



ISSN (E): 2320-3862  
ISSN (P): 2394-0530  
<https://www.plantsjournal.com>  
JMPS 2024; 12(4): 21-29  
© 2024 JMPS  
Received: 08-04-2024  
Accepted: 13-05-2024

**Annu**  
ICFRE- Eco Rehabilitation  
Centre, Prayagraj, Uttar  
Pradesh, India

**Sanjay Singh**  
ICFRE- Eco Rehabilitation  
Centre, Prayagraj, Uttar  
Pradesh, India

**Praveen Kumar Verma**  
Forest Research Institute,  
Dehradun, Uttarakhand, India

**Mohuya Pal**  
ICFRE- Eco Rehabilitation  
Centre, Prayagraj, Uttar  
Pradesh, India

**Shanza Baig**  
Forest Research Institute,  
Dehradun, Uttarakhand, India

**Corresponding Author:**  
**Sanjay Singh**  
ICFRE- Eco Rehabilitation  
Centre, Prayagraj, Uttar  
Pradesh, India

## Ethnomedicinal practices of Bhotia tribes of Uttarakhand, India

**Annu, Sanjay Singh, Praveen Kumar Verma, Mohuya Pal and Shanza Baig**

**DOI:** <https://doi.org/10.22271/plants.2024.v12.i4a.1688>

### Abstract

This review paper explores traditional medicinal practices within the Bhotia community of Uttarakhand, with a primary focus on the Chamoli district. Preservation and promotion of Bhotia medicine present challenges (e.g., loss of traditional knowledge, environmental degradation) and opportunities in modern healthcare. While deeply rooted in cultural heritage and ecological knowledge, ethno-medicine encounters limited recognition and integration with modern healthcare systems. However, sustainable practices and collaboration between traditional and modern approaches offer opportunities. Empowering the Bhotia community, integrating traditional medicine with modern healthcare, conserving biodiversity, and fostering research can enhance healthcare outcomes. Recognizing the value of traditional Bhotia medicine, respecting cultural diversity, and fostering collaboration are crucial for sustainable healthcare solutions that meet the diverse health needs of the community. These efforts honor the cultural heritage and ecological wisdom of the Bhotia tribe, ensuring access to effective, safe, and culturally appropriate healthcare services for generations to come.

**Keywords:** Bhotia tribe, Uttarakhand, Himalayan region, ethno-medicine

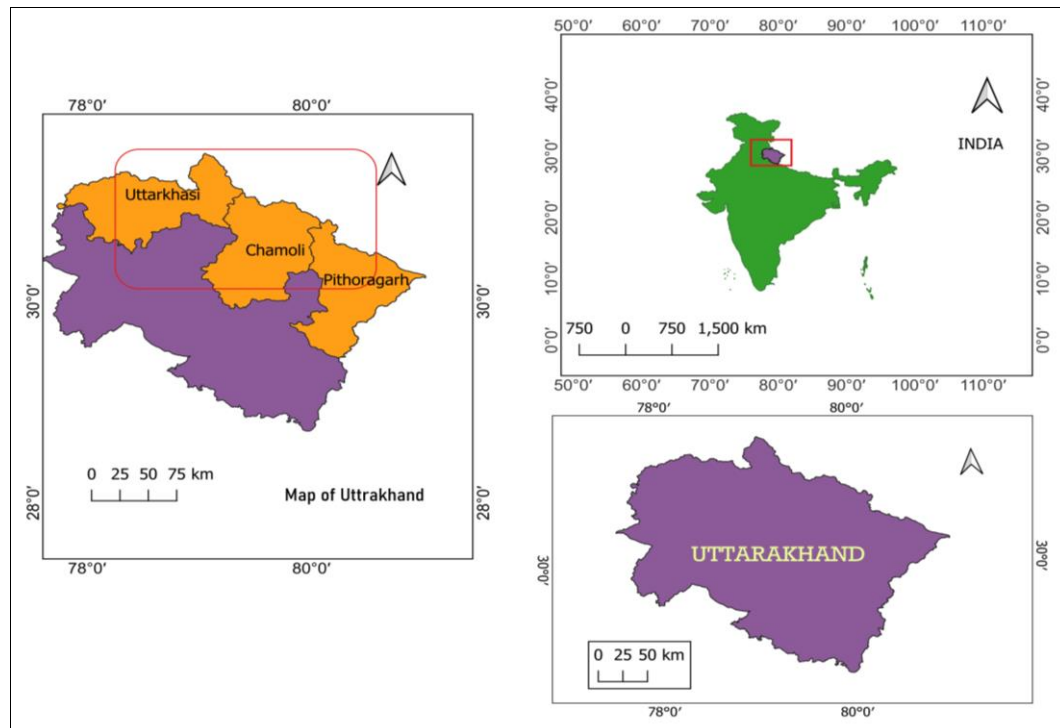
### Introduction

The Bhotiya, also known as the Bhot or Bhotia, are an ethnic group found in the Himalayan regions of India, Nepal, and Tibet (Bergmann *et al.* 2008) <sup>[1]</sup>. In India, the term “Bhotia” encompasses a diverse array of tribes residing in the high mountain valleys near the Indo-Tibetan border within Uttarakhand, specifically in the districts of Pithoragarh, Chamoli, and Uttarkashi (Dash 2006) <sup>[2]</sup>. These valleys, totaling seven in number, sprawl across the Garhwal and Kumaon divisions, characterized by altitudes ranging from 6500 to 13000 feet. The Bhotia tribes follow a traditional pattern of seasonal migration, inhabiting villages known as “mail” during the summer, rainy, and autumn seasons in the upper reaches of the river valleys and relocating to lower-altitude villages termed “Gunshas” as winter approaches (Chatterjee 1976) <sup>[3]</sup>. This migratory lifestyle offers a means of adapting to the region's harsh climatic conditions regulating cultural and economic practices in the Bhotia community. The seasonal migration from higher-altitude villages to lower-altitude ones with change in weather conditions also underlines the intricate relationship between human settlement patterns and the natural environment. Historically, the Bhotia community has been renowned for their involvement in trade across the Himalayas, particularly in Tibetan markets. They have been involved in trade between the plains of India and the Tibetan plateau, facilitating the exchange of goods and cultural influences. Their economy based on trade, agriculture, and animal husbandry along with distinct cultural practices has been the strength to provide resilience in adapting to the challenging mountain environment. Before the closure of the Indo-Tibetan border in 1962, this trade was a crucial aspect of their livelihood. The Bhotias were engaged in exchange trade, procuring Tibetan products such as wool, salt, and borax in exchange for goods sourced from Indian markets in the Terai and Bhabhar regions. This trade network not only facilitated economic prosperity but also contributed to cultural exchange and interconnectedness between the Bhotia tribes and neighbouring regions.

The Bhotia tribes exhibit a rich cultural heritage characterized by a blend of ethnic influences and have contributed significantly to the cultural diversity of the Himalayan region. The geographical location of the Bhotia tribes in the high mountain valleys near the Indo-Tibetan border has also shaped their social and cultural practices with evident traces of Tibetan

influence. The Bhotia people often follow Tibetan Buddhism and have their own set of traditions and rituals. The term "Bhotia" is however a general designation, and within this larger group, there are subgroups with their own distinct identities and customs. This diversity reflects the complex historical and cultural interactions that have shaped the identity of the Bhotia community over the centuries. Despite this diversity, the Bhotia tribes share common cultural traits,

including language, religious beliefs, and social customs, which contribute to their cohesive identity as a distinct ethnic group having a rich traditional wisdom of healing practices. Their traditional medicine system handed down across generations is a testimony to their enduring spirit and dedication to sustaining a way of life that integrates ancient wisdom with contemporary existence. It has potential for integration into broader healthcare frameworks.



