

A review on the therapeutic potential of *Madhukadi charmalepa* in managing hyperandrogenism-associated dermatological manifestations of Polycystic Ovary Syndrome

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Abstract

Polycystic ovary syndrome (PCOS) is a metabolic, reproductive, and psychological disorder affecting 6–20% of reproductive-age women world wide. Hirsutism, Acne, and Acanthosis nigricans are common hyperandrogenism features in PCOS that significantly impact the mental health and well-being of young women. In Ayurveda, this condition correlates with *Arthava kshaya* according to *Susrutha Acharya* and *Pushpagani Jathaharani* according to *Kasyapa Samhitha*. This comprehensive review analyzes the pharmacological properties of the ingredients in *Madhukadi charmalepa*, a traditional Ayurvedic formulation used at the National Ayurveda Hospital, Borella, to treat the hyperandrogenic features of PCOS. The components of *Madhukadi charmalepa* include *Nelumbo nucifera*, *Terminalia chebula*, *Santalum album*, *Coscinium fenestratum*, *Glycyrrhiza glabra*, *Curcuma zedoaria* and bee honey. Relevant literature was sourced from PubMed, Google Scholar, and classical Ayurvedic texts, with inclusion criteria focusing on research published between 2015 to June 2025. The findings indicate that these ingredients exhibit potent pharmacological properties, including anti-inflammatory, antioxidant, anti-acne, anti-androgenic, and skin rejuvenating effects. Specific biological actions such as estrogenic and androgen-suppressing properties, wound healing, collagen-enhancement, and antimicrobial activity contribute to alleviating PCOS related dermatological symptoms.

Ayurvedic attributes such as *Tridoshaghna*, *Kustaghna*, *Varnya*, and *Rasayana* further support the formulation's efficacy. The review concludes that the ingredients of *Madhukadi charmalepa* possess the potential to counteract facial hyperandrogenism in PCOS patients. A clinical study is recommended to scientifically validate these findings.

Keywords: *Madhukadi charmalepa*, Ayurveda properties Hyperandrogenism, pharmacological properties, PCOS

Introduction

Polycystic Ovary Syndrome (PCOS) is a common heterogeneous endocrine and metabolic disorder affecting women of reproductive age¹. According to the Rotterdam criteria, it's cardinal signs include reproductive dysfunction and dermatological manifestations, such as hirsutism (male-pattern hair growth), acne, and acanthosis nigricans¹. These dermatologic features may provide early clinical clues to the recognition of PCOS, and treatment of these cutaneous conditions may improve the quality of life and psychological well-being. While various herbal remedies are currently being tested for hyperandrogenism, Ayurvedic medicine offers both internal and external interventions that have been utilized for over 3000 years to treat skin-related health issues.

The selected traditional external application “*Madhukadi charmalepa*” is already used in the

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Ayurveda National Hospital, Borella, for common facial skin conditions. Seven ingredients are included in this production and they are *Nelumbo nucifera*, *Terminalia chebula*, *Santalum album*, *Coscinium fenestratum*, *Glycyrrhiza glabra*, *Curcuma zedoaria* and bee honey. The primary objective of this study is to identify and analyze the pharmacological effects of ingredients in *Madhukadi charmalepa* on hyperandrogenic features associated with polycystic ovarian syndrome.

Materials and Methods

A comprehensive review was conducted to analyze the research proven pharmacological actions of six herbal ingredients and one animal product found in the *Madhukadi charmalepa* formula. Research articles published in ResearchGate, PubMed, Google Scholar and other open access search engines were reviewed. The Ayurvedic aspect of the review was conducted with the support of authentic classical Ayurvedic texts. In this comprehensive study, *in vitro*, *in vivo* and clinically proven pharmacological effects were explored. The search strategy utilized terms such as Pharmacological properties, Ayurvedic properties, therapeutic effect, acne, hirsutism, acanthosis nigricans.

