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**HERBAL MEDICINAL PLANTS AND THEIR TRADITIONAL USES
WITH SPECIAL REFERENCE TO CHAMOLI DISTRICT,
UTTARAKHAND: A REVIEW**

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ABSTRACT

Ethnobotany is related to traditional knowledge of using plants for various therapeutic purposes. Herbal medicines have been used by them since antiquity in treating diseases. However, valid scientific data on the usage of ethnomedicinal plants is rather obscure. The Himalayas are treasure house of medicinal plants and. 1748 medicinal plants are found in Indian Himalayas. Uttarakhand has been traditionally known as the gold mine of medicinal plants and has declared as the herbal state in 2003. According to a recent study, the total number of flowering plants included 892 genera belonging to 163 families. Among 1921 species of angiosperms, 1513 are dicots with over 73 cultigens and remaining 408 constitute monocots with 15 cultigens. The species of dicots are distributed in 690 genera belonging to 135 families; 408 monocots are distributed under 194 genera belonging to 24 families. The future research perspectives include the exploration of the regions with vegetation and conservation of herbal medicinal plants. Despite, of the studies conducted on various aspects of the biodiversity in Chamoli district; there exist still unexplored regions on the traditional knowledge for the Valley of flower. The valley of flower harbours many rare and endangered plants, many of which have medicinal properties, and studies on autecology of the valuable natural resources should be undertaken.

Keywords: Ethnobotany, therapeutic purpose, valley of flower, antimicrobial, anti-helminthic activity

INTRODUCTION

Traditional knowledge is gaining more and more credibility as a solution to the issues of primary healthcare services and natural resource management on a global scale as a growing body of research backs it up [1]. However, the societal dominance of western medicine and a lack of due recognition to the stakeholders of biological resources, place, and value of traditional knowledge base have been impeding the entry of traditional medicine into mainstream healthcare services and its related field of human welfare, such as nutrition, environmental assessment, and natural resource management. This has been a barrier for traditional medicine to enter mainstream healthcare services and its related field of human [2].

According to a survey conducted by the World Health Organisation (WHO), more than 80% of the world's population relies directly on the natural diversity and its related traditional system of medicine for their primary healthcare needs (WHO, 2000). For both their means of subsistence and their medical care, indigenous peoples living in isolated areas are reliant on the forest because of its vast biodiversity in plant and animal life [3]. Since ancient times, they've been treating illnesses with medicinal plants instead of conventional pharmaceuticals. On the other hand, there is

a dearth of reliable scientific data regarding the application of ethnomedicinal plants.

More than 427 different tribal clans may be found in India, each with their own unique indigenous traditions. The old knowledge base and practises, on the other hand, have been pushed to the background due to political and socioeconomic factors. In recent years, there has been a rise in interest in traditional medicine, and ethnobotanical studies have been launched in order to investigate the knowledge base held by diverse ethnic groups located all throughout the country [1, 4, 5, 6, 7, 8].

According to a study by Kala CP [9], there are approximately 1748 different medicinal plants that may be discovered in the Indian Himalayas. The Himalayas are a treasure trove of medicinal plants. There have been sporadic reports of the medicinal plants of the Himalayas, and the Rig-Veda, which was composed somewhere between 4500 and 1600 BCE, contains the oldest reference of them, the *Atharvaveda* around 2000 BCE and the *Ayurveda* inscribed about 500 BCE [10]. According to the State Medicinal Board of Uttarakhand (<http://www.smpbuk.org>) and the National Medicinal Plant Board of India (<https://www.nmpb.nic.in>), there have been a total of 1642 medicinal plants reported from the state of Uttarakhand so far. These plants are from 177 families and 869 genera.

Uttarakhand has long been regarded as a veritable treasure trove of medicinal plants, and the state officially adopted the moniker "herbal state" in 2003 [11]. There are around 700 different species of medicinal plants that can be found in this state. Of those species, 682 are angiosperm, 12 are gymnosperm, and 7 are ferns. These medicinal plants are utilised not only in the drug and pharmaceutical sectors, but also in Ayurvedic medicine, Unani medicine, and other traditional forms of treatment. When compared to the average growth rate of 7% seen around the world in this industry, India's growth rate of 22% is significantly higher.

