+1	Gentle exfoliation, moisturization, barrier support, pH-modulating themilkywhey+1	Moisturizing creams, gentle cleansers, exfoliating masks, baby-care products

V. CHEMICAL BASIS OF COSMECEUTICAL ACTION

The observed cosmetic benefits arise from specific chemical actions:

- Citral (lemongrass): antimicrobial and deodorizing
- Berberine (daruharidra): antibacterial and anti-inflammatory
- Saponins (reetha): cleansing and foaming
- Lactic acid (goat milk): exfoliation and pH modulation

The combination of these constituents can provide synergistic effects in formulations, improving efficacy and user acceptability.

VI. FORMULATION CONSIDERATIONS

When incorporating these ingredients into cosmetic bases, the following should be considered:

- Compatibility of essential oils with emulsions/gels
- Stability of alkaloids and phenolics
- pH adjustment (ideal skin pH ~5.5)
- Use of suitable preservatives (preferably natural)
- Standardization of extracts to ensure consistent activity

VII. CURRENT TRENDS IN HERBAL COSMECEUTICALS

- Increased demand for “clean label” and natural products
- Use of plant-based surfactants (e.g., saponins)
- Incorporation of multifunctional botanicals
- Interest in bioactive delivery systems (e.g., vesicles, nanoemulsions)

VIII. CHALLENGES AND LIMITATIONS

- Lack of uniform standards for herbal ingredients
- Variability due to geographical and seasonal factors
- Stability issues (oxidation of essential oils, degradation of actives)
- Limited clinical validation for some claims

IX. FUTURE PERSPECTIVES

Future work should focus on:

- Standardized extraction and characterization methods
- Advanced delivery systems to enhance skin penetration
- Clinical evaluation of efficacy and safety
- Integration of traditional knowledge with modern analytical techniques

X. CONCLUSION

The reviewed crude drugs—lemongrass, daruharidra, reetha, and goat milk—offer significant potential in herbal cosmetic formulations due to their rich phytochemical composition and diverse biological

activities. Their combined use can provide multifunctional benefits including cleansing, antimicrobial protection, moisturization, and skin rejuvenation. A scientific understanding of their chemistry and mechanisms supports their rational application in modern cosmeceuticals, though further standardization and validation are required for broader acceptance.

REFERENCES

[1] Priyadharshana M. Eco-friendly beauty: a review of herbal cosmetics. Indian J Nat Sci. 2025;16(92):51234–51240.

[2] Patel S, Kumarkhaniya H, Patel R. Herbal cosmetics for skin and hair care: a review. Life Sci Leafl. 2024;145:1–12.

[3] Laha S, Gayen D. Berberis aristata: a comprehensive review. Int J Sci Res. 2025;14(2):102–108.

[4] Pandey MM, Rastogi S, Rawat AKS. Medicinal plants and pharmaceutical applications. J Ethnopharmacol. 2013;146(2):453–463.

[5] Bakkali F, Averbeck S, Averbeck D, Idaomar M. Biological effects of essential oils—a review. Food Chem Toxicol. 2008;46(2):446–475.

[6] Kim C, Park J, Lee H, Hwang DY, Park SH, Lee H. Evaluation of EtOAc extract of lemongrass (Cymbopogon citratus) as a potential skincare cosmetic material for acne vulgaris. J Microbiol Biotechnol. 2022;32(5):594–601.

[7] Bhuyan DJ, Vuong QV, Chalmers AC, et al. Phytochemicals in cosmetics: recent advances and future perspectives. Cosmetics. 2022;9(4):85.

[8] Singh B, Sharma RA. Plant terpenes: defense responses and clinical applications. 3 Biotech. 2015;5(2):129–151.

[9] Mukherjee PK, Maity N, Nema NK, Sarkar BK. Bioactive compounds from natural resources against skin aging. Phytomedicine. 2011;19(1):64–73.

[10] Lin TK, Zhong L, Santiago JL. Anti-inflammatory and skin barrier repair effects of plant oils. Int J Mol Sci. 2017;18(12):248.

[11] Ali B, Al-Wabel NA, Shams S, et al. Essential oils used in aromatherapy: a review. Asian Pac J Trop Biomed. 2015;5(8):601–611.

[12] Shah G, Shri R, Panchal V, Sharma N, Singh B, Mann AS. Scientific basis for therapeutic use of Cymbopogon citratus. J Adv Pharm Technol Res. 2011;2(1):3–8.

[13] Imanshahidi M, Hosseinzadeh H. Pharmacological effects of berberine. Phytother Res. 2008;22(8):999–1012.

[14] Tillhon M, Guamán Ortiz LM, Lombardi P, Scovassi AI. Berberine: new perspectives for old remedies. Biochem Pharmacol. 2012;84(10):1260–1267.

[15] Thakur R, Melzig MF. Saponins: applications in cosmetics and pharmaceuticals. Pharmazie. 2016;71(9):581–591.

[16] Sparg SG, Light ME, Van Staden J. Biological activities of plant saponins. J Ethnopharmacol. 2004;94(2–3):219–243.

[17] Park YW. Goat milk—chemistry and nutrition. Small Rumin Res. 2007;68(1–2):88–113.

[18] Campos PMBG, Mercurio DG, Melo MO, et al. Natural ingredients in cosmetic formulations. Cosmetics. 2016;3(2):18.

[19] Patravale VB, Mandawgade SD. Novel cosmetic delivery systems. Int J Cosmet Sci. 2008;30(1):19–33.

[20] Williams AC, Barry BW. Penetration enhancers. Adv Drug Deliv Rev. 2012;64:128–137. of mixed emulsifiers and emulsion stability. Adv Colloid Interface Sci. 1997;123–126:169–182