

*Research Article*

## ETHNOMEDICINAL SURVEY OF PLANTS IN PROTECTED AREAS OF KASHMIR HIMALAYA: A CASE STUDY OF THE HIRPORA WILDLIFE SANCTUARY

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**ABSTRACT:** In remote Himalayan regions, ethnic communities living near protected areas are dependent on medicinal plants for their healthcare. Although several studies related to ethnomedicine are available from Kashmir Himalaya, however studies focusing on protected areas in this region are largely overlooked. In this study, we aimed to document the ethnomedicinal plant species of the Hirpora Wildlife Sanctuary in Kashmir Himalaya. We conducted systematic field surveys in the study area to collect primary data from 60 participants through face-to-face interviews using a semi-structured questionnaire approach. We recorded 56 medicinal plant species used against different human diseases. The most frequent plant species were used for the treatment of gastro-intestinal disorders. Asteraceae followed by Lamiaceae and Polygonaceae were the most dominant families. The most commonly used plant parts were the leaves, and the main method of preparation was decoction. The present study provides an empirical documentation of valuable ethnic knowledge of medicinal plant species and their respective uses to treat various diseases that will be useful to the pharmaceutical industries for various drug formulations through bioprospection.

**Keywords:** Medicinal plants, Protected area, Ethnomedicinal, Hirpora, Himalaya.

### INTRODUCTION

Globally, unique co-existential relationships exist between the biodiversity and its utilization practices by the indigenous tribal communities [1]. It is all about the multiple ways the indigenous people, belonging to different socio-cultural systems, are using biodiversity and the associated ecosystem goods and services [2]. The indigenous people are facing problems in their day-to-day lives and they overcome these with their local solutions by employing practical experiences and skills leading to the development of these traditional knowledge systems [3]. Till now a considerable number of rural people in India are still using herbal medicines for the treatment of various ailments [4, 5]. Local traditional healing systems are well adopted by the

tribal communities for their primary health care [6]. This traditional knowledge of indigenous medicines has led to the discovery of novel products from plants as therapeutic agents [7]. Plant products have acted as new and important leads in the drug discovery process [8]. Traditional knowledge of plants is usually passed from one generation to another through word of mouth [9]. In recent times, the interest in ethnomedicine has increased manifold due to the prevalence of drug reactions, drug resistance, and the financial load of the modern systems of medicine [10].

Plant diversity provides food, fuel, and a wide range of traditional medicines and a variety of other products to ethnic communities, particularly those residing in developing countries [11, 12]. Since times

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immemorial people living in the Himalayan region have accumulated knowledge about the medicinal uses of plants growing in their close vicinity. They have been using these plants and their products for the treatment of various ailments. Since the traditional medicinal knowledge and its transfer from one generation to the future is now dwindling [13], it becomes important to scientifically document this precious knowledge, and to conserve it for future generations. Such studies contribute to conservation practices, facilitate future research on non-conventional medicinal plants and also authenticate safety and the efficacy of traditional medicinal systems [14].

The Kashmir Himalaya, one of the biotic provinces of the Himalaya, harbors a rich floristic diversity including a rich repository of medicinal plants as well as the traditional knowledge associated with these plants [15, 16]. Several works have been done to explore the medicinal wealth of the Kashmir Himalaya [17, 18, 19]. Hirpora Wildlife Sanctuary, falling in the lap of the Pir Panjal Range of Kashmir Himalaya, has remained ethnobotanically less explored. It is a rich repository of floristic elements and an important source of traditional knowledge as the sanctuary is seasonally inhabited by a reasonable population of nomadic pastoral communities such as Gujjars and Bakerwalas. These nomadic pastoralists over-winter in the sub-tropical warmer Jammu plains and with the onset of summer migrate along with their livestock to the lush green alpine pastures of the sanctuary. During their stay for 4-6 months in the sanctuary, they depend on its natural resources, including plant species for medicinal uses.

## MATERIALS AND METHODS

### Study area

Hirpora Wildlife Sanctuary falls under the administrative jurisdiction of Shopian Forest Division, Jammu and Kashmir, India. It was established in the year 1987 to give protection to the flagship wildlife species Markhor (*Capra falconeri*). Nestled in the Pir Panjal Mountain Range in North-Western Himalaya, the sanctuary is located between latitude 33°29' to 33°41' N and longitude 74°30' and 74°43' E. It is spread over an area of nearly 341 km<sup>2</sup> and represents a wide elevational gradient ranging from 2000 - 4700 m a.s.l [20]. The sanctuary is bounded to the north by Lake Gumsar, northeast by Hirpora village, east by Rupri, south by Lake Sanasar, and to the west by Pir Panjal Pass. The vegetation types in the sanctuary include Himalayan Wet Temperate, Moist Temperate, Alpine Scrub, and Grasslands (Fig. 1).