Chamoli, one of the thirteen districts of Uttarakhand, abounds in forest and meadows with characteristic plant composition. The topographic features of the district have given birth to a number of magnificent ridges and verdant valleys such as Alakananda, Pindar, Niti, Ramganga and Valley of Flowers. Each valley embodies a rich reservoir of vegetational wealth, but some of the valleys are yet to be completely botanized, Western Ramganga is one of them. In absence of specific inventory and documentation of existing flora in the montane zone of Western Ramganga Valley, Chamoli, Uttarakhand, the present work was envisaged. The Western Ramganga valley is spread in three districts of Uttarakhand, i.e. Almora, Chamoli and Pauri. The montane zone of West

ern Ramganga valley which comes under the district of Chamoli was selected for present study. It stretches between 29°57'33" N to 30°06'05" N latitudes and 79°11'33" E to 79°20'33" E longitudes, with the altitude range 1200–3100 m [12] (Figure 1).

The Valley of Flowers National Park (VOF) is located in the Nanda Devi Biosphere Reserve (NDBR) of Chamoli district in the newly created Indian Himalayan state of Uttarakhand (30°41'–30°48' N and 79°33'–79°46' E). The VOF is renowned for its marvellous display of flowering plants and its landscape beauty [13, 14].

The purpose of this research is to conduct a comprehensive literature review on the pharmacology, phytochemistry, and biological activities of a selection of medicinal plants native to Chamoli district in the state of Uttarakhand.

REGULATORY AUTHORITY RELATED TO HERBAL MEDICINAL PLANTS IN UTTARAKHAND

Farmers in the region who produce traditional medicines can get licences from the HRDI (Herbal Research and Development Institute) if they comply with the policies and undergo a personal check of their production of medicinal plant species in terms of both area and crop. Furthermore, in the context of authorised farming as well as other land managed by producers or peasants, any kinds of plants

that have the potential to provide a therapeutic benefit should typically be allowed to continue to grow, as it is acknowledged that this land is their property. Forecasts are developed on the basis of an increase in the unit volume as well as taking into account the delivery time for the most likely quantity of the product that will be processed. The estimate for small forest products (medicinal products) that need to be removed from off-farm areas is based on loosely growing biomass and renewable harvested content. These two factors make up the bulk of the computation [15]. It can vary depending on the plant species and the part of the plant being considered, such as the fruit, the seed, or the leaves. The so-called transit passes, which are formal authorizations to sell the crop goods grown or processed by medicinal herbs, have also been given the go-ahead by HRDI for the processing of crop products. The transit passes have to be handed in in a way that is compliant with the anticipated output that is mentioned in the application.

STUDIES FOR ETHNOBOTANICAL SURVEY IN CHAMOLI DISTRICT OF UTTARAKHAND STATE

The earliest botanical collections from the inner ranges of Chamoli district were made by Sir Richard Strachey and J.E. Winter bottom when they surveyed this remote area between 1846 and 1849. Their checklist was published in Atkinson's

Gazetteer of Himalayan districts in 1886, which was later updated by J.F. Duthie in 1906 [16]. Subsequent to this informal collection, the flora of the VOF and its adjacent areas has been more systematically surveyed by [17, 18, 19]. More recently, an intensive survey of the National Park area itself, conducted from 1993 to 2002, identified 520 vascular plant species, of which 498 are flowering plants, four are gymnosperms and 18 are ferns [20]. These species belong to 72 families and 248 genera. The herbaceous flora dominates the valley in terms of both the number of species and geographical area: 472 herbs, 41 shrubs and eight tree species have been recorded from the National Park. Currently, there are few studies on botanical survey in the district.