All the published full research papers from 2015 to June 2025, written in English and studies focusing on the chemical constituents and biological activities of the ingredients in *Madhukadi Charmalepa*. Other than English, research articles were written in various other languages, research papers published prior to 2015, abstract-only papers, and journals with no full text available were excluded.

Results

Madukadi charmalepa consist six herbs which are abundantly available in Sri Lanka. Table 1 presents a concise overview of Ingredients used in *Madhukadi charmalepa*, including botanical name, family, corresponding Sinhala and Sanskrit names, Specific plant parts utilized and the formulation ratio. They are taken in dry form powdered and mix equal ratio to

make the intervention. By mixing with bee's honey to formula is used as a face pack. Table 2 provide a detailed overview of the Ayurvedic attributes of the individual ingredients used in *Madhukadi Charmalepa*. *Rasa*, *Guna*, *Veerya*, *Vipaka*, *Prabhava* are key pharmacological parameters and the probable mode of action shown in table as found in the *Samhitha Granthas*. All ingredients contain phytochemicals, pharmacological activities on skin and enhance skin condition (Table 3). In Figure 1 the Ayurveda referenced pharmacological parameters and proven phytochemical and pharmacological activities are summarized.

Discussion

The integration of classical Ayurvedic principles with the clinical manifestations of PCOS provides a comprehensive framework for understanding its complex metabolic nature. In this study, PCOS is identified not merely as a reproductive disorder but as a systemic metabolic disease involving the deviation of the HPO axis, manifesting externally as a hirsutism, acne and acanthosis nigricans. The correlation of PCOS according to *Charaka Acharya*¹, *Susrutha Acharya*³ and *Kasyapa Samhitha*⁴ highlights the ancient recognition of amenorrhea coupled with abnormal hair growth.

From an Ayurvedic perspective¹, the pathogenesis begins with the vitiation of the *Tridosha*, *Dhatu* such as *Rasa*, *Raktha*, *Medas*, *Asthi*, and *Shukra*, which subsequently impairs-*Sanga* (Obstruction) of *Rasa*, *Raktha* and *Arthava vaha srotas*⁵. A critical finding in this discussion is the role of *Agni*. The failure of *Kayagni*, *Dathwagni*, and *Panchaboothagni* leads to a state of *Dhatu paka vishamatha*, where the transformation of tissue is incomplete. This results in a decrease in *Prasada bhaga* and an increase in *Kitta bhaga*. These metabolic wastes are analogous to modern free radicals, which accumulates in the Ovaries and Skin (*Adhisthana*), triggering the hyperandrogenic features of acne, hirsutism, acanthosis nigricans. According to Ayurveda, *Brajaka pitta* is found in the skin.

Table 1: Botanical name, family, Sinhala and Sanskrit names, Specific plant parts utilized and the formulation ratio of the *Madukadi charmalepa*

Botanical name and Family	Sinhala name	Sanskrit name	Part used	Ratio
<i>Terminalia chebula</i> ¹⁹ Combretaceae	<i>Aralu</i>	<i>Hareethaki</i>	Powder of pericarp rind of mature fruit	1
<i>Santalum album</i> ²⁰ Santalaceae	<i>Sudu hadun</i>	<i>Chandana</i>	Powder of heart wood	1
<i>Coscinium fenestratum</i> ¹⁰ Menispermaceae	<i>Venivelgeta</i>	<i>Daruharidra</i>	Powder of Stem	1
<i>Glycyrrhiza glabra</i> ⁹ Fabaceae	<i>Valmee</i>	<i>Maduka</i>	Root powder	2
<i>Curcuma zedoaria</i> ²¹ Zingiberaceae	<i>Harankaha</i>	<i>Bangura</i>	Rhizome powder	1:10
<i>Nelumbo nucifera</i> ¹⁷ Nelumbonaceae	<i>Nelum</i>	<i>Padma keshara</i>	Flower stamen	1:100
Bee Honey ^{22,23}	<i>Mee pani</i>	<i>Madhu</i>		3

