

Ethnomedicinal knowledge of a marginal hill community of Central Himalaya: Diversity, usage pattern and conservation concerns

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Abstract

Background Indigenous communities use wild plants to cure human ailments since ancient times, such knowledge has significant potential for formulating new drugs and administering future health care. Considering this the present study was undertaken to assess use value, diversity, and conservation concerns of medicinal plants used in traditional herbal care system of a marginal hill community in Bageshwar district of Uttarakhand in the Central Himalayan region of India. Methodology Extensive surveys were made in 73 villages to gather information on ethnomedicinal use of plant species used in traditional herbal healing system. A total of 100 respondents were identified (30 herbal healers called 'Vaidyas' and 70 non-healers/natives) and interviewed using semi-structured questionnaires, target interviews and group discussion. Some important indices such as the use value index (UV), relative frequency citation (RFC), cultural importance index (CI), and informant consensus factor (F_{ic}) were calculated for the medicinal plants included in the present study. Result It was recorded that the community use a total of 70 species with 64 genera and 35 families for curing various ailments. Family Lamiaceae recorded maximum number of medicinal plants. 21 species used most extensively in traditional health care system. The major parts of the identified plants used for treatment of various ailments were root/rhizome and leaf. The most common methods used for preparation of these plants were decoction and infusion. *Ocimum basilicum* L., *Cannabis sativa* L., *Citrus aurantifolia* (Christm) Sw., *Curcuma longa* L. and *Setaria italic* L. had the highest rate of use report. RFC value ranged between 0.03 to 0.91 with highest values for *Setaria italica*, *Zingiber officinale*, *Ocimum basilicum*, and *Rephanus sativus*. The traditional knowledge is passed verbally to generations and needs to be preserved for the future bio-prospecting of plants that could be a potential cure to any future disease. Conclusion In recent years the community has access to modern hospitals and medicinal facilities, although a considerable number still prefer medicinal plants for curing select ailments. It is suggested that these ethnomedicinal species need to be screened and evaluated further for their effectiveness for pharmacological activity. Also, significant efforts are required to conserve traditional knowledge and natural habitats of wild medicinal plants.

Background

Medicinal plants have been utilized for the treatment of various diseases since ancient times, thus form an important element of aboriginal curative systems. The Indian *Rishis* first documented the use of medicinal plants in the form of Samhitas. *Charak Samhita* (1000-800 BC) and *Shushrut Samhita* (800-700 BC) by Maharshi Charak and Maharshi Shashurut, respectively, are the baselines of the Indian Medicinal System. Maharshi Charak mentioned over 500 medicinal plants, out of which 340 plants used in the production of herbal medicine [1-2]. AYUSH (i.e. Ayurveda, Unani, Siddha, and Homeopathy) is another traditional Indian healthcare system that is considered a great knowledge-base in herbal medicines. Ayurveda reports over 2000 medicinal plant species, Siddha 1121 plant species, Unani 751 species, and homeopathy 422 species [3]. Nearly 70-80% population worldwide still relies on traditional medicinal systems for their primary healthcare because of their effectiveness, cultural preferences, and lack of modern healthcare alternatives [4-5]. The global demand for herbal medicine continues to increase over the past few decades. The earlier studies stated that out of 2,50,000 flowering plants in the world only less than 10% have been examined successfully for their medicinal potency and still, 90% remains unexplored [2]. In recent times there is an increased interest regarding the use of the medicinal plants to develop new drugs and medicines for fulfilling the demand of a growing population [6-8]. Therefore the information on plants of ethnomedicinal importance holds high potential. Uttarakhand Himalaya is a mountainous region in northern India that has a unique geography, rich biological resources, cultural heritage, and diverse climatic conditions which supports the highest number of medicinal plant species [9]. Over two-third population live in rural areas and depend on diverse natural resources to fulfill their need for food, fuel, fodder, timber, medicine, etc. Communities use a large variety of medicinal plants for treating diverse ailments [10-11]. However, it is strongly being realized that the indigenous knowledge related to herbal medicines is continuously being eroded despite high significance to humanity. The subject needs further research such as documentation of potential medicinal species,

analyzing their active constituents, clinical trials for validations, and developing new drugs and medicines [8-12]. Considering this the present study was undertaken. We argue that sustainable management and conservation of medicinal plants can be achieved when information about their use for treating ailments and traditional herbal practices within particular areas are available. Such information is strongly desired to be preserved from being lost for the use of both the present and the future generations. For the purpose of this study, we selected marginal community and local herbal practitioners (Vaidyas) of Bageshwar district in Uttarakhand state in north India and documented ethnomedicinal plant diversity and traditional medicinal practices being used by them. Efforts are also made to scientifically validate and interpret the data using several indices such as Relative Frequency Citation (RFC), Use report (Categorical and disease-based), Cultural Importance Index (CI), and Informant Consensus Index (Fci) so as to verify the homogeneity, importance, the cultural similarity of the medicinal plants in communities. It is expected that the qualitative and quantitative information generated from the study will have immense utility for the conservation and sustainable utilization of medicinal plants as well as for managing the traditional health care system.

Materials And Methods

Study area

This study aimed to investigate the medicinal species used by the marginal hill community living in remote and high-altitude areas where medical healthcare facilities are not easily available. These practices are being used since eternity descended from the inherited knowledge of the locals and indigenous population of Uttarakhand. The study was carried out at Bageshwar district (geographical area 1687.8 km²) of Uttarakhand State and lies between latitudes 29°42'40" to 30°18'56"N and longitudes 79°23' to 80°10'E (Fig.1). The district is situated on the confluence of Gomti river and Saryu river which is a tributary of Kali river. It is bounded by Almora district in the southwest, Chamoli district in the north and northwest, and Pithoragarh district in the east. Administratively the district is divisible into four Tehsils, viz. Bageshwar, Kapkot, Kanda (Sub-tehsil) and Garur, and three blocks, viz. Bageshwar, Garur and Kapkot. There are 947 revenue villages, out of which 874 villages are inhabited and 73 villages are uninhabited. As per the 2011 census the total population of Bageshwar district is 270,332. 259,898 (male 48%, female 52%) with 96% living in the rural areas.

The community of the area divided into 3 categories viz., General, Scheduled Class (SC), Scheduled Tribe (ST), and majority of them involved in primary sector (agricultural activities), while some also work in secondary and tertiary sectors, such as private works, businesses, govt. jobs etc. As such the community is highly marginal with small and scattered land holdings, low production and low income; therefore, highly dependent on natural resources. Male population out-migrates to earn better livelihoods that lead to continuous increase in fallow lands and culturable waste lands.

Data collection

The study was conducted in 39 villages covering Garur-Ganga valley (23 villages) and Saryu valley (16 villages) of Garur and Kapkot Blocks during 2016-2018. To fulfil the objectives of the study, extensive field visits were made to gather information from traditional herbal healers (*Vaidyas*) and indigenous people using semi-structured questionnaires, target interviews, visual interpretation through snowball methodology. A total of 100 respondents were randomly selected for the present study from both valleys, 37 being male and 63 female respondents. Of them, 30 were vaidyas (male 19, female 11). Female informants were given preference in view of their dominance in villages when selecting the population due to their dominance in the household and foraging sector. The age group of informants varied between 30 to 83 year although most of them vary between 50-65 years of age (Fig.2). The questionnaire contains information about the ethnomedicinal plants with their local name, parts used, habit, ailment treated by

medicinal plants, and mode of utilization of herbal formulation. Two general meetings and interviews were also organized at each valley with vaidyas and natives. The documented medicinal plant species were collected and validated for identification using available literature [13-16], The specimens matched with the herbarium lodged in CCRAS-RARI, Tarikhet, Ranikhet, Uttarakhand (acronym RKT), which houses largest medicinal plant herbariums in northern India. A few generally available species were matched with the plant database of Centre for Socio-Economic Development deposited at G.B. Pant National Institute of Himalayan Environment (GBP-NIHE), Almora, Uttarakhand.

The ethno-botanical Analysis

The information on ethnomedicinal important species were recorded including the local names of the species, habit, their uses in different forms, the part used in the medical practice, mode of administration and the condition of the plant (fresh or dry). The plants were classified into 12 main categories of ailments which were further divided into different respective sub-categories based on disease and affected body part. The data were then statistically analyzed for different parameters. To enhance the indicative value of the ethnomedicinal study suitable quantitative methods and approaches were used in the form of indices, such as relative frequency of citation (RFC); use report (based on illness, based on taxa); cultural importance (CI) and consensus factor of informants (Fci).

Use Report Values (UR) provides information on the total number of reported uses for each species. It is similar to the use-value of a species but for use report, the number of events (interviews) the process of asking one informant on one day about the uses they know for one species, is one because the respondents were interviewed only once. And response use values are broken down by the number of uses reported for each plant species part.

Use Value Index (UV) depicts the importance of each species for each informant and calculated by $UV = \sum U/N$ formula where U is the number of uses quoted in each interview by N number of informants. Use values are high when there are many useful reports for a plant representing its importance, and come within reach of to zero (0) when the use reports are low[17].

Relative Frequency Citation (RFC) index reveals the usage importance of a particular species used by different informants. The index is calculated by dividing the total number of informants referring to a particular taxon with the total number of informants given ($RFC = FCs/N$) Where FC is the total number of informants that referred to the taxon and N is the total number of informants[18].

Cultural Importance Index (CI) is estimated for each locality as the summation of Use-Report (UR) in every use category mentioned for a species in the locality divided by the total number of informants. This index provides an implication of the involvement of a particular taxon in the community and a greater value signifies that a particular is widely distributed amongst communities. A null value indicates non-existence of the species in the area. CI is calculated as: $CI = UR/N$ where UR is the total number of use reports for each species in every category of illness mentioned and N is the total number of informants[19].

Informant consensus Factor (Fic) is used to test the consistency of information knowledge in treating a particular illness category. The values obtained, are near one (1) if there lie well-defined selection criteria in the community and/or if the information is exchanged between the informants. A value approaching zero (0) represents that the plants are chosen randomly and/or there is no information exchanged between the communities about their use. Fic is calculated as $Fic = (Nur - Nt) / (Nur - 1)$. Where Nur refers to the number of use reports for a particular use category and Nt refers to the number of taxa used for a particular use category by all informants [20].

Result And Discussion

Ethnomedicinal uses of plants and mode of practice

The residents of different age groups were surveyed to assess the ethnomedicinal uses of plant species (Fig. 2). The survey revealed that a total of 70 medicinal plant species varying from 35 families and 64 genera have been used by the inhabitants of 39 villages for different (Table 1). Family Lamiaceae recorded maximum species (8) followed by Asteraceae (6 species), Fabaceae (5 species), Rosaceae (4 species), and Apiaceae, Liliaceae, Ranunculaceae, Rutaceae, Zingiberaceae (3 species each). The remaining families were represented with just one or two species. Almost all the species are widely used by the community. Of the total documented medicinal plant species the herbaceous habit (51 species) was the most dominant life form, followed by the tree (10), shrub (7), and climbers (2 species)(Fig.3).

It was interesting to note that nearly 70% population still use prescription of *Vaidyas* for common ailments, although the *Vaidyas* were having an age of >50 years. The diseases cured by *Vaidyas* comprised fever, stomach problems, cough, cold, headache, etc. from centuries. The most common plant parts used were root/rhizome, followed by leaf, whole plant, seeds, fruits, flower, and bulb and latex (Fig. 4). The collection of plant parts was very selective keeping into consideration the time of collection, plant maturity, and quantity of use thus ensuring a conservation approach. *Vaidyas* comprised sound knowledge and a species-specific method of preparing drugs to cure various ailments (Table 2). Making decoction and ingestion was the most common mode of plant part use (Fig.5). Poultice and cooking were also favored for many medicinal plants. Another mode of application includes cooking and making into powder (9.42%), direct application (7.97%), emulsion and infusion (5.80%), and ointment (2.17%) (Fig. 5). A decoction is the most commonly used method to cure ailments in traditional herbal systems [38-42]. It is considered to extract all potential bioactive compounds after heating [43]. The pleasant taste of the herbal drug can be attuned by adding together honey or sugar [44]. Ingestion and poultice were also common after crushing and/or mixing the plant parts with some solvent for application as paste and band-aid. In skeletal, muscle and dermatological issues application of plant parts as ointment were most prevalent.

The community and *Vaidyas* identify each medicinal plant with a specific vernacular name. For example, *Bergenia ciliata* is identified by the community with a local name 'Pattharchatta' (stone destroyer) and it is used in curing kidney stones. *Plantago ovate* is called 'Jonkpuri' (jonk resembles worms) is used in the treatment of *Ascaris* and other worms. *Viola betonicifolia* named 'Garur-Jadi' (Garur means eagle) and it is used as an antidote to treat snake bites. Commonly, the community identifies a native name for species based on its local uses, ecology, physiology, anatomy, pharmacological activity, etc.[45].

It was recorded that the species were used to cure a total of 12 major ailments (Fig. 6). Most species were used for curing gastrointestinal and general health disorders. It was followed by species used for treating dermatological and respiratory problems.

Lamiaceae has been the most dominating family for ethnomedicinal uses in the trans-Himalayan zone of Nepal [26] and Garhwal Himalaya in India as well [27]. Although the people in remote areas are still dependent on the traditional herbal cure system, it is being practiced by a few elderly people only. The young generation is not interested to take up this profession given minimal profit [3,10,12]. The common plant part in the present study is similar to other investigations [28-32]. The roots being the storage part of the plant it contains valuable bioactive compounds [33]. Apart from the root part, leaves also contain a high concentration of health-beneficial secondary metabolites, phytochemicals, and essential oils, which contribute significantly to phototherapy or treatment of various health disorders [34-37]. The study reports 60% more species than reported earlier for the area under investigation [21-25].