A study was carried out to chronicle the traditional system of medicine that is utilised by the indigenous communities in the Chamoli area in the Indian state of Uttarakhand. On the basis of a semi-structural questionnaire and in consultation with the local herbal practitioner (Vaidyas), a total of 124 species, belonging to 59 families and 108 genera, that were utilised for the treatment of 39 ailments were reported. About 38% of the species were utilised for their roots and rhizomes, followed by 20% for their leaves, 10% for their fruits and seeds, and 6% for the entire plant. Less than 5% of the species' seeds,

barks, flowers, twigs/branch, and gum were utilised in the treatment of a variety of ailments. 16% of the documented species were used to treat fever (20 species), 14% were used to treat skin diseases, 12% were used to treat joint aches, 8% were used to treat cough and cold as well as stomach related problems, and 7% were used to treat blood pressure. There were 58 plants that were used to treat more than one illness, whereas there were 66 plants that were only utilised for one medicinal purpose. The majority of the plants and animals that were utilised in traditional medicine in the region were gathered from their natural environments.

In Uttarakhand, thirteen of the state's 124 documented species are considered to be in danger as a direct result of harvesting practises that are harmful to the environment. Five of these are considered to be in the critically rare category, five are considered to be endangered, and three are considered to be vulnerable. The significance of traditional knowledge regarding medicinal and aromatic plants in the treatment of a variety of diseases is demonstrated by this research, which highlights the relevance of such knowledge [21].

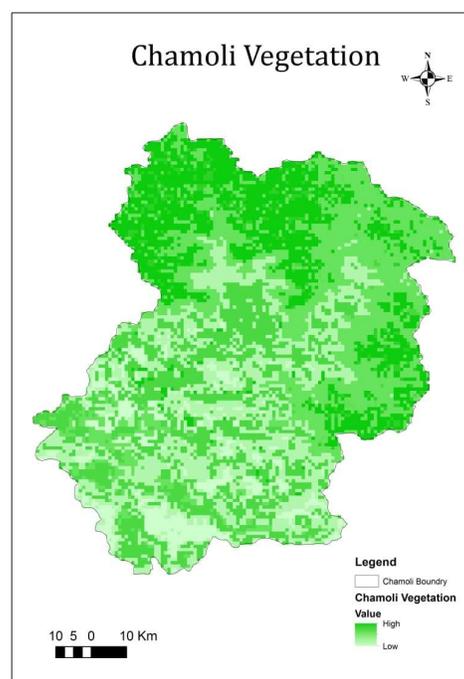


Figure: 1 Chamoli district vegetation map. A floristic survey resulted in documentation of 651 species of Spermatophyta belonging to 444 genera under 131 families (**Figure 2**). Among these, 29 species (4.45%) belongs to 20 families are new records to Chamoli district (including one new record to Western Himalaya) [12]. Asteraceae with 49 species was the dominant family, followed by Poaceae, Fabaceae and Rosaceae. Among the genera, Desmodium with eight species was dominant, followed by Ficus, Rubus and Polygonum with six species each. Of the growth forms, herbs dominate the valley with 389 species (59.7%) followed by shrubs (18.59%), trees (14.29%) and climbers (7.37%). About 9.22% species were found rare, 36.71% not common and 54.07% common. Many of the common species of low elevations and

plains are recorded in the montane zone, including invasive alien species and weeds, which are well adapted to varied environmental conditions. In the same study, ethnobotanical classification showed that the majority of species are being used for medicinal purposes (257 spp.) followed by use as fodder (256 spp.), wild edible (120 spp.), fuel wood (78 spp.), agricultural implements (60 spp.), timber (27 spp.), fiber (18 spp.), rituals (8 spp.), while 18 species are used for miscellaneous purpose. Among life forms, indigenous uses were recorded for 94.62% trees, 89.26% shrubs, 81.25% climbers and herbs 64.27%. Herbs constitute a large part of medicinal plants (59.53%), fodder (45.31%) and wild edibles (38.33%), while trees are used for agricultural implements (78.33%), fuel wood (82.05%) and timber (100%). According to botanical survey of India, in year 2022, the occurrence of large number

of species in the area and richness of the flora rendered the district a botanical paradise. The total number of flowering plants included 892 genera belonging to 163 families. Among 1921 species of angiosperms, 1513 are dicots with over 73 cultigens and remaining 408 constitute monocots with 15 cultigens. The species of dicots are distributed in 690 genera belonging to 135 families; 408 monocots are distributed under 194 genera belonging to 24 families [22].

