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TRADITIONAL *AYURVEDIC* SKINCARE FORMULATIONS IN MODERN COSMECEUTICAL SCIENCE: A COMPREHENSIVE REVIEW

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ABSTRACT

Ayurveda conceptualizes skin (*Twak*) as both a sensory organ and a reflection of systemic homeostasis, closely linked to the balance of *Doshas* (*Vata*, *Pitta*, *Kapha*) and the status of *Rasa Dhatu*. Classical dermatological practice emphasizes *Varnya* (complexion-enhancing), *Tvachya* (skin-nourishing), and *Vayasthapana* (age-retarding) interventions through diet, lifestyle, and external formulations. Among these, *Kumkumadi Taila*, *Chandanadi Lepa*, and *Triphala* are repeatedly described for improving complexion, reducing blemishes, calming inflammation, and promoting rejuvenation. Relevant classical texts and contemporary biomedical literature were reviewed to synthesize traditional concepts with experimental and clinical dermatological evidence. Increasing scientific evidence from pharmacological and cosmeceutical research supports their antioxidant, anti-inflammatory, anti-melanogenic, and photoprotective activities. This review critically correlates classical *Ayurvedic* descriptions with contemporary dermatological and biochemical findings, highlighting the relevance of these formulations as safe, sustainable, and multifunctional natural cosmeceutic agents. The synthesis underscores Ayurveda's potential contribution to evidence-based integrative skincare.

KEYWORDS: *Ayurveda*, *Kumkumadi Taila*, *Chandanadi Lepa*, *Triphala*, *Rasayana*, *Varnya Dravya*.

INTRODUCTION

Ayurvedic dermatology views visible beauty (*Saundarya*) as an outcome of internal balance, adequate tissue nourishment, and mental steadiness, rather than surface-level appearance alone.[1] The skin (*Twak*) is closely linked with *Rasa Dhatu*, the primary nutritive tissue formed immediately after digestion, which sustains all subsequent *Dhatus* (body tissues).[2] A balanced state of *Vata*[3], *Pitta*[3], and *Kapha*[3] *(body humors)* ensures adequate hydration, pigmentation, elasticity, and resilience of the skin, whereas their vitiation may lead to dryness, hyperpigmentation, inflammation, premature aging, acne, or other dermatological disorders. Classical *Ayurvedic* texts such as *Charaka Samhita* and *Sushruta Samhita* describe multiple layers of skin (six to seven "*Twak Sthara*[4]"), each susceptible to disorders according to *Dosha* predominance and *Dhatu* integrity. The classical description of *Twak Sthara*[4] bears conceptual similarity to modern stratification of epidermal and dermal layers, emphasizing function-specific vulnerability.

In recent decades, global interest in herbal, eco-friendly, and sustainable skincare products has grown substantially. Modern dermatology attributes skin aging and degeneration primarily to cumulative oxidative stress, ultraviolet (UV) radiation, chronic low-grade inflammation, collagen degradation, and impaired cellular repair mechanisms.[5,6] Consequently, contemporary skincare research increasingly focuses on botanical antioxidants, phytochemicals, and multifunctional bioactive compounds to counter photo-aging, pigmentation disorders, and barrier dysfunction – an approach that closely mirrors *Ayurvedic* objectives of nourishment, detoxification, and rejuvenation through natural means.

Cosmeceuticals occupy the interface between cosmetics and therapeutics, aiming not only to enhance appearance but also to modify biological functions of the skin, for example, by improving barrier integrity, stimulating collagen synthesis, and reducing photo-induced damage.[7] *Ayurvedic* formulations are rich sources of polyphenols, flavonoids, tannins, essential oils, and other secondary metabolites that have demonstrated antioxidant, anti-melanogenic, anti-inflammatory, and UV-protective activities in experimental studies.[8-10] Therefore, classical preparations such as *Kumkumadi Taila*, *Chandanadi Lepa*, and *Triphala* represent promising natural alternatives for modern cosmeceutical development.

Aim of the Study: To systematically narrate and critically analyze traditional *Ayurvedic* skincare formulations – particularly *Kumkumadi Taila*, *Chandanadi Lepa*, and *Triphala* – by correlating their classical indications with modern evidence on antioxidant, anti-aging, and photoprotective mechanisms, and to explore their potential integration into contemporary cosmeceutical development.

