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REVIEW ARTICLE

Ethnomedicinal plants used in the management of skin diseases: A review of traditional practices in Gujarat

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Abstract

This review focuses on contemporary ethnomedicine practices, with a specific focus on the use of medicinal plants for the treatment of skin diseases. It is based solely on published studies documenting such plants across the state's five regions: Saurashtra, North Gujarat, South Gujarat, Central Gujarat and Kachchh. Relevant literature was extensively searched through online databases, including Google, Google Scholar, ResearchGate, Scopus, Academia and Web of Science. A total of 193 plant species were identified from previous studies as being used to treat 18 different types of skin diseases. These diseases were classified into five categories based on their origin: bacterial, fungal, viral, parasitic and autoimmune. Conditions such as Abscess, Boils, Mastitis, Leprosy, Ringworm, Tinea versicolor (Karodiya), Itching, Chicken pox, Measles, Warts, Rabies, Scabies, Psoriasis, Eczema, Leucoderma, as well as cosmetic skin practices, are treated with the documented medicinal plants using various modes of administrations. Among the reported species, *Azadirchta indica*, *Cassia fistula*, *Aloe vera*, *Milletia peguensis*, *Centella asiatica*, *Argimone mexicana, Calotropis gigantea* and *Bombax ceiba* are the most frequently used for managing skin disorders and cosmetic purposes. This review highlights the rich ethnomedicinal knowledge in Gujarat and the significant role of traditional plant-based remedies in managing skin diseases. The documented information can serve as a valuable resource for future pharmacological studies, conservation efforts and the development of novel herbal formulations. Promoting and preserving such indigenous knowledge is essential to ensure its sustainable use and potential integration into modern healthcare practices.

Keywords: ethnomedicinal plants; Gujarat; skin-related diseases

Introduction

"Traditionally", plants, which are passed down from generation to generation from a vast range of communities, have been utilized to improve skin health. This tradition has persisted in many communities around the world since ancient civilizations. Plants have always played a major role in the treatment of diseases worldwide. Many earlier ethnobotanical works focused on lists of useful plants and tended to concentrate on discovering new drug sources and non-wood forest products (1, 2). Underutilised wild plant species possess great economic and nutritional value, as well as potential sources of desirable quality traits (3). The use of plants as medicine is an ancient, global tradition that represents the cornerstone of health care for many rural communities and citizens (4, 5). Skin-related diseases create major problems for society because this practice of health care is based on the beliefs and experiences of ethnic people, which are a part of their traditions and culture. Hence, there has been an increased requirement for traditional healthcare system in international trade because herbal drugs are inexpensive, more efficient, easily obtainable and have no side effects.

The skin of the human body is crucial because it is protective of the outer layer of the body. If the outer layer of the human body is infected or contains any kind of disease, then it is important to find a cure. Various skin diseases affect the human body, such as abscess, boiling, mastitis, leprosy, ringworm, tinea versicolor (Karodiya), itching, chicken pox, measles, warts, rabies, scabies, psoriasis, eczema, leucoderma, spores, blisters, burns and cosmetics (6–8).

India is among the most diverse countries in terms of both physiography and biological resources. Gujarat, with a total area of 196024 km^2, harbours rich plant diversity and varied habitats. Administratively, the state comprises 34 districts (as per the 2025 government notification) and, for the purpose of this review, is categorised into five regions: Saurashtra, Kachchh, North Gujarat, South Gujarat and Central Gujarat. Several ethnobotanical studies have been conducted in Gujarat; however, many of them do not specifically document plants used for treating skin ailments. Examples include studies on chewing-stick practices (9), ethnomedicinal plants by tribal and rural communities for treating dyspepsia in animals, digestive disorders in humans, cough and coryza (10–12), gonorrhoea (13), as well as studies on fruits and seeds used as ethnomedicines in North Gujarat (14) and ethnoveterinary practices among tribal communities (15).

Methodology

This review considered only published studies that document ethnomedicinal plants used for treating skin-related diseases in Gujarat, India. Relevant literature up to 2024 was extensively searched in online databases, including Google, Google Scholar, ResearchGate, Scopus, Academia and Web of Science, using specific keywords related to ethnomedicinal plant use for skin diseases among various communities in Gujarat. A total of 56 research articles were identified, of which 12 were excluded as they did not report any plant species used for skin-related treatment. From the remaining 44 articles, data on plant species traditionally used to manage skin diseases were compiled and analysed.