HRBAL MEDICINAL PLANTS REPORTED IN CHAMOLI DISTRICT AT UTTARAKHAND REGION

By different studies, many plants have been reported to be found in Chamoli district which are being used for therapeutic purpose. **Table 1** describes the details of the medicinal plants found in Uttarakhand state (botanical name, local name, parts used, uses, and mode of admiration).

Table 1: List of plants used for herbal medicinal purpose in Chamoli district

Botanical Name	Local Name	Family	Parts Used	Uses
<i>Achyranthes bidentata</i> , Blume.	Dansh	Amaranthaceae	Root	As Laxative
<i>Artemisia nilagirica</i> , Pampanini.	Patti & Kunj	Asteraceae	Whole plant	For urinary tract infection (antimicrobial)
<i>Artemisia sacrorum</i> , Ladeb.	Kaparpatti & Jholpatti	Asteraceae	Leaf & Bud	For hair fall
<i>Abies webbiana</i> , Lindl.	Talispatra	Pinaceae	Bud	In cough (antimicrobial)
<i>Aconitum balfouria</i> , stapf.	Bishjahaar	Ranunculaceae	Root	In wound
<i>Acorus calamus</i> , Linn.	Banj	Acoraceae	Root	Fever & pain (anti-microbial)
<i>Adiantum venustum</i> , G. Don.	Hanshraj	Pteridaceae	Seed	For chest problem and hair fall
<i>Ajuga parviflora</i> , Benth.	Ratpatia	Lamiaceae	Whole plant	In arthritis
<i>Allium stracheyi</i> , Baker.	Jambu	Lamiaceae	Whole plant	For stomach problem
<i>Allium wallichii</i> , Kunth.	Jangali Lasun	Lamiaceae	Root	In infection (anti-microbial)
<i>Aloe vera</i> , Linn.	Patquar	Liliaceae	Leaf	Stomach problem
<i>Althaea officinalis</i> , Linn.	Jangali hauli	Malvaceae	Root	For termination of pregnancy
<i>Anagallis arvensis</i> , Linn.	Vish Khaparia	Primulaceae	Fruit/Leaf	As pain killer

