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Healing skin disorders with wild edible Plants : Phytotherapeutic practices in Shivalik Hills of Himachal Pradesh

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Abstract

The Shivalik Hills of Himachal Pradesh, India, has a wide range of plants with therapeutic uses by the local inhabitants. This paper focuses on the traditional methods of treating leucoderma, leprosy, and different skin diseases frequently used by the indigenous communities inhabiting this region. The research was conducted through ethnobotanical surveys and interviews with elders and conventional healers in the community who have sufficient knowledge about various plant species with valuable medicinal qualities. These herbal parts are prepared as an infusion, decoction, or paste to be applied externally or taken orally. These therapeutic measures result from a profound understanding of the regional biodiversity. During the research, it has become apparent that many substances derived from plants contain synergistic properties that help achieve specific treatment goals. This paper serves as a crucial record for pharmaceutical research in the future, supporting the integration of traditional knowledge with modern medical research and fostering a holistic approach to healthcare.

Key words : Ethnobotanical surveys, Skin diseases, Shivalik Range, Traditional phytotherapies, Traditional knowledge.

Humankind and plants have had a relationship from the beginning of time. From the start, people have depended on plants for basic needs like food, animal feed, fuel, wood, etc. There are around 300,000 species of vascular plants globally[17]. Approximately 80 percent of global humans rely on customary practices and medications for their main medical care requirements[40]. A vast majority of communities worldwide use plant parts directly as medicine, with no negative effects similar to those of allopathic medicine. There is a chance that medicinal herbs have the potential to cure various diseases and have been used by people since ancient times[31].

The Shivalik Range, a sub-Himalayan mountain chain stretching across northern India, is not only known for its rich biodiversity but also the profound traditional knowledge held

by its rural communities[47]. These communities have been utilizing various phytotherapies for generations to treat an array of skin ailments, including leucoderma, leprosy, and other skin illnesses. Traditional knowledge, particularly in the realm of herbal medicine, plays a crucial part in the healthcare practices of rural communities. This knowledge passed down through generations, is based on the empirical use of local flora and is integral to the cultural heritage of the region. The people of the Shivalik Range rely on their deep understanding of the medicinal properties of plants, which are readily available in their natural surroundings. Skin illnesses comprise an extensive spectrum of ailments impacting the skin, which is the biggest organ in the body[14]. These conditions can vary from mild irritations to severe, chronic diseases. Common skin issues include eczema, characterized by itchy and inflamed patches of skin, and psoriasis, where skin cells accumulate to form scales and itchy, dry patches, fungal infections, including athlete's foot and ringworm, are also prevalent and caused by fungi thriving in warm, moist areas of the skin[21]. Leucoderma, also known as vitiligo, leads to the loss of skin pigment, creating white patches, and leprosy, an infectious disease caused by the bacterium *Mycobacterium leprae*, recognized from the time of the Bible. It is marked by disfiguring skin sores, nerve damage, and progressive debilitation[17]. In 2022, a total of 182 nations released leprosy data, revealing a recorded prevalence of 165,459 cases and 174,087 new instances, with 67,657 (39%) of these new cases occurring among females. In India, there were 75,394 cases of leprosy in 2021. This number increased to 103,819 cases in 2022, making India, the nation with the largest count of leprosy cases globally. The limited availability of allopathic drugs is insufficient to combat the vast number of leprosy cases worldwide, particularly in poor countries like India. Therefore, alternative treatments must be explored, and plant-based medicines are an excellent option. They are cost-effective, biologically safe, and easily accessible due to the diverse range of medicinal plants available in these regions. Consequently, the role of herbal medicine plays a crucial role in the management of leprosy and other dermatological conditions[57]. These skin diseases can significantly impact a person's quality of life, prompting the use of both modern medical treatments and traditional remedies, especially in rural areas with rich herbal traditions. Despite extensive research in ethnobotany, there has not been a systematic study to document the indigenous knowledge of wild edible plants used for skin diseases in the Shivalik hills of Himachal Pradesh, India. To fill this gap, ethnobotanical research was carried out to record the rich knowledge of these plants in this region. This research seeks to recognize and record the various wild edible plants used to treat skin diseases in the area. It is hoped that these plants will be further researched in the future to explore their chemical properties and medicinal effects.

