



RESEARCH ARTICLE

Documentation of ethnomedicinal plants for the treatment of skin diseases from Pangli valley, Western Himalaya

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Abstract

The present study deals with the systematic documentation of medicinal plants utilized by the indigenous inhabitants of Pangli valley to treat various skin problems. A total of 61 plant species belonging to 56 genera and 30 families have been found to be useful in the treatment of wounds (30 sp.), boils (27 sp.), cuts (24 sp.), burns (17 sp.), itching and pimples (05 sp. each), skin eruption, leukoderma and eczema (03 sp. each), pus removal, injuries (02 sp. each), skin pigmentation (01 sp.), etc. Details including their botanical names, families, local names, habitat, altitude range, life form, nativity, threat status, uses, parts used and mode of preparation are given as supplementary information.

Keywords

Traditional knowledge, Ethnomedicine, Skin diseases, Pangli valley, Pangwal

Introduction

Pangli Valley is one of the most remote tribal territories in Himachal Pradesh, located in the north western part of Chamba district. Geographically, it is located between 32°48'42" to 33°12'31" N latitude and 76°13'58" to 76°47'01" E longitude, with altitude ranged between 2000 to 6500 m above mean sea level (amsl; average altitude 4200 m) covering an area of about 1600 sq km, concealed between the Pir Panjal and Zaskar mountains of the Western Himalaya (Fig. 1) (1). The valley is a cold semi-desert area in the Trans Himalayas with rugged terrain, harsh weather, little rainfall and considerable snowfall (2). It is drained by the Chandrabhaga (Chenab) river and is separated into 3 forest ranges viz., Sach, Killar and Purthi (3). Lying in the tehsil of Pangli, the valley has its headquarter in Killar, which is accessible by road from Chamba through Sach Pass, Udaipur and Dharwas. The only protected area in this region is Saichu Tuan Nala Wild Life Sanctuary, to protect and preserve the flora and fauna. Thus, it serves as one of the valley's wildlife refuges. The valley shows enormous floral diversity including rare, endemic, and endangered plant species. The prominent tree species in the valley are *Abies*, *Acer*, *Betula*, *Cedrus*, *Juglans*, *Juniperus*, *Picea*, *Pinus*, *Populus*, *Salix* and *Taxus* (Fig. 8). Plant families like Fabaceae, Asteraceae, Poaceae, Rosaceae etc. dominate in the herbaceous flora. The vegetation of Pangli includes 3 types of forests viz., the Himalayan Temperate Forests (at low altitudes between 1900-2800 m) are commonly inhabited by *Abies spectabilis*, *Cedrus deodara*, *Picea smithiana*, *Pinus gerardiana* and *P. wallichiana*; the Subalpine Forests (at altitudes between 2800-3800 m) are commonly represented by *Allium humile*, *Angelica glauca*, *Bunium persicum*,

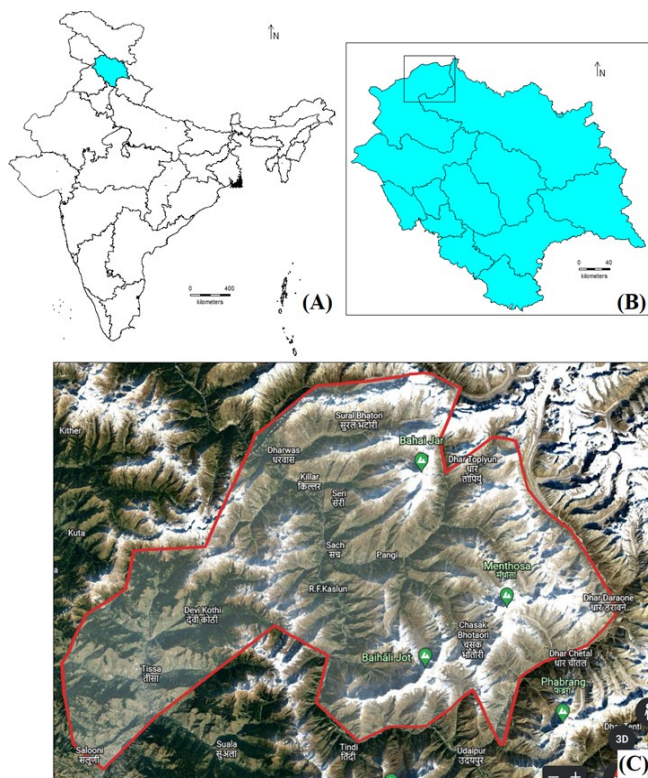


Fig. 1. Map showing the geographical locations of Pangi valley, Himachal Pradesh.