Quantitative analysis of ethnomedicinal information

The use-value of important ethnomedicinal species was also calculated to depict the number of uses reported by the informants related to the utility of a species for a specific ailment or different ailments (Table 1,3). Two forms of use reports were analyzed; the URc defines the use of a particular species to cure specific ailments as reported by all the informants, while URd reports the sum of all the uses for a particular disease/ailment. *Ocimum basilicum*, *Cannabis sativa*, *Citrus aurantifolia*, *Curcuma longa*, and *Setaria italica* have been top positioned in terms of use-reports and different ailments cured.

The usefulness of a species can be represented through its RFC value, which ranged 0.03 to 0.91 for different species (Table 1). Species with maximum RFC value were *Setaria italica*, *Zingiber officinale*, *Ocimum basilicum*, and *Raphanus sativus* which depict their higher use, while those with the least value comprised *Duchesnea indica* and *Thalictrum foliosum*.

The Cultural importance index (CIs) specifies the distribution and importance of species in traditional herbal system and the value ranged from 0.03 to 0.97. A total of 21 species have been identified as the most commonly used (Table 3). *Ocimum basilicum*, *Cannabis sativa*, and *Citrus aurantifolia* registered the highest cultural importance in the traditional herbal cure system. Low CI values specify that these species are either least used or their use is declining up in traditional herbal cure system [49].

An analysis of the Informant Consensus Factor (*Fic*) for 12 broad treatment categories most ranged between 0.92 to 1.0 (Table 4). The data revealed high homogeneity as per local people for all treatments. The immuno-regulatory category was assigned the value 1 due to the presence of only one taxon in the particular category. Apart from this, hepatic health care and urogenital categories obtained the value of 0.98 indicating well-defined criteria among the local population and non-random selection of species for the ailment category. *Asparagus recemosus*, *Glycine max*, *Hordeum vulgare*, *Polygonatum cirrhifolium*, *Punica granatum*, *Raphanus sativus*, and *Urtica dioica* not only used in hepatic health care but also provide nutritive benefits and warm-potency, particularly at higher altitude areas. These species are commonly used in the daily food habit of the local community. Also, a higher value of *Fic* verifies the distribution of the different species used for a specific ailment. The urogenital category, with only 4 taxa included comes second in terms of CI as there is a widely accepted notion of using these species for such disorders. The higher value of informant consensus factor for all the ailment categories also implies that the documented species are the most commonly used thin traditional healing system.

The gastrointestinal ailments comprised of 695 use reports from the total categories with a medicinal importance index value of 30.22 (Table 4). Some most sought species in this category are *Cannabis sativa*, *Citrus aurantifolia*, *Angelica galuca*, *Ajuga parviflora*, and *Embllica officinalis*. These species are placed following their use reports mentioned during data collection. In the category of general health care, 22 species are being used with 524 numbers of use-reports & medical importance of 23.82. The species indicated with the highest number of use-reports are *Ocimum basilicum*, *Citrus aurantifolia*, *Curcuma longa*, *Ajuga parviflora*, and *Picorhiza kurrooa* based on user reports. The dermatological category ranks third with 21 taxa in use and a use-report value of 617 and medicinal importance of 29.82. The main species employed for this category based on the use reports are *Setaria italica*, *Eupatorium adenophorum*, *Artemisia martima*. Although the hepatic health cure category comprised of only 8 taxa, it has a medicinal importance index value of 45.50, which is highest of all the categories since the species used under the category are of daily usage and are often included in daily food products with nutritive values. The species include *Glycine max*, *Hordeum vulgare*, *Punica granatum*, *Urtica dioica*, *Polygonatum cirrhifolium*, etc. In other works carried out in Uttarakhand, they have reported these medicinal plants and use different plant parts in a different ratio to cure disease or ailments [16,21-23,25,27,28,46-48].

A correlation analysis was done among RFC, CI, UR, number of species used in treating different ailments, Informant consensus factor (*Fic*), and Medical Importance. No evidence of any correlation was observed in most of the parameters, a highly positive correlation was only observed in the number of taxa used and the number of use reports (0.963). Also, there has been a moderately positive correlation observed between *Fic* and RFC which is of no significance in the study as both the parameters have been described differently.

Some species are also used in ethnoveterinary purposes for curing domestic animals. *Ajuga parviflora* is used to cure throat infection, *Coriandrum sativum* against poison, *Taraxacum officinale*, *Verbascum thapsus*, and *Viola canescens* to increase lactation in milking animals.

The weakening of traditional ethnobotanical knowledge

It is alarming to note that there has been a continued decline in traditional ethnobotanical knowledge in the target area (Fig.7). An analysis of community perception on change in use pattern of medicinal plants in 2018 and a decade earlier (i.e. 2008) revealed that there is less number of species used for curing different ailments in recent years (Table 5). People are moving away from traditional herbal cure system and the young generation has no interest in the traditional customs and values. Earlier the people of remote areas preferred to consult with *Vaidyas* for primary healthcare but in the last decade, since there is an increase in accessibility, availability, and affordability towards the allopathic medicinal system, the local community is also opting for such options. Despite that 57% of the total respondents believe that these plants are highly effective, 30% found moderately effective, while only 13% feel it less effective (Fig. 8). Interestingly, to cure selective diseases in children, such as *Juga* (removal of *Ascaris*), *Chupad* (heavy cough), and *Kasar* (constipation) still people prefer traditional cure systems as it has no side effects. During the study it was observed that the *Vaidyas* do not share their knowledge, they believed that the treatment will not be effective if they share the knowledge with anybody. In the changing lifestyle and socioeconomic scenarios, most of the inhabitants are reluctant to live with their traditional heritage leading to the vanishing of the knowledge [50].

Conclusion

Community knowledge on the use and management of wild plant resources has always been integral to the survival, sustenance, and adaptation of human cultures [46,50,56]. This study revealed 70 medicinal plant species being used by the local marginal community of which 21 are the most extensively used species to treat various ailments. The significance of the traditional herbal healing system is highly relevant due to its effectiveness. It is cost-effective and based on local resources, and still only means of cure for marginal communities in remote localities. Uttarakhand and with population growth and lack of health care, there is a need to adhere to the locally available resources to be utilized for general health care and provisioning of suitable side-effect free treatment to the communities. The community still use these species, however, the level of use is decreasing because of upcoming modern allopathic based health-care services. At the same time, there is also a decline in the number of local *Vaidhyas* and herbal practitioners. This is because of increased access to modern hospitals and medicinal facilities in recent times. This possesses a significant challenge to the continuity of the traditional herbal cure system. The impoverishment of such knowledge may lead to an enormous loss to the scientific community. The ethnomedicinal knowledge and information provided in this study are of significant value for scientific validation, product development, conservation, and policy planners for sustainable management of medicinal plants and traditional herbal cure system. It is suggested to explore and establish linkage between traditional health practices and modern health-care systems. It can be done by testing bioactive compound and biological activity of most preferred plant species and assessing the safety and efficacy of the local herbal formulation. Such an investigation may lead to many new and novel drug discovery. It is also recommended that the natural habitats of medicinal plants should be protected for the conservation of valuable gene pool and to control the exploitation of species. Since ethnomedicinal information is strongly linked to local livelihoods, culture, and

environment, it is strongly recommended to further continue studying the subject to serve humanity with healthier and operative health care measures.

Declarations

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Authors' contributions

SNO, DT and AA planned and performed the study and field survey, writing the draft manuscript, and analyzed the data and RCS revised the manuscript and data analysis. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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Availability of data and materials

The authors already included all data in the manuscript collected during the field surveys. The documented medicinal plant species were deposited at Centre of Socio-economic Development (CSED), GBPNIHE, Kosi-Katarmal, Almora, Uttarakhand.

Ethics approval and consent to participate

During field work prior consent of the informants was taken conducting these studies. This was done to adhere to the ethical standards of community participation in scientific research.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

References

1. Kala CP. Medicinal plants conservation and enterprise development. *Med Plants*. 2009; 1(2):79-95.
2. L.K Rai LK, Prasad P, Sharma E. Conservation threats to some important medicinal plants of Sikkim Himalaya. *Biol Conser*. 2000; 93(1):27-33.
3. Kala CP, Dhyani PP, Sajwan BS. Developing the medicinal plants sector in northern India: challenges and opportunities. *J Ethnobiol Ethnomed*. 2006; 2(1):32.
4. Caniago I, Siebert S. Medicinal plants ecology, knowledge and conservation in Kalimantan, Indonesia. *Econ Bot*. 1998; 52:229-250.
5. Kuniyal CP, Bisht VK, Negi JS, Bhatt VP, Bisht DS, Butola JS, Sundriyal RC, Singh SK. Progress and prospect in the integrated development of medicinal and aromatic plants (MAPs) sector in Uttarakhand, Western Himalaya. *Environ Develop Sustaina*. 2015; 17(5): 1141-1162.
6. Rossato SC, Leitao-Filho H, Gegossi A. Ethnobotany of Caicarás of the Atlantic forest coast (Brazil). *Econ Bot*. 1999; 53:387-395.
7. Hanazaki N, Tamashiro JY, Leitao-Filho H, Gegossi A. Diversity of plant uses in two Caicarás communities from the Atlantic forest coast, Brazil. *Biodivers Conserv*. 2000; 9:597-615.
8. Gazzaneo LR, Paiva de Lucena RF, Paulino de Albuquerque U. Knowledge and use of medicinal plants by local specialists in a region of Atlantic Forest in the state of Pernambuco (Northeastern Brazil). *J Ethnobiol Ethnomed*. 2005; 1(1):9.
9. Saha D, Sundriyal M, Sundriyal RC. Diversity of food composition and nutritive analysis of edible wild plants in multi-ethnic tribal land, Northeast India: An important facet for food supply. *Indian Journal of Traditional Knowledge* 2014; 13(4): 698-705.
10. Kala CP. Status and conservation of rare and endangered medicinal plants in the Indian trans-Himalaya. *Biol Conserv*. 2000; 93:371-379.
11. Bisht VK, Kandari LS, Negi JS, Bhandari AK and Sundriyal RC. Traditional use of medicinal plants in district Chamoli, Uttarakhand, India. *Jour Med PI Res*. 2013; 7(15): 918-929.
12. Kala CP. Current Status of Medicinal plants used by traditional Vaidyas in Uttaranchal State of India. *Ethnobotany Research Applications*. 2005; 3:267-278.
13. Osmaston AE. *A Forest Flora for Kumaun*. International Book Distributors, Dehradun, India. 1926.
14. Naithani BD. *Flora of Chamoli*. Botanical Survey of India, Vol. 1 and 2. Dehradun, India. 1985.
15. Kirtikar KR, Basu BD. (1994). *Indian Medicinal Plants*. Bishan Singh Mahendra Pal Singh, Dehradun. 1994.
16. Gaur RD. *Flora of the District Garhwal: North West Himalaya (with Ethnobotanical Notes)*, (Transmedia, Srinagar, Garhwal), 1999.

17. Phillips O, Gentry AH, Reynel C, Wilkin P, Galvez DBC. Quantitative ethno-medicine and Amazonian conservation. *Biodivers Conserv Biol.* 1994; 8:225-248.
18. Tardio J, Pardo-de-Santayana M. Cultural importance indices: a comparative analysis based on the useful wild plants of southern Cantabria (northern Spain). *Econ Bot.* 2008; 62(1):24–39.
19. Pardo-de-Santayana M, Tardio J, Blanco E, Carvalho AM, Lastra JJ, San Miguel E, Morales R. Traditional knowledge of wild edible plants used in the northwest of the Iberian Peninsula (Spain and Portugal): a comparative study. *J Ethnobiol Ethnomed.* 2007; 3:27.
20. Trotter RT, Logan MH. Informant consensus: a new approach for identifying potentially effective medicinal plants. In: Etkin NL, editor. *Plants in indigenous medicine and diet: biobehavioural approaches.* Bedford hills, New York: Redgrave Publishers. 1986; 91-112.
21. Bisht VK, Rana CS, Negi JS, Bhandari AK, Purohit V, Kuniyal CP, Sundriyal RC. Lamiaceous ethno-medico-botanicals in Uttarakhand Himalaya, India. *Jour Med PI Res.* 2012; 6(26): 4281-4291.
22. Sundriyal RC. Medicinal plant cultivation and conservation in the Himalaya: An agenda for action. *Indian Forester* 2005; 131(3): 410-424.
23. Singh P, Attri, BL. Survey on traditional uses of medicinal plants of Bageshwar valley (Kumaun Himalaya) of Uttarakhand, India. *Intern J Conserv Sci.* 2014; 5(2):223-234.
24. Tewari S, Paliwal AK, Joshi B. Medicinal use of some common plants among people of Garur Block of district Bageshwar, Uttarakhand, India. *Octa J Biosci.* 2014; 2(1):32-35.
25. Bhatt D, Arya D, Chopra N, Upreti BM, Joshi GC, Tewari, LM. Diversity of ethnomedicinal plant: A case study of Bageshwar district Uttarakhand. *Journal of Medicinal Plants Studies.* 2017; 5(2):11-24.
26. Shandesh B, Chaudhary RP, Quave CL, Taylor RSL. The use of medicinal plants in the transhimalayan arid zone of Mustang district, Nepal. *J Ethnobiol Ethnomed.* 2010; 6:14.
27. Kumar M, Mehraj A, Sheikh MA, Bussmann RW. Ethnomedicinal and ecological status of plants in Garhwal Himalaya, India. *J Ethnobiol Ethnomed.* 2011; 7:32.
28. Malik ZA, Bhat JA, Ballabha A, Bussmann RW. Ethnomedicinal plants traditionally used in health care practices by inhabitants of Western Himalaya. *J Ethnopharmacolog.* 2015; 172: 133–144.
29. Bhat JA, Kumar M, Bussmann RW. Ecological status and traditional knowledge of medicinal plants in Kedarnath Wildlife Sanctuary of Garhwal Himalaya, India. *J. Ethnobiol Ethnomed.* 2013; 9:1.
30. Kunwar RM, Nepal BK, Kshetri HB, Rai SK, Bussmann RW. Ethnomedicine in Himalaya: a case study from Dolpa, Humla, Jumla and Mustang districts of Nepal. *J. Ethnobiol Ethnomed.* 2006; 2:27.
31. Kunwar RM, Shrestha KP, Bussmann RW. Traditional herbal medicine in Far-west Nepal: a pharmacological appraisal. *J. Ethnobiol Ethnomed.* 2010; 6:35.
32. Kunwar RM, Mahat L, Acharya RP, Bussmann RW. Medicinal plants, traditional medicine, markets and management in far-west Nepal. *J. Ethnobiol. Ethnomed.* 2013; 9:24.
33. Moore PD. Trials in bad taste. *Nature.* 1994; 370:410–411.
34. Keter LK, Mutiso PC. Ethnobotanical studies of medicinal plants used by traditional health practitioners in the management of diabetes in lower eastern province, Kenya. *J. Ethnopharmacol.* 2012; 139:74–80.
35. Quave CL, Pieroni AA. Reservoir of ethnobotanical knowledge informs resilient foodsecurity and health strategies in the Balkans. *Nature Plants.* 2015; 1(2):14021.
36. Mahmood A, Mahmood A, Malik RN, Shinwari ZK. Indigenous knowledge of medicinal plants from Gujranwala district, Pakistan. *J Ethnopharmacol.* 2013; 148(2):714–23.