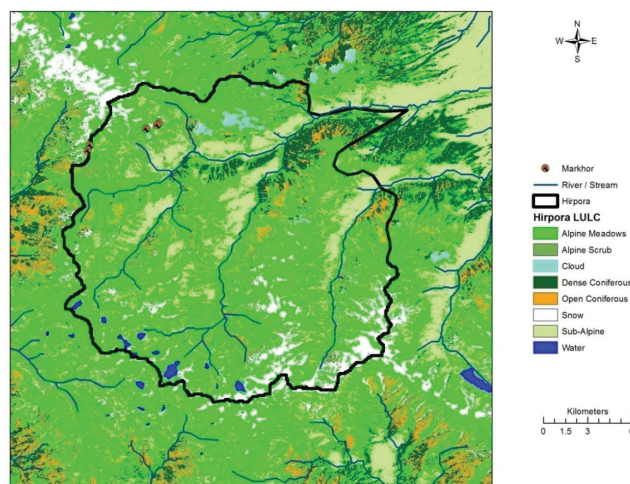


Fig. 1. Location map of the study area of Hirpora Wildlife Sanctuary.

## Methodology

### Survey of medicinal plants and data collection

An extensive ethnobotanical survey was carried out in the study area to collect information on medicinal plants from nomadic *Gujjars*, *Bakarwalas*, and herders from the surrounding villages who reside during the summer months along with their livestock in the sanctuary. The information was also gathered from the people from the villages which are in close vicinity to this sanctuary. Well-planned and structured interviews were conducted to get information from the target people. Locally experienced people known as *Hakims* were frequently approached for information regarding plants used as herbal medicines. Group discussions on the traditional uses of plant species were arranged with the elderly and experienced people after knowing their interests in the identification and utilization of plant species as medicines. Besides this, the common people from *Gujjars* and *Bakarwalas* who themselves have used these plants for treating different ailments were interviewed to know the curative potential of these plants.

For the present study, respondents were selected randomly to collect the required information. A total of 60 informants were selected from these households who had traditional knowledge of the medicinal uses of different plants and had a tradition of practicing these herbs in their families. The information given by those people was cross-checked at several levels for its validation and accuracy. All the information regarding the usable part(s), methods of use, mode of preparation of medicines, and the dosages of each medicinal plant species were recorded in detail. The specimens were collected from the study area and were processed at the

laboratory of the Center for Biodiversity and Taxonomy (CBT), University of Kashmir following standard herbarium techniques and identified with the help of relevant literature [21, 22]. The properly processed plant specimens have been deposited in the University of Kashmir Herbarium (KASH).

## RESULTS AND DISCUSSION

During the present study, 56 plant species have been reported to be used as ethnomedicine, which belong to 54 genera distributed under 34 families. Of these 34 families, 33 families are angiosperm and only one family belongs to gymnosperm. The majority of the plants utilized by these tribal communities belong to the family Asteraceae (7 species) followed by Lamiaceae and Polygonaceae (4 species each) (Table 1).

These plant species are being used to cure different diseases such as asthma, alopecia, muscular pain, soreness, wounds, skin diseases, fever, dysentery, toothache, headache, stomachache, menstrual cycle disorders, skin, allergies, and diarrhea. Out of the studied 56 species, 22 species are used for stomach, liver, and intestinal problems, 19 species for muscular and joint pain, 12 species for respiratory problems, 10 species for female-related disorders, 7 species for sores, wounds and blisters, 6 species for allergies and fever, 5 species for alopecia, 4 species for aphrodisiac and general tonic, 4 species for piles, 3 species for kidney and urinary disorders, 3 species for heart and blood pressure, 2 species for anemia, 2 species for hallucination and 2 species for eye disorders (Fig. 2).

Different plant parts, such as leaves, inflorescences, flowers, seeds, stem bark, rhizomes, roots, stem, aerial plant, or whole plant, etc. are used. Roots and leaves are used extensively followed by stem bark, stem, flowers, seeds, and rhizomes. The above observation revealed that the majority of Gujjars and Bakarwalas depend on natural plants for their daily medicinal uses. The present study reveals that these people possess valuable information on the medicinal uses of plants in the sanctuary. Documentation of medicinal heritage in the present changing cultural scenario is very important, otherwise, all this information will be lost forever. Documentation of valuable information regarding traditional medicines and their respective uses to treat various ailments will be useful to the pharmaceutical industries for various drug formulations through bioprospection.