The study involved extensive field surveys across various villages in the district during different seasons. Researchers used interactive interview methods, using questionnaire surveys, informal gatherings, field observations, and group discussions. Knowledgeable individuals, aged 35 to 65, were interviewed, including men, women, youths, and elders, mostly dependent on agriculture and horticulture. Semi-structured questionnaires were employed to assemble details concerning the customary


Ethnobotanical Questionnaire Related to Utilization of Riparian Vegetation

Informant's details:

Name: _____

Gender: _____

Age:

Occupation: _____

Education: _____

Location/ Residence: _____

Questions:

Plant Sources: Wild/ Cultivated/ Protected

Which plants have you used for different purposes (local name of plants used)? _____

Name of habitat from which plant is collected

Which part have you used?

If it is consumed as food, how do you consume it (salad, vegetables)? _____

Which ailments have you used it for?

How is it used (dried or fresh)?

How do you prepare it for use? (tea, infusion, topical application) ___

Describe in detail how you prepare for each ailment. _____

How is the preparation administered? _____

For how long do you have to take the preparation?

_____

Figure 1. 1. Questionnaire **2.** Interview with local people **3.** Herbarium sheet

Table-1. Demographic attributes

Demographic features			
		Number	Proportion(%)
Gender	Female	60	40
	Male	90	60
Age	40-55	40	26.66
	56-65	65	43.33
	66-80	45	30
Vocation	Farmer	95	63.33
	Tribal	29	19.33
	Civil employees	26	17.33
Education	Illiterates	90	60
	Matriculates	38	25.33
	Graduates	22	14.66

utilization of healing plants. Initially, plant specimens were shown to villagers and local healers to gather information on their therapeutic uses. Detailed information was then collected on the plants, their parts used, and their modes of utilization. The documented information was examined for several parameters. Fresh samples were gathered and identification of these samples will have been done by consulting various 'floras', such as 'The Flora of British India'[22], and other floras of H.P., such as 'Flora of Himachal Pradesh' [10] and flora of Mandi[52]. For the preparation of the manuscript relevant literature[1-66] has been consulted.

Data analysis :

Extensive data analysis was conducted, utilizing various ethnobotanical tools such as use value, and agreement among informants.

1. Informant consensus factor (ICF) :

It is characterized by the extent of diversity in the number of therapeutic plants employed by physicians to cure a particular ailment type[16]. It is calculated by:

$$ICF = Nur–Nt/Nur–1$$

where Nur represents the number of references used for every ailment group and Nt signifies the number of herbs used shown in Table-2. The ICF value falls within the range of 0 to 1, with higher values signifying a stronger accord among respondents regarding the use of specific floras[16,59,60].

2. Use value (UV) :

It serves as a useful instrument in evaluating the importance of local floras. It indicates the frequency of usage of particular floras among respondents, where Ui signifies the number of utilization recorded by every respondent, and Ut represents the total number of respondents[5]. It was measured by Yaseen *et al.*,[62].

$$UV = Ui/Ut$$

The use value spans from 0 to 1 value, where elevated UV values signify increased significance of herbs, while less values suggest diminished significance[1,36,56].