Classical Concepts of Ayurvedic Skincare

Ayurveda attributes healthy skin to appropriate *Ahara* (wholesome diet), *Vihara* (balanced lifestyle), and *Dinacharya* (daily regimen), supported by measures of *Shodhana* (purification), *Shamana* (palliation), and *Rasayana* (rejuvenation). Formulations intended for *Saundarya* are described as acting through *Varnya* (enhancing complexion and radiance), *Tvachya* (nourishing skin tissues), and *Vayasthapana* (maintaining youthfulness and delaying visible aging).[11,12]

Classical texts enumerate groups of *Varnya Dravyas* such as *Chandana* (*Santalum album*), *Madhuka* (*Glycyrrhiza glabra*), *Manjishta* (*Rubia cordifolia*), and *Kumkuma* (*Crocus sativus)*, often used in oils (*Taila*), pastes (*Lepa*), and washes (*Pralepa*) to improve luster and evenness of the skin tone.[12] These actions conceptually align with modern goals of hydrating the stratum corneum, preserving barrier lipids, controlling subclinical inflammation, and countering oxidative damage from pollution and ultraviolet exposure.

2. MATERIALS AND METHODS

This review adopts a narrative design with structured searching to capture both classical and biomedical sources relevant to Ayurvedic skincare. Major Ayurvedic compendia (*Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*) were consulted in standard translations and commentaries for descriptions of *Twak*, *Varnya Dravya*, *Rasayana*, and the three focal formulations.

Electronic databases such as PubMed, Scopus, and Google Scholar were searched using combinations of terms including "*Kumkumadi*," "*Chandanadi*," "*Triphala*," "*Ayurvedic* skincare," "cosmeceutical," "nano-cosmeceutical," "herbal antioxidant," and "ultraviolet protection," limited primarily to English-language publications. In vitro, in vivo, and clinical studies examining skin-related outcomes (antioxidant capacity, collagen and elastin expression, melanogenesis, barrier markers, and clinical signs of aging or pigmentation) were included. At the same time, purely marketing or anecdotal reports were excluded unless used

to illustrate contemporary consumer uptake. The review follows a narrative synthesis approach rather than a meta-analysis due to heterogeneity in study designs.

3. Review of Traditional Formulations

3.1 *Kumkumadi Taila*

Kumkumadi Taila is a classical oil-based formulation indicated for enhancing skin glow, evening out complexion, reducing spots, and supporting youthful appearance.[11,12] Core ingredients include saffron (*Crocus sativus*), sandalwood (*Santalum album*), *manjistha* (*Rubia cordifolia),* and licorice (*Glycyrrhiza glabra*), typically processed in sesame oil and goat's milk.[13]

Modern studies on constituent herbs show that saffron extract can exert antioxidant and anti-tyrosinase effects, contributing to brightening and protection from UV-induced oxidative damage. Sandalwood, manjistha, and licorice demonstrate anti-inflammatory, antimicrobial, and melanogenesis-modulating properties, making them relevant for acne-prone skin, post-inflammatory hyperpigmentation, and photoaging.[14-16] While controlled clinical trials on classical *Kumkumadi Taila* are still limited, early cosmeceutical preparations using similar herbal combinations report improvements in dullness, uneven tone, and fine lines, warranting more rigorous investigation.

Table 1: Key ingredients of *Kumkumadi Taila* and relevant skin-related actions.

Ingredient	Classical property (Ayurveda)	Modern dermatologic actions (summary)
Crocus sativus (*Kumkuma*, saffron)	*Varnya, Vayasthapana*	Antioxidant, anti-tyrosinase, UV-protective, brightening.
Santalum album (*Chandana*)	*Sheeta, Varnya*	Cooling, anti-inflammatory, antimicrobial, soothing in acne and erythema.
Rubia cordifolia (*Manjistha*)	*Raktashodhaka*	Supports microcirculation, anti-acne, depigmenting, anti-glycation (preclinical).
Glycyrrhiza glabra (*Yashtimadhu*)	*Varnya, Tvachya*	Tyrosinase inhibition, anti-inflammatory, photoprotective, and anti-aging.

3.2 *Chandanadi Lepa*

Chandanadi Lepa is described as a cooling, *Pitta*-pacifying herbal paste indicated for acneiform eruptions, erythema, burning, and inflamed or sensitive skin. Typical ingredients

include sandalwood (*Santalum album*), vetiver (*Vetiveria zizanioides*), *lodhra* (*Symplocos racemosa*), and turmeric (Curcuma longa), often mixed with hydrating media such as rose water or milk.[17] These herbs collectively soothe inflamed skin, inhibit bacterial growth, and prevent oxidative stress.