<i>Anemona obtusiloba</i> Don.	Kakaria	Ranunculaceae	Leaf	In sinus
<i>Artemisia parviflora</i> , Roxb.	Patti & Dhopani	Asteraceae	Leaf/ Bud	For round worm
<i>Asparagus racemosus</i> , willd.	Kairuwa	Liliaceae	Bud	In liver problem & enhance lactation
<i>Atropa belladonna</i> , Linn.	Dhatur Jahar	Solanaceae	Leaf	In injury as pain killer
<i>Berberis aristata</i> , DC	Kilmori	Berberidaceae	Root & stem	In fever & weakness
<i>Bergenia ciliata</i> , Moench.	Silfhora	Saxifragaceae	Root	For hydrophobia
<i>Betula utilis</i> .Don.	Bhuj & Bhojpatra	Betulaceae	Seed	To protect from worm
<i>Boerhaavia diffusa</i> , Linn.	Parnata	Nyctaginaceae	Leaf	In blood dysentery & dropsy
<i>Butea frondosa</i> , Koen.	Dhank	Fabaceae	Flower & Seed	As painkiller
<i>Calendula officinalis</i> , Linn.	Ganda (Tokar)	Asteraceae	Leaf	In bleeding
<i>Calotropis procera</i> , R. Br.	Ank	Apocynaceae	Root	In indigestion
<i>Capsicum annum</i> , Linn.	Khusane & Marac	Solanaceae	Fruit	As oil massage
<i>Cassoa absus</i> , Linn.	Banar&Chakwar	fabaceae	Seed	In urine problem
<i>Centella asiatica</i> , (Linn.)Urban	Brahmi	Apiaceae	Leaf	For brain fever
<i>Chenopodium album</i> , Linn.	Bethuwa	Amaranthaceae	Leaf/ seed	For anti-helminthic activity
<i>Cuminum cyminum</i> , L.	Jeera	Apiaceae	Seed	For indigestion
<i>Cureuma angustifolia</i> , Roxb.	Banhaldi	Zingiberaceae	Root	In gastric problem & anti-worm
<i>Datura metal</i> , Linn.	Dhatura	Solanaceae	Seed	As pain killer (for external use only)
<i>Datura stramonium</i> Linn.	Dhatura	Solanaceae	Leaf	In injury as pain killer
<i>Delphinium denudatum</i> , Wall	Nirwishi & Munel	Ranunculaceae	Seed	Anti-helminthic activity
<i>Digitalis purpurea</i> Linn.	Prawasitpushpi	Plantaginaceae	Leaf	In burning
<i>Foeniculum vulgare</i> Mill.	Saup	Apiaceae	Seed	For hookworm (anti-helminthic activity)
<i>Fragaria vesca</i> , Linn.	Pudalia Kafal	Rosaceae	Leaf	To protect abortion
<i>Fumaria parviflora</i> Lamk.	Pitpapara	Papaveraceae	Whole plant	In skin etching(disease)
<i>Gentiana tenella</i> , (Roltb) H. Smith.	Kutuki & Katuwi	Gentianaceae	Fruit	In hysteria and weakness
<i>Geranium ocellatum</i> , Camb.	Bhiljari	Geraniaceae	Whole plant	As insecticide
<i>Hedychiumspicatum</i> Ham.ex. Smith	Kapur Kachari	Zingiberaceae	Root	For fever & cough
<i>Holarrhena antidysenterica</i> , Wall.	Quiar & Indraw	Apocynaceae	Seed & bark	In fever, gastric & dysentery
<i>Hyoscyamus niger</i> , Linn.	Bran juwan	Solanaceae	Leaf & Seed	As pain killer
<i>Juniperus communis</i> , Linn.	Jhora & khichiya	Cupressaceae	Fruit	In liver disease
<i>Linum umbrosa</i> Ness.	Circira	Linaceae	Leaf	In bone injury
<i>Linum usitatissimum</i> Linn.	Alsi	Linaceae	Whole plant	For strength
<i>Litsaea polyantha</i> Juss.	Cirira	Lauraceae	Leaf	In injury
<i>Lobelia pyramidalis</i> Wall.	Bran tambacoo	Campanulaceae	Whole plant	For liver disease
<i>Ocimum sanctum</i> Linn.	Tulsi	Lamiaceae	Whole plant	In fever
<i>Origanum vulgare</i> Linn.	Jangali tulsi	Lamiaceae	Whole plant	Indigestion
<i>Psyllium orata</i> , Forsk.	Esabgol	Plantaginaceae	Seed	In dysentery
<i>Paeonia emodi</i> , Wall.	Bhoi Pawin	Paeoniaceae	Root	In stomach problem
<i>Pimpinella diversifolia</i> De	Dhanjari	Apiaceae	Seed	For lactation
<i>Piper longum</i> , L.	Pipal	Piperaceae	fruit	In low appetite & oil massage
<i>Primula denticulate</i> Smith.	Vish Khaparia	Primulaceae	Fruit	In cough & useful for mammary glands
<i>Punica granatum</i> , Linn.	Darim	Lythraceae	Skull of fruit	As antimicrobials
<i>Quercus dilatata</i> Lindl.	Banj	Fagaceae	Bark	In dysentery
<i>Reinwardtia lasiocarpus</i> , Sm.	Kala Hisalu	Acanthaceae	Leaf	In pregnancy
<i>Reinwardtia trigyna</i> , Planch.	Pyuli	Linaceae	Root	In wound
<i>Rhamnus virgata</i> , Roxb.	Chaitula	Rhamnaceae	Fruit	In leg swelling
<i>Thymus serpyllum</i> , Linn.	Van ajmain	Lamiaceae	Whole plant	In chest pain