**Fig 1:** Inhabitation of Bhotia tribe in Uttarakhand

### Historical Context

Traditional medicine practices of the Bhotia tribe in Uttarakhand have deep roots that span centuries, intertwined with their cultural heritage, spiritual beliefs, and interactions with the natural environment. The Bhotia people are an indigenous community with a distinct cultural identity, language, and way of life, historically inhabiting the high-altitude regions of the Himalayas. Their traditional medicine practices are based on a profound understanding of the local flora and fauna, passed down orally through generations of healers and practitioners. The Bhotiya healers, often referred to as "Amchis" or "Vaidyas," possess specialized knowledge of medicinal plants, herbs, minerals, and other natural resources, as well as traditional diagnostic methods and healing techniques. The historical context of traditional Bhotia medicine is closely linked to the region's geography, climate, and biodiversity. The Himalayan ecosystem is rich in medicinal plants and herbs with therapeutic properties, which have been used by the Bhotia people for various health conditions and ailments. The practice of traditional medicine is also deeply intertwined with religious and cultural rituals, reflecting the spiritual connection between humans and nature. Over time, the traditional medicine practices of the Bhotia tribe have evolved and adapted to changing socio-economic and environmental conditions. With the advent of modernization and globalization, there have been shifts in healthcare practices among the Bhotia community, with increased access to modern healthcare facilities and pharmaceutical drugs. However, traditional Bhotia medicine continues to play a vital role in the healthcare system of the region, particularly in remote and mountainous areas where

modern healthcare services may be limited or inaccessible. The historical legacy of traditional medicine practices remains a source of pride and identity for the Bhotia people, serving as a reminder of their resilience, adaptability, and intimate relationship with their natural surroundings.

### Methodology

This systematic review aims to consolidate all available scientific data addressing the medicinal plants associated with the Bhotia tribe of Uttarakhand. In striving to encompass the entire body of published work on this subject, we meticulously assessed the quality of the data. We adopted explicit and systematic methodologies to select and include research, evaluate the quality of included studies, and objectively summarize them. This approach minimizes bias and enhances transparency throughout the review process. To conduct the literature search, we utilized various prominent databases. These databases were chosen for their high-quality articles and widespread use in this research domain. The primary focus of investigation centered on the knowledge of traditional medicinal plants used by the Bhotia tribe.

### Past research overview

Various efforts have been made to document the ethnobotanical knowledge of the Bhotia tribe of Uttarakhand which has resulted in generation of significant amount of information about the plant species uses in treatment of ailments by the community.

Farooquee and Rao (1999) [4] investigated the Bhotia community of Darma and Byans valleys in the Pithoragarh district of Kumaon, which is located between the Kali and

Dhaulti rivers in the Central Himalayas. They highlight that after the Sino-Indian conflict in 1962, Bhotia community adapted to pastoralism and agriculture for survival. Despite the shift in livelihood, these people continued to be exposed to a diverse array of natural resources, relying on them for sustenance during their regular movements. These medicinal herbs gained immense effectiveness and popularity, becoming integral to the traditional medical systems practiced throughout the country. The utilization of these herbs was not limited to the Bhotia community; they were widely employed across various traditional medical practices in India.

Garbyal *et al.* (2007) <sup>[5]</sup> conducted in-depth interactions with local residents, traditional healers, and individuals possessing extensive knowledge in twenty-two Bhotia villages situated in the Darma, Vyas, and Chaudas valleys within the Dharchula area to gather comprehensive information about the diverse uses of wild plants in the region. They documented over 70 plant species that are traditionally used for medicinal purposes in the Bhotia communities, showcasing the rich traditional knowledge associated with the flora in the region. Bhatt *et al.* (2009) <sup>[6]</sup> conducted a survey across different areas of the Dharchula region in the Pithoragarh district of Uttarakhand, spanning various seasons, to explore the non-conventional uses of plants. The study focused on Johari, Juthora, Darmi, Chudans, Byansi, Marccha, Tolcha, and Jad group of the Bhotia tribe and their precious indigenous traditional knowledge regarding ethnomedicinal uses and properties of plants listed on the Red Data List of IUCN. They recorded ethno-medicinal information on 17 plant species, representing 15 families, employed by the community for various ailments. The research also aimed to provide insights into the habitat, customs, and economic aspects of the Bhotiya tribes, contributing to the documentation and preservation of their valuable traditional knowledge. Phondani *et al.* (2010) <sup>[7]</sup> gathering indigenous knowledge from local traditional healers among the Bhotia tribal communities residing in the Niti valley of the Alaknanda catchment in the Central Himalayas through questionnaires and interviews identified 86 plant species spanning 43 families, for their utilization in treating 37 common ailments with 25 species being utilized for the treatment of multiple diseases. Notably, 14 species were predominantly employed in addressing skin-related conditions.

Nautiyal *et al.* (2001) <sup>[8]</sup> extensively documented the indigenous knowledge systems of three distinct sub-sects within the Bhotia community: Tolchhas, Marchhas, and Jadhhs, residing in the Niti-Mana and Bhagirathi valleys of Garhwal Himalaya. These coexisting communities utilize approximately 220 plant species, employing either the entire plants or specific parts such as roots, tubers, leaves, stems, bark, etc. Notably, around 80% of these plants find application in medicinal and aromatic contexts. While the utilization of herbs is a common practice, detailed information regarding the optimal timing, collection methods, and dosage for each species—whether used individually, in combination with others, or with additional additives—is primarily confined to a select few individuals, particularly the local Vaidyas. Consequently, these traditional healers command considerable respect within the community. Remarkably, despite residing in the same geographical area, there are notable variations in the uses and modes of application for certain plant species among the sub-sects of Bhotias.

As per the research conducted by Samal *et al.* (2010) <sup>[9]</sup> in villages of Pithoragarh district, Bhotia community employs

over 50 indigenous medicines or treatments to address more than 45 diseases and disorders. These traditional healing practices involve approximately 40 plant species with medicinal value. The study highlights the rich traditional knowledge and practices of the Bhotia people in utilizing local flora for medicinal purposes in the Indian Central Himalayan region. Ethnomedicinal practices of the Bhotia (and some other tribal communities) were also recorded by Mehta *et al.* (2013) <sup>[10]</sup>. 78 plants were found to be employed for treating a diverse range of 68 diseases. Roots and rhizomes were the primarily utilized plant parts followed by leaves. Twenty-one species were identified for curing more than one ailment, while 57 species were reported for single therapeutic applications. Moreover, twelve species were found to serve multiple purposes, including use as dyes, spices, condiments, flavoring agents, and food items, playing a significant role in the rural economy of the region.

Bhandari *et al.* (2016) <sup>[11]</sup> documented the indigenous and traditional knowledge regarding the use of plants by the Bhotia tribe and other local residents including Vaidyas (traditional healers) in the Chamoli district of Garhwal Himalaya. Their study identified a total of 48 ethno-medicinal plants, representing 33 families, utilized for treating various diseases. Among these, Rosaceae emerged as the dominant family with five species, followed by Asteraceae and Lamiaceae with four and three species, respectively. In terms of plant types, herbs (28 species) were the most frequently used, followed by trees (9 species), shrubs (8 species), and climbers (3 species). The study highlighted that roots were the most used plant part for treatment (29.16%), followed by leaves and whole plants (22.91%), seeds and fruits (6.25%), and bark (4.16%). The medicinal applications of these plants were diverse, addressing issues such as cuts, wounds, cough, chronic fever, skin diseases, diarrhea, diabetes, joint pains, headaches, among others. Bhotia tribe in Kumaun utilize 15 plant species belonging to 13 different families for addressing various health concerns related to women during both prenatal and postnatal periods (Joshi and Pandey 2016) <sup>[12]</sup>. This reliance on traditional medicinal practices underscores the importance of preserving and documenting the indigenous knowledge that plays a vital role in healthcare, especially in areas with limited access to modern medical facilities.