Curcumin, the principal bioactive constituent of *Curcuma longa*, exhibits potent anti-inflammatory, antioxidant, and antimicrobial properties that help reduce cutaneous inflammation and oxidative stress. Experimental studies show that it supports wound healing by enhancing collagen deposition and fibroblast activity, while also protecting against UVB-induced skin damage. These actions make curcumin particularly relevant for soothing inflamed skin and supporting physiological repair processes.[18] Santalol from sandalwood has shown anti-inflammatory and antimicrobial activity, which may support its traditional use in acne and inflammatory dermatoses.[14] This combination of soothing, antimicrobial, and barrier-supportive actions positions *Chandanadi*-type pastes as attractive templates for non-steroidal, plant-based formulations for sensitive or reactive skin.

3.3 *Triphala*

Triphala combines the dried fruits of *Amalaki* (*Emblica officinalis*), *Haritaki* (*Terminalia chebula*), and *Bibhitaki* (*Terminalia bellirica*), and is classically regarded as a *Rasayana* with detoxifying and rejuvenative actions. Traditionally administered orally and externally, *Triphala* is believed to promote healthy digestion, cleanse subtle channels, and support tissue regeneration, which translates into clearer and more resilient skin in the *Ayurvedic* paradigm.[19] The dual oral and topical relevance of *Triphala* reflects Ayurveda's systemic approach to skin health, contrasting with purely topical modern interventions.

Rich in gallic acid, ellagic acid, and tannins, *Triphala* exhibits potent antioxidant and collagen-stimulating activities.[19] Studies demonstrate its capacity to reduce UV-induced oxidative stress and promote fibroblast regeneration.

A landmark in vitro study on *Triphala* extract in human dermal fibroblasts and keratinocytes demonstrated robust antioxidant capacity, protection from hydrogen peroxide-induced damage, upregulation of collagen I, elastin, filaggrin, and involucrin, and dose-dependent anti-tyrosinase and melanin-inhibitory activity.[20] A recent systematic review on *Triphala* in dermatology further reports data on anti-aging, UV protection, wound healing, and benefits in

conditions such as melasma, atopic dermatitis, and psoriasis, although many studies remain preclinical or small-scale.[21]

Table 2: Major phytochemicals in *Triphala* and dermatologic relevance.

Fruit (botanical name)	Key phytochemicals	Skin-related actions (modern)
Emblica officinalis (*Amalaki*)	Vitamin C, gallic acid, ellagic acid	Potent antioxidant, supports collagen synthesis, photoprotection.
Terminalia chebula (*Haritaki*)	Chebulinic acid, chebulagic acid, tannins	Wound-healing, anti-glycation, detoxifying, anti-wrinkle (preclinical).
Terminalia bellirica (*Bibhitaki*)	Ellagic acid, lignans, tannins	Anti-inflammatory, antioxidant, rejuvenating, potential anti-melanogenic.

4. Emerging role of nanotechnology and formulation science

Nanotechnology-enabled delivery systems – such as liposomes, solid lipid nanoparticles, nanostructured lipid carriers, and nanoemulsions – have revolutionized cosmeceutical science by enhancing solubility, dermal penetration, and controlled release of active compounds.[22,23] For herbal ingredients, these systems can also protect labile polyphenols and flavonoids from oxidation and degradation, prolonging shelf-life and bioactivity in finished products.[24]

Recent research demonstrates that herbal nanoemulsion systems significantly enhance stability, skin penetration, and bioavailability of plant-derived active compounds, making them particularly attractive for modern cosmeceutical formulations. For example, comprehensive reviews have detailed formulation design and characterization of herbal nanoemulsions in cosmetics, showing enhanced delivery and performance of bioactives compared with conventional systems. Topical nanocosmetic strategies such as nanoemulsions, nanostructured lipid carriers, and nanoemulgels have also been explored specifically for anti-aging and dermatological delivery.[24]

Recent reviews on herbal nano-cosmeceuticals suggest that nano-sized encapsulation of plant extracts like turmeric increases transdermal absorption, potentially allowing lower doses with equivalent or superior efficacy.[25] Conceptually, classical *Ayurvedic* oils such as *Kumkumadi Taila* already function as primitive lipid-based carriers; adapting these to modern nano-delivery platforms may bridge tradition and high-tech skincare, while maintaining the holistic integrity of multi-herb combinations.

5. DISCUSSION

The three formulations examined in this review collectively illustrate the synergistic approach of Ayurveda, where multiple botanicals with complementary actions are combined to address oxidative stress, inflammation, pigmentation, and tissue regeneration. Preclinical data on *Triphala* and its individual fruits corroborate antioxidant, anti-tyrosinase, collagen-supportive, and barrier-enhancing effects that are consistent with classical claims of *Rasayana* and *Varnya* actions.