Table-2. Informant consensus factor

Symptom Groups	Diseases	Use Citation (N_{ur})	Number of Species (N_t)	Informant Consensus factor (ICF)
Skin Disorders	Scabies, Ringworm, Abcess, Leucoderma, Eczema, Inflammation, Leprosy, Sores, Carbuncles, Vitiligo, Psoriasis, Pruritus, Brwon spot, Bacterial infection, Filarial, Skin eruption	103	27	0.74

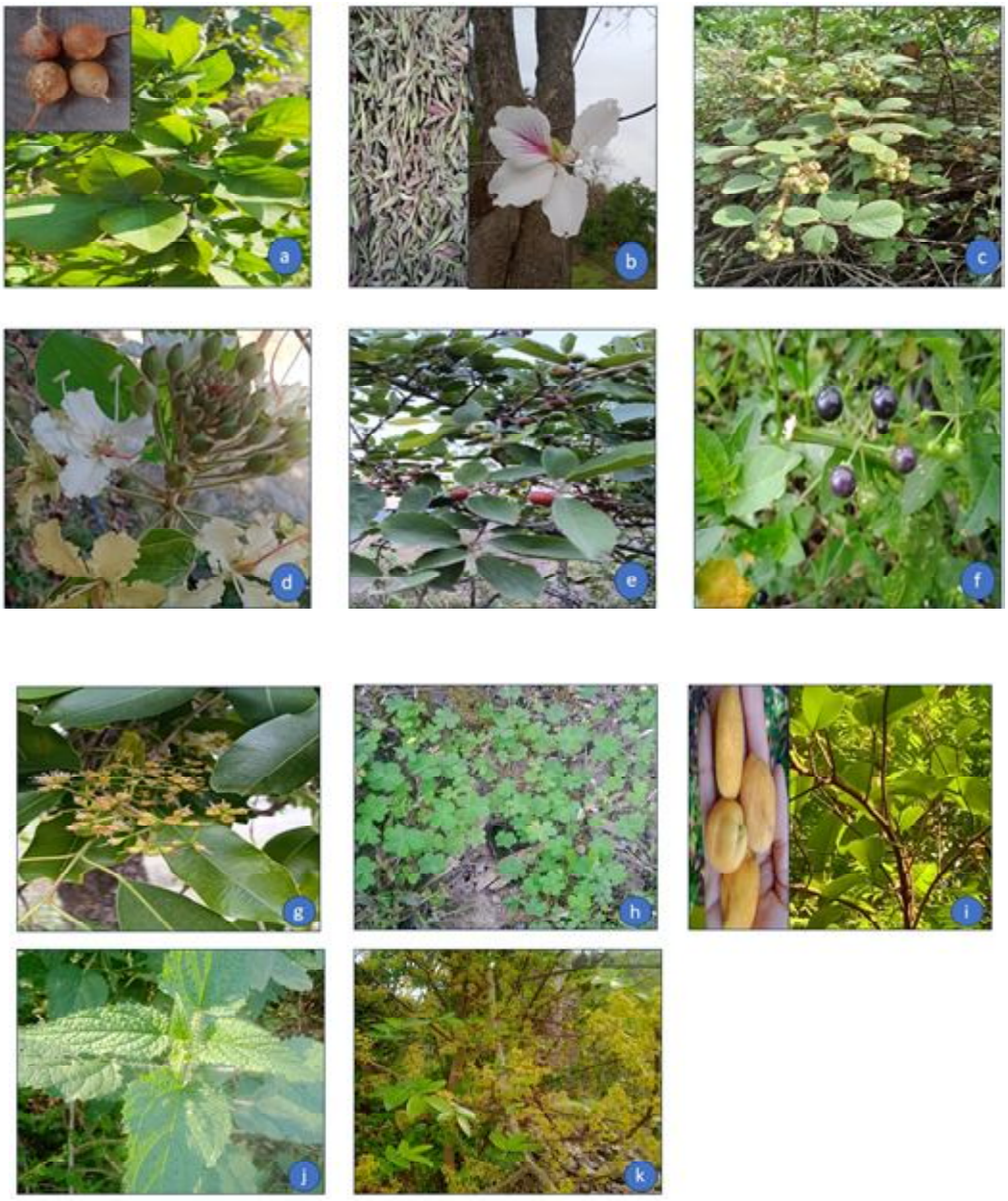

Figure 1: Some plants from Shivalik Hills : a. *Aegle marmelos* **b.** *Bauhinia variegata* **c.** *Rubus ellipticus* **d.** *Bauhinia vahlii* **e.** *Flacourtia indica* **f.** *Solanum nigrum* **g.** *Syzygium cumini* **h.** *Oxalis corniculata* **i.** *Artocarpus lakoocha* **j.** *Urtica dioica* **k.** *Zanthoxylum armatum.*

Table-3 Traditional phytotherapies used for the treatment of skin disease.