Bupleurum falcatum, *Carum carvi*, *Elsholtzia ciliata*, *Geranium wallichianum* and *Heracleum lanatum* while the Alpine forests (at altitudes above 3800 m amsl) are occupied by *Arnebia euchroma*, *Betula utilis*, *Capparis himalayensis*, *Cassiope fastigiata*, *Cortia depressa*, *Corydalis meifolia*, *Myricaria squamosa*, *Primula macrophylla*, *Rhododendron campanulatum*, *Saussurea graminifolia* etc.

Pangwal and Bhoti groups make up the majority of the population in Pangi Valley. Pangwal are the tribal people of Pangi valley living in the remote areas of the valley and are mainly engaged in agricultural activities. Bhortories are high-altitude communities in the Pangi Valley and their inhabitants are known as "Bhots." The majority of these people are Buddhists with Tibeto-Mongolian traits (4). Pangi has a wide range of floral diversity, including herbs, shrubs, trees etc. present at different ranges of altitudes. People in the tribal communities have long relied on natural resources to meet their daily requirements and health care. In the process, they have discovered a variety of ethnobotanical uses from the great plant wealth. Furthermore, tribal methods of life, devotion to earliest myths, stories, practices and traditions are well-developed in this region, which represents a wide and rugged terrain with scattered human settlement (5). The diversity of plant species in the valley region is mostly untouched due to their geographic and cultural isolation from the rest of the state. Due to the limited access to this area, the valley's natural riches remain underutilized, although residents of the Pangi valley area are aware of the importance of plant wealth and mode of usage for variety of illnesses such as stomach problems, lung problems and eye problems, different skin conditions such as blisters, boils, itching, leprosy and skin eruption, which are most common in the



Fig. 8. Terrain of the Pangi valley.

area. During our field visits, we could observe that people are suffering from several skin diseases which may be due to high ultraviolet radiation as people are exposed to extreme cold weather so they spend most of their day time in the sun. In addition, there may not be enough water available for bathing or maintaining proper hygiene, which may be the main cause of the widespread skin diseases. Ethnomedicinal knowledge of several species was obtained while investigating the plant resources in the Pangi region of Himachal Pradesh. A number of plant species were identified by the natives in curing various skin ailments. Few workers have attempted to document traditional knowledge from the Pangi area in the recent past, but no information on medicinal plants used to treat a specific condition, such as skin diseases, has been revealed. As a result, the present study was made to uncover the treasure trove of indigenous knowledge relevant to the tribal belt's medicinal resources, and it is projected to add new aspects to the pharmaceutical industry's ever-expanding scope (6, 7).

Materials and Methods

Since the last 2 years (2021-2022) extensive field surveys of plants have been conducted in order to assess the floristic wealth of Pangi Valley. Plants were collected either in flowering or fruiting condition for identification and detailed taxonomic studies. Among these plants, a few plant species have been found having medicinal value for different skin ailments. A number of locations in the Pangi Valley, including Bairagarh (2300 m amsl), Sach Pass (4500 m amsl), Pre garaon (3600 m amsl), Killar (2621 m amsl), Tilmil Pani (2300 m amsl), Luj (2400 m amsl), Sansari Village (Jammu and Kashmir Border) (2080 m amsl),