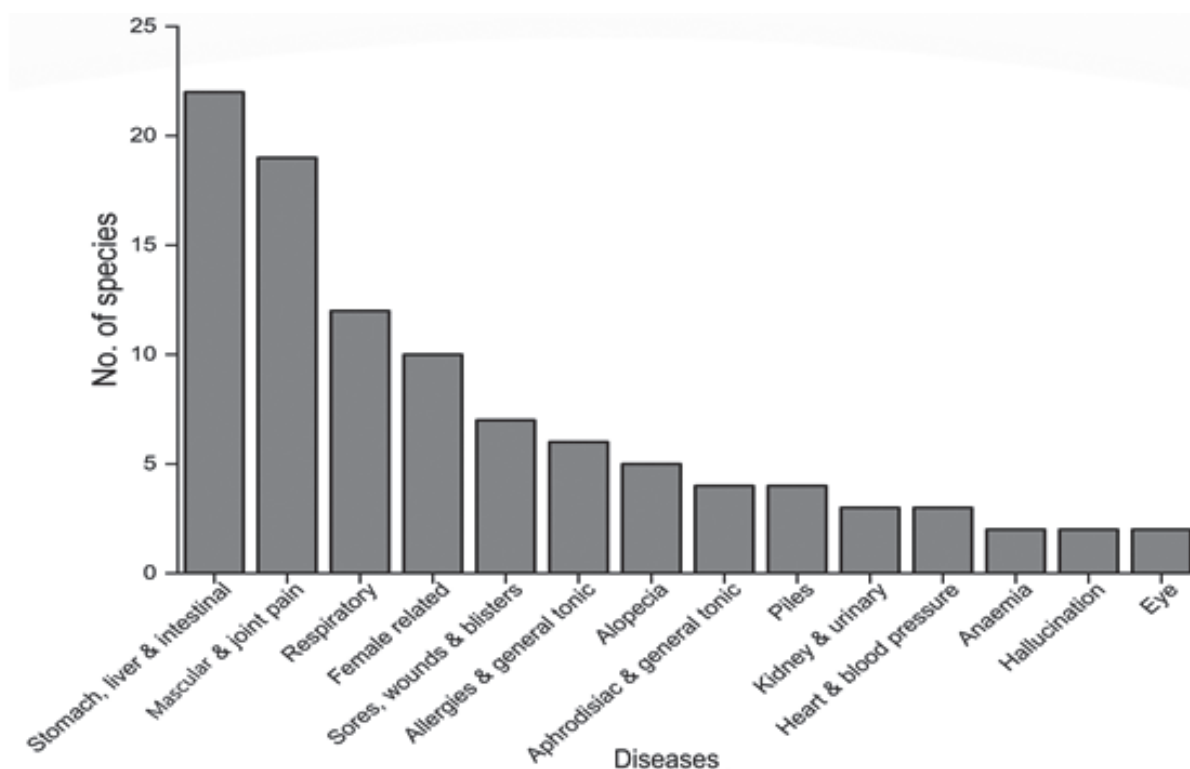


Fig. 2. Number of species used for curing various diseases.

**Table 1. Ethnomedicinal uses of some plants known from Hirpora Wildlife Sanctuary, Kashmir Himalaya.**

Plant species [Family] and specimen number	Local name (s)	Altitude (m a.s.l)	Ethnomedicinal uses	Previous reports of use
<i>Sambucus wightiana</i> Wall. ex Wight & Arn. [Adoxaceae] Suliman 176, KASH	Fakil, Vish	2000–3200	Leaves and fruits possess pungent smell and decoction of leaves and fruits used to cure stomach disorders.	Expel poisonous substances from stomach, poliomyelitis, diuretic [23]
<i>Viburnum grandiflorum</i> Wall. ex DC. [Viburnaceae] Suliman 130, KASH	Surnaiwool, Kulmanch	2000–2900	Mature fruits eaten to treat the anaemic condition; fruit juice used to cure cough.	Cough, cold, fever [24]
<i>Allium victorialis</i> L. [Amaryllidaceae] Suliman 243, KASH	Van Ganda	2500–3000	Root powder used by female-folk to treat the irregular menstrual flow.	Abdominal problems, swellings, asthma, respiratory problems and dysentery [25]
<i>Angelica glauca</i> Edgew. [Apiaceae] Suliman 295, KASH	Fakagassa	2100–3000	Seeds boiled in water and its decoction taken to cure stomach disorders; fleshy aromatic roots used as purgative.	Burn, bone strength [24]
<i>Heracleum candicans</i> Wall. ex DC. [Apiaceae] Suliman 289, KASH	Tachalmool	2000–4000	Rhizome powder used as an aphrodisiac; also used to treat cysts and piles.	Rejoining of wrong joint, enhancing sexual desire of animals, thermogenic [24], cough and throat infections, reducing high blood pressure [26]
<i>Arisaema jacquemontii</i> Blume [Araceae] Suliman 26, KASH	Sarfamakai, Hapatmakai	2400–3300	Flowers decoction used to treat appendicitis; dried leaves used to treat respiratory problems.	Sexual tonic, boils [26], leprosy [27]
<i>Aralia cachemirica</i> Decne. [Araliaceae] Suliman 25, KASH	Chuhur	2400–3300	Decoction of leaves used to cure baldness (alopecia).	Heel wound, stop bleeding, treat gastritis, stomach disorder [28]
<i>Polygonatum oppositifolium</i> (Wall) Royle [Asparagaceae] Suliman 236, KASH	Doodedaani	2500–3500	Dried powder of roots used to cure fever and allergic reactions; also used to enhance capacity of lactating mothers to feed their babies.	Post-partum infection, excessive bleeding [29]
<i>Polygonatum verticillatum</i> (L.) All. [Asparagaceae] Suliman 238, KASH	Doodedaani	2000–3300	Rhizomes powder used by people to treat impotency.	Galactagogue, dysentery, tongue infection [29]
<i>Berberis jaeschkeana</i> C. K. Schneid. [Berberidaceae] Suliman 175, KASH	Kaw Dacha	3000–3500	Root extract taken orally to cure urine infection and kidney stones, and to regulate blood pressure and blood sugar level; root paste used to cure eye sores and to cure piles; leaves used to treat jaundice.	Jaundice, wound, maggots in wounds, fractures [29]
<i>Podophyllum hexandrum</i> Royle [Berberidaceae] Suliman 149, KASH	Vanwangun	2400–3700	Pericarp of mature red fruit used to treat constipation, insect bites and wounds.	Body tonic, vermifuge, Snake bite [23], vermifuge, cough [24]
<i>Myosotis sylvatica</i> Hoffm. [Boraginaceae] Suliman 135, KASH	Sabzposh	2000–3600	Decoction of flowers used to treat stomach acidity.	Superficial red color skin lesion [30]