Sr. No	Botanical Name	Family	Local name	Part used	Traditional uses	Use citation (Ui)	Use value (Ut)
1.	*Aegle marmelos* (L.) Correa	Rutaceae	Bill, bail	Fruit, Leaves	The paste from fresh leaves is applied to the infected part for one week and tied with a bandage to cure the abscess. 50–60 ml of juice extract from its fruit pulp is used daily on patches of skin to treat leucoderma.	18	0.17
2.	*Amaranthus spinosus* L.	Amaran-thaceae	Cholyi	Leaves, Root	The smooth paste made from the leaves and roots is used as a poultice for two weeks once a day to treat skin diseases like abscesses, eczema, inflammation, and leprosy.	26	0.25
3.	*Artocarpus lakoocha* Buch.-Ham	Moraceae	Dheu	Root	A decoction made from the root is used to drink daily as a tonic for 3–4 weeks, twice daily, and is used in the treatment of ringworm infection.	44	0.42
4.	*Bauhinia variegata* L.	Fabaceae	Karyala	Root, Bark	The decoction made from the root and bark is given orally three times a day as a tonic for three to four weeks to cure leprosy.	56	0.53
5.	*Bauhinia vahlii* Wight & Arn.	Fabaceae	Torr	Bark	The powder is made from the bark combined with water, which is sprayed onto patches on the skin for 6-7 days to treat skin infections like ringworms.	62	0.60
6.	*Berberis lycium* Royle	Berberi-daceae	Kashmal	Stem	5-6 drops of extract of the stem are applied daily for skin diseases like leprosy and sores.	49	0.47
7.	*Cassia occidentalis* L.	Fabaceae	Bari elwan	Leaves, Root, Seed, Flower	A thick paste from the leaves and root is used topically for 15–20 days to treat scabies and ringworms. A decoction made from young leaves is taken twice a day to cure skin diseases internally. An infusion made from its root mixed with black pepper is useful for filarial skin infection. A paste	78	0.75

					made from seeds and flowers is used every day to treat minor skin infections and inflammation.		
8.	*Centella asiatica* (Linn.) Urban	Apiaceae	Brahmi booti	Whole plant	For heating and skin soreness in the limbs, 30 to 50 ml of the entire plant extract is taken orally for at least 30 days. A 30-ml decoction from whole plants is taken for one month to treat eczema, carbuncles and leprosy disease.	36	0.34
9.	*Chenopodium album* L.	Chenopo-diaceae	Bathu, Bhettu	Leaves	A fine powder from dried leaves is dusted on skin infections to soothe irritation. Chew two to three leaves twice a day and simultaneously apply 15 ml of juice extract from the leaves over the white patches on the skin. This may help in treating vitiligo.	29	0.28
10.	*Cordia dichotoma* G. Forst	Boragin-aceae	Lasuda	Fruit, Bark	5–10 g of bark powder is blended with lukewarm water to prepare a thick paste that is applied to the skin to treat abscesses. 10 ml of extract from the fruit is applied to treat skin eruptions. Paste made from the kernels of fruit is applied to patches of skin infection, which provides soothing effects. Fruit peel extract is applied for two weeks, twice a day, to treat skin ailments.	35	0.33
11.	*Dioscorea bulbifera* L.	Diosco-reaceae	Tardi, Tarad	Tuber, Bulbils, Leaves	The decoction made from the tuber and bulbils is taken daily for 2-3 weeks to treat skin diseases. Paste from the leaves is applied as a poultice to cure skin infection.	19	0.17
12.	*Emblica officinalis* Gaertn	Euphorbi-aceae	Amla	Fruit	Paste made from fresh fruit is applied daily, two times a day, for two weeks to treat eczema and psoriasis. For better results, eat fruit daily.	48	0.46
13.	*Ficus auriculata*	Moraceae	Tiamble	Leaves	The 50 ml of juice extracted from the leaves is	71	0.68

