

Plants Used in Tradition Primary Health Care System at Dhaula-Dhar Hilly Regions of Himachal Pradesh

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Abstract: *Himachal Pradesh is one of the most species-rich regions of the Indian Himalaya and represents an important center of plant diversity. Despite its rich floristic wealth, several locally important plant species remain overlooked and insufficiently documented, particularly with regard to their traditional and ethnomedicinal significance. The present study explores the nature, status, and traditional utility of plants in tradition primary health care system at Dhaula Dhar hilly regions of Himachal Pradesh. Ethnobotanical investigations were carried out through systematic field surveys, open-ended interviews, and focused group discussions with tribal communities, local herbal experts and traditional healers. A total of twenty-five medicinal plant species were documented for their therapeutic applications in treating several ailments of human beings. Among the recorded species, *Mentha longifolia* exhibited the highest use value, indicating its significant role in local healthcare practices. The findings highlight the urgent need for proper documentation, conservation strategies, and sustainable utilization of these lesser-known yet valuable plant resources to prevent further erosion of traditional knowledge and biodiversity.*

Keywords: Conservation, Dhaula-Dhar, Health, Traditional, Use Value

1. Introduction

Herbal medicine is widely used not only in developing countries but also in developed ones. In France and Germany, for instance, it is estimated that 70% of all medical doctors regularly prescribe herbal medicine. The 18th and 19th centuries saw Western colonial powers taking control of India, resulting in the suppression and marginalization of many aspects of traditional Indian culture including Ayurveda. Practitioners and scholars of Ayurveda were forced to flee or faced persecution. However, there has been a resurgence of interest in homopathic medicine both in India and worldwide in recent years. Many individuals are turning to traditional health care system as a natural and holistic approach to health and wellness, supported by a growing body of scientific evidence (Cox and Balick, 1994). In developed countries, traditional primary health care system has gained significance. Modern medicine, while affecting various metabolic activities in the human system, often comes with side effects, making the body more susceptible to other diseases.

Ayurveda, a time-honored Indian medicinal system with a rich history spanning 5,000 years, holds a special place as a key player in addressing serious health issues. Its name comes from the Sanskrit words "Ayur," meaning life, and "Veda," meaning knowledge, signifying its status as the world's oldest known medical system. In the world of Ayurveda, health is viewed as a delicate balance of body, mind, and spirit in each individual (Kamboj, 2000; Pandey et al., 2008). Achieving this balance in today's world, filled with tempting junk food, environmental toxins, and negative thoughts, can be quite a

challenge. Charaka, an influential figure in Ayurveda, saw health as more than just taking medicine; it was a way of life. He stressed the importance of a balanced connection between the mind, body, and spirit, attainable through practices like nourishment, exercise, meditation, and other holistic approaches. Despite facing challenges, Ayurveda gradually reached beyond India, making its mark in places like Lanka and Tibet. Moreover, its influence spread to other medical traditions such as Unani medicine, traditional Chinese medicine, and Siddha medicine (Patwardhan et al., 2005).

Traditional primary health care system prescribes individualized treatments, including compounds of herbs or proprietary ingredients, and diet, exercise, and lifestyle recommendations (Conboy et al., 2009). In India, most people rely on homemade and traditional medicine either on its own or alongside conventional Western medicine. This trend extends to Southeast Asia in various forms. According to the 2007 National Health Interview Survey in the United States, which extensively covered the use of complementary health approaches, over 200,000 American adults had utilized Ayurveda in the year leading up to the survey. In a preliminary clinical trial conducted in 2011, partially funded by NCCAM, it was discovered that conventional treatments and Ayurvedic approaches for rheumatoid arthritis exhibited similar effectiveness. Methotrexate, a conventional drug, was tested alongside a traditional primary health care system involving 40 herbal compounds. Local practitioners commonly use turmeric for inflammatory conditions, and although there is some evidence from clinical trials suggesting its potential benefits for certain digestive disorders and arthritis, the research is limited. Additionally, researchers have explored

traditional homemade methods for conditions such as schizophrenia and diabetes (Sridharan et al., 2011).