Table 2: Ayurvedic pharmacological properties of ingredients of *Madhukadi charmalepa*

Ingredient	Rasa	Guna	Veerya	Vipaka	Dosha karma	Prabhava	Properties
<i>Aralu</i> ¹²	Kashaya, Katu, Amla	Laghu, Ruksha	Ushna	Madhura	Tridoshagna, Sp in Vata Shamana		Kushtaghna, Vayasthapan, Varanadi Gana
<i>Sudu Hadun</i> ²⁴	Tikta, Madhura	Laghu, Ruksha	Sheetha	Katu	Kapa Pitta Shamaka		Varnya, Charma roga nashaka, Krimigna, Rakta shodaka
<i>Venivelgeta</i> ¹⁰	Tikta, Kahsaya	Ruksha, Lagu	Ushana	Katu	Kapavata shamaka		Kustagna, Vishahara, Rasayana
<i>Valmee</i> ²⁶	Madhura	Guru, Snigda	Sheetha	Madhura	Vata pitta shamaka	Medya	Varnya, Raktha shodaka, Asru doshahara, Vrana, Vishagna, Keshya,
<i>Harankaha</i> ²⁶	Katu, Tikta	Lagu, Thikshna	Ushna	Katu	Kapa vata shamaka		Kustagna, Krimigna, Raktha shodaka
<i>Nelum Renu</i> ²⁷	Kashaya, Madhura, Tikta	Guru, Snigda	Sheetha	Madhura	Kapha-Pitta shamaka		Vrushya, Grahi, Varnya, Garbha sthapaka
Bee Honey ²⁸	Madhura, Kashaya, Kashaya anurasa	Lugu, Ruksha, Yogavahi, Sukshma, Snigdha, Manda, Sheetha	Sheetha	Katu	Aggravate Vata, Scraps Kapa, Pacifies Pitta, Rakta,		Agnideepana, Varnya Lekhana, Shodhana, Ropana Prasadhana, Sukshma Marganusari, Vishaprashamana Medohara, Vishagna Kushtagna, Krimigna

Table 3: Chemical composition, pharmacological properties and medicinal uses of ingredients of *Madhukadi charmalepa*

Ingredient	Chemical composition	Pharmacological properties	Medicinal Usage
<i>Terminalia chebula</i> ¹⁵	Phenolic compound Hydrolysable Tannin, Corilagin, Flavonoid	Antioxidants, Anti-inflammatory Antibacterial, Analgesic, Anti-diabetic.	Skin hydration, elasticity, firmness, ,tone , rejuvenation therapy ¹²
<i>Santalum album</i> ²⁰	Santalol, Terpins, Fatty acids, Phenolics, Saponins, Phytosterols lignans, glycosides, triterpenoids, and sesquiterpenoids santalic acid, -curcumone, nuciferol	Antioxidant, Anti-inflammatory, Antibacterial, Antifungal, Antiviral, Antihyperglycemic, Antihyperlipidemic	Skin inflammation -irritation, Radiodermatitis ²⁴
<i>Coscinium fenestratum</i> ¹⁰	Berberine, 2 benzyloisoquinoline alkaloids, 3 aporphine alkaloids, 12 quaternary protoberberine alkaloids, cetyl-alcohol, saponin	Thermogenic, Anodyne, Anti-inflammatory, Depurative, Antiseptic, Febrifuge, Sudorific and Tonic, Wound Healing, Antiacne, Antioxidant ²⁹	Inflammation, wounds, ulcer, skin diseases
<i>Glycyrrhiza glabra</i> ⁹	Glycyrrhizin: triterpenoid Saponin, Glycyrrhetic Acid: Flavonoid: liquiritigenin, isoliquiritigenin, glabridin, Polysaccharides	Anti-inflammatory, Antioxidant, Anti-ulcerogenic, Anti-microbial, Anti-viral, Expectorant, Immunomodulatory, Estrogenic	Adrenal Support Hormonal Imbalances inflammatory skin conditions Hair health ³⁰
<i>Curcuma zedoaria</i> ²¹	Eurcumin, zingiberene, dihydrocurcumin, furanodiene , germacrone	Antioxidant, Antibacterial, Antimicrobial, Antitumor, Antifungal, Anti-ulcerogenic, Immunomodulatory, Wound healing, Anti-inflammatory	Skin diseases, Oxidation ^{26,31}
<i>Nelumbo nucifera</i> ¹⁷	In Stamen- Glutathione Kaempferol, nelumboside A, nelumboside B isorhamnetin, glycosides, non-flavonoids arbutin, myo-inositol	Antioxidant, Antibacterial, Antifungal, Antiaging, Immunomodulatory, Anti-inflammatory. Anti-fertility, Anti-proliferative activity, Diuretic activity, Anti-fibrosis, Anti-obesity, Aphrodisiac ²⁷	male sexual disorders, cancer, syphilis, body heat imbalance, Rath pith condition, for stopping bleeding, Skin discoloration ²⁷
Bee Honey ²³	Polyphenols, Terpenoids, Glucosinolates, Alkaloids, Lignans, Saponins, Flavonoids Tannins, Enzymes, Glycosides Organic Acids, Volatile	Antibacterial, Anti-inflammatory, Antioxidant, Wound healing, Antimicrobial.	Eczema, dermatitis and skin diseases ⁸

