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Ethnobotanical review of plants utilized for treating skin diseases in Northeastern India

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Abstract

Skin infections pose significant health challenges globally, particularly in regions like Northeastern India characterized by diverse ecosystems and indigenous healing traditions. This review synthesizes ethnobotanical knowledge from various communities in Northeastern India regarding plants utilized for treating skin infections. A systematic analysis of ethnobotanical literature, field surveys, and traditional healers' knowledge was conducted to compile data on plants employed in dermatological care. Traditional practices often involve the preparation of poultices, ointments, or decoctions from plant parts like leaves, roots, and barks. Phytochemical investigations have identified bioactive compounds like alkaloids, flavonoids, tannins etc. in these plants, contributing to their antimicrobial, antibacterial and anti-inflammatory properties. Northeast India is renowned for its rich cultural diversity, which is reflected in its traditional medicinal practices deeply rooted in indigenous knowledge systems. This review provides a comprehensive overview of the ethnobotanical knowledge surrounding plants used for treating skin infections in Northeastern India, and potential for modern healthcare practices.

Keywords: Ethnomedicinal plants, chemical constituents, northeast India, traditional, skin infection.

Introduction

Throughout history, plants have served as a vital source of chemical compounds with medicinal potential. Many plant-derived secondary metabolites are highly valuable commercially, as they are extracted and used in various pharmaceutical products. Indigenous communities have also long utilized these plants in traditional medicine, underscoring their significance and effectiveness in healthcare [1]. The ethno-botanical approach is essential in encouraging rural communities to participate in conservation initiatives to preserve biodiversity [2]. Medicinal plants have been used to treat a variety of ailments since ancient times, with human knowledge of their therapeutic properties extending back over five thousand years. Indigenous communities worldwide have extensive knowledge about different medicinal plants and their uses, utilizing their expertise to create innovative practices and products from their natural environment [3, 4]. The demand for natural medicine is steadily increasing, with about 64% of the global population depending on traditional medicine to treat various illnesses and injuries [5].

Nearly 80% of the population in developing countries primarily depends on indigenous, mostly natural medicines to meet their primary healthcare needs. The high cost of allopathic medicines, which are unaffordable for many, and the lack of adequate healthcare facilities in rural areas contribute to the continued prevalence of traditional medicine. The decentralized nature of traditional medicine, its easy and quick accessibility, along with the traditional faith of tribal communities, keeps them connected to their own healing practices [6]. Researchers are increasingly interested in the potential of developing medicines from ethnomedicinal plants due to their widespread availability, accessibility, and versatility. Traditional medicinal plants are being studied for their pharmaceutical properties, with ongoing efforts to integrate them into primary healthcare systems. The WHO Traditional Medicine Strategy 2014-2023 highlights the importance of incorporating traditional medicine into public health systems, as demonstrated by the inclusion of a course on traditional and complementary medicine (T&CM) in its publications [7]. Medicinal plants are rich in a variety of secondary metabolites, such as polyphenols, saponins, alkaloids, flavonoids, and terpenoids, which have diverse biological properties.

As a result, ethnomedicinal plants have been widely studied for their pharmacological effects, including antibacterial, antifungal, antiviral, antioxidant, anticancer, anti-inflammatory, and hepatoprotective activities. They also show benefits for gastrointestinal, dermatological, and metabolic health, and are used in pest control^[8, 9].

The North-eastern region of India, located between latitudes 87°32'E and 97°52'E and 21°34'N and 29°50'N, is part of two major biodiversity hotspots and is renowned for its genetic resources globally. This region is also considered the biogeographical gateway to India. The local population, particularly ethnic groups, traditionally use various parts of plants, such as leaves, bark, and roots, to treat numerous diseases. In the Eastern Himalayas alone, about 300 plant species are found out of an estimated 800 species used as food plants in India. Despite its rich biodiversity, there is still a significant lack of data on many plant taxa in this area^[10].