Results and Discussion

Fifty six research articles were found in various online databases documenting traditional knowledge of medicinal plants used by multiple communities in their healthcare system in Gujarat, India. These articles covered all regions of Gujarat state. Gujarat state has vast diversity in terms of societal communities as well as plant diversity. Most ethnobotanical studies are on tribal communities because these communities are dependent on plants for their daily practices, such as food, medicine, shelter, etc. This review article reports 193 ethnomedicinal plants used for curing skin-related problems by various communities around Gujarat state, as represented in Supplementary Table S1.

This study revealed that 18 kinds of skin diseases are cured by traditional healers or used by lay people and different tribal communities. We categorized these 18 diseases into 6 groups, viz. 1. Bacterial origin, 2. Fungal origin, 3. Viral origin, 4. Parasitic origin, 5. Autoimmune or chronic conditions and 6. Other causes are represented in Table 1 according to various studies. These reported diseases are cured by various parts of plants. Among the 193 species, 174 (90.10 %) were dicotyledons and 19 (9.90 %) were monocotyledons. According to these data, most traditional medicinal plants belong to the dicotyledons class (Fig. 1). These documented ethnomedicinal plants belong to 71 families (Fig. 2). The predominant families were Fabaceae, with 29 species, followed

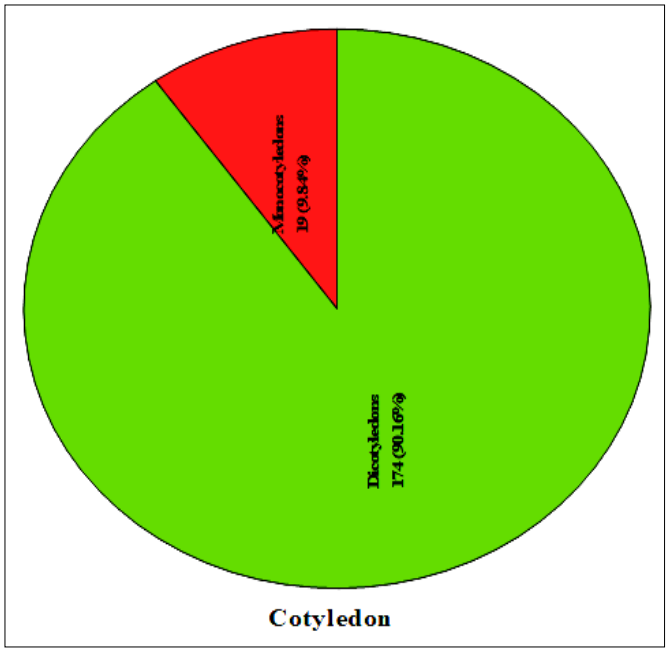

Fig. 1. Classes of ethnomedicinal plants reported in Gujarat state.

by Apocynaceae (11 species). Other notable families included Euphorbiaceae (8 species), Asteraceae (7 species), Malvaceae (7 species), Lamiaceae (6 species) and Solanaceae (6 species). The dominance of plant species is due to the different geography of the state.

The data presented in Fig. 3 show that plant species belong to five distinct growth habits: climbers, herbs, trees, shrubs and lianas. Among these, trees presented the highest representation, with 86 species (44.27 %), followed by herbs with 55 species (28.65 %) and shrubs with 27 species (14.06 %). Climbers accounted for 23 species (11.98 %), whereas lianas had the lowest representation, with only 2 species (1.04 %). In this review, we reported 16 different plant parts (Fig. 4) used for treating various kinds of skin diseases, including leaves, bark, roots, fruits, seeds, whole plants, stem flowers, rhizomes, bulbs, gum, latex and oil. Leaves were the most commonly used part, with 64 species, followed by fruits (20 species), roots (18 species), whole plants