Chauhan (1989) reported 100 aromatic plants from the Himachal Pradesh the voucher specimens of the collected species have been preserved in the herbarium at IRISM (Institute of Research in Indian System of Medicine). Jogindernagar and University of Horticulture and Forestry, Nauni, Solan (H.P.). Shrivastava et al., (1995) classified 63 plant species including medicinal and aromatic plants as minor forest produce of Jammu and Kashmir. The inventory includes many important medicinal and aromatic plants like *Inula racemosa*, *Silybum marianum*, *Ephedra gerardiana*, *Aconitum* spp. etc. Ong et al., (1996) collected the medicinal plants from the Botanic Garden of the University of Malaya.

2. Materials and Methods

The Traditional herbal knowledge of plants can be considered a distinct cultural domain with clear boundaries that contributes to the comprehension of human knowledge. When conducting field research, language is crucial for accessing this area and the knowledge expressed through naming has been referred to as “lexical” knowledge. This study focuses mainly on the ethnobotanical surveys of medicinal plants, drug formulations of multi remedial medicine by the local people and preparation of nanoparticles from the selected medicinal plant based on the use value of plants.

The present study was conducted in the Dhauladhar hilly region of the North-Western Himalaya, India. The study area lies in the northern part of Mandi district, Himachal Pradesh, within the catchment of the Uhl River. Geographically, the area is situated between 32°02'11" N latitude and 76°50'51" E longitude, with an altitudinal range of approximately 1,850 to 2,850 meters above mean sea level.

The Dhauladhar region is characterized by rugged mountainous terrain, dense temperate forests, alpine meadows, and snow-clad peaks. The combination of green valleys, rich biodiversity, perennial streams, and high-altitude landscapes makes the region ecologically significant and scenically remarkable. These physiographic and climatic features provide a unique natural setting for ecological and ethnobotanical investigations in the Western Himalayan zone.

Use Value (UV) Analysis: To assess the relative importance of plant species within the community, the Use Value (UV) index was calculated. The concept of use value was initially introduced by Prance et al. (1987) and later refined by Phillips and Gentry (1993) to incorporate the frequency of citation by informants. The UV index provides a quantitative measure of the relative cultural significance of plant species.

The use value was calculated using the formula:

$$UV = \sum U / N$$

Where, UV = Use value of a given plant species, U = Number of use-reports cited by each informant for that species and N = Total number of informants interviewed

A high UV indicates that a species is widely recognized and frequently used within the community, whereas a low UV suggests limited ethnomedicinal importance. However, it should be noted that the UV index does not differentiate between single-use and multiple-use applications of a species (Musa et al., 2011).

3. Results

An extensive ethnobotanical survey conducted in the Janjheli Valley of Himachal Pradesh documented 25 ethnomedicinal plant species used by local communities for the treatment of diverse human ailments.