Dharwas (2419 m amsl), Sural (3000 m amsl), Bhatori (3500 m amsl), Tundru (3000 m amsl), Hudan Bhatori (3627 m amsl), Kirouni Serri (2561 m amsl), Kumar (2800 m amsl), Parmar (3400 m amsl), Sach village (2355 m amsl), Hillaur (2500 m amsl), Sahli (2400 m amsl), Sechu (2945 m amsl), Hillu Tuwan (2978 m amsl), Chasak Bhatori (3249 m amsl), Phindrou (2384 m amsl), Mindhal (2377 m amsl), Purthi (2355 m amsl), Ajog (2300m amsl), Shor (2350 m amsl) and Saichu Tuan Nala Wild Life Sanctuary (3090 m amsl), which were visited twice to document the use of medicinal herbs. A Semi-structured questionnaire was prepared to get

significant information about the ethnobotanical uses of plant resources. Discussions with local senior people, Gaddies, Gujjars, hermits, shepherds and Vaidis revealed the ethnomedicinal significance of the plants which have been collected, including information on the local name (s), part(s) used, purpose for which used, mode of preparation and curative capabilities. Depending on the information gathered, the plants were included in the list, along with their traditional usage. Different floras including Flora of British India, Flora of Lahaul-Spiti and Flora of Himachal Pradesh were consulted to identify the



Fig. 9. Some important ethnomedicinal plants used in skin diseases in Pangi valley; (A) *Aesculus indica* (Wall. ex Cambess.) Hook.; (B) *Arctium lappa* L.; (C) *Berberis lycium* Royle; (D) *Berberis aristata* DC; (E) *Caltha palustris* L.; (F) *Berberis asiatica* Roxb. ex DC.; (G) *Bergenia ciliata* (Haw.) Stemb.; (H) *Betula utilis* D.Don; (I) *Delphinium cashmerianum* Royle; (J) *Geranium wallichianum* D.Don ex Sweet; (K) *Delphinium vestitum* Wall. ex Royle; (L) *Geranium nepalense* Sweet; (M) *Podophyllum hexandrum* Royle; (N) *Verbascum thapsus* L.; (O) *Viola biflora* L.

species. Different Herbaria viz., CSIR – National Botanical Research Institute, Lucknow (LWG), CSIR – Central Institute of Medicinal and Aromatic Plants (CIMAP), CSIR- Central Drug Research Institute (CDRI), Forest Research Institute Herbarium, Dehradun (DD) and Botanical Survey of India (Northern Regional Centre Herbarium), Dehradun (BSD) have been consulted for additional confirmation of the plant specimens. Furthermore, for the therapeutic value and applications of the plant species documented from the Pangi valley and also used by other communities in the Indian Himalayan region, published literature, internet databases and other available information on the web were searched. Photographs of the live plants were also taken during the field surveys (Fig. 9).

Results and Discussion

A total of 61 plant species (Angiosperms: 59, Gymnosperms: 02) from 30 families and 56 genera have been recognised in the treatment of skin diseases (Supplementary Table 1), of which 46 species are herbs, eight are shrubs, Five are trees and Two are climbers (Fig.

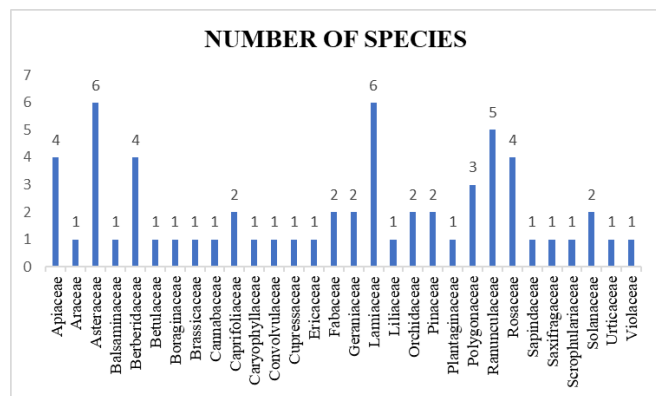


Fig. 2. Family wise distribution of ethnomedicinal plants used in skin diseases in Pangi valley.