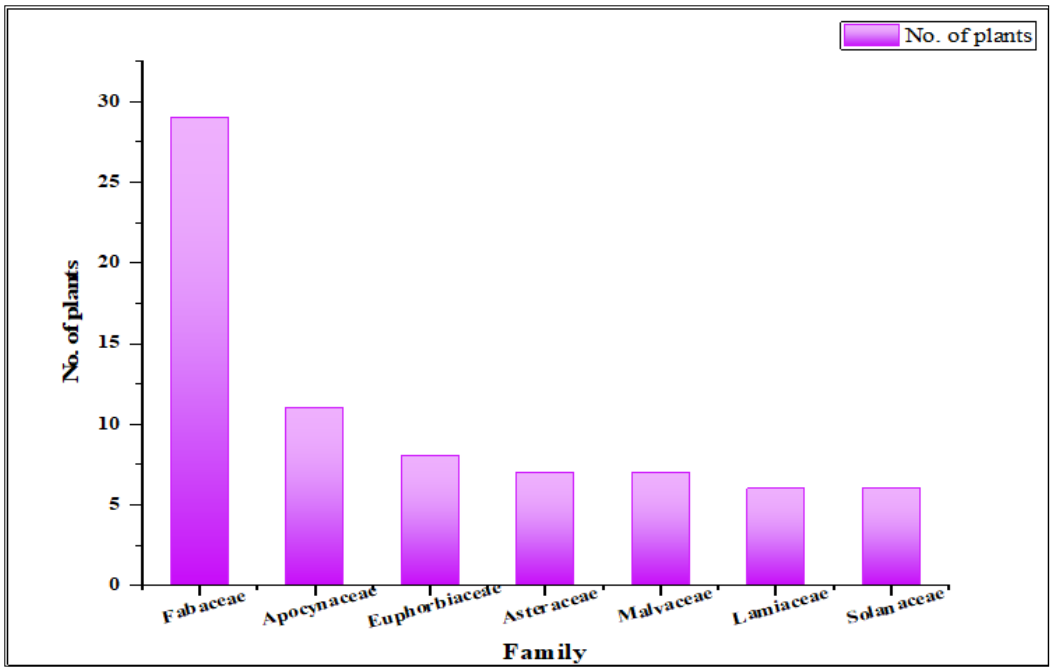

Fig. 2. Predominant plant families used for the treatment of skin diseases in Gujarat.

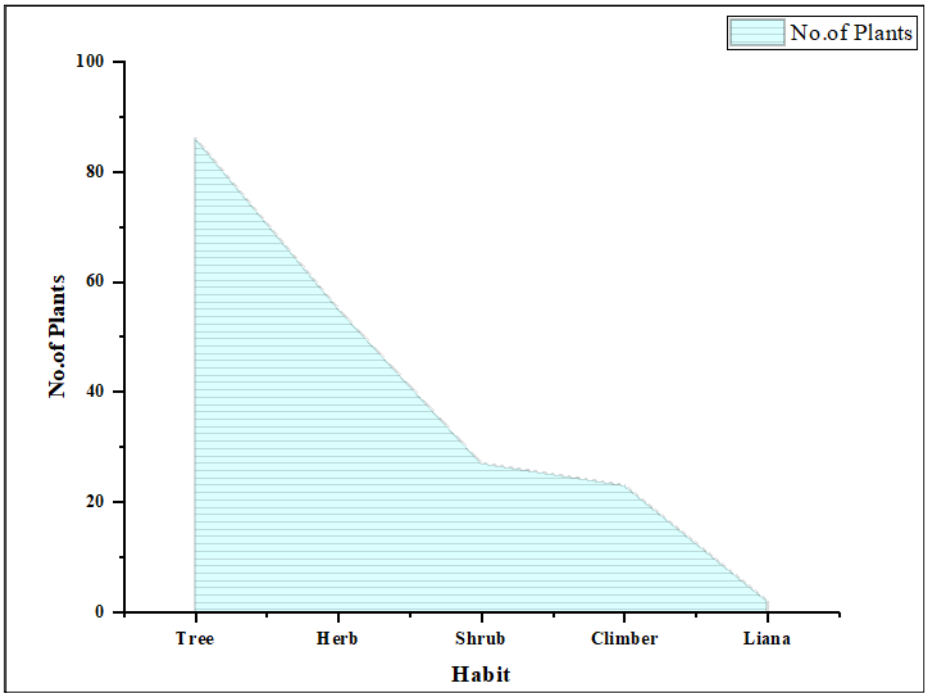

Fig. 3. Distribution of plant habits used in the treatment of skin-related diseases.