37. Bano A, Ahmad M, Hadda TB, Saboor A, Sultana S, Zafar M, Khan MPZ, Arshad M, Ashraf MA. Quantitative ethnomedicinal study of plants used in the skardu valley at high altitude of Karakoram-Himalayan range, Pakistan. *J Ethnobiol Ethnomed.* 2014; 10(1):43.
38. Gurdal B, Kultur S. An ethnobotanical study of medicinal plants in Marmaris (Mugla, Turkey). *J Ethnopharmacol.* 2013; 146(1):113–26.
39. Ahmad M, Sultana S, Fazl-i-Hadi S, Ben Hadda T, Rashid S, Zafar M, Khan MA, Khan MPZ, Yaseen G. An ethnobotanical study of medicinal plants in high mountainous region of Chail valley (district swat-Pakistan). *J Ethnobiol Ethnomed.* 2014; 10(1):36.
40. Tugume P, Kakudidi EK, Buyinza M, Namaalwa J, Kamatenesi M, Mucunguzi P, Kalema J. Ethnobotanical survey of medicinal plant species used by communities around Mabira central Forest reserve, Uganda. *J Ethnobiol Ethnomed.* 2016; 12(1):5.
41. Umair M, Altaf M, Abbasi AM. An ethnobotanical survey of indigenous medicinal plants in Hafizabad district, Punjab-Pakistan. *PloS one.* 2017; 12(6):e0177912.
42. Farooq A, Amjad MS, Ahmad K, Altaf M, Umair M, Abbasi AM. Ethnomedicinal knowledge of the rural communities of Dhirkot, Azad Jammu and Kashmir, Pakistan. *J Ethnobiol Ethnomed.* 2019; 15:45.
43. El Amri J, El Badaoui K, Zair T, Bouharb H, Chakir S, Alaoui T. Ethnobotanical study of medicinal plants in the region El Hajeb (Central Morocco). *J Res Biol.* 2015; 4(8):1568–80.
44. Boudjelal A, Henchiri C, Sari M, Sarri D, Hendel N, Benkhaled A, Ruberto G. Herbalists and wild medicinal plants in M'Sila (North Algeria): an ethnopharmacology survey. *J Ethnopharmacol.* 2013; 148(2):395–402.
45. Singh H. Importance of local names of some useful plants in ethnobotanical study. *Indian J Tradit Knowledge.* 2008; 7(2):365-370.
46. Jain A, Sundriyal M, Roshnibala S, Kotoky R, Kanjilal PB, Singh HB, Sundriyal RC. Dietary use and conservation concern of edible wetland plants at Indo-Burma hotspot: A case study from northeast India. *Jour Ethnobiol Ethnomed.* 2011; 7: 7-29.
47. Pandey K, Pandey S. Indigenous medicines of Raji tribes of Uttarakhand. *Indian J Tradit Knowledge.* 2010; 9(1):131-133.
48. Joshi M, Kumar M, Bussmann RW. Ethnomedicinal Uses of Plant Resources of the Haigad Watershed in Kumaun Himalaya. *J Medicinal and Aromatic Plant Science and Biotechnology.* 2010; 4(1):43-46.
49. Tuttolomondo T, Licata M, Leto C, Bonsangue G, Gargano ML, Venturella G, La Bella S. Popular uses of wild plant species for medicinal purposes in the Nebrodi Regional Park (north-eastern Sicily, Italy). *J Ethnopharmacol.* 2014; 157:21–37.
50. Maikhuri RK, Nautiyal S, Rao KS, Saxena KG. Medicinal plant cultivation and biosphere reserve management: a case study from the Nanda Devi Biosphere Reserve, Himalaya. *Curr Sci.* 1998; 74(2):157-163.
51. Samal PK, Dhyani PP, Dollo M. Indigenous medicinal practices of Bhotia tribal community in Indian Central Himalaya. *Indian J Tradit Knowledge.* 2010; 9(1):140-144.
52. Samal PK, Shah A, Tiwari SC, Agrwal DK. Indigenous healthcare practices and their linkages with bioresources conservation and socio-economic development in Central Himalayan region of India. *Indian J Tradit Knowledge.* 2004; 3(1):12-26.
53. Jalal JS, Garkoti SC. Medicinal plants used in the cure of stomach disorders in Kumaon Himalaya, Uttarakhand, India. *Academia J Medicinal Plants.* 2013; 1(7):116-121.
54. Saha D, Sundriyal RC. Utilization of non-timber forest products in humid tropics: Consumption pattern, contribution to rural income and forest revenue. *Forest Policy and Economics* 2012; 14:28-40.

55. Uprety Y, Poude RC, Gurung J, Chettri N, Chaudhary RP. Traditional use and management of NTFPs in Kangchenjunga Landscape: implications for conservation and livelihoods. *Jour Ethnobiol Ethnomed.* 2016; 12:19
56. Singh A, Nautiyal MC, Kunwar RM, Bussmann RW. Ethnomedicinal plants used by local inhabitants of Jakholi block, Rudraprayag district, Western Himalaya, India. *J Ethnobiol Ethnomed.* 2017; 13:49.
57. Garbyal SS, Aggarwal KK, Babu, CR. Traditionally used medicinal plants in Dharchula Himalayas of Pithoragarh district, Uttaranchal. *Indian J Tradit Knowledge.* 2005; 4(2):199-207.
58. 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.

Tables

Table 1. Quantitative enumeration of ethno-medicinal plants used by marginal hill community of district Bageshwar.

Botanical Name	Local Name	Voucher/ Ident. No.	Habit	Part Used	Popular Ailment Uses (Group & Categories)	Used in	Preparation	FC ^a	RFC ^b	UR ^c	UR ^d	CI ^e
Family: Alliaceae												
<i>Allium sativum</i> L.	Lasan	GBPCSED1	H	B	Skeleton & muscles- Joint Pain (Arthritis)	Hu	O	59	0.59	59	59	0.59
Family: Apiaceae												
<i>Angelica glauca</i> Edgew.	Gandaraini	RKT 27789	H	Rt	Gastrointestinal- Stomach ache, vomiting, Other - Spices & condiment, Herbal tea	Hu	Po, Inf	44	0.44	35	89	0.89
<i>Centella asiatica</i> L.	Brahmi	RKT 28186	H	L	General health care - Headache	Hu	Po	28	0.28	28	28	0.28
<i>Coriandrum sativum</i> L.	Dhaniya	RKT 28118	H	Sd	Antidote - Against poison	C	Em	36	0.36	36	36	0.36
Family: Araceae												
<i>Acorus calamus</i> L.	Bojh/Buch	RKT 27965	H	Rh	Skeleton & muscles- Sprain, Inflammation Other - Insect repellent	Hu, I	Pw, O, Da	55	0.55	21	74	0.74
Family: Asteraceae												
<i>Ageratina adenophora</i> (Spreng.) King & H. Rob.	Nargadiya/Pagaljhad	RKT 22106	H	L	Dermatological- Cuts & wounds	Hu	Po	80	0.8	80	80	0.8
<i>Artemisia martima</i> L.	Pati/Titpati	RKT 23793	H	L	Dermatological- Cuts & wounds, skin ailments	Hu	Po	55	0.55	77	77	0.77
<i>Saussurea costus</i> (Falc.) Lipsch.	Kut/Kuth	RKT 28203	H	Rt	General health care- Fever Respiratory- Cough Gastrointestinal- Stomach ache, Dysentery	Hu	Pw, De	28	0.28	27	64	0.64
<i>Taraxacum officinale</i> Weber.	Dudhil	RKT 27817	H	L,Rt	Antidote- Snake bite Other- To increase lactation in mulching animals	Hu, C	In, Po, Inf	50	0.5	13	39	0.39
<i>Tegetus erecta</i> L.	Hazari	GBPCSED2	H	L	General health care- Fever, ear infection Dermatological- wounds	Hu	Po, Po	51	0.51	46	61	0.61
Family: Berberidaceae												
<i>Berberis asiatica</i> Roxb. ex DC	Kilmori	RKT 22109	S	Rt	General health care - Fever Circulatory- Diabetes	Hu	Pw, Pw	42	0.42	13	54	0.54
Family: Boraginaceae												
<i>Cynoglossum zeylanicum</i> Thunb. Ex Lehm.	Chtkura	RKT 22969	H	Rt	Dermatological- Boils	Hu	Da	54	0.54	54	54	0.54

Family: Brassicaceae												
<i>Rephanus sativus</i> L.	Mooli	RKT 27049	H	WP	Hepatic health cure- Jaundice	Hu	Co	87	0.87	87	87	0.87
Family: Cannabaceae												
<i>Cannabis sativa</i> L.	Bhaang	GBPCSED3	H	Sd, L	Gastrointestinal- Purgative & Laxative, Carminative, Constipation, Stomach ache	Hu	In	63	0.63	46	94	0.94
					Antidote- Insect bite		Da			5		
					Other- Warm effect in winters		In, Co			43		
Botanical Name	Local Name	Voucher/ Ident. No.	Habit	Part Used	Popular Ailment Uses (Group & Categories)	Used in	Preparation	FC^a	RFC^b	UR^c	UR^d	CI^e
Family: Caryophyllaceae												
<i>Drymaria cordata</i> (L.) Willd. ex Schult	--	RKT 19989	H	WP	Respiratory- Cough	Hu	In	19	0.19	7	7	0.07
<i>Silene vulgaris</i> (Moench) Garcke	Pyankura	GBPCSED4	H	WP	General health care- Fever	Hu	De	15	0.15	4	17	0.17
					Gastrointestinal- Removal of Ascaris (antiparasitic) locally known as <i>juga</i>		De			13		
Family: Combretaceae												
<i>Terminalia chebula</i> (Gaertner) Retz.	Harar	RKT 15469	T	Fr	Gastrointestinal- Purgative & laxative, Carminative, Constipation, Digestive problems, Diarrhoea	Hu	Pw, Po	12	0.12	64	64	0.64
Family: Cucurbitaceae												
<i>Momordica charantia</i> L.	Karela	RKT 27529	Cl	Fr	Circulatory- Diabetes	Hu	Co, In	39	0.39	39	39	0.39
Family: Dioscoreaceae												
<i>Dioscorea deltoidea</i> Wall.	Genthi	RKT 27301	Cl	Fr (Atu)	Respiratory- Cough & cold	Hu	Co	32	0.32	32	32	0.32
Family: Ericaceae												
<i>Rhododendron arboreum</i> Smth	Burans	RKT 27288	T	F	Hepatic health cure- Liver complaints, Tonic	Hu	De	47	0.47	64	64	0.64
Family: Euphorbiaceae												
<i>Emblica officinalis</i> Gaertn.	Aanwla	RKT 21022	T	Fr	Circulatory- Diabetes	Hu	In	35	0.35	8	85	0.85
					Gastrointestinal- Purgative & Laxative, Carminative, Stomach ache		In			54		
					Respiratory- Cough		In			6		

					Other- Source of vitamin 'C'		In				17		
<i>Euphorbia prolifera</i> Ehrenb. Ex. Boiss	Dudhiya, Maikuri	RKT 29216	H	WP	Other- Insect repellent	I	Da	7	0.07	7	7	0.07	
Family: Gentianeaceae													
<i>Swertia angustifolia</i> Buch.-Ham. ex D.Don	Chiraita	RKT 25110	H	WP	General health care- Fever Dermatological- Skin ailments	Hu	In	37	0.37	19	24	0.24	
Family: Fabaceae													
<i>Glycine max</i> (L.) Merri	Kala Bhatt	RKT 15664	H	Sd	Hepatic health cure - Jaundice	Hu	Co	84	0.84	84	84	0.84	
<i>Microtylomauniflorum</i> (Lam) Verdc.	Gahat/Kulthi	GBPCSED5	H	Sd	Urinogenital disorder- Stone	Hu	Co	69	0.69	69	69	0.69	
<i>Trifolium repens</i> L.	Chalmoda	RKT 26479	H	L	General health care - Headache Dermatological- Skin disease of dogs-Luta	Hu	Po	44	0.44	18	22	0.22	
<i>Trigonella foemun-graecum</i> L.	Maithi	RKT 28507	H	L,Sd	Circulatory- Diabetes Gastrointestinal- Carminative, Obesity, Indigestion, Constipation Skeleton & muscles - Joint pain	Hu	Inf	31	0.31	11	61	0.61	
							Inf				47		
							Inf				3		
Botanical Name	Local Name	Voucher/ Ident. No.	Habit	Part Used	Popular Ailment Uses (Group & Categories)	Used in	Preparation	FC^a	RFC^b	UR^c	UR^d	CI^e	
<i>Vigna mungo</i> L. (Fabaceae)	Mass, Urad	RKT 27199	H	Sd	Skeleton & muscles- Fracture	Hu	In	61	0.61	61	61	0.61	
Family: Lamiaceae													
<i>Ajuga bracteosa</i> Wall. ex Benth.	Ratpatia	RKT 25182	H	WP	General health care- Fever Gastrointestinal- Constipation Urinogenital- Diuretic	Hu	De	55	0.55	53	72	0.72	
											16		
											3		
<i>Ajuga parviflora</i> Benth.	Ratpatia	RKT 26408	H	Rt	General health care- Fever, Throat infection in animal (<i>Galghotu</i>) Gastrointestinal- Constipation, Stomach ache Urinogenital- Stone	Hu & C	De, Em	56	0.56	58	87	0.87	
											25		
							De				4		
<i>Leucas lanata</i> Benth	Nirasi Jhad	RKT 29214	H	L	Respiratory- Cough	Hu	De	80	0.8	80	80	0.8	
<i>Mentha arvensis</i> L.	Pudina	RKT 4355	H	L	Gastrointestinal- Stomach ache, vomiting,	Hu	De	43	0.43	50	50	0.5	
<i>Micromeria biflora</i> Benth.	--	RKT 22949	H	WP	General health care- Fever	Hu	De	6	0.06	6	6	0.06	