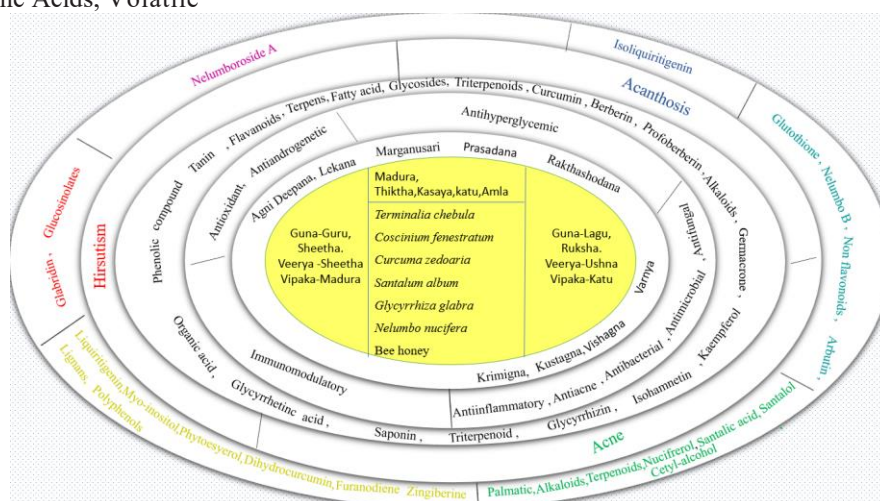


Fig.1: Ayurvedic pharmacological Properties, Proven Chemical Composition, pharmacological properties and medicinal uses of ingredients of *Madhukadi charmalepa*

Physiologically it contributes to the formation and maintenance of normal skin colour, regulation of temperature, smoothing of the skin, and the digestion and absorption of substances applied to the skin.