	Lour.				applied externally to the affected areas as a treatment for leucoderma.		
14.	*Ficus palmata* L.	Moraceae	Phegla, Jangli anjir	Fruit	The sap from fruit is applied to the skin for 2-3 weeks to get rid of warts, and a burning sensation in the skin.	33	0.32
15.	*Flacourtia indica* (Burm. f.) Merr.	Flacourtiaceae	Kangu	Bark, Leaves, Stem	Juice extract from leaves is applied twice a day for one month for scabies and pruritus. Powder made from stem bark is mixed with water and applied to patches of skin for the treatment of leucoderma. Bark paste is applied to eczema three times a day.	31	0.30
16.	*Murraya koenigii* (L.) Spreng.	Rutaceae	Gandla, Gandhela	Fruit	Paste made from the fruit is applied as a poultice twice a day for 2 to 3 days on the infected portion of the skin to treat fungal infection.	22	0.21
17.	*Ocimum basilicum* L.	Lamiaceae	Bhabri	Leaves	For skin allergies and irritations, apply 20–30 ml of leaf juice extract externally twice daily for two weeks, continuing until recovery.	39	0.37
18.	*Oxalis corniculata* L.	Oxalidaceae	Malori	Leaves, Whole plant	The paste made from the entire plant is applied to bacterial infections of the skin and also helps in the removal of warts and corn. A 30–40-ml infusion of leaves is applied for the treatment of skin eruptions.	21	0.20
19.	*Pyrus pashia* Buch. Ham. ex D. Don	Rosaceae	Kainth	Leaves, Bark	The paste made from the leaves and bark is used as poultices for 5-7 days to treat skin infections like ringworm.	24	0.23
20.	*Rubus ellipticus* Sm.	Rosaceae	Aakhe	Whole plant	Paste made from the whole plant is applied on skin patches for 2-3 weeks to cure skin infections.	34	0.33
21.	*Rumex hastatus* D. Don	Polygonaceae	Almora, Khatti-Mithi	Root, Leaves, Whole plant	The 10-15 g of grinded powder from its root mixes with water to make a thick paste which is applied on the skin and helps treat scabies. Juice extract from the leaves is applied to the affected area from	28	0.27

					scabies for 2-3 hours daily before bathing until cured. Whole plant material is used in skin disease treatment.		
22.	*Syzygium cumini* (L.)	Myrtaceae	Jamun	Leaves, Bark	Leaf paste is applied as poultices to treat many skin diseases. 5-6g ash of the bark, mixed with water, is spread over local inflammations of skin.	61	0.59
23.	*Solanum nigrum* L.	Solanaceae	Makoi	Leaves, Berries	The green berries are crushed to make a thick paste that is applied locally to treat ringworms. 50–60 ml of juice extract from leaves is used externally three times a day for curing sores, psoriasis, and eczema. Dried berry powder mixed with water is used externally for malignant sores and black sores until cured.	75	0.72
24.	*Stellaria media* (L.) Vill.	Caryoph-yllaceae	Khukhani	Leaves	Powder made from the dried leaves is dusted on the skin twice daily for 2–3 weeks to treat dermal infection.	95	0.92
25.	*Urtica dioica* Jacq. ex Wedd.	Urticaceae	Aan, Bichu Buti	Leaves	15-20 ml of juice extract from young leaves is taken orally two times a day after a meal, which helps in blood purification and cures skin disease. Leaf juice is also applied locally to treat fungal infections.	89	0.86
26.	*Zanthoxylum armatum* DC.	Rutaceae	Timir	Leaves, Fruit, Bark	Paste made from the leaves is applied daily to treat the skin from scabies until it is cured effectively. Powder from dried fruit and bark is mixed with water and used daily to treat bacterial and fungal skin infections.	91	0.88
27.	*Ziziphus mauritiana* Lam.	Rhamn-aceae	Jungli ber	Leaves, Root	The paste of leaves is applied externally to eliminate scabies and other skin diseases. 20 ml of decoction from the root is taken daily for 2–3 weeks to cure a skin ulcer.	92	0.89