<i>Ocimum basilicum</i> L.	Tulsi	RKT 19325	S	L, Sd	General health care- Fever Respiratory- Cough & cold Other- Herbal tea, Warm effect in winters	Hu	De	88	0.88	33	97	0.97
<i>Origanum vulgare</i> L.	Van Tulsi	RKT 29244		L, Rt	General health care- Fever Respiratory- Cough & cold Dermatological- wounds Other- Herbal tea	Hu	De	31	0.31	15	71	0.71
<i>Thymus serpyllum</i> L.	Van- ajwayan	RKT 27966	H	WP	Skeleton & muscles- Joint pain Respiratory- Asthma Gastrointestinal- Digestive & Stomach problems Other- Spices & condiments	Hu	Em	18	0.18	3	14	0.14
Family: Liliaceae												
<i>Asparagus racemosus</i>	Keruwa	RKT 28055	S	Rt	Immuno-regulatory- Stimulant Hepatic health cure- Tonic Gastrointestinal- Stomach ache	Hu	Pw	46	0.46	15	65	0.65
Willd.							Pw			39		
<i>Polygonatum cirrhifolium</i>	Maha- (Wall.) Royle Meda	RKT 26144	H	WP	Hepatic health cure- Tonic Dermatological- Cuts & wounds Circulatory - Blood purifier	Hu	De	21	0.21	13	34	0.34
<i>Polygonatum verticillatum</i>	Meda	RKT 25894	H	Rt	Gastrointestinal- Carminative Dermatological- wounds	Hu	In	15	0.15	8	19	0.19
L.							Po			11		
Family: Moraceae												
<i>Ficus palmata</i> Forsk.	Bedu	RKT 28094	T	Lt	Dermatological- Cuts & wounds	Hu	Da	48	0.48	39	39	0.39
<i>Ficus roxburghii</i> Wall.	Timul	GBPCSED6	T	Fr	Gastrointestinal- Acidity, Carminative Circulatory - Blood pressure	Hu	Co	26	0.26	45	48	0.48
							Co		0	3		0
Botanical Name	Local Name	Voucher/ Ident. No.	Habit	Part Used	Popular Ailment Uses (Group & Categories)	Used in	Preparation	FC^a	RFC^b	UR^c	UR^d	CI^e
Family: Myricaceae												
<i>Psidium guajava</i> L.	Amrood	GBPCSED7	T	L	General health care- Mouth	Hu	In	12	0.12	12	12	0.12

					blisters (astringent)							
Family: Orchidaceae												
<i>Dactylorhiza hatagirea</i>	Salmpanja/ Hattajari	RKT 26089	H	Rt	Circulatory- Bleeding Dermatological- Wounds	Hu	De Po	17	0.17	17	34	0.34
Family: Plantaginaceae												
<i>Plantago ovate</i> Forsk.	Isabgoal	RKT 1899	H	Sd	Gastrointestinal- Constipation, digestive problems, Diarrhoea	Hu	In	74	0.74	83	83	0.83
<i>Plantago lanceolata</i> L.	Jonkpuri	RKT 8154	H	Rt	Gastrointestinal- Removal of stomach worm of domestic animals	C	In	43	0.43	43	43	0.43
Family: Poaceae												
<i>Hordium vulgare</i> L.	Jau	RKT 26630	H	Sd	Hepatic health cure- Warm & nutritive effect Dermatological - Burns	Hu	Co O	46	0.46	46	63	0.63
<i>Setaria italica</i> L.	Kouni	RKT 7389	H	Sd	Dermatological - Measles & Chicken pox	Hu	Co	91	0.91	91	91	0.91
Family: Podophyllaceae												
<i>Podophyllum hexandrum</i> Royle	Van-Kakri	RKT 27764	H	Fr, Rt	Dermatological - Wounds	Hu	Po	19	0.19	19	19	0.19
Family: Polygonaceae												
<i>Rheum emodi</i> Wall.	Dolu	RKT 27793	H	Rt	General health care - Fever Dermatological - Wounds	Hu	De Po	31	0.31	15	42	0.42
Family: Punicaceae												
<i>Punica granatum</i> L.	Darim	RKT 28845	T	Fr	Respiratory - Cough & cold Hepatic health cure - Anaemia Other- Source of vitamin 'C'	Hu	In De De, In	59	0.59	49	71	0.71
Family: Ranunculaceae												
<i>Aconitum heterophyllum</i> Wall.	Atis	RKT 29008	H	Rt	General health care - Fever Gastrointestinal - vomiting	Hu	Pw In	34	0.34	34	51	0.51
<i>Ranunculus repens</i> L.	Aingadua	GBPCSED8	H	Rt	Dermatological - Boils Gastrointestinal- Intestinal pains (<i>NasPalatana</i>)	Hu	Po In	21	0.21	21	27	0.27
<i>Thalictrum foliosum</i> DC.	Uppankat hi/Mamira	RKT 29204	H	WP	Ophthalmic- Eye infection (White dot-cataract) Other- Insect repellent	Hu	Inf Da	4	0.04	9	21	0.21
Family: Rosaceae												
<i>Duchesnea indica</i> (Andrews)	Van Kafal	GBPCSED9	H	L	Dermatological-	Hu	Po	3	0.03	3	3	0.03

Botanical Name	Local Name	Voucher/ Ident. No.	Habit	Part Used	Popular Ailment Uses (Group & Categories)	Used in	Preparation	FC ^a	RFC ^b	UR ^c	UR ^d	CI ^e
<i>Prunus persica</i> Stokes.	Aaru	RKT 26465	T	L	General health care- Headache	Hu	Po	6	0.06	6	6	0.06
<i>Rosa moschata</i> Hermm.	Kunja	RKT 28695	S	L, F	Dermatological- Cuts & wounds, boils, Ophthalmic- Eye diseases	Hu	Po Ste	9	0.09	27	32	0.32
<i>Rubus ellipticus</i> Smith.	Hisalu	RKT 29240	S	Rt	General health care- Fever Gastrointestinal- Stomach ache	Hu	De De	9	0.09	9	18	0.18
Family: Rubiaceae												
<i>Rubia cordifolia</i> L.	Manjistha	RKT 27933	H	Rt	General health care- Fever	Hu	De	27	0.27	23	23	0.23
Family: Rutaceae												
<i>Citrus aurantifolia</i> (Christm) Sw.	Kagji Nimboo	GBPCSED10	T	Fr	General health care - Headache Gastrointestinal- Constipation, weight loss Respiratory - Cold Other - Herbal tea, Source of vitamin 'C'	Hu	De De De	38	0.38	20	94	0.94
<i>Citrus hystrix</i> DC.	Jamer/ Jamir	GBPCSED11	T	Fr	Gastrointestinal- Removal of ascaris (antiparasitic) locally known as <i>juga</i> . Respiratory- Cold Antidote - Against poison	Hu	In In C Em	38	0.38	27	50	0.5
<i>Zanthoxylum armatum</i> DC	Timoor/ Timuru	RKT 28615	S	Sd	General health care- Toothache Respiratory- Cough & cold Gastrointestinal- Carminative, Other- Spices & condiments	Hu	In In In	61	0.61	21	77	0.77
Family: Saxifragaceae												
<i>Bergenia ciliata</i> (Haw) Sternb	Silphora	RKT 25124	H	Rt	Urogenital- Urinary infection, Stone	Hu	Inf, Pw	51	0.51	61	61	0.61
Family: Scrophulariaceae												
<i>Picrorhiza kurrooa</i> Royle.	Kutki	RKT 27765	H	Rt	General health care- Fever Gastrointestinal - Abdominal pain	Hu	In In	53	0.53	53	80	0.8
<i>Verbascum thapsus</i> L.	Akalveer	RKT 27890	H	WP	Dermatological -	Hu	Po	63	0.63	17	42	0.42

					Boils									
					Other- increase lactation milching animals	To		Da				25		
Family: Urticaceae														
<i>Urtica dioica</i> L.	Shishun/ Bichhu ghas	RKT 22903	S	L	Skeleton muscles- pain Hepatic cure-Warm nutritive effect	& Joint	Hu	Da	37	0.37	31	52	0.52	
							Hu	Co			21			
Family: Violaceae														
<i>Viola betonicifolia</i> J.E. Smith	Garurjadi/ garurabuti	GBPCSED12	H	WP	Antidote - Snake bite		Hu	Po	12	0.12	13	13	0.13	
<i>Viola canescens</i> Wall. Ex Roxb	Gulovansh	RKT 17561	H	WP	Other- increase lactation milching animals	To	C	Da	29	0.29	29	29	0.29	
Botanical Name	Local Name	Voucher/ Ident. No.	Habit	Part Used	Popular Ailment Uses (Group & Categories)		Used in	Preparation	FC^a	RFC^b	UR^c	UR^d	CI^e	
Family: Zingiberaceae														
<i>Curcuma longa</i> L.	Haldi	RKT 5970	H	Rh	General health care - Internal injury Dermatological- Cuts & wounds, cosmetics Respiratory - Cough		Hu	De	78	0.78	39	91	0.91	
								Da			36			
								De			16			
<i>Hedychium spicatum</i> Buch. Ham. ex Smith.	Van Haldi	RKT 24059	H	Rh	Gastrointestinal - Intestinal problems, Purgative & Laxative, Carminative Respiratory - Cough Dermatological - Cosmetics, anti- lice		Hu	Pw	13	0.13	30	52	0.52	
											8			
							Hu & C	Pw			14			
<i>Zingiber officinale</i> Rosc.	Adrak	RKT 5921	H	Rh	Respiratory - Cough & cold		Hu	Em	89	0.89	89	89	0.89	

^aUse Citation of Taxa (The no. of informants that referred the taxon); ^bRFC= FC/N, Where N is the total no. of informants; ^cUse-reports of the taxon by ailment c

^dUse-reports of the taxon; ^eCI= UR/N_r, where N_r is the total no. of reported taxa;

Aerial tuber (Atu); Bulb (B); Cattle (C); Climber (Cl); Cooking (Co); Decoction (De); Direct application (Da); Emulsion (Em); Flower (F); Fruit (Fr); Herb (H); Insect (I); Ir (Inf); Ingestion (In); Hour (hr); Human (Hu); Leaves (L); Latex (Lt); Ointment (O); Poultice (Po); Powder (Pw); Rhizome (Rh); Root (Rt); Shrub (S); Seed (Sd); Steam (S-Tree (T); Whole Plant (WP).

Table 2. Bio-processing of Medicinal Plants of District Bageshwar.