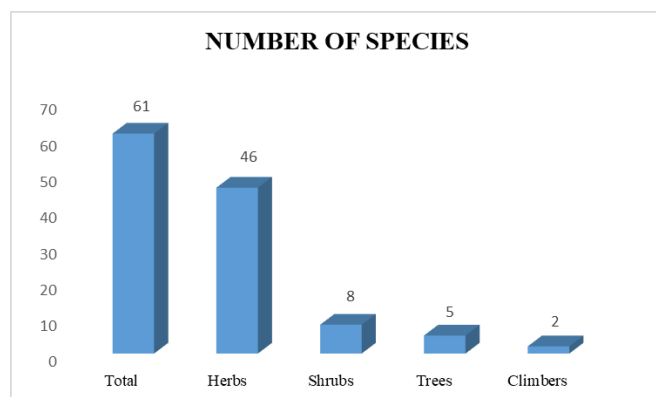


Fig. 3. Distribution of ethnomedicinal plants used in skin diseases under various life forms.

3, Supplementary Table 1), Of all, 30 species are recognized in the treatment of wounds, 27 for boils, 24 for cuts, 17 for burns, five for itching and pimples. In addition, some of the plant species have also been used in the cure of skin eruption and pimples, eczema, leprosy, haemostasis, skin fissures, leukoderma, psoriasis and in skin pigmentation etc (Fig. 7, Supplementary Table 1). The major prevalent families are Asteraceae and Lamiaceae (06 sp., each), followed by Ranunculaceae (05 sp., each), Apiaceae, Berberidaceae and Rosaceae (04 sp., each),

Polygonaceae (03 sp.), (Fig. 2, Supplementary Table 1). In terms of the usefulness of plant parts, leaves (24 sp.) are widely utilized, followed by roots (22 sp.); seed (11 sp.); whole plant (08 sp.); fruit (06 sp.); flower and stem (05 sp. each); bark (04 sp.); aerial part (03 sp.); tuber, rhizome, bulb and twig (02 sp. each) and resin, wood and pseudobulb (01 sp. each) have been found to be extremely valuable to tribal cultures (Fig. 6, Supplementary Table 1).

The largest number of ethnomedicinal plants (43 sp.) has been found between the altitudinal range of 2000-2500 m but this number decreases with increasing altitude. This range shows a number of significant ethnomedicinal species viz. *Artemisia parviflora*, *Inula racemosa*, *Lactuca dissecta*, *Impatiens sulcata*, *Berberis asiatica*, *Podophyllum hexandrum*, *Lepidium apetalum* etc.

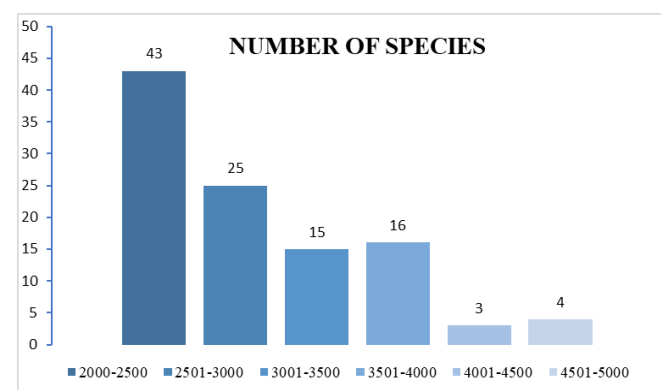


Fig. 4. Altitudinal distribution of ethnomedicinal plants used in skin diseases in Pangi valley

followed by the plants (25 sp.) in the altitudinal range of 2501-3000 m. Some significant ethnomedicinal plants in this range are *Rhododendron campanulatum*, *Medicago falcata*, *Fritillaria cirrhosa*, *Potentilla atrosanguinea* etc. 15 species in the altitudinal range of 3001-3500 m. viz. *Origanum vulgare*, *Koenigia alpina*, *Hyssopus officinalis*, *Rumex nepalensis*, *Rosa macrophylla*, *Verbascum thapsus* etc. 16 species in the altitudinal range of 3501-4000 m. viz. *Dactylorhiza hatagirea*, *Dolomiaea macrocephala*, *Impatiens sulcata*, *Morina longifolia*, *Rhododendron campanulatum*, *Taraxacum sect. Taraxacum*, etc. Three