Traditional medicine

India had a system of medicine with professional healers for several centuries before and after 2000 BC. The seeds of Indian medicine were present in Harappan culture. Additionally, the earliest Indian literature, the Rigveda, dating mostly to the later part of the 2nd millennium BC, contains lines indicating a definite nature of medicine. During this time, diseases were often attributed to the wrath of gods and evil spirits, and healing practices involved prayers, hymns, and herbal remedies, successfully treating ailments such as blindness, lameness, and even leprosy. By the late 5th or 6th century BC, the traditional Indian medical system began to take shape, as referenced in Hindu texts. This period was marked by strict socio-religious taboos that controlled people's contacts and dietary habits. Over time, the science of medicine, known as Ayurveda, was developed and believed to have been passed down through various eras by a line of sages. In later stages, Charaka and Susruta significantly contributed to the popularization of Ayurveda in India by authoring the Sanskrit medical manuals Charaka Samhita and Susruta Samhita, respectively^[11]. The World Health Organization (WHO) defines traditional medicine as "the sum total of the knowledge,

skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement, or treatment of physical and mental illness". This definition highlights the holistic nature of traditional medicine, considering the individual within a broader ecological context and recognizing the importance of balance and equilibrium in maintaining health^[12].

Potential of ethnomedicinal studies in Northeast india

In North East India, herbal medicine has a longstanding tradition, particularly among rural residents and tribal groups living in remote or forested areas. While research in this field has mainly focused on a few tribes like the Ler, Mikir, Karbis, Mirin, Khasi, Jaintia, Garo, Monpas, Nishi, Apatani, and Reangs, numerous plants with ethnobotanical properties effective against various ailments have been identified. However, many tribal communities in the region hold extensive knowledge of folk remedies. Therefore, there is a need to prioritize ethnomedicinal studies in North East India, as they can offer valuable insights and indicate the necessity for further comprehensive research on the ethnobotanical characteristics of the area. Such research efforts could provide valuable information for promoting the utilization of traditional herbal medicinal plants^[13].

Methodology

We undertook a comprehensive examination of the current literature concerning medicinal plants employed in treating skin ailments. Our main source of information was the website of the State Medicine Plant Board, supplemented by references from academic papers, books, and articles to aid in our analysis. Furthermore, we also conducted some personal interviews and delved into existing literature to gain insights into the utilization of traditional herbal remedies. In addition to data collection, our study sought to investigate the relationship between communities and the use of medicinal plants.

Plants uses for skin infection in Northeastern region India

Table 1: Plants uses for skin infection in Northeastern region India

Sl. no	Scientific name	Family	Local name	Part used	Habitat	Mode of administration	Chemical constituents	Reference number
1.	<i>Manihot esculenta</i> Crantz.	Euphorbiaceae	Phan-dieng	Leaf	Meghalaya	Decoctions of the leaves are applied locally.	Alkaloids, Flavanoids, Phenols, Tannins, Terpenoids, anthraquinones.	14, 34
2.	<i>Cucurma longa</i> L.	Zingiberaceae	Tharmit	Rhiz-ome	Assam	Paste of rhizome is applied to treat infected areas.	Curcumin, Demethoxycurcumin, Bisdemethoxycurcumin	15, 35
3.	<i>Cassia occidentalis</i> L.	Fabaceae	Bari Kasondi	leaf	Tripura	Leaf paste is used in skin disease like ringworm etc.	Achrosin, Aloeemodin, Emodin, Anthraquinones, Anthrones, Apigenin, Etc.	16, 36
4.	<i>Azadirachta indica</i> Juss.	Meliaceae	Neem	Leaf	Assam	Crushed leaves are applied externally to treat ringworm, crushed bark is used to heal abscesses and other skin conditions.	Nimbin, Nimbidin, Quercetinazadirachtin.	17, 37
5.	<i>Pterocarpus marsupium</i> Roxb.	Pterocarpaceae	Red sandal	Stem	Nagala-nd	Stem wood paste used in skin diseases and rashes.	Pterosupin, Pterostilbene, Liquirtigenin, Epicatechin.	18, 38
6.	<i>Gynocardia odorata</i> R. Br.	Flacourtiaceae	Saithei	Seed	Mizoram	The seeds are extracted & used as lotion in leprosy & other skin diseases.	Gynocardic acid, Gynocardin, Gynocardinol, Gynocardinol acetate.	19, 39
7.	<i>Meyna spinosa</i> Roxb.	Rubiaceae	Monkata	leaf	Tripura	Leaves is crushed with small amount of ginger and the past is applied on infected areas	Triterpenes, Saponins, Phytosterols, Flavonoids, Etc	20, 40