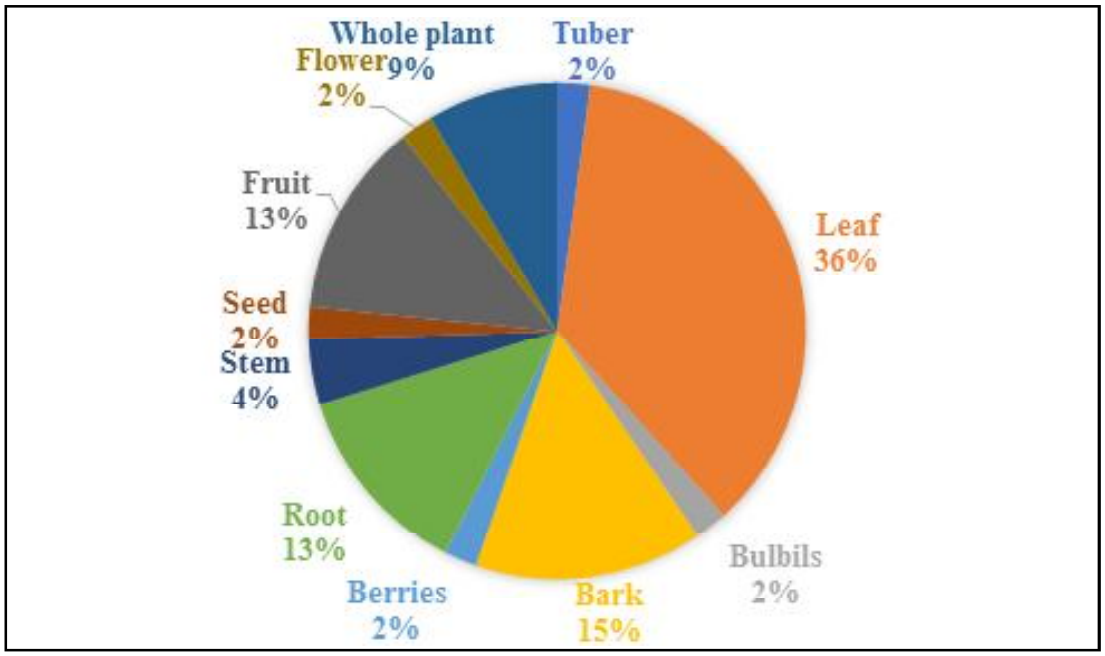

Figure 2. Part(s) of the plants used by inhabitants for disease treatment.