<i>Trifolium repens</i> , Linn.	Garila	Fabaceae	Whole plant	For Satrika
<i>Urtica dioica</i> , Linn.	Sisauna	Urticaceae	Leaf	Skin disease & lactation
<i>Valeriana hardwichi</i> , wall.	Samyo & Dhup	Valerianaceae	Root	For titaini
<i>Verbascum thapsus</i> , Linn.	Akalvir	Scrophulariaceae	Leaf	In bronchitis
<i>Viola biflora</i> , Linn.	Banpansa	Violaceae	Whole plant	In calf for heart & faint problem
<i>Zingiber officinals</i>	Banhaldi	Zingiberaceae	Root	Internal injury & antiworm (anti-helminthic activity)

PLANTS SHOWING ANTIMICROBIAL AND ANTI-HELMINTHIC PROPERTIES

Infections by microbes (viruses, bacteria, and fungi) and parasites can cause serious diseases in both humans and animals. Heavy use of antimicrobials has created selective pressure and caused resistance to currently available antibiotics, hence the need for finding new and better antibiotics.

Natural products, especially from plants, are known for their medicinal properties, including antimicrobial and anthelmintic activities. Geoclimatic variation, together with diversity in ethnomedicinal traditions, has made the Himalayas of Nepal an invaluable repository of traditional medicinal plants [23].