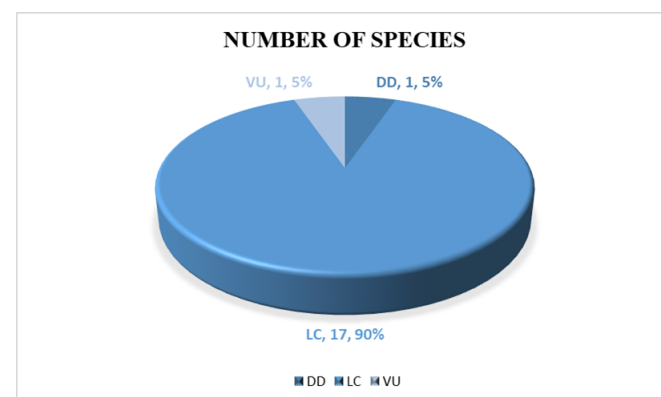


Fig. 5. Threat categories of ethnomedicinal plants used in skin diseases in Pangi valley.

species in the altitudinal range of 4001-4500 m. viz. *Betula utilis*, *Medicago falcata*, *Stellaria media* etc. Four species in the range of 4501-5000 m. viz. *Fritillaria cirrhosa*, *Delphinium vestitum*, *Delphinium cashmerianum*, *Heracleum candicans* etc. Several other species have been

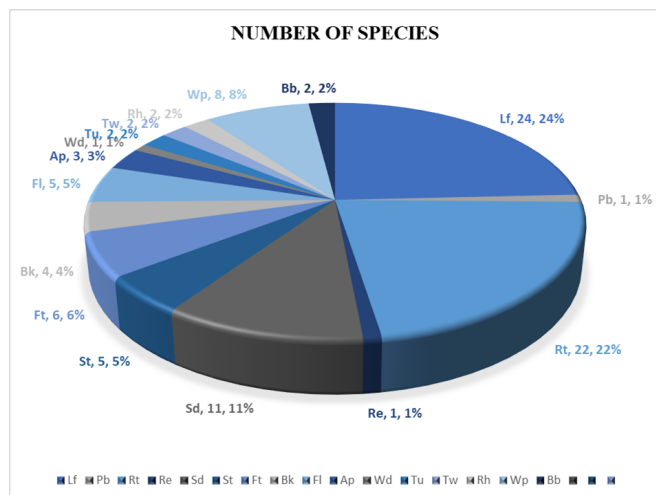


Fig. 6. Plant part used in different skin diseases (Lf = Leaf; Rt = Root; Re = Resin; Sd = Seed; St = Stem; Ft = Fruit; Bk = Bark; Fl = Flower; Ap = Aerial part; Wd = Wood; Tu = Tuber; Tw = Twig; Rh = Rhizome; Wp = Whole plant; Pb = Pseudobulb and Bb = Bulb).

found in different altitudinal gradient (Fig. 4, Supplementary Table 1).

In the IUCN red list, of these, 17 species have been categorised in the Least Concern (LC), two species namely *Prunus armeniaca* and *Malaxis muscifera* have been placed under Data Deficient (DD) and Vulnerable categories (VU) respectively (Fig. 5, Supplementary Table 1). We have located only one population of *M. muscifera* near Hudan Bhatari at about 3590 m elevation. The inclusion of *M. muscifera* in the threat category might be due to overexploitation of its pseudobulb which is used as a refrigerant in skin burn by the indigenous people (18).

Conclusion

The study revealed that, Pangri Valley is a rich trove of ethnomedicinal plants. Native people in the Pangri valley area have been noted to retain a strong belief in their traditional medicinal system and still rely on natural plant resources to treat a variety of maladies. However, the younger generation appears to be almost oblivious to or uninterested in conventional healing knowledge. Therefore, there is a need to increase awareness among the young generation in order to slow the rapid deterioration of essential ethnic knowledge about plant resources. Traditional knowledge of the habitat, parts used and methods for employing ethnomedicinal should be maintained for future use. Therefore, exploration of the valley to uncover more useful plants necessitates a concerted effort to gain a greater understanding of medicinally essential plants. However, to save these plants from extinction, they must be used sustainably.