Bhardwaj *et al.* (2016) <sup>[13]</sup> highlighted the preparation of traditional starters and the fermentation of alcohol, employing indigenous resources by Bhotia and Jaunsari communities. In their study, they explore the microbiology of the starter known as "Balma" used in the traditional solid-state fermentation process of the alcoholic beverage "Chhang" by the Bhotia tribe of Uttarakhand. The study also emphasizes the significance of herbs in Balma preparation and examines the kinetics of lactic acid and ethanol fermentation during Chhang production using Balma. Their study suggests that herbs such as *Inula cuspidata*, *Micromeria biflora*, *Origanum vulgare*, *Rubus sp.*, and *Thymus linearis*, historically used by the Bhotia tribe in Balma preparation, contribute as sources of yeasts, LAB, and amyolytic bacilli.

Chandola and Nautiyal (2017) <sup>[14]</sup> identified a total of 34 plants utilized for medicinal purposes by the Bhotia community in Chamoli Garhwal. Among these, 24 (70.5%) were identified as wild, while 10 (29.5%) were cultivated. There was a remarkable consensus among the informants regarding the ethno-medicinal uses of these plants. Their results underscore the potential efficacy of herbal formulations in addressing various health issues, with the ability to provide immediate relief for minor ailments and

gradual improvement for more severe conditions with prolonged use. Rawat *et al.* (2019) <sup>[15]</sup> conducted a study in five villages—Lata and Chinka in Chamoli, Darkot and Baluwakot in Pithoragarh, and Dunda in Uttarkashi, Uttarakhand to gather information from different sub-groups of the Bhotia tribe regarding plants historically used for extracting dyes and for traditional textile coloration, both in the past and the present. They highlighted that Bhotia tribals traditionally utilized wild plant species for dyeing their woolen products. Notable plants for obtaining dyes included jangli palak (*Rumex nepalensis*), bagmaru (*Eupatorium*), kilmora (*Berberis asiatica*), akhrot (*Juglans regia*), dholu (*Rheum australe*), tea leaves, tantri (*Rheum moorcroftianum*), kaphal (*Myrica esculenta*), darim (*Punica grantum*), burans (*Rhodendron arborium*), and harda (*Terminalia chebula*). However, in the current scenario, only the Shauka and Jadh tribals continue to use natural dyes for woolen yarn. Mukherjee *et al.* (2018) <sup>[16]</sup> highlighted the preparation of traditional beverage of Bhotia tribe *i.e.* "Namkeen chai" or

"Jya" (salted tea), which holds a special place because of its scientific health benefits derived from the unique combination of ingredients. This unique concoction is esteemed for its remarkable energizing and nutritive qualities, contributing significantly to the health of the community. The preparation of "Namkeen chai" involves the utilization of *Taxus baccata* L. bark, milk, ghee, and salt. This beverage not only serves as a source of sustenance but also plays a noteworthy role in illustrating the socio-economic and cultural aspects of the Bhotiya tribe in Uttarakhand. They also highlighted the scientific aspects of this traditional practice, biochemical analysis of the *Taxus baccata* bark, which aimed to determine the total phenolic content, total flavonoids, and antioxidative properties inherent in the bark.

### Medicinal Plants and Remedies

Based on the literature, various medicinal plants, and their uses by the Bhotia community can be highlighted in Table 1.

**Table 1:** Various diseases and their corresponding treatment *via* specific portions of the local plants used by the Bhotia community

| S. N.         | Local name    | Scientific name   | Disease                                      | Used portion      | Reference   |
|---------------|---------------|---|--|-------------------|---|
| <b>Native</b> |               |   |  |                   |   |
| 1.            | Atis          | <i>Aconitum heterophyllum</i> Wall.                           | Headache, vomiting, abdominal pain, fever    | Root              | Samal <i>et al.</i> 2010 <sup>[9]</sup><br>Chauhan 2014 <sup>[17]</sup>               |
| 2.            | Amesh         | <i>Hippophae rhamnoides</i> Serv. Subsp.                      | Cold and cough                               | Fruit             | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>  |
| 3.            | Bhojpatra     | <i>Betula utilis</i> D. Don.                                  | Cold and cough                               | Fruit             | Samal <i>et al.</i> 2010 <sup>[9]</sup>   |
| 4.            | Choru         | <i>Angelica glauca</i> Edgew.                                 | Injury and pain                              | Leaf, Fruit       | Chauhan 2014 <sup>[17]</sup>  |
| 5.            | Cheraita      | <i>Swertia chirata</i> Buch.-Ham. ex Wall.                    | Cold and cough                               | Root              | Chauhan 2014 <sup>[17]</sup>  |
| 6.            | Chippa        | <i>Pleurospermum angelicoides</i> (DC.) Benth. ex C.B. Clarke | Fever  | Fresh leaves      | Phondani <i>et al.</i> 2010 <sup>[7]</sup>  |
| 7.            | Kutki         | <i>Picrorhiza kurrooa</i> Royel.                              | Fever, stomachache, dysentery                | Root              | Chauhan 2014 <sup>[17]</sup>  |
| 8.            | Biskandru     | <i>Morina longifolia</i> Wall. ex DC                          | Wounds, Cuts and Boils                       | Fresh leaves      | Phondani <i>et al.</i> 2010 <sup>[7]</sup>  |
| 9.            | Brahm kamal   | <i>Saussurea obvallata</i> Nakai                              | Wounds, Cuts and Boils                       | Dried leaves      | Phondani <i>et al.</i> 2010 <sup>[7]</sup>  |