Scientific Name	Mode of administration
<i>Aconitum heterophyllum</i> Wall.	Dry root powder (1TS) taken orally with boiled water twice a day for 2-3 days against fever; 1-2 roots chewed to control vomiting.
<i>Acorus calamus</i> L.	Root powder mixed with grains used as insect repellent, 3-4 dry roots heated with mustard oil applied on the sprain and inflammatory region.
<i>Ageratina adenophora</i> (Spreng.) King & H. Rob	Leaf paste prepared from 100g fresh leaf twigs applied on affected parts for early healing.
<i>Ajuga bracteosa</i> Wall. ex Benth.	Juice of whole plant (10-20 ml) taken twice a day for 2-3 days.
<i>Ajuga parviflora</i> Benth.	Decoction prepared from 100g fresh or dried roots with water given 3-5TS orally in fever, stomach ache and constipation for 5 days; this decoction taken orally in empty stomach regularly for stone; 1-2 leaves chewed on empty stomach for gastric problem; decoction of whole plant (5-8) crushed with red chilli (3) and 100g Jiggery (<i>Gur</i>) given twice a day for 2-3 days to treat throat infection in domestic animals.
<i>Allium sativum</i> L.	Paste prepared from 5-7 Spilled bulb heated with 20 ml mustard oil, massage on joints
<i>Angelica glauca</i> Edgew.	Root powder (50g) mixed with 100ml water used to control vomiting & stomach ache; rhizomes are used as spices & condiments and tea (as flavour).
<i>Artemisia martima</i> L.	Juice (5-10ml) of fresh leaf applied on the affected area.
<i>Asparagus racemosus</i> Willd.	Root decoction (100 gm) prepared in water given to cure stomach ache (5 ml for adult, 1TS for children) for 3-5 days, one palm full root powder taken with water as stimulant and tonic.
<i>Berberis asiatica</i> Roxb. ex DC	Root powder (100-150g) taken with warm water given twice a day for 3 days against fever; fresh or dried roots soaked in water overnight, filtered and taken orally to cure diabetes in empty stomach.
<i>Bergenia ciliata</i> (Haw) Sternb.	Fresh or dried roots (50-100g) soaked overnight and filtered, taken orally in morning for kidney stone. Root powder (50g) taken with water twice a day for urinary infection.
<i>Cannabis sativa</i> L.	Grinded seeds cooked with some local vegetables (e.g. <i>Colacasia esculanta</i> , <i>Brassica oleracea</i>) for warm effect; broiled seeds are grinded with salt and green chilli to prepare salt (<i>Pahadi namak</i>), Broiled seeds grinded with <i>Punica garnatum</i> mixed with green leaves of coriandum, green chilli, salt and sugar to prepare <i>Chatni</i> ; Fresh leaves crushed with 3-5 seeds of black pepper and applied on insect bite.
<i>Centella asiatica</i> L.	Fresh leaf paste is applied on forehead.
<i>Citrus aurantifolia</i> (Christm) Sw.	Juice extracted from fruit mixed with 1TS honey and 50 ml water taken orally in empty stomach for constipation and weight loss; lemon tea used in Fever & Cold.
<i>Citrus hystrix</i> DC.	Fruit juice given orally (1TS) to children for removal of ascaris; cough & cold 10 ml thrice a day; fruit juice with mentha leaves (100g) and coriander seeds made into paste given to domestic animals against poison.
<i>Coriandrum sativum</i> L.	Seed (80-100g) paste mixed with 1-2 ltr. processed curd (<i>Mattha</i>) is given to domestic animals against poison for 2-3 days.
<i>Curcuma longa</i> L.	Haldi powder (5g) mixed with a full glass of warm milk for internal injury; paste of rhizome applied on cuts and wounds.
<i>Cynoglossum zeylanicum</i> Thunb. Ex Lehm.	Fresh or dried root paste applied on the affected parts
<i>Dactylorhiza hatagirea</i> (D. Don) Soo.	Decoction of 100 gm root with water taken orally (10-15ml) twice a day for excessive bleeding; root paste applied on wounds
<i>Dioscorea bulbifera</i> L.	Broiled fruit and cooked vegetable.
<i>Drymaria cordata</i> (L.).	Juice of aerial parts (2-4 drops) taken orally for 2-3 days.
Scientific Name	Mode of administration
<i>Duchesnea indica</i> (Andrews) Focke	Leaf paste is regularly applied on affected part.
<i>Emblica officinalis</i> Gaertn.	Fresh fruits are chewed regularly to control diabetes; dried fruits (3-5) boiled with water, filtered and taken orally against cough, stomach ache; fresh and processed fruits are source of Vitamin 'C'.
<i>Euphorbia</i> sp.	Whole plant (50-100) mixed with FYM.
<i>Ficus palmata</i> Forsk.	Milky latex applied on cuts & wounds.

<i>Ficus roxburghii</i> Wall.	Fresh fruits are cooked as vegetable.
<i>Glycine max</i> (L.) Merri	<i>Bhatt ka Jaula</i> (an indigenous dish) is prepared from paste of seeds (soaked overnight) & cooked with rice in an iron vessel " <i>Kadahi</i> ".
<i>Hedychium spicatum</i> Buch. Ham. ex Smith.	Dried rhizome powder (2-3g) taken with hot water once a day; paste of fresh rhizome used as anti-lice
<i>Hordium vulgare</i> L.	<i>Sattu</i> prepared from 200g broiled seeds mixed with 100g jaggery (<i>Gur</i>) and 100g <i>Ghee</i> for warm and nutritive effect; 50g broiled seeds heated with 40ml mustard oil applied on burns.
<i>Leucas lanata</i> Benth	Leaf juice with 3-5 drops of breast milk taken orally twice a day for one week.
<i>Mentha arvensis</i> L.	Leaves (100g) boiled with water and filter, the filtrate (50ml) given orally twice a day.
<i>Micromeria biflora</i> Benth.	Juice of whole plant with water (1-2 times in a day).
<i>Macrotyloma uniflorum</i> (Lam) Verdc.	<i>Gahat ka Ras</i> (an indigenous dish) prepared by 150g seeds cooked with water (1 ltr.) until the volume reduced (100ml) and taken regularly.
<i>Momordica charanti</i> L.	Vegetable and juice (50ml) of fresh fruit taken regularly.
<i>Ocimum basilicum</i> L.	Decoction of 100g leaves and seeds, zinger (50g), 5 seeds black paper with 150 ml water taken orally 2-3 times a day for fever, cough & cold; aerial part used to make herbal tea.
<i>Origanum vulgare</i> L.	Decoction of 1 00g fresh & dried leaves with water taken orally (10ml) for a week in cough, cold & fever; root paste applied on wounds.
<i>Picrorhiza kurrooa</i> Royle.	Decoction of 50g root with water taken orally against fever and abdominal pain for 5-7 days.
<i>Plantago ovate</i> Forsk.	Seeds (10g) soaked overnight or consumed directly with water twice a day for 30 days against constipation and digestive problems; Isabgoal (15g) mixed with 10TS fresh curd taken after meal for diarrhoea.
<i>Plantago lanceolata</i> L.	Paste of roots (100g) given to domestic animals.
<i>Podophyllum hexandrum</i> Royle	Root paste applied on wound.
<i>Polygonatum cirrhifolium</i> (Wall.) Royle	Small pieces of tuber (8-10) soaked in water for overnight, taken in empty stomach for weakness and develop immunity; cooked green leaves eaten as blood purifier; root paste applied on cuts and wounds.
<i>Polygonatum verticillatum</i> L. All	Root powder (50g) is taken with warm water in gastric complaints; fresh root paste applied for wound healing.
<i>Prunus persica</i> Stokes.	Fresh leaf paste applied on head for 2-3 hr.
<i>Psidium guajava</i> L.	Fresh leaves are chewed.
<i>Punica granatum</i> L.	Powder (50g) of dried fruit peel taken orally with warm water for old cough; Fruit juice (50ml) given twice a day to anaemic patient.
<i>Ranunculus repens</i> L.	Root paste (50g) applied for boils and 30-50ml filtered root extract (juice) is given twice a day against intestinal pain.
<i>Rephanus sativus</i> L.	Vegetable prepared from fresh leaves and root as salad.
<i>Rheum emodi</i> Wall.	Decoction of 100g root with warm water taken orally (10ml) for fever twice a day; root paste applied on wounds.
<i>Rhododendron arboreum</i> Smth	Juice extracted from fresh flowers
Scientific Name	Mode of administration
<i>Rosa moschata</i> Hermm.	Fresh leaf paste is applied on cuts, wounds and boils; water extracted from fresh flowers used in eye diseases.
<i>Rubia cordifolia</i> L.	Root decoction with water given orally (1-2TS) against fever twice a day to children (5 months-10years)
<i>Rubus ellipticus</i> Smith.	Decoction (10ml) of 100g roots with water taken orally against fever and stomach ache for 5 days.
<i>Saussurea costus</i> (Falc.) Lipsch	Decoction of root (50g) with water given against dysentery for 3-5 days twice a day; root powder (50g) taken orally with boiled water in fever, cough and stomach ache.
<i>Setaria italica</i> L.	<i>Koni ka Jaula</i> (an indigenous dish) prepared from seeds cooked with water.
<i>Silene vulgaris</i> (Moench)Garcke	Root decoction (10ml) with warm water given against fever for 3 days; 1TS is used for removal of ascaris (<i>Juga</i>);leaves are used as a vegetable.
<i>Swertia spp</i>	Juice of fresh leaves (100g) given with boiled water 3TS for 3-5 days for fever; <i>Panchang</i> (whole plant) is used after soaking overnight and taken (50-100ml) orally in empty stomach for 15 days.

<i>Taraxacum officinale</i> Weber.	For snake bite: juice of whole plant with water taken orally (1-2TS) thrice a day & applied on injured part for one week; mixture of 100g roots with 9 seeds of black pepper, 1-2 ltr. processed curd (<i>Mattha</i>) and 250g paste of black soybean given to increase lactation in milching animals
<i>Tegetus erecta</i> L.	Fresh leaf juice with water taken against fever(3-5 TS twice a day); leaf extract (2-3 drops) in ear infection; fresh leaf paste is applied for healing cuts & wounds.
<i>Terminalia chebula</i> (Gaertner) Retz.	Dried fruit powder (100g) given orally with boiled water twice a day for 3-5 days in stomach ache; dried fruit crushed with water and given (1-2 ml) orally to children (3 months to 5 years) and small amount applied around the navel.
<i>Thalictrum foliosum</i> DC.	Fresh roots (50g) soaked in rose water (100ml) for overnight, filtered and used as eye drop.
<i>Thymus serpyllum</i> L.	Paste of whole plant mixed with mustered oil gently applied on joints; whole plants juice (10ml) mixed with honey (20g) is taken orally for cough and asthma; broiled seeds (10-15g) with warm water taken for digestive and stomach problems; leaves and seeds are used as spices & condiment.
<i>Trifolium repens</i> L.	Leaf paste (5g) with water.
<i>Trigonella foenum-graecum</i> L.	Leaf juice is taken orally for curing obesity, indigestion, joints pain and constipation; 25g seeds are soaked overnight filter, the filtrate taken orally in empty stomach for gastric problems and diabetes.
<i>Urtica dioica</i> L.	Branches with leaves are gently rubbed on joints and muscles; Fresh leaf twigs taken as vegetable; fine powder of dry leaf (5-10 g) dissolve in 50 ml water is taken orally in joints & muscular pain
<i>Verbascum thapsus</i> L.	Fresh leaf paste applied on affected part for boils; 8-10 whole plants mixed with grass given mulching animals
<i>Viola betonicifolia</i> J.E. Smith (Violaceae)	Paste of whole plant (fresh or semidry) applied on affected part for 1-2 weeks.
<i>Viola canescens</i> Wall. Ex Roxb	Fresh plants (30-50) given with grass for one to two weeks.
<i>Vigna mungo</i> L.	Paste prepared by grinding of 150g seeds with water applied on the fractured part.
<i>Zanthoxylum armatum</i> DC	Seeds (100g) boiled with water taken orally twice a day; seed bark used as a spices.
<i>Zingiber officinale</i> Rosc.	A piece (5-10g) of broiled rhizome mixed with small amount of honey and chewed.

Farm Yard Manure (FYM); Tablespoon (TS);

Table 3. Use value of important ethnomedicinal species of target area

Taxa	UR ^a	FC ^b	CI ^c	NDAS	Ailments Categories (Decreasing order)
<i>Ocimum basilicum</i> L.	97	88	0.97	5	Respiratory, general health care and others
<i>Cannabis sativa</i> L.	94	63	0.94	6	Gastrointestinal, others and antidote
<i>Citrus aurantifolia</i> (Christm) Sw.	94	38	0.94	6	Others, gastrointestinal, general health care and respiratory
<i>Curcuma longa</i> L.	91	78	0.91	5	General health care, dermatological and respiratory
<i>Setaria italica</i> L.	91	91	0.91	2	Dermatological
<i>Angelica glauca</i> Edgew.	89	44	0.89	4	Others and gastrointestinal
<i>Zingiber officinale</i> Rosc.	89	89	0.89	2	Respiratory
<i>Ajuga parviflora</i> Benth.	87	56	0.87	5	General health care, gastrointestinal and urinogenital disorder
<i>Rephanus sativus</i> L.	87	87	0.87	1	Hepatic health cure
<i>Emblica officinalis</i> Gaertn.	85	35	0.85	6	Gastrointestinal, others, circulatory and respiratory
<i>Glycine max</i> (L.) Merri	84	84	0.84	1	Hepatic health cure
<i>Plantago ovate</i> Forsk.	83	74	0.83	3	Gastrointestinal
<i>Ageratina adenophora</i> (Spreng.) King & H. Rob.	80	80	0.80	2	Dermatological
<i>Leucas lanata</i> Benth	80	80	0.80	1	Respiratory
<i>Picrorhiza kurrooa</i> Royle.	80	53	0.80	2	General health care and gastrointestinal
<i>Artemisia martima</i> L.	77	55	0.77	3	Dermatological
<i>Zanthoxylum armatum</i> DC	77	61	0.77	5	Others, general health care, respiratory and gastrointestinal
<i>Acorus calamus</i> L.	74	55	0.74	3	Others and skeleton & muscles
<i>Ajuga bracteosa</i> Wall. ex Bent.	72	55	0.72	3	General health care, gastrointestinal and urinogenital disorder
<i>Origanum vulgare</i> L.	71	31	0.71	5	Dermatological, respiratory, General health care and others
<i>Punica granatum</i> L.	71	59	0.71	4	Respiratory, others and hepatic health cure

^a Total no. of Use-reports of the taxon; ^bUse Citation of Taxa (The no. of informants that referred the taxon); ^cCI= UR/N_t, where N_t is the total no. of reported taxa; No. of different ailment subcategories (NDAS).

Table 4. Informant consensus factor (F_{ic}) and medicinal importance (MI) of Ethno-medicinal plants.

Ailments Category	No. of Taxa (N _t) ^a	Frequency (%) ^b	No. of Use -reports (N _{ur})	Informant consensus factor (F _{ic}) ^c	Medicinal Importance (MI) ^d
Gastrointestinal	23	32.86	695	0.97	30.22
General health cure	22	31.43	524	0.96	23.82
Dermatological	21	30.00	617	0.97	29.38
Respiratory	15	21.43	402	0.97	26.80
Hepatic health cure	8	11.43	364	0.98	45.50
Circulatory	7	10.00	126	0.95	18.00
Skeleton & muscles	6	8.57	178	0.97	29.67
Antidote	5	7.14	83	0.95	16.60
Urinogenital	4	5.71	137	0.98	34.25
Ophthalmic	2	2.86	14	0.92	7.00
Immuno-regulatory	1	1.43	15	1.00	15.00
Other	15	21.43	377	0.96	25.13

^aNo. of species listed in several of the categories of medicinal usage; ^bPercentage of records on the total of 70 records; ^cF_{ic} = (N_{ur} - N_t) / (N_{ur} - 1); ^dMI = N_{ur}/N_t.