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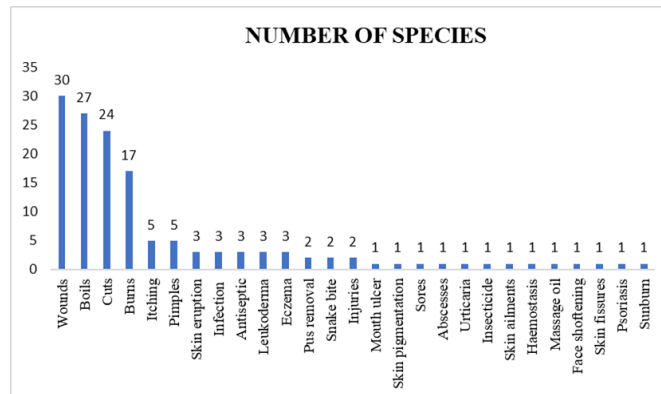


Fig. 7. Number of plants used in various skin diseases.

plant samples from Pangri Valley, Chamba. We would like to extend our gratitude to the curators of BSD, DD, LWG, CIMAP and CDRI for granting access to the collections. We are also grateful to the inhabitants of Pangri Valley who have kindly shared their knowledge on the ethnomedicinal uses of the plant wealth of Pangri. We also thank CSIR, New Delhi for providing Junior Research Fellowship to the first and second author. The third author is obliged to the UGC, New Delhi for providing Junior Research Fellowship.

Authors contributions

PD searched all the necessary material and prepared the first draft of the manuscript. RK, KY and ST helped in refining the manuscript. PA supervised the whole work, included her suggestions, modified the manuscript and submitted the manuscript for publication. All authors read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interests to declare.

Ethical issues: None.

References

- Kumari P, Kumar G, Prasher S, Kumar M, Mehra R, Kaur S. Determination of terrestrial radionuclides and related radiological risks in the soils from Pangri Valley of Chamba, Himachal Pradesh, India. In Journal of Physics: Conference Series 2020 May 1 (Vol. 1531, No. 1, p. 012035). IOP Publishing. doi:10.1088/1742-6596/1531/1/012035
- Singh H, Kumar P. A brief overview of vegetation of Pangri valley (Chamba, Himachal Pradesh): A high altitude region of northwest Himalaya, India. Biosci Biotechnol Res. Asia. 2017 Jun 28;14(2):625-30. <http://dx.doi.org/10.13005/bbra/2487>
- Dutt B, Nath D, Chauhan NS, Sharma KR, Sharma SS. Ethnomedicinal plant resources of tribal Pangri Valley in district Chamba, Himachal Pradesh, India. Int J Bio-Res Stress Manag. 2014 Sep 1;5:416-21. DOI:10.5958/0976-4038.2014.00591.0
- Prakash O, Samant SS, Yadava AK, Kumar V, Dutt S, Singh A. Diversity, distribution and indigenous uses of wild edible plants used by the tribal community (Pangri) in Pangri valley, Chamba of Himachal Pradesh, North-Western Himalaya. Int J Chem Stud. 2020;8:2424-37. <https://doi.org/10.22271/chemi.2020.v8.i3ai.9573>