Maintaining *Varna* and *Ushma* is one of its fundamental purposes. Any deviation from *Bhrajaka Pitta*⁶ will result in an individual's *Ushma* and *Varna* being improperly managed. One of *Pitta*'s seats is *Sweda*. *Sweda* is crucial for maintaining a healthy body temperature. The pigment melanin and the hormone MSH that the pituitary gland secretes are the primary factors that determine skin colour. Temperature is another factor that melanin influences. The choice of *Madhukadi charmalepa* as a tropical intervention targets the *Sthanika Shodhana*, *Amapachana*, *Agnideepana*. The efficacy of *Lepa*⁷ can be attributed to the synergistic action of its ingredients. The predominance of *Kashaya*, *Madhura*, and *Tikta rasa* effectively pacifies the aggravated *Pitta*, while the *Lagu* and *Ruksha guna* counteract the *Kapha* accumulation typical of PCOS. The inclusion of honey is vital, its *Yogavahi* and *Vyavayi*⁸ properties ensure that the active herbal components penetrate the skin layers rapidly to stimulate local metabolism. For conditions like *Mukhadushika* and *Twak vaivarnya*. The *Lepa* acts as a *Rakta shodhaka*. By restoring *Sthanika dathvagni*, *Krimigna*, *Kustagna*, *Vishagna guna* reduced the acne vulgaris action, *Varnya*, *Prasadana*, *Rasayana*, *Vaysthapana guna* clears the normalization of skin color and reduction of androgen driven hair growth. The management of hyperandrogenism features in PCOS requires a multi targeted approach, as the condition manifests through complex interrelated pathways involving hormonal imbalances, insulin resistance and chronic inflammation. The phytochemical analysis of the seven ingredients in *Madhukadi charmalepa*, reveals a synergistic therapeutic action on hyperandrogenism features. Hirsutism in PCOS is primarily driven by the overexposure of hair follicles to androgens. *G. glabra*⁸ and *C. fenestratum*¹⁰ exhibit significant anti androgenic properties. Specially licorice can reduce circulating androgen levels by blocking 17-Hydroxysteroid dehydrogenase (17HSD) and 17,20-

lyase. The inhibition of the 5 α ,5 β -reductase enzyme is critical, as it prevents the conversion of testosterone in to the more potent dihydrotestosterone. By blocking androgen receptors in the dermal pappilla cells, the formula reduces local androgen sensitivity. This leads to a modulation of the hair growth cycle, shortening the anagen phase and prolonging the telogen phase. Clinical application may reduce follicular miniaturization, gradually transforming coarse terminal hairs into finer vellus like hairs¹¹.

The efficacy of the formula against acne is attributed to its ability to target microbial overgrowth, excessive sebum production, and follicular keratinization. Standardized *T. chebula*¹² extract, containing high levels of chebulinic acid and chebulagic acid, provides a potent antioxidant environment that neutralizes reactive oxygen species.

Curcumin in *C. zedoaria*¹³ acts as a multifaceted agent by inducing fibroblast differentiation and modulating cytokine levels, which effectively manage the inflammatory response in acne. Combined with the antibacterial and antifungal properties of propolis and the antimicrobial action of phenolic acids, the formula suppresses *Cutibacterium acnes* while promoting wound healing and skin barrier restoration. This multitargeted localized action is particularly beneficial for managing the persistent hormonally influenced acne seen in PCOS patients.

Acanthosis nigricans is often a cutaneous marker of insulin resistance. *C. fenestratum*¹⁰, through its primary active alkaloid berberine, has been shown to improve insulin sensitivity and reduce circulating testosterone. The dermatological improvement of these dark, velvety plaques is further supported by the melanogenesis inhibiting effects of *G. glabra*¹⁴ and *T. chebula*¹⁵. These herbs contain glycyrrhizin and gallic acid, which inhibit tyrosinase activity, the rate limiting enzyme in melanin production. Also reducing oxidative stress and regulating keratinocyte proliferation, by the nelumboroside and glutathione of *N. nucifera*(16), the formula helps to restore skin integrity and lighten hyperpigmented areas, including solar lentigines and post inflammatory hyperpigmentation¹⁷.

Beyond the management of PCOS symptoms, the formula offers significant preventive and restorative anti-aging benefits. The high concentration of hydrolysable tannins inhibits matrix metalloproteinases (MMP), the enzymes responsible for collagen degradation. By attenuating the formation of Advanced Glycation End-products (AGEs) and protecting the skin from UVB radiation damage, the formula prevents premature skin aging¹⁸.

Conclusion

According to the findings of the review it shows the ingredients of the *Madhukadi charmalepa* contain the potential ability to act against the hyperandrogenic features of the face in PCOS cases. A clinical study is suggested to prove its significant action scientifically.

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