Table: Traditionally Important Medicinal Plants, Ailment Cured and Use-Value

Botanical Name	Disease/Disorder Cured	$\sum U_s$	$\sum U_s / N$
<i>Gardenia gummifera</i> L.f.	Diarrhoea, stomach ache, indigestion, ear problems, cholera, ear problems, boils and pimples, urine problems	7	0.033
<i>Gardenia jasminoides</i> J. Ellis.	Fever, uterine problems, wound healing	3	0.014
<i>Gossypium arboreum</i> L.	Uterine problems, diarrhea, arthritis,	4	0.019
<i>Hibiscusrosa-sinesis</i> L.	Hair problem, anaemia, asthenia, leucorrhoea, acidity	25	0.119
<i>Holarrhena antidysentrica</i> (L.) Wall. Ex. DC.	Kidney problem, leucoderma, piles, liver disorders, diarrhea,	33	0.157
<i>Ipomoea carnea</i> Jacq.	Skin problems, wound healing, menstruation problems, leucoedema, arthritis	17	0.081
<i>Jasminum sambac</i> (L.) Aiton.	Bleeding problems, itching, paralysis, ear diseases, naval dislocation, stomach worm infection	11	0.052
<i>Jatropha curcus</i> L.	Skin allergies, sleeping disorders, Cardiac problems, wrinkled on face, hair fall problems	27	0.129
<i>Justica adhatoda</i> L.	Leprosy, crampson hands & feet, TB, cough, asthma, toothache	21	0.100
<i>Kalanchoe pinnata</i> (Lam.) Pers.	Piles, acidity, wound healing, kidney problems	39	0.186
<i>Lycopersicon esculentum</i> Mill.	Appendicitis, Lycopersiconesculentum, itching, jaundice	17	0.080
<i>Mallotus philippinensis</i> Muell. Arg.	Eczema, renal problems, blood disorders, gut worms, ulcer	10	
<i>Melia azedarach</i> L.	Piles problems, dysmenorrhea, dog bite, Baldness,	37	0.176
<i>Mentha longifolia</i> L.	Gastric disorders, Stomach disorders, cough, cold, cholera, freckleson face	47	0.223
<i>Moringa oleifera</i> Lam.	Skin diseases, arthritis, injuries & sprains, ear ache, eye diseases, spleen enlargement,	18	
<i>Mucuna pruriens</i> (L) DC	Asthenia, infertility, fainting, vagina spreading, wound healing	26	0.124
<i>Murraya koenigii</i> Spreng.	Piles, constipation, vomiting, burning of skin	31	0.148
<i>Nerium indicum</i> Mill.	Erectile problem, teeth problems, syphilis, skin diseases	7	0.033
<i>Nyctanthes arbor-tritis</i> L.	Fever, diabetes, bleeding problem, arthritis, worms in stomach, hair fall problem	15	0.071
<i>Ocimum sanctum</i> L.	Cough, common cold, nasal problems, throat sore, fever	42	0.200

<i>Opuntia littoralis</i> (Engelm.) Cockerell.	Skin problems, diabetes, wound healing, liver disorders	5	0.024
<i>Oxalis corniculata</i> L.	Intoxication, colic problems, heartburn, diarrhea, inflammation	9	0.043
<i>Persicaria hydropiper</i> (L.) Delarbre	Alopecia, insect bite, wound healing,	3	0.014
<i>Phyllanthus niruri</i> L.	Urinary disease, conjunctivitis	3	0.014
<i>Piper longum</i> L.	Heart problems, insomnia, headache, over Production of milk	17	0.081

An extensive ethnobotanical survey conducted in the Dhaula Dhar regions of Himachal Pradesh documented a total of 25 ethnomedicinal plant species traditionally used by local communities for the treatment of a wide range of human ailments. The recorded species represent diverse botanical families and growth forms, including shrubs, trees, climbers, and herbs, reflecting the rich floral diversity of the northwestern Himalayan region. The study further quantified the relative importance of each species using Use-Value (UV), calculated as $\sum Us/N$, which indicates the frequency of citation and therapeutic relevance of a species among informants.

Among the documented taxa, several species exhibited high use-values, signifying their prominent role in traditional healthcare practices. *Mentha longifolia* recorded the highest number of use citations (47) with a use-value of 0.223. This species is widely employed for managing gastric and stomach disorders, cough, cold, cholera, and facial freckles. Its strong representation underscores its therapeutic versatility, especially in treating digestive and respiratory ailments. Similarly, *Ocimum sanctum* (UV = 0.200; 42 citations) was frequently reported for cough, common cold, nasal congestion, throat soreness, and fever, highlighting its central role in respiratory and febrile conditions.

Another highly valued species was *Kalanchoe pinnata*, which showed 39 use citations (UV = 0.186). It is traditionally used for piles, acidity, wound healing, and kidney-related problems. Its extensive use in wound management and internal disorders reflects its perceived anti-inflammatory and healing properties. *Melia azedarach* also demonstrated high ethnomedicinal importance (37 citations; UV = 0.176), being utilized for piles, dysmenorrhea, dog bites, and baldness. Likewise, *Holarrhena antidysenterica* (33 citations; UV = 0.157) was predominantly employed in the treatment of kidney problems, leucoderma, piles, liver disorders, and diarrhea, confirming its traditional recognition as a potent remedy for gastrointestinal disturbances.