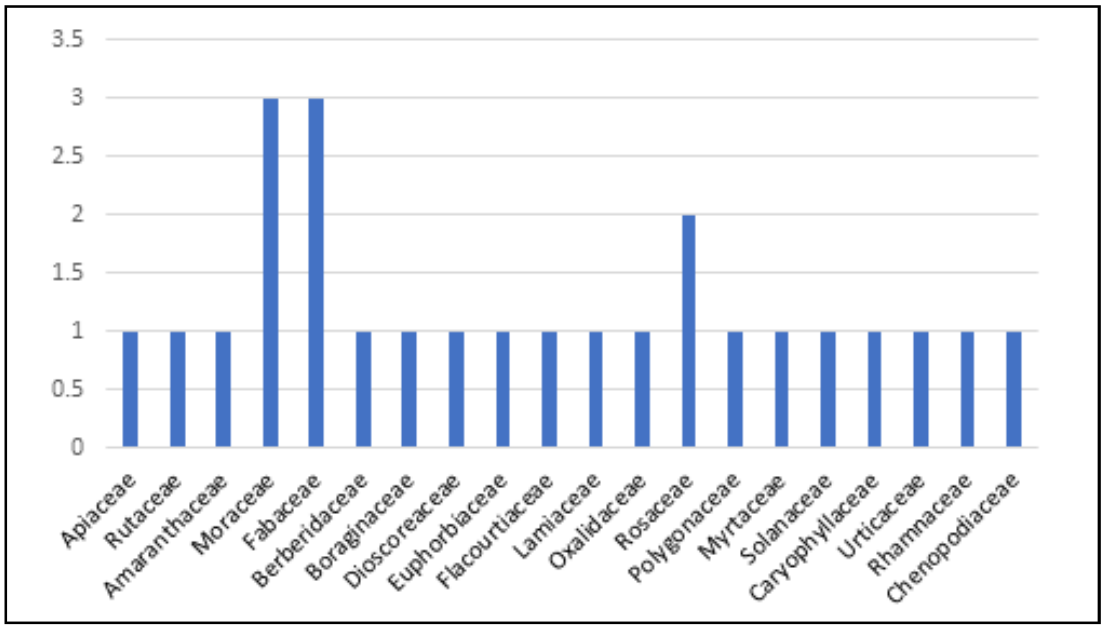

Figure 3. Dominant family in the study area.

The Shivalik Hills of Himachal Pradesh exhibit a significant diversity of wild edible plants. These hills are relatively insufficiently documented, yet the plants in this area are utilized for various purposes, such as for medicinal purposes. In this paper, the ethnobotanical study reveals that 27 plant species from 20 different families were reported by doing interviews with local informants. These plants are arranged in alphabetic order, according to their families, local names, part used, and their use in skin infection treatment. These plants were used to treat 19 types of skin diseases in the form of a paste, decoction, juice, etc. The use of leaf (36%) and fruit (13%) is the highest use for skin disease treatment (Figure 2). In the study area, among all families, Fabaceae, Rutaceae, and Moraceae are the dominant families (Figure 3). The finding indicates that the majority of use values are 0.92 in the treatment of skin diseases, which is the value of *Stellaria media* (Table-3). The herbal parts of the plants are prepared as extracts, decoctions, or pastes, which are applied externally or taken orally. These therapeutic measures are the result of a thorough understanding of the regional biodiversity. The study done by Pushpangadan and Atal[44] also describes the use of extracts, decoctions, and pastes by Western Ghats tribes, emphasizing their profound understanding of regional biodiversity.

The paste from fresh leaves of *Aegle marmelos* is applied to the infected part for one week and tied with a bandage to cure the abscess and 50–60 ml of juice extract from its fruit pulp is used daily on patches of skin to treat leucoderma. Similar results have been shown by Dutta *et al*.,[13]. The decoction made from the tuber and bulbils of *Dioscorea bulbifera* is taken daily for 2-3 weeks to treat skin diseases. Similar results have been shown by Kundu *et al*.,[30].

The current research offers information about the customary use of plants found in the Shivalik Hills of Himachal Pradesh for treating skin diseases. This initiative aims to document the extensive ethnobotanical knowledge of residents, knowledge that has traditionally been transmitted verbally from one generation to the next. It became evident that the rural population heavily relies on these plants as medicinal sources for various health conditions, showcasing their extensive understanding of medicinal flora. The findings indicate that the Shivalik Hills region possesses significant ethnobotanical diversity, particularly regarding medicinal plants used for skin disease treatments. This research sheds light on the application of various plant species in addressing different skin-related ailments. The documentation of this knowledge is crucial as it preserves traditional practices that might otherwise be lost in the modern era. This ethnobotanical diversity not only highlights the wealth of traditional knowledge but also emphasizes the potential for discovering new plant-based treatments that could contribute to modern medicine. By systematically recording the use of these plants, the research aims to preserve this valuable knowledge and potentially inspire further studies that could lead to new medical treatments derived from these traditional remedies.

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