8.	<i>Tacca integrifolia</i>	Dioscoraceae	Tagoon	Tuber, Rhizome	Arunachal Pradesh	Paste is used to treat bacterial skin infection, leprosy etc.	Steroidals, Diarylheptanoids, Phenolics, Flavonoids, Sesquiterpenoids, Triterpenoids	21, 41
9.	<i>Artocarpus heterophyllus</i> Lam	Moraceae	Kathal	leaf	Tripura	Latex is used to treat skin infections.	Cynomacurin, Artocarpin, Isoartocarpin, Cyloartocarpin, Artocarpesin, Norartocarpetin.	22, 42
10.	<i>Nephrolepis cordifolia</i>	Davalliaceae	Seraenjen	Tuber	Nagaland	Fresh tubers are crushed and applied topically or a slice of tuber is rubbed into the affected areas for the treatment of skin infections.	Phenolic Acids, Flavonoids, Glycosides, Alkaloids, Oleanolic Acid, Eugenol, Ionone Etc.	23, 43
11.	<i>Berberis aristata</i>	Berberidaceae	Kanchan	Whole plant	Arunachal Pradesh	Paste of plant is applied on infected areas.	Berberine, Oxyberberine, Berbamine, Karachine, Palmatine, Oxycanthine, Tannins	24, 44
12.	<i>Jatropha curcas</i>	Euphorbiaceae	Kangdamdawi	Leaf	Mizoram	Leaves juice was applied on the skin for scabies and ring worm.	Phenolic Acids, Lignans, Flavonoids, Coumarins, Alkaloids, Terpenes.	25, 45
13.	<i>Artemisia vulgaris</i>	Asteraceae	Ngonho Hanshem	Leaf and root	Nagaland	Paste is used to treat different bacterial skin infections	Camphor, Camphene, Germacrene d, β -Caryophyllene, β -Thujone, α -Thujone, Borneol, Germacrene d And α -Zingiberene.	26, 46
14.	<i>Alstonia scholaris</i> (L) R. Br.	Apocynaceae	Chatiana	Latex, Stem bark	Assam	Latex is applied on scabies and some skin diseases.	Alkaloids, Coumarins, Iridoids, Flavonoids, Leucoanthocyanines, Steroids, Tannins, Phenolics, Saponins.	27, 47
15.	<i>Hyptis suaveolens</i> (Linn.) Poit.	Lamiaceae	Bontulsi	Leaf	Meghala-ya	Young twigs and leaves are used against skin diseases.	Suaveolic Acid, Suaveolol, Methyl Suaveolate.	28, 48
16.	<i>Cassia tora</i> L	Caesalpiniaceae	Chakramarda	Leaf	Mizoram	Leaf paste is used in skin diseases, eczema, itching and scabies for its control.	Anthroquinones, Chrysophanol, Emodin, Obtusifolin, Obtusin, Chryso-Obtusin, Auranto-Obtusin.	29, 49
17.	<i>Coptis teeta</i>	Ranunculaceae	Rinko	Root	Arunachal Pradesh	Root paste is applied topically on the skin.	Berberine, Palmatine, Jatrorrhizine, Coptisine, Columbamine, And Epiberberine.	30, 50
18.	<i>Aconitum ferox</i>	Ranunculaceae	Bikh, Bish	Tuber	Sikkim	Tuber paste is used for leprosy and other skin diseases.	Aconitine And Other Diterpenoid Ester Alkaloids (Aconitine, Mesaconitine, Jesaconitine, Hypaconitine.	31, 51
19.	<i>Lyonia ovalifolia</i> Wall.	Ericaceae	Angeri	Leaf	Sikkim	Juvenile Leaf juice is used to cure skin diseases.	Eriodictyol, Quercitrin (Quercetin-3-o-Rhamnoside), Quercetin-3-o-Galactoside, Luteolin, Astilbin.	32, 52