Table 5. Similarity between present and past ethno-medicinal uses of important species

Botanical Name	Use Reports in Study Area	Earlier Use Reports from Uttarakhand
<i>Aconitum heterophyllum</i> Wall.	Fever & Vomiting	Fever, Vomiting and cough [21,28,51,59]
<i>Acorus calamus</i> L.	*Inflammation & Insect repellent Sprain	Arthritis, Cancer, Convulsions, Diarrhoea, Dyspepsia, Epilepsy [21,23]; Sprain [51]
<i>Ageratina adenophora</i> (Spreng.)	Cuts & wounds	Cuts and Wounds [21, 28]
<i>Ajuga bracteosa</i> Wall. ex Benth.	*Constipation Diuretic, Fever	Fevers, Diuretic [21]
<i>Ajuga parviflora</i> Benth.	*Constipation, Stone, Throat infection in animal (<i>Galghotu</i>) Fever, Stomach ache	Headache, Fever, stomach-ache [54]
<i>Allium sativum</i> L.	*Joint Pain (Arthritis)	Mascular pain [23,52]; Ear pain [59]
<i>Angelica glauca</i> Edgew.	*Spices & condiment & Herbal tea Stomach ache, Vomiting,	Constipation, bronchitis and stomach disorders, Vomiting [23,28,51]
<i>Artemisia martima</i> L.	Cuts, Skin ailments, Wounds	Skin ailments [54]
<i>Asparagus racemosus</i> Willd.	*Stimulant, Tonic & Stomach ache	Leucorrhoea, Headache, Hysteria, Ulcer, Liver disorders [21,23]
<i>Berberis asiatica</i> Roxb. ex DC	*Fever Diabetes	Diabetes, Jaundice [21]
<i>Bergenia ciliata</i> (Haw) Sternb	Urinary infection & Stone	Fever, Digestive disorders, skin diseases, Urinary infection & Stone [16,28]
<i>Cannabis sativa</i> L.	*Insect bite, Stomach ache, Purgative & Laxative, Warm effect in winters Carminative, Constipation	Analgesic, Cough, Cold, Sedative, Narcotic, Skin diseases [23]
<i>Centella asiatica</i> L.	*Headache	Inflammatory infections, Wounds[21, 23]
<i>Citrus aurantifolia</i> (Christm) Sw.	Cold, Constipation, Headache, Herbal tea, Source of vitamin 'C' & Weight loss,	Diarrhoea, Dysentery, Fever, Headache [56]
<i>Citrus hystrix</i> DC.	*Against poison, Cold, Removal of <i>Ascaris</i> (Anti- parasitic)	Vomiting [52]
<i>Coriandrum sativum</i> L.	*Against poison	Stomachic and diuretic [23]
<i>Curcuma longa</i> L.	*Internal injury Cough, Cuts & wounds & Cosmetics	Skin disorders, Wound healing [23,52]
<i>Cynoglossum zeylanicum</i> Thunb. ex Lehm.	*Boils	Asthma, Bronchitis, Cough, Vomiting, [16,55]
<i>Dactylorhiza hatagirea</i> (D.Don)Soo	Bleeding & Wounds	Burns, Cuts, Checks bleeding [21,28]
<i>Dioscorea deltoidea</i> Wall	Cough & cold	Cough, Fever Urogenital disorders, [21,23,28,54]
<i>Drymaria cordata</i> (L.) Willd. ex Schult	*Cough	Laxative [48]; Bile complaints [54]
<i>Duchesnea indica</i> (Andrews) Focke	*Burns and removal of burn scars	Diarrhoea, Fever, Leucorrhoea [55]; Skin diseases [56]
<i>Emblica officinalis</i> Gaertn.	Diabetes, Purgative & Laxative, Carminative, Stomach ache & Source of vitamin 'C'	Asthma, Digestive disorders, Hair fall [28]; Dysentery, Cholera and Jaundice [21,54]
<i>Euphorbia prolifera</i> Ehrenb. ex Boiss	*Insect repellent	--
<i>Ficus palmata</i> Forsk.	*Cuts & wounds	Lungs diseases, Skin diseases [23,48,54]
<i>Ficus roxburghii</i> Wall.	*Acidity, Source of vitamin 'C'	Laxative [48]
<i>Glycine max</i> (L.) Merri	*Jaundice	--
<i>Hedychium spicatum</i> Buch. Ham. ex Smith.	Anti-lice, Cough, Cosmetics, Intestinal problems, Purgative & Laxative, Carminative	Carminative, Stomachic, Liver complaints, Fevers, Vomiting, Diarrhoea, Inflammation, Snake bite [16,21,54]
<i>Hordium vulgare</i> L.	*Burns, Warm and nutritive effect	--
Botanical Name	Uses Report in Study Area	Earlier Uses Report from Uttarakhand
<i>Leucas lanata</i> Benth	*Cough	Cuts, To check bleeding, Wounds [54]
<i>Mentha arvensis</i> L.	Stomach ache & Vomiting,	Diarrhoea, Stomach ache [53,54]
<i>Micromeria biflora</i> Benth.	*Fever	Joints pain, Worm infested wounds [21]
<i>Microtyloma uniflorum</i> (Lam)	Stone	Stone [52]

Verdc.		
<i>Momordica charantia</i> L.	Diabetes	Jaundice, Diabetes [23]
<i>Ocimum basilicum</i> L.	Cough & cold, Fever, Herbal tea, Warm effect in winters	Cough, Cold, Fever [16]
<i>Origanum vulgare</i> L.	Cough & cold, Fever, Herbal tea & Wounds	Cold, Diarrhoea, Fever, Indigestion, Influenza, Menstrual disorder [23, 54]
<i>Picrorhiza kurrooa</i> Royle.	Abdominal pain, Fever	Anemia, Asthma, Blood troubles, Inflammation, Jaundice [21]; Fever, Stomach ache [28]; Abdominal pain, Cataract [51,54]
<i>Plantago ovate</i> Forsk.	Constipation, Digestive problems & Diarrhoea	Constipation, Dysentery & Diarrhoea [21]
<i>Plantago lanceolata</i> L.	*Removal of stomach worm of domestic animals	Dyspepsia, Sore wounds, Dysentery, Purgative, Mouth disease and chicks [21]
<i>Podophyllum hexandrum</i> Royle	Wounds	Purgative, Cancer [21]; Wounds [28]
<i>Polygonatum cirrhifolium</i> (Wall.)	*Blood purifier, Cuts, Tonic & Wounds	Anaemia, Fever, Bronchitis, General debility[54]
<i>Polygonatum verticillatum</i> L.	Carminative & Wounds	Aphrodisiac, Gastric complaints, Nervine tonic, Wound healing [23,54]
<i>Prunus persica</i> Stokes.	*Headache	Ear infection of children [28]; Antipyretic, Brain tonic [21]
<i>Psidium guajava</i> L.	Mouth blisters (astringent)	Mouth blisters [51,59]
<i>Punica granatum</i> L.	*Anaemia, Cough, Cold, Source of Vitamin 'C'	Diarrhoea, Dysentery, Piles[21]
<i>Ranunculus repens</i> L.	*Boils & Intestinal pains (Nas Palatana)	--
<i>Rephanus sativus</i> L.	Jaundice	Jaundice [52]
<i>Rheum emodi</i> Wall.	Fever & Wounds	Cuts, Fracture, Wounds [57]
<i>Rhododendron arboreum</i> Smth	Liver complaints, Tonic	Heart tonic [28], Stomach diseases [21]
<i>Rosa moschata</i> Hermm.	*Boils, Cuts, Eye diseases, Wounds	Leucorrhoea, Bleeding, Pregnancy termination [16]
<i>Rubia cordifolia</i> L.	*Fever	Blood purifier, Joints pain, Leucorrhoea, Cuts, Wounds, Insect sting [54]
<i>Rubus ellipticus</i> Smith.	*Fever & Stomach ache	Blood pressure, Diarrhoea [21]
<i>Saussurea costus</i> (Falc.) Lipsch.	Cough, Dysentery, Fever ,Stomach ache,	Asthma, Cough, Dysentery, Fever [53,54]; Abdominal pain [59]
<i>Setaria italica</i> L.	*Chicken pox & Measles	--
<i>Silene vulgaris</i> (Moench)Garcke	*Fever & Removal of <i>Ascaris</i> (Anti-parasitic)	Asthma, Bronchitis [16]
<i>Swertia angustifolia</i> Buch.-Ham. ex D.Don.	*Skin ailments Fever	Pneumonia, Cold, Cough, Fever [54]
<i>Taraxacum officinale</i> Weber.	*Snake bite & To increase lactation in mulching animals	Headache, acts as a heart tonic and blood purifier [28,59]
<i>Tegetes erecta</i> L.	*Ear infection, Fever & Wounds	Muscular pain, Piles, Ulcer, Wound healing [23]
<i>Terminalia chebula</i> (Gaertner) Retz.	Carminative, Constipation, Digestive problems, Diarrhoea, Purgative	Asthma, Digestive problems, Diarrhoea, Purgative[16,28]
<i>Thalictrum foliosum</i> DC.	*Eye infection (White-dot-cataract), Insect repellent	Gastric trouble, Used to control external parasites[21]
Botanical Name	Uses Report in Study Area	Earlier Uses Report from Uttarakhand
<i>Thymus serpyllum</i> L.	*Asthma, Joint pain, Spices & condiments Digestive & stomach problems,	Laxative, Stomachic [21]; Cough, Epilepsy, Itching & skin diseases, Menstrual disorders, Swelling [54]
<i>Trifolium repens</i> L.	*Headache & Skin disease of dogs	Astringent [16]
<i>Trigonella foemum-graecum</i> L.	Carminative, Constipation, Diabetes, Indigestion, Joint pain & Obesity,	Diabetes, Rheumatism [16,52]
<i>Urtica dioica</i> L.	*Joint pain, Warm & nutritive effect	Skin diseases, Boils [21,28]; Bone fracture [54]
<i>Verbascum thapsus</i> L.	*To increase lactation in milching animals Boils	Cough, Fever, Rheumatism [21]; Boils Eye cataract [54]
<i>Viola betonicifolia</i> J.E. Smith	*Snake bite	Blood diseases, Cough, Fever, Skin [58]
<i>Viola canescens</i> Wall. Ex Roxb	*To increase lactation in milching animals	Cough, Cold, Malaria, Jaundice [23,48]

<i>Vigna mungo</i> L.	*Fracture	--
<i>Zanthoxylum armatum</i> DC	Carminative, Cough & cold, Toothache, Spices & condiments	Toothache[28]; Constipation, Gastric disorders [21,23,51]
<i>Zingiber officinale</i> Rosc. (Zingiberaceae)	Cough & cold	Asthma, Cough & cold [23]

*New ethno-medicinal use reports documented from study sites.

Figures

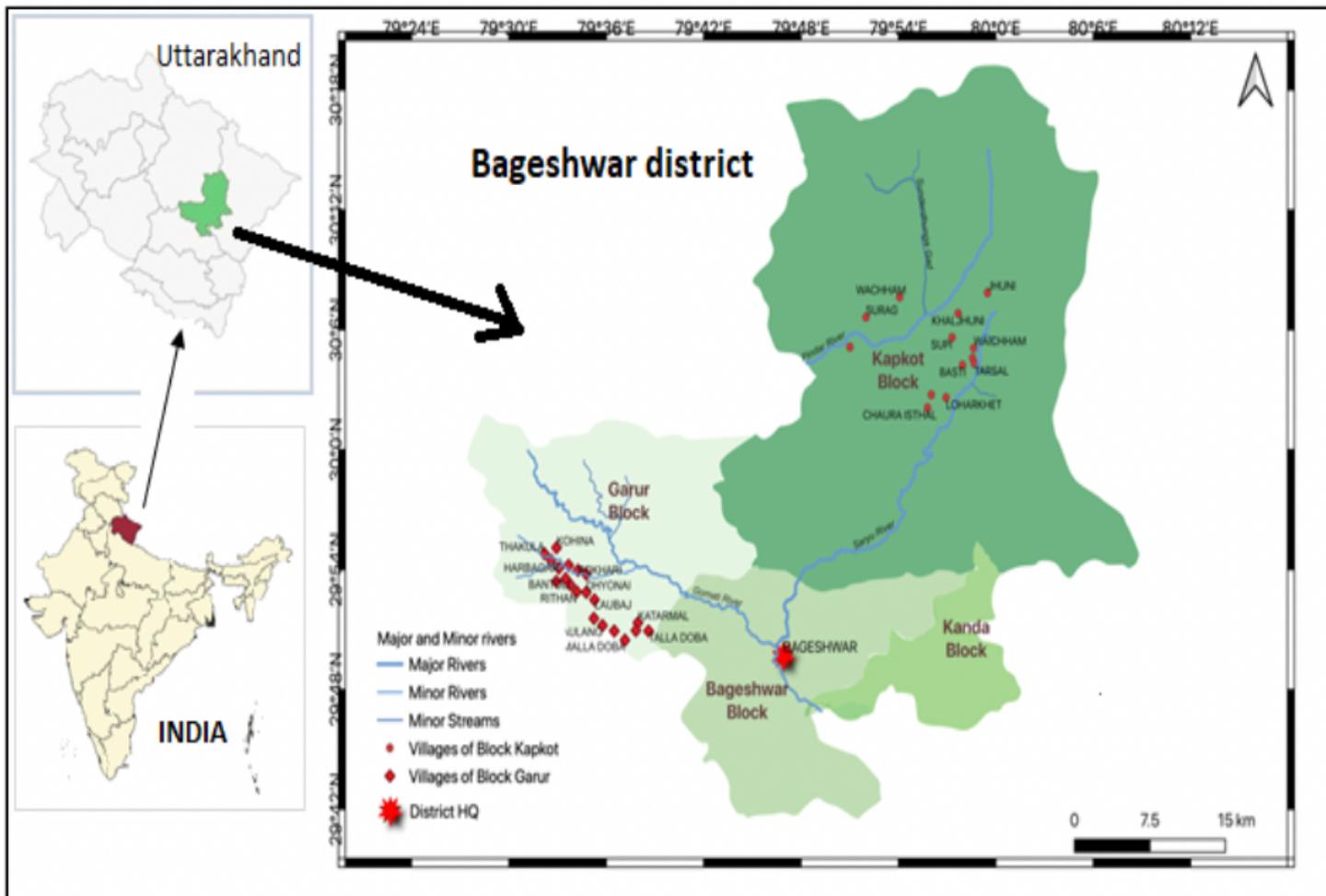


Figure 1

Study area and villages in Garur and Kapkot Bolcks of District Bageshwar, Uttarakhand, India