Despite these encouraging findings, several limitations remain. Robust, randomized controlled clinical trials on standardized *Kumkumadi Taila*, *Chandanadi Lepa*, and *Triphala-based* topical formulations are scarce, and variability in raw material quality, processing methods, and excipients complicates reproducibility. There is also a need for validated physicochemical and bioactivity markers (for example, defined ranges of gallic acid, ellagic acid, or specific santalol isomers) to support quality assurance and regulatory approval in global markets. Additionally, regulatory harmonization across AYUSH, CDSCO, and international cosmetic frameworks remains a significant translational challenge.

Another methodological challenge is integrating *Ayurvedic* diagnostic frameworks (*Prakriti*, *Dosha* predominance, *Agni* status) into clinical trial design so that patient selection and outcome measures remain faithful to classical principles while meeting contemporary evidence standards. At the same time, concerns about safety, potential contact allergy, and long-term use must be addressed through toxicological profiling and post-marketing surveillance, particularly as these products transition from traditional use to mass-market cosmeceutics.

6. Future prospects

Several promising research pathways emerge from the current evidence.

i. Development of standardized, Good Manufacturing Practice (GMP)-compliant formulations of *Kumkumadi Taila*, *Chandanadi Lepa*, and *Triphala* with clearly defined phytochemical fingerprints and batch-to-batch consistency.
ii. Design of nanotechnology-assisted delivery systems (e.g., *Triphala*-loaded nanoemulsions or *Kumkumadi*-inspired nano-lipid carriers) with rigorous in vitro skin-penetration studies and pharmacokinetic profiling.

iii. Conduct of well-designed randomized controlled trials evaluating outcomes such as hyperpigmentation, photo-aging scores, transepidermal water loss, and patient-reported quality-of-life measures in diverse skin types.
iv. Exploration of sustainable sourcing and green-chemistry extraction methods that align with *Ayurveda's* ecological ethos while meeting international regulatory expectations for environmental impact.

Collaborations between *Ayurvedic* clinicians, dermatologists, pharmacognosists, formulation scientists, and regulatory experts will be crucial to translate traditional knowledge into globally acceptable, evidence-based cosmeceutical products.

7. CONCLUSION

Kumkumadi Taila, *Chandanadi Lepa*, and *Triphala* occupy a unique position at the intersection of classical *Ayurvedic Saundarya* practice and modern cosmeceutical science. Existing preclinical and early clinical evidence suggests that their constituent herbs possess antioxidant, anti-inflammatory, anti-melanogenic, collagen-supportive, and photoprotective properties that are highly relevant to contemporary concerns of premature aging, pigmentary disorders, and environmental skin damage.

However, systematic standardization, mechanistic clarification, and high-quality clinical trials remain necessary to fully substantiate their therapeutic claims and to position them alongside mainstream cosmeceuticals in global skincare. Addressing these gaps can help *Ayurveda* contribute meaningfully to the growing demand for safe, sustainable, and holistically designed skincare solutions.

Conflict of Interest

The author declares no conflict of interest.

REFERENCES

1. Sushruta Samhita by Ambikadutta Shastri, Part 1st, Sutra Sthana, Adhyaya 15 Shloka no.10, Chaukhambha Sanskrit sansthan, Varanasi, Reprint, 2017.
2. Agnivesa's Charaka Samhita Chikitsasthana 15/16-17, on Chakrapani Datta's Ayurveda Dipika edited by Dr Ram Karan Sharma & Vaidya Bhagwan Dash, Chowkhamba Sanskrit Series Office, Varanasi, Reprint edition, 2012.