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Plant species [Family] and specimen number	Local name (s)	Altitude (m a.s.l)	Ethnomedicinal uses	Previous reports of use
<i>Dipsacus inermis</i> Wall. [Caprifoliaceae] Suliman 48, KASH	Wopalhaak	2000– 3500	Dried stems boiled in water for half an hour and then whole body washed with warm water for women after 40 days of delivery, as it helps in contraction of muscles.	Cough, indigestion [24]
<i>Valeriana jatamansi</i> Jones [Caprifoliaceae] Suliman 301, KASH	Sadre Maal	2000– 3300	Dried leaves taken along with tea to treat joint pain; dried stems grounded to powder to cure baldness (alopecia); decoction of flower used for the onset of menstruation in females.	Muscular pain, dryness, reddening of eyes [29], To get liquid, fresh leaves are squeezed [27]
<i>Achillea millefolium</i> L. [Asteraceae] Suliman 109, KASH	Chukgasse, Pahelgasse	2000– 3500	The aerial plant chewed to relieve toothache; and its paste used to treat bruises and also used as a stimulant.	Inflated gums, toothache, burns, bruises [23], Toothache, cough, fever, cold [24]
<i>Artemisia gmelinii</i> Weber ex Stechm. [Asteraceae] Suliman 94, KASH	Tethwan	2500– 4000	Dried leaves used to relieve stomach pain and to cure intestinal infections; plant extract applied to the ring worm and scabies affected portion of the body.	Appetizer, abdominal worms, anthelmintic, liver infection [29]
<i>Cirsium falconeri</i> (Hook.f.) Petr. [Asteraceae] Suliman 101, KASH	Chari Kund	2400– 4000	Flowers mixed with white albuminous part of egg used to treat blisters.	Leaf extract used against stomach complaints [31], gastric troubles [32], jaundice, paralysis [33]
<i>Ligularia jacquemontiana</i> (Decne.) M. A. Rau [Asteraceae] Suliman 98, KASH	Khalar	2400– 3000	Paste of rhizome used to cure boils and wounds.	Nerve tonic, rheumatic pain, joint pain, boils [34]
<i>Saussurea simpsoniana</i> (Fielding & Gardner) Lipsch. [Asteraceae] Suliman 85, KASH	Jogeebadsha, Jogeephool	4300– 4700	Whole plant used to treat muscle pain, back pain and to cure baldness (alopecia).	Skin diseases [35]
<i>Taraxacum officinale</i> Weber [Asteraceae] Suliman107, KASH	Hand	2000– 4000	Dried leaves given to women to contract belly muscles after delivery; decoction of leaves used to prevent anemia.	Post-partum hemorrhage [23], bone and joints, jaundice, back pain, fever [24]
<i>Tussilago farfara</i> L. [Asteraceae] Suliman 76, KASH	Mukhtemalb-ooti	2000– 3000	Tea prepared with the leaves taken to treat respiratory disorders; leaves used to treat gout and rheumatism.	Cough, bronchitis, asthma, lung disease, muscle-skeletal disease, rachitis, tuberculosis [36, 37, 38]
<i>Cuscuta europaea</i> L. [Convolvulaceae] Suliman 281, KASH	Kukilipot	2000– 3000	Whole plant paste used as anti-dandruff and to cure baldness (alopecia); decoction given to relieve chest pain.	Insect sting and piles [39]
<i>Dioscorea deltoidea</i> Wall. ex Griseb. [Dioscoreaceae] Suliman 49, KASH	Bale	2000– 3000	Tubers used for antifertility; root juice used to cure worm infections of intestines.	Gastritis, arthritis [24]
<i>Euphorbia wallichi</i> Hook. F [Euphorbiaceae] Suliman 54, KASH	Gur Tsochal	2500– 3500	Decoction of shoot used as expectorant and diuretic; latex from green stems applied to treat fungal infection.	Fungal infection, foot and mouth disease [29], warts, skin diseases [27]