Moderately high use-values were recorded for *Murraya koenigii* (31 citations; UV = 0.148), which is used for piles, constipation, vomiting, and burning sensations of the skin. *Jatropha curcas* (27 citations; UV = 0.129) is traditionally administered for skin allergies, sleeping disorders, cardiac problems, facial wrinkles, and hair fall, indicating its multipurpose role in dermatological and systemic conditions. *Mucuna pruriens* (26 citations; UV = 0.124) is valued for treating asthenia, infertility, fainting, vaginal disorders, and wound healing, suggesting its application in reproductive and neurological health.

Hibiscus rosa-sinensis also showed notable importance (25 citations; UV = 0.119), being widely used for hair problems, anemia, asthenia, leucorrhoea, and acidity. Its common use in gynecological and nutritional deficiencies highlights its perceived tonic properties. *Justicia adhatoda* (21 citations;

UV = 0.100) was frequently mentioned for respiratory ailments such as tuberculosis, cough, and asthma, along with leprosy, cramps, and toothache. The dominance of respiratory applications further emphasizes the prevalence of respiratory disorders in the study region and the reliance on plant-based remedies.

Several species showed moderate but significant ethnomedicinal relevance. *Ipomoea carnea* (17 citations; UV = 0.081) is used for skin problems, wound healing, menstrual disorders, leucoderma, and arthritis. *Piper longum* (17 citations; UV = 0.081) is valued for heart problems, insomnia, headache, and regulation of lactation. *Lycopersicon esculentum* (17 citations; UV = 0.080) was reported in remedies for appendicitis, itching, and jaundice, reflecting the integration of common cultivated species into traditional medicine.

Moringa oleifera (18 citations) is employed for skin diseases, arthritis, injuries, sprains, earache, eye diseases, and spleen enlargement, signifying its broad-spectrum medicinal applications. *Nyctanthes arbor-tristis* (15 citations; UV = 0.071) is commonly used for fever, diabetes, bleeding problems, arthritis, intestinal worms, and hair fall. *Oxalis corniculata* (9 citations; UV = 0.043) is applied in cases of intoxication, colic, heartburn, diarrhea, and inflammation.

Species with relatively lower use-values nevertheless contribute to the ethnomedicinal repertoire of the region. *Gardenia gummifera* (7 citations; UV = 0.033) is used for diarrhea, stomach ache, indigestion, ear problems, cholera, boils, pimples, and urinary disorders. *Nerium indicum* (7 citations; UV = 0.033) is employed for erectile dysfunction, dental problems, syphilis, and skin diseases, though its known toxicity suggests careful traditional dosage regulation. *Opuntia littoralis* (5 citations; UV = 0.024) is used for skin problems, diabetes, wound healing, and liver disorders.

Some species had minimal citation frequencies (UV = 0.014), including *Gardenia jasminoides* (3 citations) for fever, uterine problems, and wound healing; *Persicaria hydropiper* (3 citations) for alopecia, insect bites, and wound healing; and *Phyllanthus niruri* (3 citations) for urinary diseases and conjunctivitis. Although cited less frequently, these species remain integral to localized therapeutic knowledge systems.

Additional important taxa include *Gossypium arboreum* (4 citations; UV = 0.019), primarily used for uterine problems, diarrhea, and arthritis; and *Mallotus philippinensis* (10 citations), utilized for eczema, renal disorders, blood purification, intestinal worms, and ulcers.

Overall, the results indicate that gastrointestinal, respiratory, dermatological, and reproductive disorders constitute the major health concerns addressed through traditional herbal remedies in the Dhaula Dhar regions. High use-values of species such as *Mentha longifolia*, *Ocimum sanctum*, and

Kalanchoe pinnata demonstrate strong cultural consensus and therapeutic reliability. Conversely, species with lower citation frequencies may represent specialized or condition-specific remedies.