| 10.           | Gandhrani     | <i>Angelica glauca</i> Edgew.                                 | Jaundice, cough                              | Flower            | Rana <i>et al.</i> 2013 <sup>[18]</sup>   |
| 11.           | Hatajari      | <i>Dactylorhiza hatagirea</i> D. Don Soo.                     | Vomiting, abdominal pain.                    | Dry root          | Samal <i>et al.</i> 2010 <sup>[9]</sup>   |
| 12.           | Tatri         | <i>Rheum webbianum</i> Royel                                  | Burns and injuries                           | Root              | Chauhan 2014 <sup>[17]</sup>  |
| 13.           | Methabish     | <i>Rheum webbianum</i> Royel                                  | diabetes                                     | Root              | Samal <i>et al.</i> 2010 <sup>[9]</sup>   |
| 14.           | Jambu faran   | <i>Allium stracheyi</i> Baker.                                | Wounds, cuts and boils                       | Dried leaves      | Phondani <i>et al.</i> 2010 <sup>[7]</sup>  |
| 15.           | Laljari       | <i>Arnebia benthamii</i> Wall. ex G. Don.                     | Leprosy                                      | Root              | Phondani <i>et al.</i> 2010 <sup>[7]</sup>  |
| 16.           | Kunjarpati    | <i>Artemisia spp.</i>   | Gastric                                      | Whole plant       | Chauhan 2014 <sup>[17]</sup>  |
| 17.           | Dhak          | <i>Butea frondosa</i> Roxb.                                   | Skin disease                                 | Root              | Samal <i>et al.</i> 2010 <sup>[9]</sup>   |
| 18.           | Pashanbhed    | <i>Bergenia ligulata</i> (Wall) Engl.                         | Dandruff for healthy hair                    | Root              | Chauhan 2014 <sup>[17]</sup>  |
| 19.           | Silpori       | <i>Berginia ciliata</i> (Haw.) Sternb.                        | Cut and wound                                | Green leave       | Samal <i>et al.</i> 2010 <sup>[9]</sup>   |
| 20.           | Kasturi kamal | <i>Delphinium brunonianum</i> Royle.                          | urine infection                              | flower            | Samal <i>et al.</i> 2010 <sup>[9]</sup>   |
| 21.           | Nirvisi       | <i>Delphinium denudatum</i> Wall.                             | kidney stone                                 | Dry rhizome       | Samal <i>et al.</i> 2010 <sup>[9]</sup>   |
| 22.           | Harvish       | <i>Dioscorea spp.</i>   | Kidney stone                                 | Root              | Chauhan 2014 <sup>[17]</sup>  |
| 23.           | Dolu          | <i>Rheum australe</i> D. Don.                                 | Burn, cuts, boils and pimples.               | Leaf              | Samal <i>et al.</i> 2010 <sup>[9]</sup>   |
| 24.           | Van ajwain    | <i>Thymus serpyllum</i> L.                                    | blood purification, Snake bitten             | Root              | Samal <i>et al.</i> 2010 <sup>[9]</sup>   |
| 25.           | Bhutkesh      | <i>Selinum vaginatum</i> (Edgew.) C.B. Clarke                 | Cuts, boils and pimples.                     | Dry rhizome       | Samal <i>et al.</i> 2010 <sup>[9]</sup>   |
| 26.           | Kut           | <i>Sausuurea costus</i> (Falc.) Lipsch.                       | Boils and pustules, swelling, pain in bones  | Root/Shoot        | Chauhan 2014 <sup>[17]</sup><br>Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>            |
| 27.           | Van Tulsi     | <i>Origanum vulgare</i> L.                                    | Cold cough and gastric, respiratory problems | Seed              | Chauhan 2014 <sup>[17]</sup>  |
| 28.           | Kala jeera    | <i>Carun carvi</i> L.   | Increase lactation in cow                    | Root, Whole plant | Chauhan 2014 <sup>[17]</sup>  |
| 29.           | Masi Tagar    | <i>Valeriana hardwickei</i> Wall.                             | Stomachache, Gastric, appetizer              | Root              | Chauhan 2014 <sup>[17]</sup>  |
| 30.           | Bhitara       | <i>Juniperus communis</i> L.                                  | Acidity                                      | Root, Whole plant | Chauhan 2014 <sup>[17]</sup>  |
| 31.           | Mentha        | <i>Aconitum balfouri</i> Staf.                                | Preservative                                 | Seed              | Chauhan 2014 <sup>[17]</sup>  |
| 32.           | Sedum         | <i>Allium humile</i> Kunth.                                   | Hawan  | Whole plant       | Chauhan 2014 <sup>[17]</sup>  |
| 33.           | Deodar        | <i>Cedrus deodara</i> Royal. Ex D. Don.                       | Hawan  | Whole plant       | Chauhan 2014 <sup>[17]</sup>  |
| 34.           | Jagli akhrot  | <i>Juglans regia</i> L.                                       | Snake bite, infection wounds                 | Tuber, Root       | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup><br>Rana <i>et al.</i> 2013 <sup>[18]</sup> |
| 35.           | Ban oggal     | <i>Fagopyrum esculentum</i> Meth.                             | Stomachache and spice                        | Whole plant       | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>  |
| 36.           | Barmao        | <i>Megacarpaea polyandra</i> Benth.                           | Stomach disease                              | Wood              | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>  |
|               |               |   | Stomach pain                                 | Fruit, Seed       | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>  |
|               |               |   | Headache, Fever                              | Leaf/Young shoot  | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>  |
|               |               |   | Stomach disorder                             | Leaves            | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>  |