5. Verma RK. Analysis of plant diversity in Man Lunga Valley and Khamengar valley of Pin Valley National Park in Himachal Pradesh. *Environment and Ecology*. 2003;21(4):941-46.
6. Chowdhery HJ, Rao RR. Trans-Himalaya: a vast genetic resource centre of less known economic plants. *Indian J For*. 2000;23(4):446-56.
7. Gupta A. Ethnobotanical studies on Gaddi tribe of Bharmour area of Himachal Pradesh. PhD (Forestry) [Thesis], Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, HP, India. 2011;155.
8. Begum D, Nath SC. Ethnobotanical review of medicinal plants used for skin diseases and related problems in Northeastern India. *J Herbs Spices Med Plants*. 2000 Dec 18;7(3):55-93. https://doi.org/10.1300/J044v07n03_07
9. Bhatt D, Sharma P, Sharma L, Joshi GC. Folk herbal remedies for skin care in Kumaun Himalaya. *J Non-Timber Forest Prod*. 2012; 19:309-12. <https://doi.org/10.54207/bsmps2000-2012-221CPI>
10. Choi H, Ahn S, Lee BG, Chang I, Hwang JS. Inhibition of skin pigmentation by an extract of *Lepidium apetalum* and its possible implication in IL-6 mediated signaling. *Pigment Cell Res*. 2005 Dec;18(6):439-46. DOI: 10.1111/j.1600-0749.2005.00266.x
11. Gupta M, Singh A, Joshi HC. *Berberis lycium* multipotential medicinal application: An overview. *Int J Chem Stud*. 2015;3(4):10-13.<http://dx.doi.org/10.21746/aps.2018.7.2.12>
12. Hussain W, Badshah L, Ullah M, Ali M, Ali A, Hussain F. Quantitative study of medicinal plants used by the communities residing in Koh-e-Safaid Range, northern Pakistani-Afghan borders. *J Ethnobiol Ethnomedicine*. 2018 Dec;14(1):1-8. DOI: 10.1186/s13002-018-0229-4
13. Joshi RK, Satyal P, Setzer WN. Himalayan aromatic medicinal plants: a review of their ethnopharmacology, volatile phytochemistry and biological activities. *Medicines*. 2016 Feb 19;3(1):6. <https://doi.org/10.3390/medicines3010006>
14. Kaur M, Singhal VK, Singh J. Use of some ethnomedicinal herbs by the natives of Solang Valley, Kullu District, Himachal Pradesh. *Int J Pharm Pharm Sci*. 2017;9(9):222-27. DOI: <http://dx.doi.org/10.22159/ijpps.2017v9i9.20664>
15. Khan I, Najeebullah S, Ali M, Shinwari ZK. Phytopharmacological and ethnomedicinal uses of the Genus *Berberis* (Berberidaceae): A review. *Trop J Pharm Res*. 2016 Oct 5;15(9):2047-57.<http://dx.doi.org/10.4314/tjpr.v15i9.33>
16. Lal B, Singh KN. Indigenous herbal remedies used to cure skin disorders by the natives of Lahaul-Spiti in Himachal Pradesh. *Indian J Tradit Knowl*. 2008; 7(2): pp. 237-41.
17. Manoj S, Priyanka S, Priyanka S, Anita RG. Biodiversity conservation of Himalayan medicinal plants in India: A retrospective analysis for a better vision. *Int J Biodivers Conserv*. 2013 Sep 30;5(9):529-40.<http://www.academicjournals.org/IJBC>
18. Prakash O, Samant SS, Yadava AK, Kumar V, Dutt S. Orchid Diversity at Pangri Valley of Himachal Pradesh, NorthWestern Himalaya. *J Orchid Soc India*. 2018;32(1-2):45-54.
19. Rana MS, Samant SS. Diversity, indigenous uses and conservation status of medicinal plants in Manali wildlife sanctuary, North western Himalaya. *Indian J Tradit Knowl*. 2011; 10(3): pp. 439-59.
20. Rana PK, Kumar P, Singhal VK, Rana JC. Uses of local plant biodiversity among the tribal communities of Pangri Valley of district Chamba in cold desert Himalaya, India. *Sci World J*. 2014 Jan 1;2014. <http://dx.doi.org/10.1155/2014/753289>
21. Samant, Pant S, Singh M, Lal M, Singh A, Sharma A, Bhandari S. Medicinal plants in Himachal Pradesh, north western Himalaya, India. *Int J Biodivers Sci Ecosyst Serv Manag*. 2007 Dec 1;3(4):234-51.<https://doi.org/10.1080/17451590709618177>
[10.1080/17451590709618177](https://doi.org/10.1080/17451590709618177)
22. Singh SK, Rawat GS. Floral diversity and vegetation structure in great Himalayan national park, western Himalaya. *Wildlife Institute of India*. 1999 Aug;2(5):1-28.
23. Thakur KS, Kumar M, Bawa R, Bussmann RW. Ethnobotanical study of herbaceous flora along an altitudinal gradient in Bharmour Forest Division, District Chamba of Himachal Pradesh, India. *Evidence-Based Complementary and Alternative Medicine*. 2014 Jan 1;2014.<https://doi.org/10.1155/2014/946870>
24. 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 Dec;2(1):1-8. doi:10.1186/1746-4269-2-14