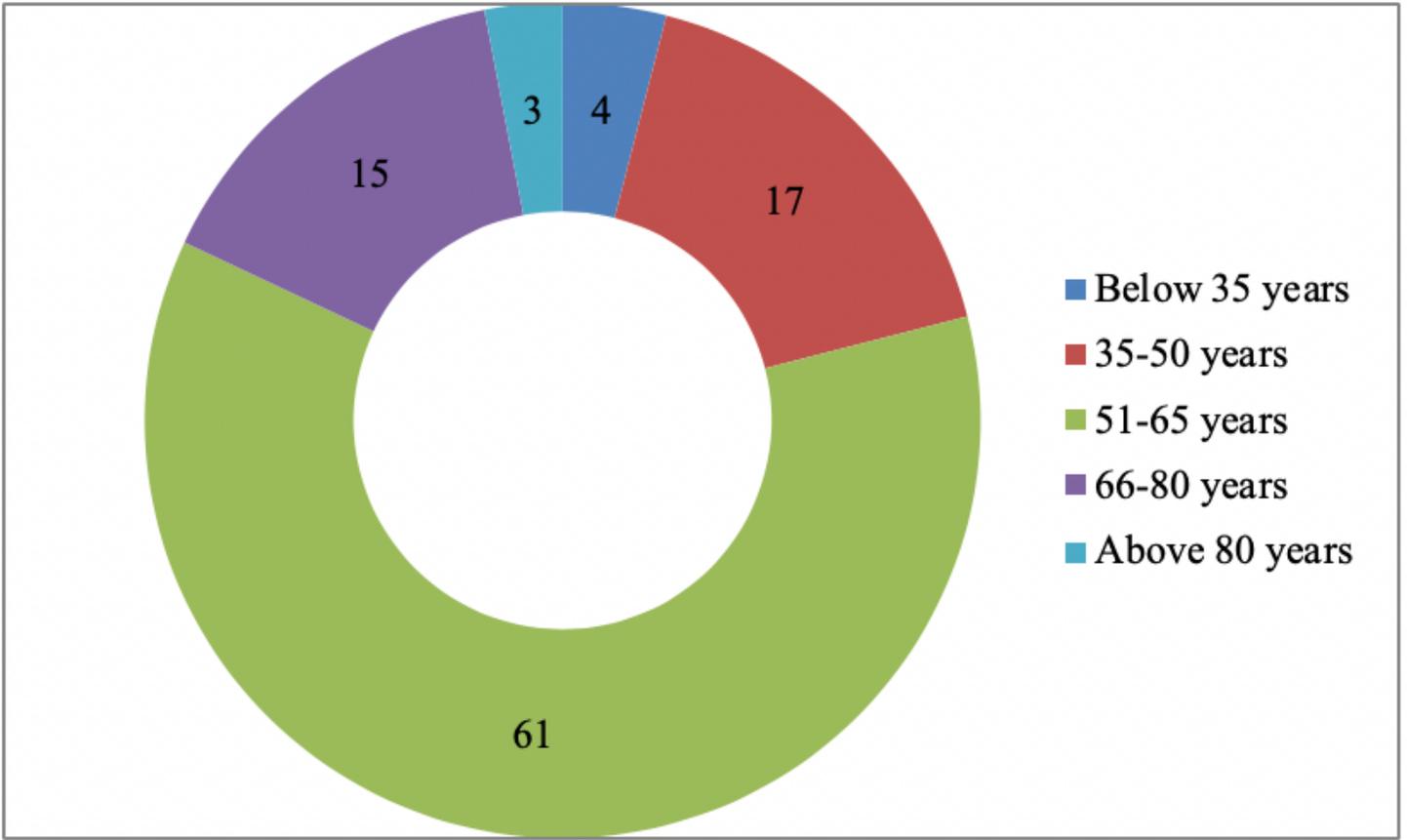


Figure 2

Age distribution of respondents

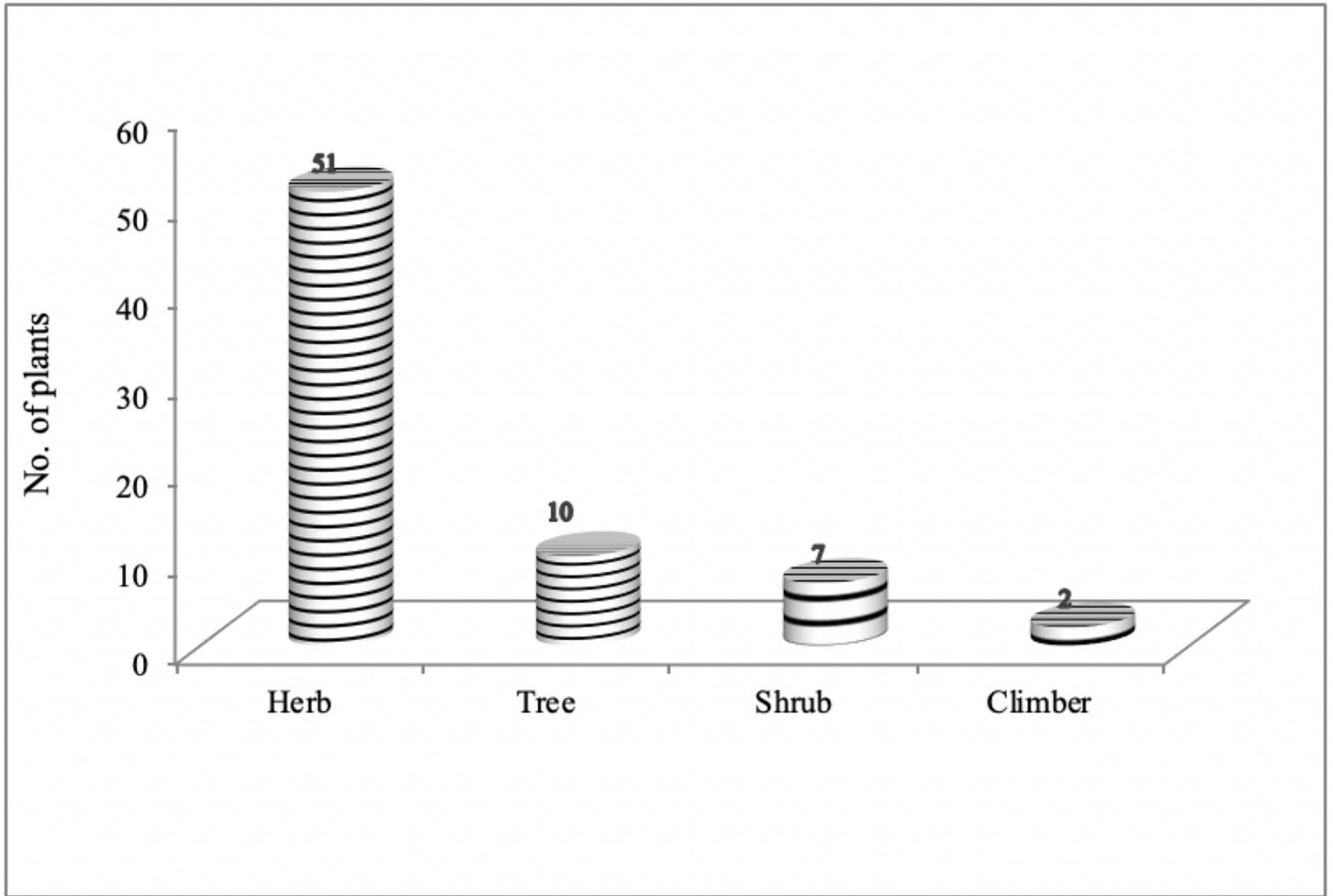


Figure 3

Distribution of medicinal plants in different life form

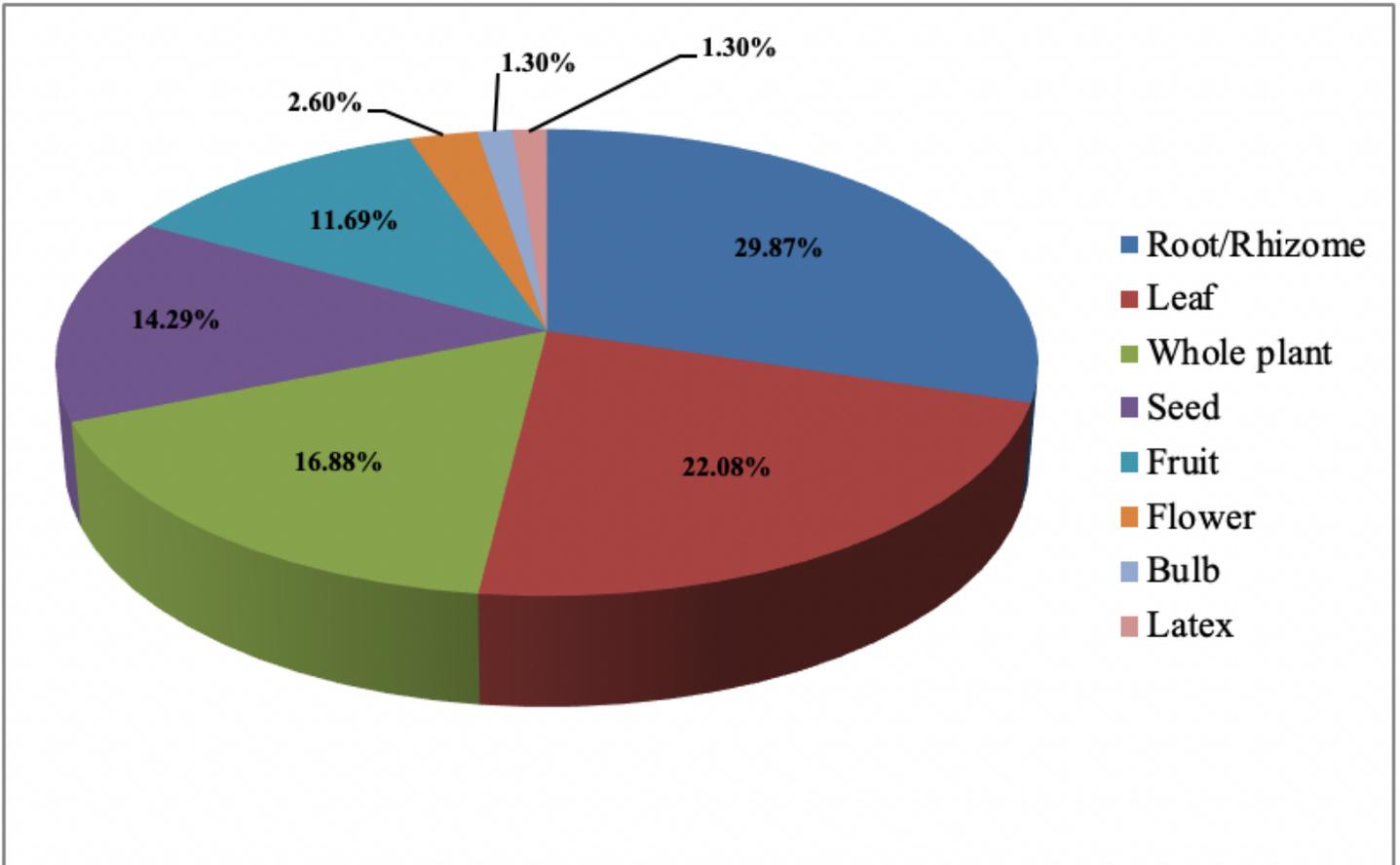


Figure 4

Plant part used in preparation of medicine

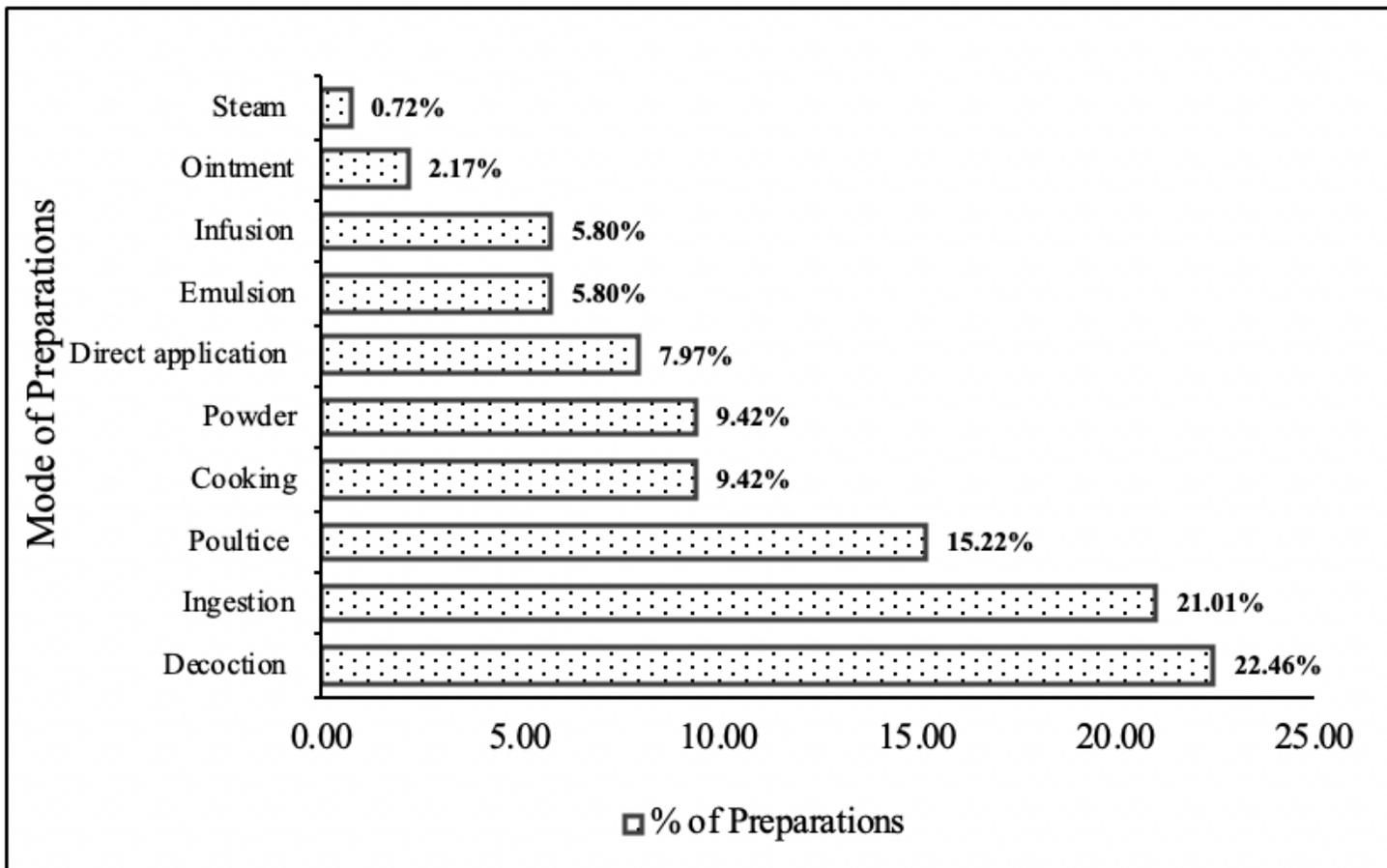


Figure 5

Processing of plant parts in preparation of medicine