|     |               |   |   |               |  |
|-----|---------------|---|---|---------------|--|
| 37. | Khirku        | <i>Nepeta discolor</i> Royle.   | Asthma, wounds and cuts   | Leaves        | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>   |
| 38. | Chandra       | <i>Paeonia emodi</i> Wall.Ex Royle.                                   | Dysentery, colic  | Leaves        | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>   |
| 39. | Bajradanti    | <i>Potentilla fulgens</i> , Wall. Ex Hook.                            | Teeth ache  | Root          | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>   |
| 40. | Kirol         | <i>Prunus persica</i> , L.  | Stomach pain  | Seed          | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>   |
| 41. | Awom          | <i>Rhododendron companulatum</i> , D. Don.                            | Wounds, cold and cough  | Leaves        | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>   |
| 42. | Sedum         | <i>Rosa webbiana</i> , Wall. Ex Royle.                                | Eye disease   | fruit         | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>   |
| 43. | Thuner        | <i>Taxus wallichiana</i> Zucc.<br>(reported as <i>Taxus baccata</i> ) | Rejuvenation  | Bark          | Nautiyal <i>et al.</i> 2001 <sup>[8]</sup>   |
| 44. | Dhatura       | <i>Datura stramonium</i> L.   | Treat rheumatism  | Seed          | Phondani <i>et al.</i> , 2010 <sup>[7]</sup>   |
| 45. | Chitra jhar   | <i>Corydalis cornuta</i> Royle.                                       | Leprosy   | Root          | Phondani <i>et al.</i> , 2010 <sup>[7]</sup>   |
| 46. | Kandali       | <i>Urtica dioica</i> L.   | Rabies  | Leaves        | Phondani <i>et al.</i> 2010 <sup>[7]</sup>   |
|     |               |   | Urinary complaints, menstrual disorder                            | Leave, Root   | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 47. | Mirchya ghass | <i>Cymbopogon martini</i> (Roxb.)<br>Will.Watson                      | Rabies  | Fresh leaves  | Phondani <i>et al.</i> 2010 <sup>[7]</sup>   |
| 48. | Nirbishi      | <i>Delphinium nudatum</i> Wall. ex Hook.f.<br>& Thomson               | Snake bite/ Scorpion sting  | Root          | Phondani <i>et al.</i> 2010 <sup>[7]</sup>   |
| 49. | Kail          | <i>Pinus wallichiana</i> A.B.Jacks.                                   | Bone fracture   | Bark          | Phondani <i>et al.</i> 2010 <sup>[7]</sup>   |
| 50. | Bankakri      | <i>Podophyllum hexandrum</i> Royle.                                   | Cancer  | Root          | Phondani <i>et al.</i> 2010 <sup>[7]</sup>   |
| 51. | Kirmor        | <i>Berberis lycium</i> Royle.   | Diabetes  | Leaves        | Phondani <i>et al.</i> 2010 <sup>[7]</sup>   |
| 52. | Mamiri        | <i>Thalictrum javanicum</i> Blume.                                    | Diabetes  | Root          | Phondani <i>et al.</i> 2010 <sup>[7]</sup>   |
| 53. | Salam misri   | <i>Eulophia campestris</i> Wall.                                      | Conceiving pregnancy and body strength                            | Root          | Joshi and Pande 2016 <sup>[12]</sup>   |
| 54. | Akalveer      | <i>Verbascum thapsus</i> L.   | Birth to child  | Leaf, Root    | Joshi and Pande 2016 <sup>[12]</sup>   |
| 55. | Hada          | <i>Terminalia chebula</i> Retz.                                       | Pain during mensuration period                                    | Fruit         | Joshi and Pande 2016 <sup>[12]</sup>   |
| 56. | Bankh         | <i>Arisaema tortuosum</i> (Wall.) Schott.                             | snake bite  | Rhizome       | Samal <i>et al.</i> 2010 <sup>[9]</sup>  |
| 57. | Chandra       | <i>Paeonia emodi</i> Wall. ex Royle.                                  | Blood dysentery, diabetes, improves lactation, hysteria, epilepsy | Leave, Root   | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 58. | Laxaman buti  | <i>Meconopsis robusta</i> Royle.                                      | Antisterility   | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 59. | Barhmao       | <i>Megacarpaea polyandra</i> Benth.                                   | Chronic fever, abdominal, ailments, fever                         | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup><br>Samal <i>et al.</i> , 2010 <sup>[9]</sup> |
| 60. | Semal         | <i>Bombax ceiba</i> L.  | Leucorrhoea, diabetes, aphrodisiac                                | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 61. | Rattan jot    | <i>Geranium wallichianum</i> D. Don ex.                               | Improves eye sight  | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 62. | Gang jeeru    | <i>Impatiens sulcata</i> Wall.  | Haematuria  | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 63. | Kubashya      | <i>Boemninghausenia albiflora</i> Hk.                                 | Leucoderma, psoriasis   | Leave         | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 64. | Nairpati      | <i>Skimmia anquetilia</i> Taylor and Airy                             | Psoriasis, leucoderma   | Leave         | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 65. | Chadalu       | <i>Rhamnus virgatus</i> Roxb.   | Improves eye sight  | Bark          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 66. | Panger        | <i>Aesculus indica</i> (Colebr. ex Camb.) Hk.                         | Leucorrhoea, anti-dandruff  | Seed          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 67. | Rudarawanthi  | <i>Astragalus candolleanus</i> Royle ex Benth.                        | Abdominal complaints  | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 68. | Bhainkal      | <i>Prinsepia utilis</i> Royle   | Arthritis   | Seed          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 69. | Jamun         | <i>Prunus cornuta</i> (Wall. ex Royle) Steud.                         | Diabetes  | Seed          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 70. | Kunjir        | <i>Rosa brunonii</i> Lindley.   | Asthma, bronchitis  | Flower        | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 71. | Pan Brahmi    | <i>Centella asiatica</i> L.   | Leucorrhoea   | Leave         | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 72. | Chhatra jhar  | <i>Heracleum lanatum</i> Michaux                                      | Leucorrhoea, asthma, bronchitis.                                  | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 73. | Chit kuru     | <i>Rubia manjith</i> Roxb. ex Fleming                                 | Internal injury   | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 74. | Manshi        | <i>Nardostachys grandiflora</i> DC.                                   | Arthritis, piles, hysteria, epilepsy                              | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 75. | Vish kanar    | <i>Morina longifolia</i> Wall. ex DC.                                 | Haematuria  | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 76. | Gugal dhoop   | <i>Tanacetum dolichophyllum</i> Kitamura                              | Chest pain, arthritis   | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 77. | Guggle dhoop  | <i>Jurinea dolomaea</i> Boiss.  | Leucorrhoea, menstrual disorders, urinary complaints.             | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 78. | Vishnu kamal  | <i>Saussurea gossypiphora</i> D. Don                                  | Chest pain, snake bite.   | Flower, Leave | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 79. | Chiratu       | <i>Swertia chirayita</i> Roxb. ex Flem.                               | Lung ailments, fever, stomachache, leucorrhoea, diabetes.         | Leave         | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 80. | Lal buti      | <i>Arnebia benthamii</i> Wall. ex G. Don                              | Antiseptic, hair tonic, leucorrhoea, cardiac complaints.          | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 81. | Kachao        | <i>Ipomoea purpurea</i> (L.) Roth.                                    | Improves lactation  | Leave         | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 82. | Khurasani     | <i>Hyoscyamus niger</i> L.  | Asthma, mental disorders, urinary disease                         | Seed          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 83. | Pit papadi    | <i>Lindernia crustacea</i> (L.) F.V. Mueller                          | High fever, diabetes  | Leave         | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 84. | Neelbati      | <i>Ajuga parviflora</i> Benth.  | High fever, colic, stomachache, leucorrhoea, diabetes             | Leave         | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 85. | Pwatina       | <i>Mentha longifolia</i> (L.) Huds.                                   | Cholera, constipation   | Leave         | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 86. | Isabgol       | <i>Plantago depressa</i> Willd.                                       | Colic, dysentery, diarrhea, constipation                          | Leave, Seed   | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 87. | Shahtoot      | <i>Morus alba</i> L.  | Cough and cold.   | Fruit         | Samal <i>et al.</i> 2010 <sup>[9]</sup>  |
| 88. | Kapashi       | <i>Corylus jacquemontii</i> Decne.                                    | Eczema, psoriasis   | Leave         | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 89. | Kakoli        | <i>Habenaria pectinata</i> (J.F. Smith) D. Don                        | Semiferous, tonic.  | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 90. | Ridhi shidhi  | <i>Malaxis muscifera</i> (Lindl.) Kuntz.                              | Tonic in general weakness   | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 91. | Garud panja   | <i>Spiranthes sinensis</i> (Pers.) Ames.                              | Leucorrhoea, diabetes   | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 92. | Mooshali      | <i>Satyrium nepalense</i> D. Don                                      | Colic, tonic, leucorrhoea, diabetes                               | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 93. | Ban Haldu     | <i>Hedychium spicatum</i> Buch.-Ham. ex J.E.                          | Asthma, tonic, liver complaints                                   | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 94. | Lenku faran   | <i>Allium wallichii</i> Kunth.  | Carminative   | Leave         | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 95. | Faran         | <i>Allium humile</i> Kunth.   | Cold, cough   | Leave         | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 96. | Satuwa        | <i>Paris polyphylla</i> J. E. Smith                                   | Constipation, cardiac complaints.                                 | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 97. | Soma          | <i>Ephedra gerardiana</i> Wall. ex Stapf                              | Asthma  | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |
| 98. | Bauchu        | <i>Acorus calamus</i> L.  | Pharyngitis, bronchitis, asthma, hysteria, epilepsy               | Root          | Rana <i>et al.</i> 2013 <sup>[18]</sup>  |