The diversity of ailments treated—ranging from common colds and digestive disturbances to chronic conditions such as diabetes, infertility, and liver disorders—highlights the depth of indigenous knowledge preserved in the region. The quantitative use-value analysis reinforces the cultural prominence of certain species and provides a scientific basis for prioritizing plants for pharmacological validation and conservation strategies. Collectively, the findings emphasize the importance of documenting and safeguarding traditional ethnomedicinal knowledge, particularly in ecologically sensitive Himalayan landscapes where biocultural heritage remains closely intertwined with community health practices

4. Discussion

The present ethnobotanical investigation from the Dhaula-Dhar hilly regions of Himachal Pradesh, particularly the Dhaula Dhar regions, reveals the continuing centrality of medicinal plants in the traditional primary health care system of mountain communities. The documentation of 25 ethnomedicinal plant species highlights not merely a list of therapeutic resources, but a deeply rooted, community-based health care framework sustained by indigenous knowledge, ecological familiarity, and intergenerational transmission of practices. In geographically remote and ecologically fragile Himalayan terrains, where access to modern medical infrastructure remains limited or seasonal, plant-based remedies continue to serve as the first line of treatment for a broad spectrum of ailments.

The dominance of species used for gastrointestinal disorders reflects a pattern commonly reported in Himalayan ethnobotanical studies. Digestive ailments such as diarrhea, stomach ache, indigestion, colic, constipation, and intestinal worms were treated using multiple species, indicating both the prevalence of such conditions and the adaptive evolution of herbal remedies. Notably, *Holarrhena antidysenterica* was widely cited for diarrhea and liver disorders, consistent with its established reputation in Ayurvedic and folk medicine as a potent anti-dysenteric agent. Similarly, *Mentha longifolia*, which recorded the highest use-value (0.223), was extensively used for gastric disturbances and cholera. Its aromatic and carminative properties make it particularly valuable in rural settings where digestive infections and contaminated water sources can be common.

The prominence of respiratory remedies further reflects the climatic and environmental realities of the Dhaula-Dhar region. Cold temperatures, seasonal fluctuations, and high-altitude exposure often predispose inhabitants to cough, cold, asthma, throat infections, and fever. *Ocimum sanctum* and *Justicia adhatoda* emerged as key species in managing respiratory complaints. *Ocimum sanctum*, with a use-value of 0.200, is traditionally prepared as decoctions or infusions to alleviate cough and nasal congestion, while *Justicia adhatoda* is recognized for its bronchodilatory and expectorant properties. The frequent citation of these plants suggests a strong consensus among informants regarding their efficacy,

reinforcing their role as household remedies in primary health care.

Dermatological conditions constituted another significant category of ailments. Skin infections, eczema, boils, pimples, itching, and wound healing were treated with a diverse array of species. *Kalanchoe pinnata* (UV = 0.186) was particularly valued for wound healing and anti-inflammatory applications. The fleshy leaves of this species are often crushed and applied directly to cuts or burns, demonstrating the reliance on readily accessible and easily processed plant materials. *Jatropha curcas* and *Melia azedarach* were also reported for skin allergies, baldness, and parasitic infections. The use of these species indicates a nuanced understanding of topical versus systemic treatments within the traditional health system.

Reproductive and gynecological health emerged as another important therapeutic domain. Several plants were cited for uterine disorders, infertility, leucorrhoea, dysmenorrhea, and menstrual irregularities. *Hibiscus rosa-sinensis* was frequently mentioned for leucorrhoea and anemia, suggesting its role as a tonic in women's health. *Mucuna pruriens* was reported for infertility and asthenia, reflecting its broader application in reproductive vitality and strength enhancement. *Gossypium arboreum* and *Gardenia jasminoides* were also utilized in uterine problems. The presence of multiple plant remedies for women's health indicates the cultural importance of reproductive well-being in sustaining agrarian Himalayan communities.

The study also recorded plants used for chronic and metabolic disorders, including diabetes, arthritis, kidney problems, and liver diseases. *Nyctanthes arbor-tristis* was cited for diabetes and arthritis, while *Phyllanthus niruri* was used for urinary diseases. *Moringa oleifera* demonstrated multipurpose applications, including treatment for arthritis, spleen enlargement, and eye diseases. The use of such plants for chronic conditions illustrates the adaptability of traditional medicine beyond acute ailments, addressing long-term health management within the community.