20.	<i>Cyperus rotundus</i> L.	Cyperaceae	Sembang Kaothum	Tuber	Manipur	The crushed tuber is used to cure skin diseases.	Patchoulenone, Isopatchoulenone, Sugeonyl Acetate, Sugetriol Triacetate, Kaempferol, Luteolin And Quercetin.	33, 53
21.	<i>Euphorbia hirta</i> L.	Euphorbiaceae	Laghudughika	Leaf	Naagaland	Plant paste and latex used in skin diseases.	Afzelin, Quercitrin, Myricitrin Etc.	18, 54
22.	<i>Cassia fistula</i>	Caesalpiniaceae	Raj briksha	Leaf	Sikkim	Paste is used for treating skin diseases.	Anthraquinones, Flavonoids, Flavon-3-OI Derivatives, Alkaloid, Glycosides, Tannin, Saponin, Terpenoids, Reducing, Steroids.	31, 55
23.	<i>Bauhinia acuminata</i> L.	Leguminosae	Chingthrao angouba.	Stem, bark	Manipur	Decoction of bark is used in various skin infections like scabies, itches, boils etc.	Phenolic Compounds, Saponins, Flavonoids, Oils, And Fats, Alkaloids, Anthocyanoside, Steroids, Anthraquinone, Terpenoids, Resins, Amino Acid, Sugars And Cardiac Glycosides.	33, 56
24.	<i>Altemanthera sessilis</i> L.	Amaranthaceae	Matikanduri	Leaf	Assam	Paste is applied on the skin topically.	Alkaloids, Carbohydrates, Cardiac-Glycosides, Flavonoids, Phenols, Saponins, Tannins, Terpenoids, Quinones, Coumarins Etc.	15, 57
25.	<i>Cassia alata</i> Linn.	Caesalpiniaceae	Tuihlo	Leaf	Mizoram	The leaves are bruised & applied to earthworm, ringworm infection as well as to other skin infections.	Adenine, Chrysoeriol, Quercetin, Anthraquinone, Tetrahydroxy Flavone.	19, 58



(1)



(2)



(3)



(4)



Fig 1: Plants uses for skin infection in Northeastern region India

Conclusion

In conclusion, the rich botanical diversity of Northeast India has long been harnessed by indigenous communities for managing various ailments, including skin infections. Through this review, we have highlighted numerous plant species with documented traditional uses in treating dermatological conditions. These plants often contain bioactive compounds with antimicrobial, anti-inflammatory, and wound-healing properties, offering promising alternatives or adjuncts to conventional therapies. However, despite their widespread use and cultural significance, many of these traditional remedies lack scientific validation through rigorous pharmacological and clinical studies. Future research should focus on elucidating the mechanisms of action, safety profiles, and efficacy of these plant-derived compounds. Furthermore, efforts to conserve the region's plant biodiversity and traditional knowledge are imperative to ensure the sustainability of these invaluable resources. By integrating traditional wisdom with modern scientific approaches, we can unlock the full therapeutic potential of Northeast India's botanical wealth for the management of skin infections and contribute to global efforts in drug discovery and development.

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