3. Vagbhata's Astanga Hridayam Sutra Sthana 1/10-12, translated by Prof K. R Srikantha Murthy, Chowkamba Krishnadas Academy, Varanasi, Reprint edition, 2009.
4. Sushruta Samhita by Ambikadutta Shastri, Part 1st, Sharir Sthana, Adhyaya 4 Shloka no. 4, Chaukhambha Sanskrit sansthan, Varanasi, Reprint, 2017.
5. Farage MA, Miller KW, Elsner P, Maibach HI. Intrinsic and extrinsic factors in skin ageing: A review. *Int J Cosmet Sci*, 2008; 30(2): 87–95.
6. Gilchrest BA, Krutmann J. Skin aging. In: *Skin Aging*. Berlin: Springer, 2013; 13.
7. Dureja H, Kaushik D, Gupta M, Kumar V, Lather V. Cosmeceuticals: An emerging concept. *Indian J Pharmacol*, 2005; 37(3): 155–159.
8. Mukherjee PK, Maity N, Nema NK, Sarkar BK. Bioactive compounds from natural resources against skin aging. *Phytomedicine*, 2011; 19(1): 64–73.
9. Singh N, Brown AN, Gold MH. Ayurvedic ingredients in dermatology: A call for research. *J Cosmet Dermatol*, 2025; 24: e16673.
10. Verma K, Chauhan M, Sharma R. Potential of Ayurvedic herbs in maintaining stratum corneum pH and skin barrier function. *J Ayurveda Integr Med Sci*, 2025; 10(5): 167–174.
11. Chaudhari H, Akshita, A Review on Ayurvedic Cosmetology and Cosmetic Toxicity. J Ayu Int Med Sci, 2024; 9(9): 147-153.
12. Sharma V, Jindal A. Exploring Varnya dravyas for Ayurvedic cosmeceuticals. *Int J Res Publ Rev*, 2025; 6(8): 883–894.
13. Srikantha Murthy K R, Kumkumadi Thaila of Vagbhata, Vol -3, Uttaratantra chapter 32 verse 27- 30. Edition 9. Varanasi. Chaukamba Krishnadas Academy, 2017; p303.
14. Moy, R. L., & Levenson, C. (2017). Sandalwood Album Oil as a Botanical Therapeutic in Dermatology. *The Journal of clinical and aesthetic dermatology*, *10*(10): 34–39.
15. Kang, M. H., Jang, G. Y., Ji, Y. J., Lee, J. H., Choi, S. J., Hyun, T. K., & Kim, H. D. (2021). Antioxidant and Anti-Melanogenic Activities of Heat-Treated Licorice (Wongam, *Glycyrrhiza glabra* × *G. uralensis*) Extract. *Current issues in molecular biology*, *43*(2): 1171–1187. https://doi.org/10.3390/cimb43020083
16. Salam PM, Dandale S, More DB. Pharmacological and clinical information on Manjistha (*Rubia cordifolia* Linn.): A review article. J Emerg Technol Innov Res (JETIR), 2023 Oct; 10(10): c229. Article ID: JETIR2310226. ISSN: 2349-5162.
17. Srimad Vagbhat, Nirmala Hindi Commentary by Dr Brahmananda Tripathi, Ashtang hridyam, Shareera Sthana, Chapter 1, Shloka 60, Edition 2003, Chaukhambha Sanskrit Pratishthan, Delhi, 2003.

18. Kasprzak-Drozd, K., Niziński, P., Hawrył, A., Gancarz, M., Hawrył, D., Oliwa, W., Pałka, M., Markowska, J., & Oniszczuk, A. (2024). Potential of Curcumin in the Management of Skin Diseases. *International journal of molecular sciences*, *25*(7): 3617. https://doi.org/10.3390/ijms25073617
19. Peterson CT, Denniston K, Chopra D. Therapeutic uses of Triphala in Ayurvedic medicine. *J Altern Complement Med*, 2017; 23(8): 607–614.
20. Varma SR, Sivaprakasam TO, Mishra A, Kumar LMS, Prakash NS, Prabhu S, et al. (2016) Protective Effects of Triphala on Dermal Fibroblasts and Human Keratinocytes. PLoS ONE, 11(1): e0145921. https://doi.org/10.1371/journal.pone.0145921
21. Kiszluk A, Lio P. Triphala in dermatology: A systematic review. *J Integr Dermatol*. 2025.
22. Ola, M., Bhaskar, R., Patil, P. S., Badgujar, S. V., & Haswani, N. G. Formulation and Delivery Issues for Active Ingredients of Herbal Medicines, Nutraceuticals, and Cosmetics: Comparisons to Small-Molecule Drugs, 163-191. https://doi.org/10.1002/9781119769484.ch6
23. Puglia, C., & Bonina, F. (2012). Lipid nanoparticles as novel delivery systems for cosmetics and dermal pharmaceuticals. *Expert opinion on drug delivery*, *9*(4): 429–441. https://doi.org/10.1517/17425247.2012.666967
24. Iskandar, B., Liu, T. W., Mei, H. C., Kuo, I. C., Surboyo, M. D. C., Lin, H. M., & Lee, C. K. (2024). Herbal nanoemulsions in cosmetic science: A comprehensive review of design, preparation, formulation, and characterization. *Journal of food and drug analysis*, *32*(4): 428–458. https://doi.org/10.38212/2224-6614.3526
25. Md Saari, N. H., Chua, L. S., Hasham, R., & Yuliati, L. (2020). Curcumin-Loaded Nanoemulsion for Better Cellular Permeation. *Scientia Pharmaceutica*, *88*(4): 44. https://doi.org/10.3390/scipharm88040044