|                   |               |  |                                       |                   |   |
|-------------------|---------------|--|---------------------------------------|-------------------|---|
| 99.               | Bahera        | <i>Terminalia bellirica</i> (Gaertn.) Roxb.            | Digestive problems                    | Fruit             | Chandola and Nautiyal 2017 <sup>[14]</sup>                              |
| 100.              | Harad         | <i>Terminalia chebula</i> Pierz.                       | Digestive problems                    | Fruit             | Chandola and Nautiyal 2017 <sup>[14]</sup>                              |
| 101.              | Dhai          | <i>Woodfordia fruticosa</i> G.) Kurz                   | Gout                                  | Flower            | Chandola and Nautiyal 2017 <sup>[14]</sup>                              |
| 102.              | Gurjar Gudchi | <i>Tinospora cordifolia</i> (Willd.) Hook.f. & Thomson | Fever                                 | Stem              | Farooquee and Nautiyal, 2012 <sup>[19]</sup>                            |
| 103.              | Hansraj       | <i>Adiantum venustum</i> D.Don                         | Diarrhoea                             | Whole plant       | Farooquee and Nautiyal, 2012 <sup>[19]</sup>                            |
| 104.              | Dhavephul     | <i>Woodfordia floribunda</i> Salisb.                   | Piles                                 | Flower            | Farooquee and Nautiyal, 2012 <sup>[19]</sup>                            |
| 105.              | Gurbach       | <i>Acorus calamus</i> L.                               | Sprain                                | Root              | Farooquee and Nautiyal, 2012 <sup>[19]</sup>                            |
| 106.              | Chir          | <i>Pinus roxburghii</i> Sarg.                          | Crack cream                           | Bark              | Bhandari <i>et al.</i> 2016 <sup>[11]</sup>                             |
| 107.              | Mamiri        | <i>Thalictrum foliolosum</i> DC.                       | Ophthalmia, fever and colic           | Root              | Bhandari <i>et al.</i> 2016 <sup>[11]</sup>                             |
| 108.              | Kingor        | <i>Berberis aristata</i> Roxb. ex DC.                  | Fever                                 | Root              | Bhandari <i>et al.</i> 2016 <sup>[11]</sup>                             |
| 109.              | Khadik        | <i>Celtis australis</i> L.                             | Bone, joint pain                      | Bark              | Bhandari <i>et al.</i> 2016 <sup>[11]</sup>                             |
| 110.              | Almora        | <i>Rumex nepalensis</i> Sprengel.                      | Stomach-ache                          | Leave             | Bhandari <i>et al.</i> 2016 <sup>[11]</sup>                             |
| 111.              | Aaru          | <i>Prunus persica</i> (L.) Batsch.                     | Cough, cold                           | Leave, Bark       | Bhandari <i>et al.</i> 2016 <sup>[11]</sup>                             |
| 112.              | Hinsar        | <i>Rubus biflorus</i> Buch-Ham. ex Smith               | Diarrhoea                             | Root              | Bhandari <i>et al.</i> 2016 <sup>[11]</sup>                             |
| 113.              | Somya         | <i>Valeriana jatamansi</i> Jones                       | Mental disorders                      | Root              | Bhandari <i>et al.</i> 2016 <sup>[11]</sup>                             |
| 114.              | Kunja         | <i>Artemisia roxburghiana</i> Wallich ex Besser.       | Skin allergy                          | Leave             | Bhandari <i>et al.</i> 2016 <sup>[11]</sup>                             |
| 115.              | Doob, Dobra   | <i>Cynodon dactylon</i> (L.) Persoon                   | Internal injury                       | Root              | Bhandari <i>et al.</i> 2016 <sup>[11]</sup>                             |
| 116.              | Aak           | <i>Calotropis procera</i> Br.                          | Migraine                              | Leave             | Bhatt <i>et al.</i> 2009 <sup>[6]</sup>                                 |
| 117.              | Gethi         | <i>Dioscorea bulbifera</i> Linn.                       | Cold cough                            | Tuber             | Bhatt <i>et al.</i> 2009 <sup>[6]</sup>                                 |
| 118.              | Tatri         | <i>Rheum webbianum</i> Royle.                          | Cuts and wounds, boils                | Root, Leave       | Kumar <i>et al.</i> 2016 <sup>[20]</sup>                                |
| 119.              | Karan phool   | <i>Taraxacum officinale</i> Weber.                     | Fever, headache                       | Root              | Kumar <i>et al.</i> 2016 <sup>[20]</sup>                                |
| 120.              | Nayalo        | <i>Aconogonum tortuosum</i> (D. Don) Hara              | Leucorrhoea                           | Root, Shoot       | Kumar <i>et al.</i> 2016 <sup>[20]</sup>                                |
| 121.              | Purchu        | <i>Artemisia maritima</i> L.                           | Stomachache, rheumatism               | Leave             | Kumar <i>et al.</i> 2016 <sup>[20]</sup>                                |
| 122.              | Bethua        | <i>Chenopodium foliolosum</i> (Monech) Aschers.        | Indigestion, cold and cough           | Leave             | Kumar <i>et al.</i> 2016 <sup>[20]</sup>                                |
| 123.              | Phaphar       | <i>Fagopyrum esculentum</i> (L.) Moench.               | Rheumatism, lung diseases, fever      | Root, Leave       | Kumar <i>et al.</i> 2016 <sup>[20]</sup>                                |
| 124.              | Jheri         | <i>Gaultheria trichophylla</i> Royle.                  | Wound, cold and cough                 | Fruit, Leave      | Kumar <i>et al.</i> 2016 <sup>[20]</sup>                                |
| 125.              | Koot          | <i>Saussurea costus</i> (Falc.) Lipsch.                | Fever, abdominal pain and asthma      | Root              | Samal <i>et al.</i> 2010 <sup>[9]</sup><br>Chauhan 2014 <sup>[17]</sup> |
| 126.              | Banspa        | <i>Viola sp.</i>                                       | Fever, cold and cough                 | Flower            | Samal <i>et al.</i> 2010 <sup>[9]</sup>                                 |
| 127.              | Doana         | <i>Tanacetum nubigenum</i> DC.                         | Chronic fever                         | Leave             | Rana <i>et al.</i> 2013 <sup>[18]</sup>                                 |
| 128.              | Kanjyalu      | <i>Cirsium wallichii</i> DC.                           | Chronic fever, constipation           | Root              | Rana <i>et al.</i> 2013 <sup>[18]</sup>                                 |
| 129.              | Angyar        | <i>Lyonia ovalifolia</i> (Wall.) Drude.                | Eczema, wounds, boils                 | Leave, Seed       | Rana <i>et al.</i> 2013 <sup>[18]</sup>                                 |
| 130.              | Bugga ghas    | <i>Anaphalis triplinervis</i> (Sims) C.B. Clarke       | Cough, breathing difficulty           | Whole plant       | Bhatt <i>et al.</i> 2023 <sup>[21]</sup>                                |
| 131.              | Bahera        | <i>Terminalia bellirica</i> (Gaertn.) Roxb.            | Indigestion, constipation             | Fruit             | Bhatt <i>et al.</i> 2023 <sup>[21]</sup>                                |
| 132.              | Timar         | <i>Ficus auriculata</i> Lour.                          | Skin disease                          | Latex             | Bhatt <i>et al.</i> 2023 <sup>[21]</sup>                                |
| <b>Cultivated</b> |               |  |                                       |                   |   |
| 133.              | Pyaj          | <i>Allium cepa</i> L.                                  | Diarrhea                              | Root              | Phondani <i>et al.</i> 2010 <sup>[7]</sup>                              |
| 134.              | Haldi         | <i>Curcuma longa</i> L.                                | Wounds, cuts and boils                | Root              | Phondani <i>et al.</i> 2010 <sup>[7]</sup>                              |
| 135.              | Lahsun        | <i>Allium sativum</i> L.                               | Ear                                   | Root              | Samal <i>et al.</i> 2010 <sup>[9]</sup>                                 |
| 136.              | Choulai       | <i>Amaranthus paniculatus</i> L.                       | Wounds                                | Leaf              | Samal <i>et al.</i> 2010 <sup>[9]</sup>                                 |
| 137.              | Sarsoun       | <i>Brassica campestris</i> L.                          | Burns                                 | Seed              | Samal <i>et al.</i> 2010 <sup>[9]</sup>                                 |
| 138.              | Mirch         | <i>Capsium annum</i> L.                                | Body bitten by dog                    | fruit             | Samal <i>et al.</i> 2010 <sup>[9]</sup>                                 |
| 139.              | Jaun          | <i>Hardeum vulgare</i> L.                              | Headache                              | Seed              | Samal <i>et al.</i> 2010 <sup>[9]</sup>                                 |
| 140.              | Podina        | <i>Mentha arvensis</i> L.                              | Diarrhea                              | Fresh leaves      | Phondani <i>et al.</i> 2010 <sup>[7]</sup>                              |
| 141.              | Adrak         | <i>Zingiber officinale</i> Roscoe.                     | Paralysis                             | Rhizome           | Phondani <i>et al.</i> 2010 <sup>[7]</sup>                              |
| 142.              | Kali dal      | <i>Vigna mungo</i> (L.) Hepper                         | Bone fracture                         | Bark              | Phondani <i>et al.</i> 2010 <sup>[7]</sup>                              |
| 143.              | Muli          | <i>Raphanus sativus</i> L.                             | Jaundice                              | Whole plant       | Phondani <i>et al.</i> 2010 <sup>[7]</sup>                              |
| 144.              | Jagra         | <i>Phytolacca acinosa</i> Roxb.                        | Cardiac complaints                    | Leave, Seed       | Rana <i>et al.</i> 2013 <sup>[18]</sup>                                 |
| 145.              | Palak         | <i>Spinacia oleracea</i> L.                            | Eye irritation, blood related disease | Seed, Whole plant | Bhatt <i>et al.</i> 2023 <sup>[21]</sup>                                |
| 146.              | Methi         | <i>Trigonella foenumgraecum</i> L.                     | Cold, postnatal health issues         | Seed              | Bhatt <i>et al.</i> 2023 <sup>[21]</sup>                                |