Interestingly, some cultivated species, such as *Lycopersicon esculentum* and *Murraya koenigii*, were integrated into medicinal practices. This reflects the fluid boundary between food and medicine in traditional systems, where dietary plants double as therapeutic agents. Such dual-purpose usage reinforces the concept of "food as medicine," a foundational principle in many indigenous health traditions.

The use-value (UV) analysis provides quantitative insight into cultural consensus and therapeutic prominence. Species with higher UV values, such as *Mentha longifolia*, *Ocimum sanctum*, and *Kalanchoe pinnata*, may be considered culturally keystone species within the traditional primary health care system. Their frequent citation suggests widespread availability, proven efficacy, and community trust. Conversely, species with lower UV values, including *Persicaria hydropiper* and *Opuntia littoralis*, may represent specialized remedies used for specific or less common ailments. Low citation does not necessarily imply low importance; rather, it may indicate restricted knowledge transmission or limited ecological distribution.

The reliance on plant-based remedies in the Dhaula-Dhar region is also shaped by socio-economic and geographic factors. Remote villages often face challenges such as difficult terrain, seasonal road blockages, and limited healthcare facilities. In such contexts, traditional healers, elderly community members, and household knowledge systems serve as accessible and affordable health resources. Medicinal plants are typically harvested from nearby forests, agricultural fields, or home gardens, minimizing economic burden. This localized health model underscores the resilience and sustainability of indigenous knowledge systems.

Ecologically, the Dhaula-Dhar range forms part of the northwestern Himalaya, characterized by altitudinal gradients, temperate forests, and rich biodiversity. The availability of diverse plant species across ecological niches supports the continuity of ethnomedicinal practices. However, increasing anthropogenic pressures, land-use changes, and overharvesting pose potential threats to certain species. Plants with high use-values may be particularly vulnerable due to frequent collection. Therefore, integrating conservation strategies with community-based management becomes essential to sustain both biodiversity and traditional health systems.

The integration of ethnomedicinal knowledge with formal health frameworks offers promising possibilities. Scientific validation of frequently cited species, particularly those with high UV values, could lead to pharmacological exploration and potential drug development. For instance, documented anti-inflammatory, antimicrobial, and antioxidant properties of species like *Holarrhena antidysenterica* and *Ocimum sanctum* align with their traditional uses. Such validation strengthens the credibility of indigenous systems while promoting evidence-based integration.

Culturally, the persistence of plant-based healing reflects the intimate relationship between people and their environment. Knowledge transmission occurs orally, often through elders, traditional healers, and women who manage household health. Rituals, beliefs, and seasonal harvesting practices are interwoven with therapeutic applications, creating a holistic model of health that encompasses physical, spiritual, and ecological dimensions. The documentation of these practices not only preserves medicinal knowledge but also safeguards cultural identity.

In conclusion, the findings underscore that plants form the backbone of the traditional primary health care system in the Dhaula-Dhar hilly regions of Himachal Pradesh. The diversity of ailments treated, the high use-values of certain culturally significant species, and the integration of wild and cultivated plants demonstrate a dynamic and adaptive health tradition. Gastrointestinal, respiratory, dermatological, and reproductive disorders dominate the therapeutic landscape, reflecting environmental and lifestyle influences. Quantitative use-value analysis enhances understanding of community consensus and priority species for conservation and pharmacological research.

Preserving this ethnomedicinal heritage requires collaborative efforts involving local communities,

researchers, conservation agencies, and policymakers. Sustainable harvesting practices, cultivation of high-demand species, awareness programs, and integration with primary health initiatives can strengthen both biodiversity conservation and rural health security. Ultimately, the traditional plant-based health system of the Dhaula-Dhar region represents not merely an alternative medical practice but a resilient, culturally embedded, and ecologically grounded primary health care model that continues to support the well-being of Himalayan communities. The present study on *Plants in the Traditional Primary Health Care System of the Dhaula-Dhar Hilly Regions of Himachal Pradesh* clearly demonstrates that ethnomedicinal plant knowledge remains a vital and functioning component of rural health security in the northwestern Himalaya. The documentation of 25 medicinal plant species used by local communities in the Dhaula Dhar regions highlights the depth, resilience, and practical relevance of indigenous knowledge systems. These plant-based remedies are not merely supplementary alternatives but constitute the primary line of healthcare for many households residing in remote and mountainous terrains where access to modern medical facilities is limited or seasonal.