Plant species [Family] and specimen number	Local name (s)	Altitude (m a.s.l)	Ethnomedicinal uses	Previous reports of use
<i>Geranium wallichianum</i> D.Don ex Sweet [Geraniaceae] Suliman 55, KASH	Kawaashud	2000–3300	Shoot paste used to relieve tooth pain; also applied externally to eyes to make sharp eyesight; decoction of plant taken to relieve constipation	Fever, muscular pain, general weakness [23], blood pressure, gastrointestinal problems [24]
<i>Isodon rugosus</i> (Wall. ex Benth.) Codd [Lamiaceae] Suliman 198, KASH	Solai	2400–3000	Whole plant boiled in water and the water used for washing of eyes.	Induce appetite, stomach disease [24]
<i>Nepeta cataria</i> L. [Lamiaceae] Suliman 200, KASH	Brarigasse	2000–3000	Raw leaves chewed to relieve tooth pain; decoction used to treat dysentery; used as herbal tea to treat cough, cold, abdominal pain and stomach disorders.	Fever, worms, diarrhea, vomiting [23], Joint pain [24]
<i>Prunella vulgaris</i> L. [Lamiaceae] Suliman 120, KASH	Kalveoth	2000–3300	The tea prepared from plant used to treat stomach, liver and heart disorders; shoot of the plant is boiled in water and then decoction used to wash to relieve general body pain.	Muscle pain, wounds, tonic [23], wounds, body and joint pain [24]
<i>Thymus linearis</i> Benth. [Lamiaceae] Suliman 124, KASH	Van Jawin	2000–4000	Decoction of the plant given to treat stomach and liver disorders, and also to cure the irregular menstrual cycle.	Vermifuge, loss of appetite [24]
<i>Gagea lutea</i> (L.) Ker Gawl. [Liliaceae] Suliman 237, KASH	Zarad Posh	2000–2800	Flower extract used to cure liver and stomach problems; bulb paste used to get rid of dandruff and lice.	Indigestion [24]
<i>Lilium polyphyllum</i> D. Don [Liliaceae] Suliman 238, KASH	Hapatgande	2500–3400	Decoction of bulb used to treat backache; roasted bulbs used as a tonic.	Tonic and aphrodisiac [40], abdominal bloating [41]
<i>Lavatera cachemiriana</i> Cambess. [Malvaceae] Suliman 244, KASH	Janglisazposh	2000–3300	Flower extract used against mumps in children; paste of seeds used as antiseptic.	Laxative, abdominal disorders and renal colic, flowers for common cold and mumps [42] and seeds as antiseptic laxative, antiseptic, antiviral, anticold, anti-dandruff, urinary disorders, anti-lipoxygenase [43]
<i>Malva neglecta</i> Wallr. [Malvaceae] Suliman 245, KASH	Tsochal	2000–3500	Shoot used as a general tonic, laxative and expectorant.	Constipation, retention of placenta, general tonic, galactagogue, weakness, fever, indigestion, diarrhea [29]
<i>Trillium govianum</i> Wall. ex D. Don [Melanthiaceae] Suliman 233, KASH	Soper Posh, Tri Patre	2400–3000	Flower decoction used for bone fracture; rhizome paste used for skin treatment.	Worms [29], leg pain [27]
<i>Oxalis acetosella</i> L. [Oxalidaceae] Suliman 194, KASH	Chukchani	2100–3000	Decoction of above ground portion given to relieve fever; also used to treat stomach, chest and urinary disorders.	Stomach, chest disorders [29]
<i>Phytolacca acinosa</i> Roxb. [Phytolaccaceae] Suliman 153, KASH	Kawfal	2000–3000	Fruits used to induce hallucination.	Blood purifier, cough, stomach disorder, sedative, arthritis, wounds, diarrhea, dysentery, stomach cramps, joint pain [34], cough, arthritis, induce sleep [24]