### Comparison with Modern Medicine

When comparing traditional medicine with modern medicine in the context of the Bhotia tribe in Uttarakhand, it's essential to consider various factors.

**Effectiveness and Efficacy:** Traditional medicine often relies on natural remedies derived from plants, animals, and minerals, while modern medicine utilizes synthetic drugs and advanced medical technologies. Comparing the effectiveness

and efficacy of traditional Bhotia medicine with modern medicine requires rigorous scientific research and evaluation to understand the strengths and limitations of each approach.

**Cultural Context:** Traditional Bhotia medicine is deeply rooted in the community's cultural beliefs, practices, and values. It incorporates spiritual and holistic elements that may not be present in modern medicine, which tends to focus more on scientific evidence and clinical outcomes. Understanding

the cultural context is crucial when comparing the two approaches and respecting the preferences and beliefs of the Bhotia community.

**Accessibility and Affordability:** Traditional Bhotia medicine may be more accessible and affordable for community members, especially in remote areas where modern healthcare facilities are limited. However, modern medicine often offers advanced treatments and technologies that may not be available in traditional settings, but which can be costly and inaccessible to marginalized communities.

**Safety and Regulation:** Modern medicine undergoes rigorous testing, regulation, and quality control processes to ensure safety and efficacy. In contrast, traditional Bhotia medicine may lack standardized dosages, formulations, and quality control measures, raising concerns about safety and potential adverse effects. Comparing the safety and regulation of both approaches is essential for ensuring public health and well-being.

**Integration and Collaboration:** There is growing recognition of the value of integrating traditional and modern medicine to provide comprehensive healthcare services. Collaborative efforts between traditional healers, modern healthcare practitioners, researchers, and policymakers can harness the strengths of both approaches while addressing the diverse health needs of the Bhotia community.

**Sustainability and Conservation:** Traditional Bhotia medicine relies on natural resources such as medicinal plants, whose conservation is essential for maintaining biodiversity and ecological balance. On the other hand, modern medicine may rely more on synthetic drugs and biomedical technologies that have environmental impacts. Comparing both approaches' sustainability and conservation aspects can inform efforts to promote environmentally friendly healthcare practices.

**Resilience and Adaptation:** Traditional Bhotia medicine has evolved through trial and error over generations, adapting to local environments and cultural practices. Modern medicine, with its emphasis on scientific research and technological innovation, offers opportunities for continuous improvement and adaptation to emerging health challenges. Comparing the resilience and adaptability of both approaches can inform strategies for enhancing healthcare resilience in the face of changing environmental, social, and health contexts. Therefore, comparing traditional Bhotia medicine with modern medicine requires a nuanced understanding of their respective strengths, limitations, and cultural contexts. By recognizing the complementary nature of both approaches and fostering collaboration and integration, it is possible to enhance healthcare outcomes and promote the well-being of the Bhotia community in Uttarakhand.

### Challenges in Preserving Traditional Medicine of Bhotia Tribe

Preserving the traditional medicine of the Bhotia tribe in Uttarakhand faces several challenges.

**Loss of Traditional Knowledge:** With modernization and globalization, there's a risk of traditional knowledge being lost as younger generations may not be as interested in or exposed to traditional medicinal practices.

**Cultural Shifts:** As younger generations move away from traditional lifestyles and towards more modern practices, there's a risk of a cultural shift that devalues traditional medicine.

**Environmental Changes:** Climate change and environmental degradation can impact the availability of medicinal plants and resources traditionally used by the Bhotia tribe, affecting the efficacy and sustainability of their traditional medicine practices.

**Lack of Documentation:** Traditional medicine practices are often passed down orally from generation to generation. Without proper documentation, valuable information about medicinal plants, remedies, and treatment methods can be lost.

**Legal and Regulatory Challenges:** Traditional medicine may not always conform to modern regulatory standards, leading to legal challenges and restrictions that could hinder its practice and transmission.

**Access to Resources:** Economic factors and limited access to resources such as medicinal plants, which may be affected by land-use changes or over-harvesting, can hinder the practice of traditional medicine.

**Integration with Modern Medicine:** There may be a lack of integration between traditional Bhotia medicine and modern healthcare systems, leading to a preference for modern medicine among younger generations or a lack of recognition and support for traditional practices.

**Socioeconomic Factors:** Economic pressures and migration away from traditional Bhotia settlements can also contribute to the erosion of traditional medicinal practices as communities adapt to new environments and livelihoods.

**Education and Awareness:** Limited education and awareness about the value of traditional medicine, both within the Bhotia community and among outsiders, can hinder efforts to preserve and promote these practices.

**Globalization:** Increased exposure to Western medicine and cultural influences through globalization can lead to a decline in the practice and transmission of traditional Bhotia medicine.

Various studies in the literature have also highlighted the challenges in preserving the traditional medicine and culture of the Bhotia tribe. Nautiyal *et al.* (2001) <sup>[8]</sup> also observed a decline in the transfer of this knowledge to the younger generation, raising concerns about the preservation of these valuable traditional practices of Tolchhas, Marchhas, and Jadhs, residing in the Niti-Mana and Bhagirathi valleys of Garhwal Himalaya. Chandola and Nautiyal (2017) <sup>[14]</sup> observed that the valuable ethno-medicinal knowledge passed down through generations is gradually diminishing owing to swift socio-economic changes in the mountainous regions they inhabit. Therefore there is the urgent need of preserving and documenting this traditional knowledge before it further diminishes due to the evolving socio-economic landscape in the mountains. Rawat *et al.* (2019) <sup>[15]</sup> found that the decline in the usage of natural dyes among Bhotia tribals is attributed to factors such as the extinction of plant species, changes in land use, natural disasters, government restrictions on the harvesting of certain plants, and the widespread availability of

synthetic dyes and colored yarns at a lower cost in the market. Their study sheds light on the cultural and environmental factors influencing the traditional practices of the Bhotia tribe in Uttarakhand.

Sharma (2020) <sup>[21]</sup> investigated the challenges faced by the Bhotias for their livelihood and preservation of culture. Their research concluded that the Bhotia community, known for its resilience, resides and works in remote, challenging, and extremely cold regions. Their daily lives are intricately entwined with the constant struggle to make a living amidst unstable and harsh conditions. Recognizing these challenges, they also proposed recommendations and suggestions aimed at uplifting the Bhotia community and ensuring the preservation of their cultural heritage.

### **Opportunities for Sustainable Practices**

To overcome the challenges and promote sustainable practices in preserving the traditional medicine of the Bhotia tribe in Uttarakhand, several strategies can be employed:

**Documentation and Research:** Encourage documentation and research efforts to record traditional medicinal knowledge, practices, and the uses of medicinal plants within the Bhotia community. This can involve collaboration between traditional healers, researchers, and local institutions.

**Community Empowerment:** Empower the Bhotiya community to take ownership of their traditional medicine practices through education, training, and capacity-building initiatives. This can include workshops, seminars, and community-led programs aimed at preserving and transmitting traditional knowledge.

**Intergenerational Transmission:** Facilitate intergenerational transmission of traditional knowledge by encouraging dialogue and interaction between younger and older members of the Bhotia community. This can involve storytelling sessions, mentorship programs, and cultural events that highlight the importance of traditional medicine.

**Integration with Modern Healthcare:** Promote the integration of traditional Bhotiya medicine with modern healthcare systems through collaboration between traditional healers and modern healthcare practitioners. This can involve training programs for healthcare professionals on traditional medicine practices and the development of guidelines for integrating traditional and modern approaches to healthcare.