The findings reveal that the traditional health system of the Dhaula-Dhar region is strongly oriented toward addressing common and recurrent ailments such as gastrointestinal disorders, respiratory infections, dermatological problems, reproductive health issues, and chronic inflammatory conditions. The high frequency of remedies for digestive and respiratory complaints reflects the environmental and socio-economic realities of the region, including climatic fluctuations, limited sanitation infrastructure in remote areas, and high-altitude exposure. Plants such as *Mentha longifolia* and *Ocimum sanctum*, which recorded the highest use-values, illustrate strong community consensus regarding their effectiveness in managing gastric disturbances, cough, cold, and fever. Their widespread use underscores the reliance on readily available, culturally trusted, and time-tested herbal formulations for day-to-day health management.

Similarly, species such as *Kalanchoe pinnata* and *Holarrhena antidysenterica* highlight the therapeutic versatility embedded within local plant knowledge. These species are used for wound healing, piles, kidney disorders, and diarrhea, demonstrating the adaptability of traditional remedies to treat both external and internal ailments. The use of plants for reproductive health, including infertility, leucorrhoea, and menstrual disorders, further emphasizes the culturally embedded nature of healthcare practices, particularly in supporting women's health within agrarian communities.

An important conclusion emerging from this study is the integrative nature of the traditional primary healthcare system. The boundaries between food and medicine are fluid, as cultivated species such as *Moringa oleifera* and *Murraya koenigii* serve dual roles in nutrition and therapy. This holistic approach aligns with the broader Himalayan worldview, where diet, environment, spirituality, and healing practices are interconnected. The use of locally available plants ensures affordability, accessibility, and sustainability, making the system inherently resilient.

The quantitative use-value analysis adds scientific rigor to the ethnobotanical documentation by identifying culturally significant and highly prioritized species. Plants with high use-values represent keystone components of community health practices and may serve as priority candidates for pharmacological validation, conservation planning, and sustainable cultivation initiatives. Conversely, species with lower use-values, though cited less frequently, may represent specialized treatments and should not be overlooked in conservation and research efforts.

5. Conclusion

The persistence of plant-based healthcare in the Dhaula-Dhar region also reflects strong intergenerational knowledge transmission. Traditional healers, elderly community members, and women play a central role in preserving and disseminating ethnomedicinal practices. However, modernization, migration, changing lifestyles, and reduced dependence on forest resources pose challenges to the continuity of this knowledge. Without systematic documentation and community engagement, valuable ethnomedicinal wisdom risks erosion.

From a conservation perspective, the study underscores the need for sustainable harvesting and management of medicinal plant resources. Overexploitation of high-demand species, habitat degradation, and climate change may threaten the availability of key medicinal taxa. Integrating community-based conservation strategies, promoting cultivation of high-use species, and linking traditional knowledge holders with scientific institutions can ensure both biodiversity preservation and livelihood enhancement. Furthermore, the findings highlight the potential for integrating validated traditional remedies into broader primary healthcare frameworks. Scientific evaluation of frequently cited plants could lead to the development of cost-effective herbal formulations and strengthen the credibility of indigenous knowledge systems. Such integration would not only benefit rural populations but also contribute to the broader field of phytotherapy.

In conclusion, the traditional plant-based healthcare system of the Dhaula-Dhar hilly regions represents a dynamic, adaptive, and culturally embedded model of primary health care. The diversity of documented species, the range of ailments treated, and the strong cultural consensus surrounding certain plants collectively affirm the enduring significance of ethnomedicinal knowledge in Himalayan communities. Preserving this biocultural heritage requires collaborative efforts that combine documentation, conservation, scientific validation, and community participation. By recognizing and strengthening traditional plant-based healthcare systems, we contribute not only to biodiversity conservation but also to sustainable rural health security and cultural continuity in the fragile ecosystems of the northwestern Himalaya.

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