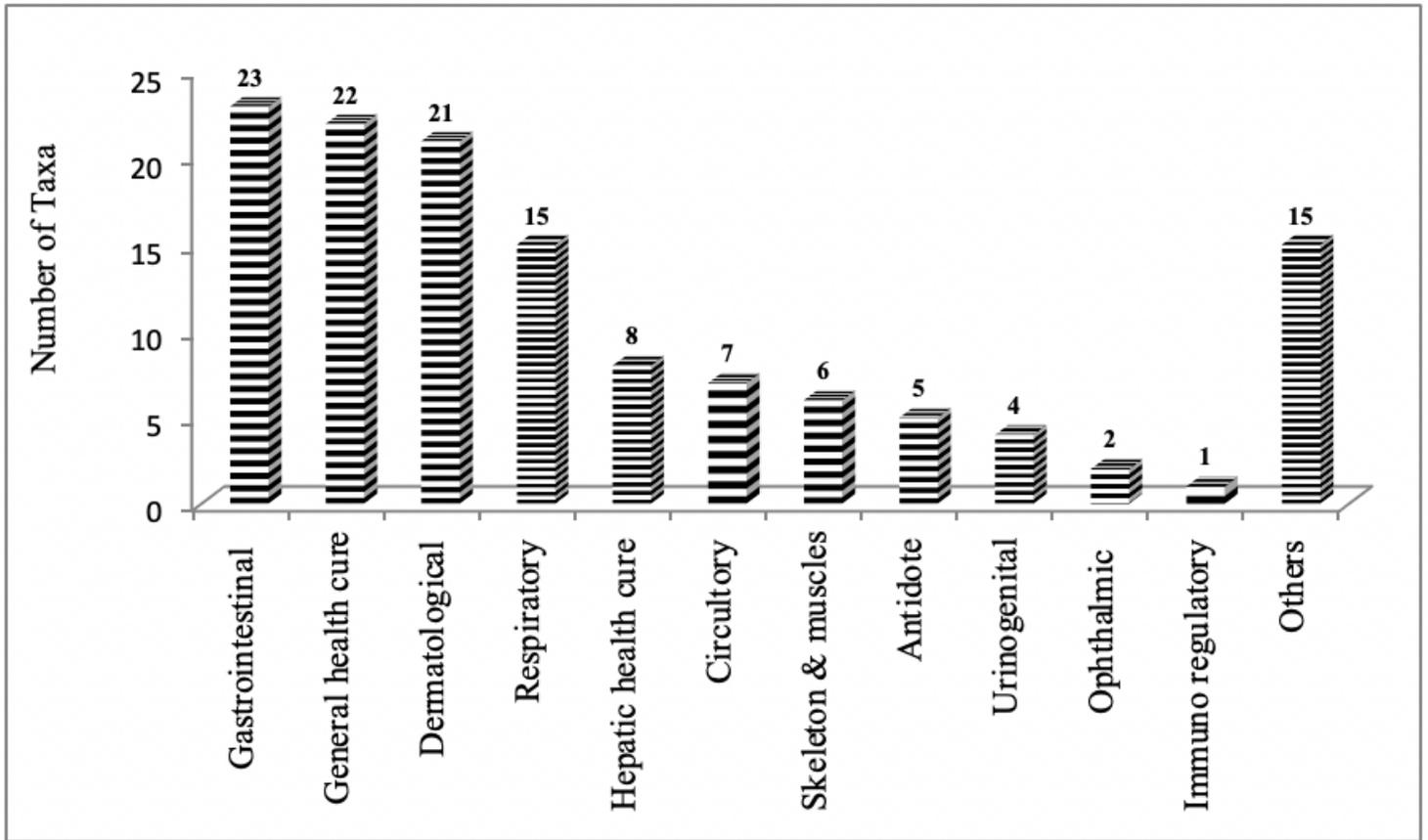


Figure 6

Distribution of medicinal plants in different ailments category

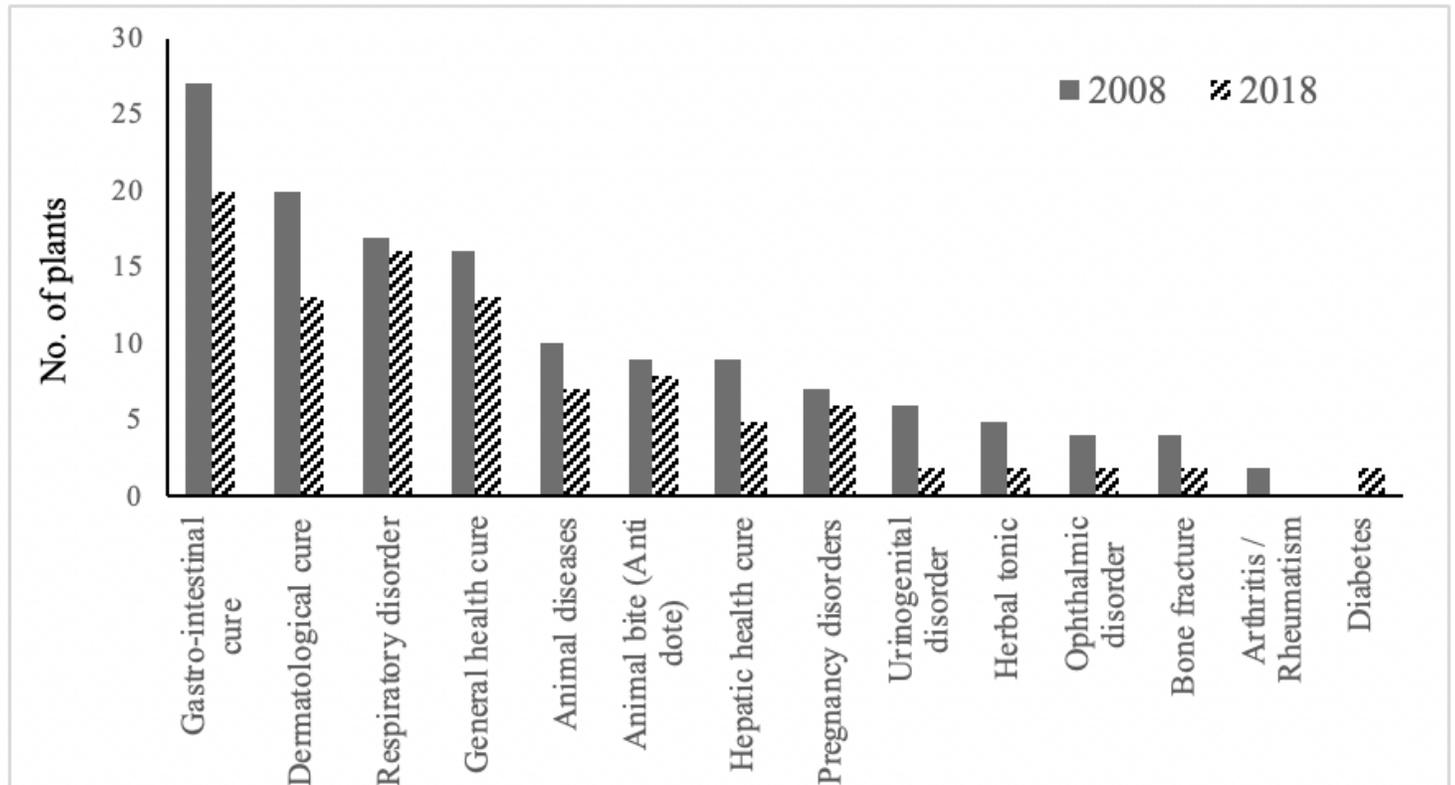


Figure 7

Past (2008) and present (2018) use of plants in traditional healthcare system

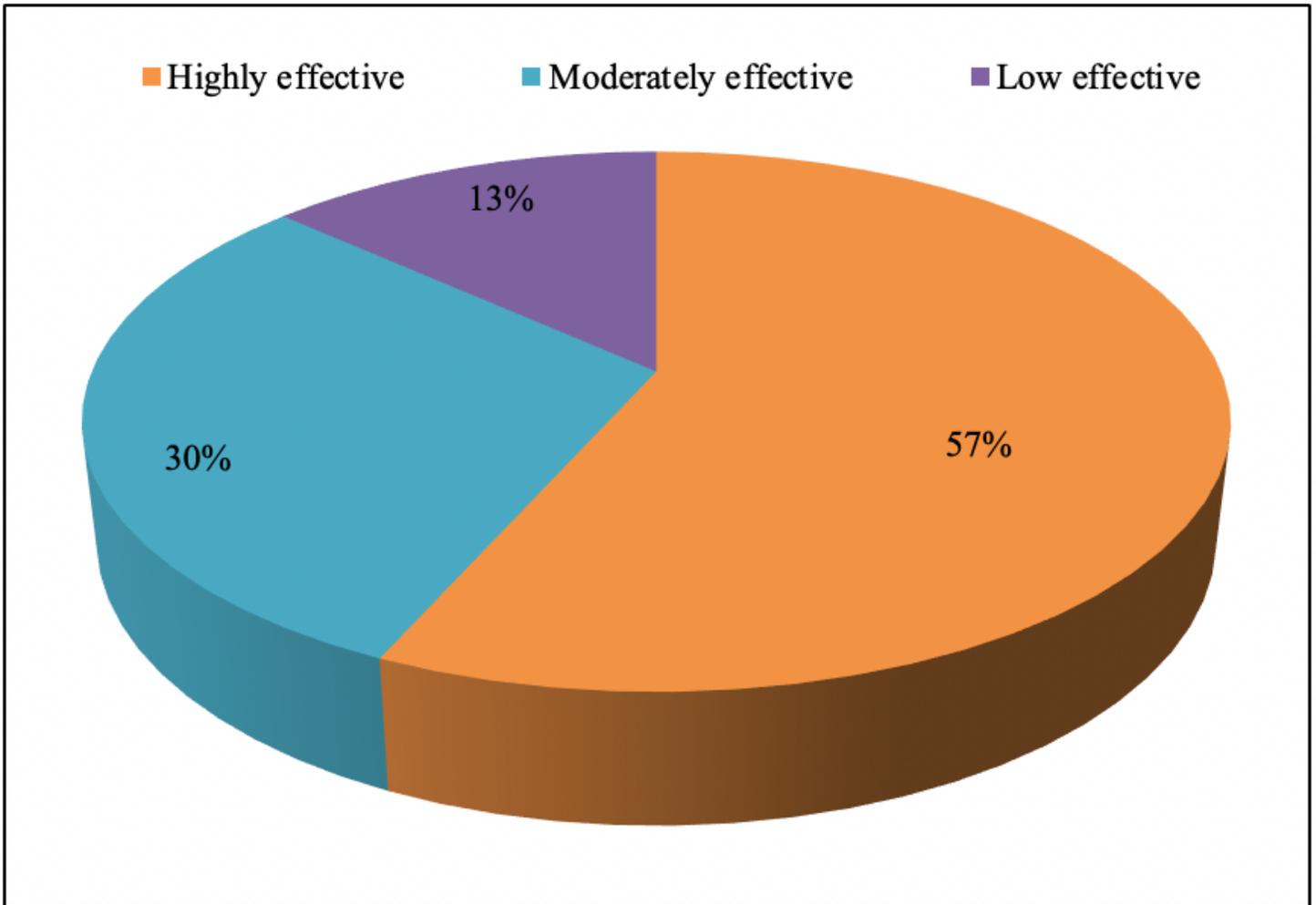


Figure 8

Community view points on effectiveness of traditional healthcare system