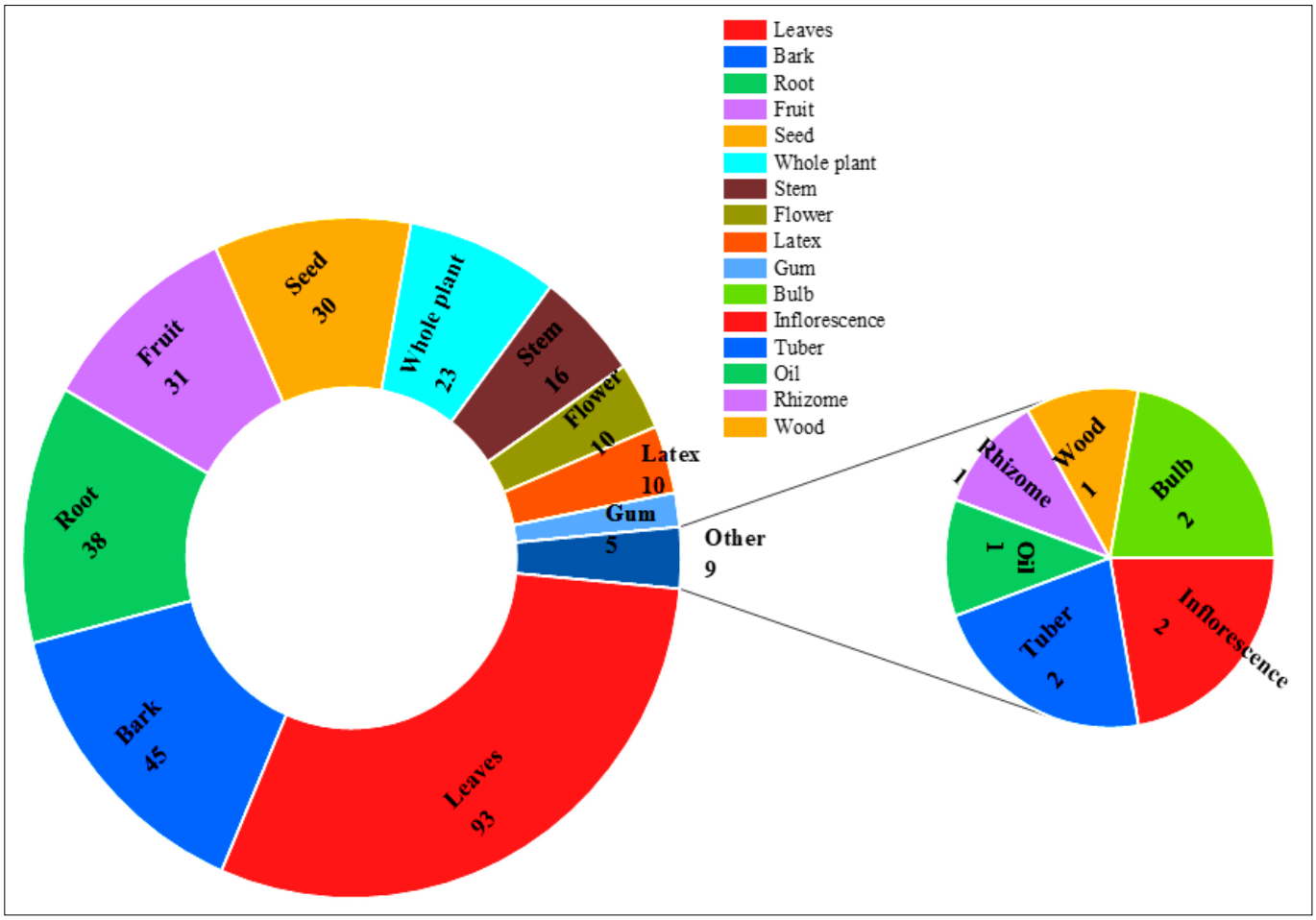

Fig. 4. Plant parts used for the preparation of traditional herbal medicines.

(18 species) and bark (14 species). According to habitat categorization, terrestrial and aquatic habitats, terrestrial plants were dominant, with 189 species (97.93 %), whereas aquatic plants were rare, with only 4 species (2.07 %).

The mode of preparation of traditional medicine also varies for the treatment of different skin diseases documented by researchers. We reported many traditional remedies in which paste, juice, decoction, etc., are used to treat skin diseases, as shown in Fig. 5. These traditional medicines are applied topically and directly to infected skin. We also observed that for the preparation of medicines, combinations of various plant species are used. In this study, we found that *Azadirachta indica* A. Juss plants are widely used by various communities as well as traditional healers of Gujarat State for many skin diseases around the state. Based on previous studies (Supplementary Table S1), 55 plants were used to cure bacterial-origin skin disease (Table 1).