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Plant species [Family] and specimen number	Local name (s)	Altitude (m a.s.l)	Ethnomedicinal uses	Previous reports of use
<i>Lagotis cashmeriana</i> Rupr. [Plantaginaceae] Suliman 23, KASH	Wangan Rang	3300– 4500	Decoction of whole plant antipyretic and analgesic properties.	Dyspepsia [27]
<i>Polemonium caeruleum</i> L. [Polemoniaceae] Suliman 339, KASH	Surya Bala, Sabz Posh	2300– 3200	Flower juice taken orally to treat acidity and toothache.	Stomach disorder [44]
<i>Persicaria alpina</i> (All.) H.Gross [Polygonaceae] Suliman154, KASH	Tsokemuth	2000– 3000	Shoot extract used as energy-boosting vegetable; root extract used to prevent excessive bleeding during menstruation.	Stomach problems [45]
<i>Persicaria amplexicaulis</i> (D.Don) RonseDecr. [Polygonaceae] Suliman 156, KASH	Musloon	2100– 3500	Root extract used to prepare tea; and its paste applied on head to relieve headache.	General weakness, diarrhea, dysentery, hoptysis, stomach problem [46]
<i>Rheum webbianum</i> Royle [Polygonaceae] Suliman 163, KASH	Pam Tsari	3000– 4200	Rhizome used for the treatment of wounds; dried leaves used to control blood pressure.	Rheumatism [27]
<i>Rumex nepalensis</i> Spreng. [Polygonaceae] Suliman162, KASH	Jangleebij	2000– 3800	Leaf paste applied for boils; roots used for respiratory problems and purgative.	Boils, constipation [33]
<i>Primula denticulata</i> Sm. [Primulaceae] Suliman 164, KASH	Tajalmulk	2000– 3200	Dried flowers used to treat heart ailments.	Urinary infection [27]
<i>Caltha palustris</i> var. <i>alba</i> (Cambess .) Hook.f. & Thomson [Ranunculaceae] Suliman 361, KASH	Yur Posh	2400– 3800	Dried flowers orally taken to conceive and maintain pregnancy.	Mouthwash, digestive [45]
<i>Thalictrum alpinum</i> L. [Ranunculaceae] Suliman 256, KASH	Surmaboti	2500– 3500	Black powder from dried leaves used as eyeliner ( <i>Surma</i> ); decoction of the whole plant used to cure neck strain.	Eye problems and abdominal pain [34]
<i>Ranunculus hirtellus</i> Royle [Ranunculaceae] Suliman 257, KASH	Veuru	3000– 4500	A decoction of the whole plant is used to treat the abdominal disorders like diarrhoea and constipation.	Cooling effects, anthelmintic [34]
<i>Fragaria nubicola</i> (lindl. ex Hook. f.) Lacaíta [Rosaceae] Suliman 14, KASH	Yangraich	2000– 3500	Roots used to prepare tea which alleviates from joint pain; fruits used to cure dyspepsia.	Brain tonic, diabetes [24]
<i>Galium aparine</i> L. [Rubiaceae] Suliman 335, KASH	Kredezal	2000– 3000	Shoot extract used to cure joint pain and back pain	Burning sensation of urine, sedative, regulates urine discharge, allergy, antiscorbutic, diuretic [34]
<i>Rubus ellipticus</i> Sm. [Rubiaceae] Suliman10, KASH	Raize	2000– 2400	Fruit paste used to relieve pain in the neck.	Aperients, tonic, oral ulcers, dysentery, astringent [34]
<i>Skimmia anquetilia</i> N.P.Taylor & Airy Shaw [Rutaceae] Suliman 184, KASH	Wangon Tar, Ganpatre, Patla	2300– 3500	Leaf extract used to cure fever; fermented leaves used to cure acute headache.	Rodenticide, repellent for snakes, vermifuge [24]

Plant species [Family] and specimen number	Local name (s)	Altitude (m a.s.l)	Ethnomedicinal uses	Previous reports of use
<i>Bergenia ciliata</i> (Haw.) Sternb. [Saxifragaceae] Suliman 30, KASH	Pashand Pan, Zakhmihayat	2500– 4000	Decoction of the rhizome used against piles and urinary infections, also given to relieve menstrual cycle pain.	Gastritis, wounds [24]
<i>Verbascum thapsus</i> L. [Scrophulariaceae] Suliman 24, KASH	Wan Tamoke	2000– 3500	Paste of dried leaves used to cure burns; extract of the shoot given to cure respiratory infections.	Burns, ear ailments, blood diseases, cuts, diuretic, infection, sores, wounds, abscess, asthma, burns, cold, constipation, diuretic, dysentery, infection, mental relaxation, pulmonary problems, styptic, inflammation, gynecological disorders [34]
<i>Atropa acuminata</i> Royle ex Lindl. [Solanaceae] Suliman178, KASH	Meit Brand	2000– 3000	Roots and leaves used to produce a hallucination; also used to cure convulsive disorders.	Cough, fever, throat pain [24]
<i>Taxus wallichiana</i> Zucc. [Taxaceae] Suliman 311, KASH	Postul	2100– 3200	Bark used as a medicine to treat gastrointestinal and respiratory disorders, also taken as tea.	Appetizer, muscle relaxant [24]
<i>Urtica dioica</i> L. [Urticaceae] Suliman 362, KASH	Soi	2000– 2700	Roots boiled in water and the decoction used to relieve muscle pain and also to treat skin allergies.	Joint pain, wound, stomach ache [23], rheumatoid and skin diseases [24]
<i>Viola odorata</i> Linn. [Violaceae] Suliman 300, KASH	Bunafsha	2300– 2500	Fermented flowers mixed with sugar and used to treat asthma and other respiratory disorders.	Throat infection [23], throat infection, constipation [24]

## CONCLUSION

The present study highlighted the important role of herbal medicines in the local health care system of nomadic *Gujjars*, *Bakarwalas*, herders, and locals residing in the vicinity of Hirpora Wildlife Sanctuary. This study also provides comprehensive information on local medicinal flora extensively used for the treatment of various diseases. Traditional medicines are preferred over allopathic medicines as they are inexpensive, normally self-administered, and have fewer side effects. The findings from this study provide a basis for the utilization of various medicinal species and future detailed pharmacological studies.