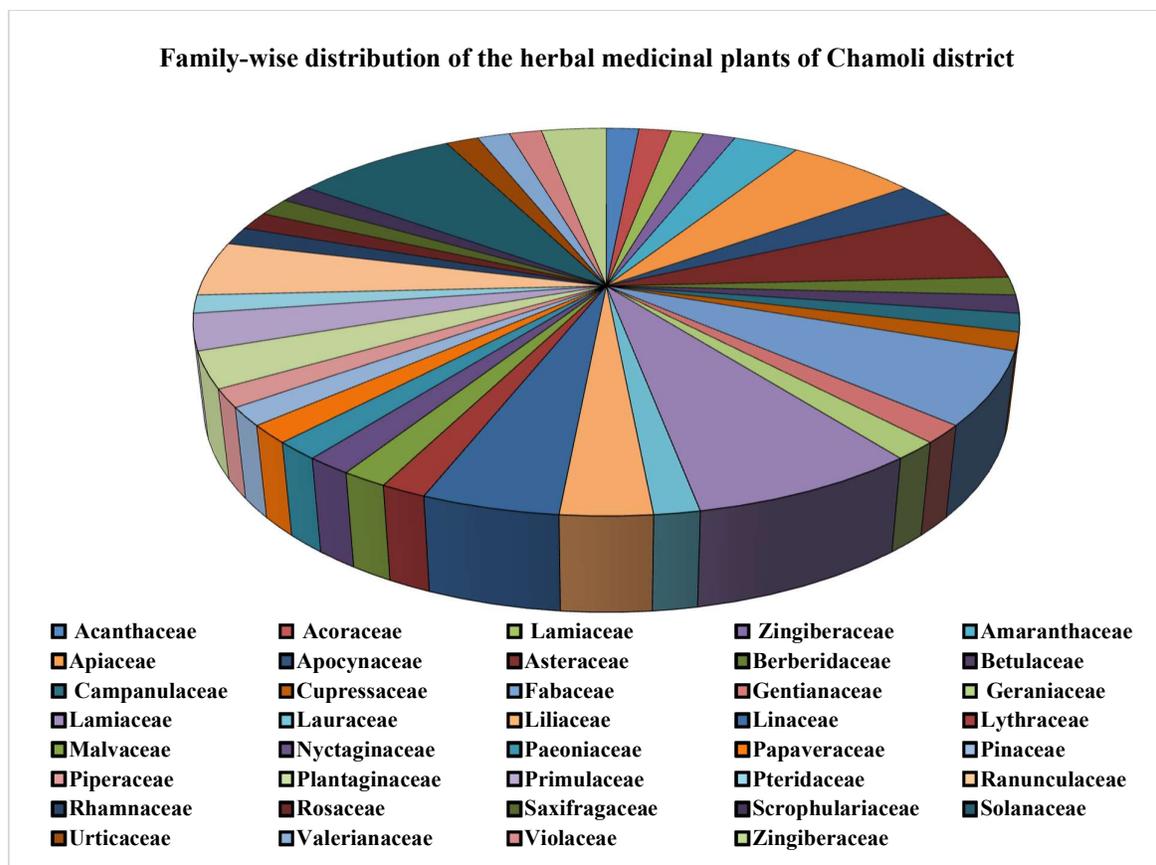


Figure 2: Family-wise distribution of the herbal medicinal plants of Chamoli district
 Mong plants recorded at Uttarakhand state, antimicrobial activity against respiratory
K. rotunda possess significant tract pathogens [24]. In the similar study,

Antibacterial activity of *T. arjuna* leaf extract showed antibacterial activity followed in petroleum ether (PET), acetone (ACE) and H₂O (water) extract. The maximum inhibition was found against *S. pneumoniae* (17.3±0.57 mm) followed by *H. influenzae* (16.6±0.57mm), *P. aeruginosa* (14.6±0.76mm) and *S. pyogenes* (13.6±0.28 mm), *S. aureus* (12.6±0.28 mm) respectively while *O. europaea* extracts showed broad spectrum activity against selected pathogens.

Helminthic infections are among the most common infections in human beings, affecting a large proportion of the world's population. In developing countries they pose a large threat to public health and contribute to the prevalence of anemia, malnutrition, eosinophilia and pneumonia. The diseases originated from parasitic infections causing severe morbidity include lymphatic filariasis, onchocerciasis and schistosomiasis. There are many plant derived preparations reported for treating helminth derived infections [25]. We have not found at study related to anti-helminthic activity of plants in Chamoli district.

CONCLUSION

Chamoli in the state of Uttarakhand has an abundance of plants used in medicine. In India, the majority of the population relies mostly on medicinal plants as their primary source of health care resources. Their principal method for curing ailments is

based on careful observation of nature as well as their comprehension of the practices and information associated with traditional medicine. The indigenous inhabitants of this region, particularly tribal people and women, make heavy use of these traditionally available medicinal plants for health reasons. They think that these medicinal plants are readily available, cost less money, and have no negative side effects in comparison to modern medication. The development activities, population boom, impact of tourism, and deforestation, amongst other factors, are contributing to the gradual extinction of the plants that were used for medicinal purposes in the primary health traditions. The state has a significant untapped potential for the cultivation of medicinal plants, which has the potential to become one of the most essential and viable solutions for maintaining a sustainable life in hilly areas. The future research perspectives include the exploration of the regions with vegetation and conservation of herbal medicinal plants. Despite, of the studies conducted on various aspects of the biodiversity in Chamoli district; there exist still unexplored regions on the traditional knowledge for the Valley of flower. In the recent past, the herbal medicinal plants knowledge on the biodiversity of plants are unavailable at valley of flower. Besides being lack of studies on herbal medicinal

plant, several studies on density and diversity of bryophytes, lichens from valley of flowers had been reported. Biomass production and nutrient recycling studies are lacking, there is no meteorological station in the park, and there are no long-term studies on the patterns of vegetation distribution or environmental impact. The valley of flower harbours many rare and endangered plants, many of which have medicinal properties, and studies on autecology of the valuable natural resources should be undertaken.

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