Table 1. Various skin diseases are categorized into groups according to their origin or causes reported in Gujarat

Group of skin disease	Type of skin disease	Cause	References
Bacterial origin	Abscess	*Staphylococcus aureus* or *Streptococcus pyogenes*	(6)
	Boils	*Staphylococcus aureus*	
	Mastitis	*Staphylococcus aureus* or *Streptococcus* spp.	
	Leprosy	*Mycobacterium leprae*	
Fungal origin	Ringworm	Dermatophytes like Trichophyton, Microsporum and Epidermophyton	(7)
	Tinea versicolor (Karodiya)	*Malassezia furfur*	
	Itching	Often linked to fungal infection like dermatophytosis	
Viral origin	Chicken pox	Varicella-zoster virus	(8)
	Measles	Measles virus (Paramyxovirus)	
	Warts	Human Papillomavirus (HPV)	
	Rabies	Rabies virus (Lyssavirus)	
Parasitic origin (helminthic or other)	Scabies	*Sarcoptes scabiei* (a parasitic mite)	
Autoimmune or chronic condition	Psoriasis	An autoimmune disorder, no infectious causative agent	
	Eczema	Often associated with allergic or immune response, not an infection	
	Leucoderma	Likely autoimmune or genetic, no direct infectious agent	
Other causes	Sore	Often due to trauma, infection or irritation	
	Blisters	Typically, caused by friction, burns or viral infection	
	Burns	Caused by heat, chemicals or radiation	

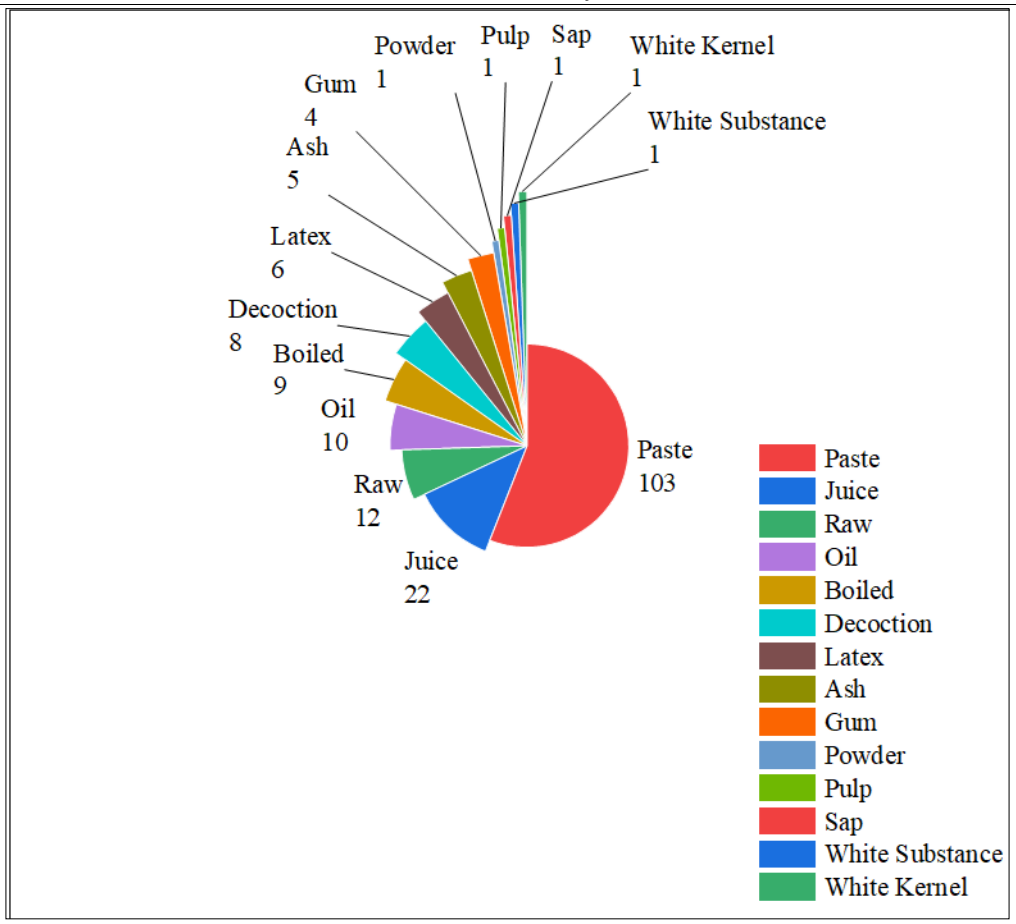

Fig. 5. Preparation methods of traditional medicines used in Gujarat, India.