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## REFERENCES

1. Mahmood A, Mahmood A, Tabassum A. Ethnomedicinal survey of plants from district Sialkot, Pakistan. *J Appl Pharm Sci*. 2011; 2(3): 212-220.
2. Cox PA. Will tribal knowledge survive the millennium? *Science*. 2000; 287: 44-45.
3. Bhatia H, Sharma YP, Manhas RK, Kumar K. Traditional phyto-remedies for the treatment of menstrual disorders in district Udhampur, J&K, India. *J Ethnopharmacol*. 2015; 160: 202-210.
4. Choudhury A, Singh PA, Bajwa N, Dash S, Bisht P. Pharmacovigilance of herbal medicines: Concerns and future prospects. *J Ethnopharmacol*. 2023; 116383.
5. Tamang S, Singh A, Bussmann RW, Shukla V, Nautiyal MC. Ethno-medicinal plants of tribal people: A case study in Pakyong subdivision of East Sikkim, India. *Acta Ecol Sin*. 2023; 43(1): 34-46.



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6. Singh KN, Lal B. Ethnomedicines used against four common ailments by the tribal communities of Lahaul-Spiti in western Himalaya. *J Ethnopharmacol.* 2008; 115: 147-159.
7. Katewa SS, Choudhary BL, Jain A. Folk herbal medicines from the tribal area of Rajasthan, India. *J Ethnopharmacol.* 2004; 92: 41-46.
8. Balunas MJ, Kinghorn AD. Drug discovery from medicinal plants. *Life Sci.* 2005; 78(5): 431-441.
9. Bhatia H, Sharma YP, Manhas RK, Kumar K. Ethnomedicinal plants used by the villagers of district Udhampur, J&K, India. *J Ethnopharmacol.* 2014; 151(2): 1005-1018.
10. Dubey NK, Kumar R, Tripathi P. Global promotion of herbal medicine: India's opportunity. *Curr Sci.* 2004; 86(1): 37-41.
11. Warner K. Forestry and sustainable livelihoods. What part can forests and forestry play in reducing poverty? *Unasylva.* 2000; 202: 312.
12. Pandey R. Forest resources utilization by tribal community of Jaunsar, Uttarakhand. *Indian For.* 2009; 135: 655-662.
13. Bano A, Ahmad M, Zafar M, Sultana S, Rashid S, Khan MA. Ethnomedicinal knowledge of the most commonly used plants from Deosai Plateau, Western Himalayas, Gilgit Baltistan, Pakistan. *J Ethnopharmacol.* 2014; 155(2): 1046-1052.
14. Bunalema L, Obakiro S, Tabuti JRS, Waako P. Knowledge on plants used traditionally in the treatment of tuberculosis in Uganda. *J Ethnopharmacol.* 2014; 151: 999-1004.
15. Dar GH, Bhagat RC, Khan MA. Biodiversity of Kashmir Himalaya. Valley Book House, J&K, India; 2002.
16. Dar GH, Khuroo AA. Biodiversity of the Himalaya: Jammu and Kashmir State. Singapore: Springer; 2020.
17. Khan ZS, Khuroo AA, Dar GH. Ethnomedicinal survey of Uri, Kashmir Himalaya. *Indian J Tradit Knowl.* 2004; 3(4): 351.
18. Bhat TA, Nigam G, Majaz M. Study of some medicinal plants of the Shopian district, Kashmir (India) with emphasis on their traditional use by Gujjar and Bakerwal tribes. *Asian J Pharm Clin Res.* 2012; 5: 94-98.
19. Jeelani SM, Wani MP, Kumari S, Gupta RC, Siddique MA. Ethnobotany of some polypetalous plants from the Kashmir Himalaya. *J Med Plant Res.* 2013; 7(36): 2714-2721.
20. Ahmad F, ul Hassan Z, Farooq S, Shah JA. Assessment of land use/land cover change in Hirpora Wildlife Sanctuary, Kashmir. *Asian J Earth Sci.* 2015; 8(3): 64.
21. Hooker JD (1872-1897). The flora of British India, L. Reeve.
22. Stewart RR. An Annotated Catalogue of the Vascular Plants of West Pakistan and Kashmir. 1972; Fakhri Press, Karachi.
23. Jan M, Mir TA, Ganie AH, Khare RK. Ethnomedicinal use of some plant species by Gujjar and Bakerwal community in Gulmarg mountainous region of Kashmir Himalaya. *Ethnobot Res Appl.* 2021; 21: 1-23.
24. Islam T, Nawchoo IA, Magray JA, Khuroo AA. Sustaining traditional ethnomedicinal knowledge and protected areas in synergy: A case study of Overa-Aru Wildlife Sanctuary in Kashmir Himalaya. *Planta Med.* 2023.
25. Shahid F, Shahid R, Waseem T, Hussain S. Flora of Pakistan: An ethnopharmacological perspective. *J Shifa Tameer-e-Millat University.* 2020; 3(1): 42-48.
26. Rahman SU, Ullah Z, Ali A, Aziz MA, Alam N *et al.* Traditional knowledge of medicinal flora among tribal communities of Buner Pakistan. *Phytomed Plus.* 2022; 2(3): 100277.
27. Haq SM, Waheed M, Khoja AA, Amjad MS, Bussmann RW, Ali K. A cross-cultural study of high-altitude botanical resources among diverse ethnic groups in Kashmir Himalaya, India. *J Ethnobiol Ethnomedicine.* 2023; 19(1): 12.
28. Shrestha N, Shrestha S, Koju L, Shrestha KK, Wang Z. Medicinal plant diversity and traditional healing practices in eastern Nepal. *J Ethnopharmacol.* 2016; 192: 292-301.
29. Dutta A, Sharma YP, Bikarma BS, Bussmann RW. Plant-based veterinary practices in Jammu and Kashmir: A review of the trends, transfer and conservation of traditional ethnoveterinary knowledge. *Ethnobot Res Appl.* 2022; 24: 1-24.
30. Shah A, Bharati KA, Ahmad J, Sharma MP. New ethnomedicinal claims from Gujjar and Bakerwals tribes of Rajouri and Poonch districts of Jammu and Kashmir, India. *J Ethnopharmacol.* 2015; 166: 119-128.
31. Wagay NA. Ethnobotany from north Kashmir-a review. *Life Sci Leaflet.* 2016; 80: 38.
32. Uniyal SK, Singh KN, Jamwal P, Lal B. Traditional use of medicinal plants among the tribal communities of Chhota Bhangal, Western Himalaya. *J Ethnobiol Ethnomedicine.* 2006; 2: 1-8.
33. Arya A, Kumar S, Paul R, Suryavanshi A, Kain D, Sahoo RN. Ethnopharmacological survey of indigenous medicinal plants of Palampur, Himachal Pradesh in north-western Himalaya, India. *Adv Tradit Med.* 2021; 1-44.
34. Gairola S, Sharma J, Bedi YS. A cross-cultural analysis of Jammu, Kashmir and Ladakh (India) medicinal plant use. *J Ethnopharmacol.* 2014; 155(2): 925-986.