**Conservation of Medicinal Plants:** Implement measures to conserve medicinal plants and their habitats, including sustainable harvesting practices, community-managed conservation areas, and the cultivation of medicinal plants in home gardens or community-owned lands.

**Legal and Policy Support:** Advocate for supportive legal and policy frameworks that recognize and protect traditional medicine practices and the rights of indigenous communities to access and use traditional medicinal knowledge and resources.

**Promotion of Cultural Heritage:** Promote the cultural heritage of the Bhotiya tribe and their traditional medicine practices through cultural festivals, exhibitions, and tourism initiatives that highlight the importance of traditional knowledge in preserving biodiversity and promoting

community well-being.

**Market Access and Livelihood Opportunities:** Create market access opportunities for traditional Bhotia medicine products through certification schemes, fair trade practices, and support for community-based enterprises engaged in the sustainable production and sale of traditional medicinal products.

**Education and Awareness:** Increase education and awareness about the value of traditional medicine among both the Bhotia community and the wider society through educational programs, public awareness campaigns, and the inclusion of traditional medicine topics in school curricula.

**Research and Innovation:** Support research and innovation in traditional medicine practices, including studies on the efficacy and safety of traditional remedies, the development of new formulations, and the adaptation of traditional knowledge to address emerging health challenges.

By implementing these strategies, it is possible to overcome the challenges and create opportunities for sustainable practices in preserving the traditional medicine of the Bhotiya tribe in Uttarakhand.

### **Conclusion**

Preservation and promotion of traditional Bhotia medicine in Uttarakhand present both challenges and opportunities in the context of modern healthcare practices. While traditional medicine is deeply rooted in the cultural heritage and ecological knowledge of the Bhotia community, it faces challenges such as loss of traditional knowledge, environmental degradation, and limited recognition and integration with modern healthcare systems. However, there are also opportunities for sustainable practices and collaboration between traditional and modern approaches to healthcare. By empowering the Bhotia community to preserve and transmit their traditional knowledge, promoting the integration of traditional medicine with modern healthcare systems, conserving medicinal plants and biodiversity, and fostering research and innovation, it is possible to harness the strengths of both approaches to enhance healthcare outcomes and promote community well-being. Ultimately, recognizing the value of traditional Bhotia medicine, respecting cultural diversity, and fostering collaboration and mutual respect between traditional healers, modern healthcare practitioners, researchers, policymakers, and community members are essential for achieving sustainable healthcare solutions that meet the diverse health needs of the Bhotia community in Uttarakhand. Through these efforts, we can honour and preserve the rich cultural heritage and ecological wisdom of the Bhotia tribe while ensuring access to effective, safe, and culturally appropriate healthcare services for generations to come.

### **References**

1. Bergmann C, Gerwin M, Nusser M, Sax WS. Living in a high mountain border region: the case of the 'Bhotiyas' of the Indo-Chinese border region. *Journal of Mountain Science*. 2008;5:209-217.
2. Dash C. Social ecology and demographic structure of Bhotias: Narratives and discourses. Concept Publishing Company. c2006. p. 240.
3. Chatterjee BB. The Bhotias of Uttarakhand. *India International Centre Quarterly*. 1976;3:3-16.



4. Farooquee NA, Rao KS. Conservation and utilization of indigenous cattle and livestock among the transhumant pastoralists of Kumaun Himalaya (India). *Journal of Environmental Systems*. 1999;27(4):317-329.
5. Garbyal SS, Grover A, Aggarawal KK, Babu CR. Traditional phytomedicinal knowledge of Bhotias of Dharchula in Pithoragarh. *Indian Journal of Traditional Knowledge*. 2007;6(2):360-364.
6. Bhatt D, Joshi GC, Tiwari LM. Culture, habitat and ethno-medicinal practices by Bhotia tribe people of Dharchula region of Pithoragarh District in Kumaun Himalaya, Uttarakhand. *Ethnobotanical Leaflets*. 2009;13:975-983.
7. Phondani PC, Maikhuri RK, Rawat LS, Farooquee NA, Kala CP, Vishvakarma SCR *et al.* Ethnobotanical uses of plants among the Bhotiya tribal communities of Niti Valley in Central Himalaya, India. *Ethnobotany Research and Applications*. 2010; 8:233-244.
8. Nautiyal S, Rao KS, Maikhuri, Semwal RL, Saxena KG. Traditional knowledge related to medicinal and aromatic plants in tribal societies in a part of Himalaya. *Journal of Medicinal and Aromatic Plant Sciences*. 2001;22(4):528-541.
9. Samal K, Dhyani PP, Dolo M. Indigenous medicinal practices of Bhotia tribal community in Indian Central Himalaya. *Indian Journal of Traditional Knowledge*. 2010;9(1):140-144.
10. Mehta PS, Negi KS, Ojha SN, Rayal A, Verma SK. Herbal based traditional practices used by the Bhotias and Gangwals of the central Himalayan region, Uttarakhand, India. *J. Nanotechnol.* 2013;2(1):83-96.
11. Bhandari BS, Riaz T, Panwar R, Gusain P. Indigenous Traditional Knowledge Of Health Care System Adopted by The Bhotiya Tribe other Inhabitants in a Part Of Garhwal Himalaya. *World Journal of Pharmacy and Pharmaceutical Sciences*. 2016;5(12):802-817.
12. Joshi A, Pande N. Indigenous practices used by Bhotia tribe in Kumaun for prenatal and postnatal care. *Journal for Research Analysis*. 2016;5(2):29-30.
13. Bhardwaj KN, Jain KK, Kumar S, Kuhad R. Microbiological analyses of traditional alcoholic beverage (Chhang) and its starter (Balma) prepared by Bhotiya tribe of Uttarakhand, India. *Indian Journal Microbiol.* 2016;56(1):28-34.
14. Chandola V, Nautiyal AR. Ethnomedicinal study on the Bhotiya tribe in Chhinka Village, Chamoli, Uttarakhand, India. *Journal of Non-Timber Forest Products*. 2017;24(3):153-158.
15. Rawat H, Rani A, Goel A. Sustainable traditional dyeing of wool by Bhotia tribe in Himalayan region: A case study. *Journal of Applied and Natural Science*. 2019;11(2):379-383.
16. Mukherjee A, Joshi K, Pal RS, Ateequlla GA, Roy ML, Chandra N. Scientific health benefits of namkeen chai/jya (salted tea): A traditional tea beverage of Bhotiya tribal community in higher altitude of Uttarakhand. *Indian Journal of traditional Knowledge*. 2018;17(2):365-369.
17. Chauhan A. Ethno-medicine of Bhotia tribe in Mana village of Uttarakhand. *Academic journals*. 2014;6(10):296-304.
18. Rana CS, Tiwari JK, Dangwal LR, Gairola S. Faith herbal healer knowledge document of Nanda Devi Biosphere Reserve, Uttarakhand, India. *Indian Journal of Traditional Knowledge*. 2013;12(2):308-314.
19. Farooquee NA, Nautiyal A. Traditional knowledge and practices of Bhotiya pastoralists of Kumaon Himalaya: the need for value addition. *International Journal of Sustainable Development and World Ecology*. 2012;6:60-67.
20. Kumar A, Mitra M, Adhikari BS, Rawat GS. Flora of Niti Valley: a cold arid region of Nanda Devi Biosphere Reserve, Western Himalaya, India. *The Biodiversity Data Journal*. 2016;12(1):1-16.
21. Bhatt S, Kumar A, Arunachalam A, Arunachalam K. Ethnomedicinal Diversity and Traditional Knowledge System of the Jaunsari Tribe in Uttarakhand, Western Himalaya. *Proceedings of the National Academy of Sciences, India - Section B: Biological Sciences*. 2023;94(1):177-192.