Earlier studies reported that *C. asiatica* can be combined with Asiaticoside, which is used to treat leprosy and stimulate wound healing and skin grafts, which correlates with the reported use for traditional healthcare in this article (16). The previous study investigated the antibacterial activity from alcohol extract of *C. fistula* leaves and reported that it is effective against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Salmonella typhi* which can be used to prevent bacterial skin diseases (17). Study from Karnataka, they used *C. fistula* to treat Itching due to impure blood, eczema, herpes, ringworm and scabies (18).

Earlier study demonstrated that the methanol extract of *A. mexicana* leaves was tested *in vitro* via the well diffusion method, which confirmed that the methanol extract of *A. mexicana* leaves can be used to treat diseases of bacterial origin (19). The plant has strong inhibitory activity against *S. aureus*, *B. subtilis* and *Enterococcus faecalis*, which are responsible for skin infections (20). *Aloe vera*, *C. gigantea*, *J. sambac*, *S. aurens* and *P. cineraria* are plants used to cure bacterial-origin skin diseases as well as other skin-related diseases. Ethnomedicinal report of plant from Santhal community of India, also support the pharmacological validation (21). The number

of plants that are helpful for treating fungal-origin diseases is 24 and an earlier study have demonstrated the effectiveness of *S. tora* extracts against various dermatophytes (22). For example, the methanolic extract of leaves was evaluated for *in vitro* antifungal activity against *Candida albicans* using the cup plate method, and the test drug significantly inhibited fungal growth at a concentration of 10 mg/mL. The minimum inhibitory concentration of extract that can inhibit the growth as observed by development of turbidity in broth dilution technique was found to be 2 mg/mL, alcoholic extract of seeds was evaluated for antifungal activity by culture and sensitivity test and the extract at concentration of 1.25, 2.5, 5, 10 and 20 µL showed dose dependant inhibition of dermatophytes collected from skin samples of patients, hence its pharmacological validation supports the traditional healthcare. An experiment was conducted in an earlier study (23) alcoholic extract prepared from *A. marmelos* fruit, which has anti-inflammatory, antipyretic, analgesic and antimycobacterial activities and is used to treat skin-related diseases. Other plants, such as *C. fistula*, *A. vera*, *M. peguensis*, *S. tora*, *J. sambac* and *S. urens*, were also used.

Currently, the vital skin diseases are of viral origin and seven plants are used to cure the disease, including *M. charantia*, which is used mostly and studies have shown that bitter melon extracts inhibit the replication of herpes simplex virus and reduce the severity of HSV-induced lesions. The salt-precipitated fraction of MRK29 caused 82 % reduction of viral core protein p24 expression in HIV-infected cells and an increased in TNF activity. Furthermore, it has shown promise against other viruses, including human papillomavirus, by targeting infected cells and enhancing immune responses, which proves its ethnobotanical significance (24).

Sixteen plants are used to treat autoimmune-related skin diseases, whereas *C. gigantea is* used to treat diseases such as psoriasis, eczema and vitiligo, which result from an overactive immune response attacking the skin. *Calotropis gigantea* has shown potential in modulating these responses due to its bioactive compounds, including calotropin, uscharin and cardenolides (25) and it is traditionally used in eczema, herpes, pruritus and scabies (18). Some plants, such as *M. peguensis*, *S. tora* and *P. cineraria*, are also effective at treating other skin diseases.

Skin care is currently important but also has side effects in modern medicine; hence, herbal remedies involving plants such as *E. hirta*, *B. aegyptiaca*, *C. fistula*, *M. parvifolia*, *B. ceiba*, *F. religiosa*, *C. lemon*, *C. trifolia*, *M. spinosa*, *E. scaber*, *A. indica*, *W. somnifera* and *A. precatorius* are very acute and effective in pimples, acne and dark spots as cosmetics. *B. ceiba* extracts are rich in flavonoids and polyphenols, which combat oxidative stress, protect the skin from premature aging caused by free radicals, stimulate collagen production, improve skin elasticity and reduce fine lines (26).