35. Bhat JA, Kumar M, Negi AK, Todaria NP. Informants' consensus on ethnomedicinal plants in Kedarnath Wildlife Sanctuary of Indian Himalayas. *J Med Plant Res.* 2013; 7(4): 148-154.
36. Dogan Y, Nedelcheva A, Luczaj L, Dragulescu C, Stefkov G *et al.* Of the importance of a leaf: the ethnobotany of sarma in Turkey and the Balkans. *J Ethnobiol Ethnomedicine.* 2015; 11(1): 1-15.
37. Kazanci C, Oruç S, Mosulishvili M. Medicinal ethnobotany of wild plants: a cross-cultural comparison around Georgia-Turkey border, the Western Lesser Caucasus. *J Ethnobiol Ethnomedicine.* 2020; 16: 1-20.
38. Chen S, Dong L, Quan H, Zhou X, Ma J *et al.* A review of the ethnobotanical value, phytochemistry, pharmacology, toxicity and quality control of *Tussilago farfara* L (colts foot). *J Ethnopharmacol.* 2021; 267: 113478.
39. Abdullah A, Andrabi SAH. An approach to the study of traditional medicinal plants used by locals of block Kralpora Kupwara Jammu and Kashmir India. *Inter J Bot Stud.* 2021; 6(5): 1433-1448.
40. Kumar P, Singh H, Ambrish K. Traditional knowledge of medicinal and threatened plants used by the local inhabitants dwelling in and around Sechu-tuan Nalla: a high altitude Wildlife Sanctuary in Himachal Pradesh, northwest Himalaya. *Perspect Biodivers India.* 2018; 329.
41. Khoja AA, Andrabi SAH, Mir RA, Bussmann RW. Ethnomedicine and culture: Exploitation of plant species for traditional use in the remote area of Kashmir Himalayas. *Ethnobot Res Appl.* 2022; 24: 1-22.
42. Islam M, Ahmad I, Akhtar N, Alam J, Razzaq A *et al.* Medicinal plants resources of Western Himalayan Palas Valley, Indus Kohistan, Pakistan: Their uses and degrees of risk of extinction. *Saudi J Biol Sci.* 2021; 28(5): 3076-3093.
43. Saggo MIS, Nawchoo IA, Akhter A. Meiotic irregularities in *Lavatera cachemiriana*, an endemic, endangered and ethnomedicinal herb of Kashmir Himalaya. *Cytologia.* 2017; 82(3): 235-239.
44. Gyawali S, Luintel S, Kunwar RM, Bussmann RW, Paniagua-Zambrana NY. *Thalictrum cultratum* Wall. *Thalictrum foetidum* L. *Thalictrum foliolosum* DC. Ranunculaceae. *Ethnobot Himalayas.* 2020; 1-11.
45. Awan MS, Dar ME, Hussain K, Sabir S, Iqbal T *et al.* Ethnomedicinal utilization and conservation status of highland flora from Western Himalayas of Azad Jammu and Kashmir, Pakistan. *Ethnobot Res Appl.* 2023; 26: 1-20.
46. Sharma J, Gairola S, Gaur RD, Painuli RM. The treatment of jaundice with medicinal plants in indigenous communities of the Sub-Himalayan region of Uttarakhand, India. *J Ethnopharmacol.* 2012; 143(1): 262-291.

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