A previous study reported the isolation of the dimeric glycoside Shamimicin from the stem bark of *Bombax ceiba* using petroleum ether as the solvent. The compound was evaluated using the hypotensive activity normotensive Sprague–Dawley rat model and was found to be useful against pimples or acne (27). While most studies suggest that flowers of *B. ceiba* are rich in flavonoids, polyphenols and anthocyanins, which provide antioxidant and anti-aging properties (28). Maximal scavenging was observed in flower at 0.55 mg mL^{-1} (85.34 %) for the methanolic extracts which helps to protect the skin from oxidative stress and UV-induced damage (29), The methanolic extract of *B. ceiba* flower showed an EC_{50} value of 87 ± 3 µg/mL (30), while stem bark extract of *B. ceiba* showed EC_{50} value of 139.4 ± 0.98 µg/mL (31), promote skin brightening and enhance complexion by inhibiting melanin production (32). Ethnobotanical reports from other state suggested that *B. ceiba* bark paste is good for skin eruptions, Leaves are good for strangury and skin eruptions. Flowers are astringent and are good for skin troubles (33), thorn for curing pimples, petals for soft and bright skin (34). All these studies indicate that flowers show high ethnomedicinal use in cosmetics compared with other parts.

Compared with other plants, which is used in skin ethnomedicines, *A. indica* consist high ethnomedicinal value (Supplementary Table S1). *Azadirachta indica* is utilized to treat multiple bacterial skin diseases and contains a variety of bioactive compounds, including nimbidin, nimbin, azadirachtin and quercetin, which are known for their potent effects on *E. coli*, *P. aeruginosa*, *S. typhi*, *S. aureus* and *B. subtilis*. The leaf aqueous extract, flower and stem bark ethanol extracts observed to be higher free radical scavenging activity with 50 % scavenging activity at 26.5, 27.9 and 30.6 µg mL^{-1}, respectively. The total antioxidant activity of the extracts was also determined to be 0.959, 0.988 and 1.064 mM of standard Trolox, respectively (35, 36). Studies have demonstrated that neem extracts can effectively inhibit the growth of pathogenic bacteria such as *S. aureus*, *S. pyogenes* and *P. aeruginosa*, which are common causative agents of bacterial skin infections, including boils and abscesses (37).

Azadirachta indica (neem) aqueous ethanolic extracts of neem leaves have shown promising results in both *in vitro* and *in vivo* studies. They inhibit the growth of *Candida* species, which are often implicated in skin infections such as candidiasis. Neem has shown acaricidal (mite-killing) properties and effectively treats scabies without causing resistance (38). Neem extracts, especially neem bark and leaf extracts, have demonstrated significant antileishmanial activity by inhibiting parasite growth (39). Neem seed oil and leaf extracts have strong antifungal and antiparasitic properties, preventing the growth of the *Tinea* species responsible for the ringworm. Topical neem-based creams and lotions help relieve itching, scaling and inflammation (40). Ethnobotanical study from other state, people used *A. indica* to removing external parasites (41), burning sensation, leprosy, skin diseases, leukoderma (42), itching problems (21), ringworm, scabies (18). Our study indicated that there was high consistency of the indigenous informant knowledge in the practices of ethnomedicines and utilised the same plants to treat it.

Conclusion

This review complies previous ethnomedicinal studies in Gujarat, India, focusing on plants traditionally used for treating various skin diseases. Among the documented species, *Azadirachta indica*, *Cassia fistula*, *Aloe vera*, *Milletia peguensis*, *Centella asiatica*, *Argimone mexicana*, *Calotropis gigantea* and particularly *Bombax ceiba* show high therapeutic potential for skin healthcare. *B. ceiba* stands out as a promising ethnomedicinal plant species due to diverse medicinal applications. Traditional remedies remain cost-effective and culturally significant in developing countries, offering safer alternatives with minimal side effects compared to modern medicines. However, the pharmacological properties of several promising species are still underexplored. Future research should focus on the clinical validation of these plants, detailed pharmacological investigations and bioprospecting to identify novel bioactive compounds, such efforts could lead to the discovery and

development of new or improved herbal drugs while preserving valuable indigenous knowledge.

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Authors' contributions

RS and SG compiled the data and wrote the manuscript. SG, KG and TC compiled the data and analysis. RS, SG and KG compiled the data and edited. SV edited and wrote and SG drafted and edited the manuscript. All authors read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interest to declare.

Ethical issues: None

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