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## Indigenous medicinal practices of rural communities in respect use of the non-timber forest products in Indian central Himalaya

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### Abstract

Indian Central Himalayan region is characterized by a rich heritage of indigenous medicine practices. Indigenous medicinal practices in rural communities of the area are being passed orally hence gradually vanishing in new generations. Documentation of such knowledge accessible with rural communities is vital. Failure to document this indigenous knowledge would represent a tremendous economic and scientific loss to mankind. Therefore, an effort has been made to document the Indigenous medicinal practices in which Non-timber Forest Products (NTFPs) are used by rural communities in this region of India. The study revealed that women possess more knowledge than men about this therapy. About 89.33% people using various plants parts (NTFPs), mostly collected from wild forest, of medicinal plants as healers of different ailments. Their preference for wild sources compared to planted medicinal plants due to the belief that plant parts collected from the former are more effective than those from planted ones. People of the region are frequently using NTFPs of 70 plant species as medicine for curing 28 common diseases, representing to 45 families, and majority of them are collected from the forest and life form wise belonged to trees followed by shrubs, Herb and climber. The species richness is highest for Moraceae; leaves are identified as most frequently used NTFP having medicinal values and contributes in curing a verity of diseases.

**Keywords:** Indian Central Himalayan region, Indigenous medicinal practices, Non- Timber Forest Products (NTFs), Orally, Rural communities

### 1. Introduction

The Indian Central Himalaya (ICH) region is synonymous with the Himalayan state of Uttarakhand of which 64.81% is covered by forest. The geographical area of the region is dispersed within an altitudinal variation ranging from 200 m to more than 8000 m amsl. Because of its unique geography and diverse climatic conditions this region of India harbors the highest number of plant species known for medicinal properties among all the Indian Himalayan states <sup>[1]</sup>. Majority (69.45%) of the human population in the state lives in rural areas with 16,826 rural settlements of which 81% has a population of less than 500<sup>2</sup>. The rural settlements are located in the altitudinal limit of 1400 to 3500 masl. The health care infrastructure in rural areas, served by state sponsored medical system, has been developed as a three tier system based on the population norms that in Hilly / Tribal / Difficult area Sub-Centre 3000, Primary Health Centre 20,000, Community Health Centre 80,000. Each primary health center caters more then 31,000 people. Therefore, the inhabitants in rural areas of Uttarakhand are still dependent on the Vaidyas (traditional herbal practitioners) for treating disease due to isolation and relatively poor access to modern medical facilities <sup>[3]</sup>. Women constituting about 52% population of rural area play a vital part in the mountainous region of Uttarakhand state.

Non-timber Forest Products (NTFPs) collected from different plants from forest have been used in virtually all cultures as a source of medicine. About 80% of the population of the developing world depends on NTFPs for their primary health and nutritional needs <sup>[4]</sup>. The forests of India have been the source of invaluable medicinal plants since man became aware of the preventive and curative properties of plants and started using them for human health care. In India, about 80% of the rural population uses medicinal herbs or indigenous systems of medicine. Indigenous people living on their traditional territory largely rely on medicinal plants for healthcare and they are therefore rich in ethnopharmacological knowledge. Documenting indigenous knowledge through ethno botanical studies is important for the

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conservation of biological and cultural diversities as well as sustainable utilization of resources. Therefore, establishment of the local names and indigenous uses of plants has significant potential societal benefits. The main characteristics of Indigenous medicinal practices is their hereditary nature and evolution in the families, groups and communities. The knowledge passed in the oral, practice and imitation process, in the absence of records, gradually vanishing in new generations. Studies have been carried out on the use of the medicinal plants in the ICH in general and Uttarakhand state in particular [5, 1, 6, 7]. The botanical knowledge on medicinal NTFPs accessible from the forest of the area is not yet entirely documented. The study is an attempt to analyze the uses of NTFPs in indigenous medicinal practices in the region by rural communities and to disseminate the research findings for the sustainable utilization of the medicinal NTFPs for the future research and development of medicines in Central Himalayan region of India.

## 2. Materials and methods

### 2.1 Study area and socio-economic profile of the people

The study area was located in 28° 43' 55" to 30° 30' 12" N latitude and 78° 44' 30" to 80° 45' E longitude of Central Himalayan region. Kumaun Himalaya is altitudinally divisible

into subtropical (300 to 1500 m), temperate (1500 to 3500 m) and alpine (>3500 m) zones. Annual rainfall peaks at about 1200 m altitude (4100 mm) and gradually declines to 670 mm at 2700 m. There are five main forest types found in the whole of Kumaun Himalaya [8]. These are sal forests (found up to 1200 m), pine forests (1200-2400 m), oak forests (1300-3300 m), mixed broadleaf forest (foothills to 3300 m) and *Betula utilis* forest (3200-3500 m). The numbers of villages in the districts of study area with population 500 or less varies from 87.9% to 75.3%. About 82% inhabitants of the study area (Kumaun) residing in rural area [2]. In this region, as men in most of the families work outside due to lack of industries or other avenues of employment, women toil through the day, starting with the family works, nurturing children and livestock, going out for fodder, fuel, drinking water and NTFP collection for sustaining livelihood. Therefore women (constituting about 52% population of rural area [2] are the life and blood of the economic structure [9]. For present study, four villages each, in five districts were randomly selected for the survey (Table 1). These study sites are known for its rich biodiversity and the rural communities of these areas primarily depend on Indigenous medicinal practices for curing different diseases they suffer from.

**Table 1:** Study sites selected in Central Himalayan Region of India

S. No.	Name of Districts	Location	% Villages	Study sites with Pop.< 500 <sup>2</sup>			
1	Nainital	Between Longitude 80°14'E to 78°80' E to Latitude 29° 05' N and 29°05'N.	87.9	Musabunger	Bajoon	Dolmar	Saur
2	Bageshwar	Between 29o 42'40" to 30o 18'56" N Latitude and 79o 23'to 80.9oE Longitude.	86.7	Nadigaon	Chhatina	Khatigaon	Loharkhat
3	Almora	Between 29° 36' N Latitude and 79° 30' E Longitude.	86.0	Silpad	Berchula	Dol	Damer
4	Pithoragarh	Between 29.4° to 30.3° N Latitude and 80° to 81° E Longitude.	84.8	Tajam	Munsiyari	Madkot	Dharmgarh
5	Champawat	Between 290 5'to 290 30' in N Latitude and 790 59'to 800 3' E longitude.	75.3	Khatikhan	Amauli	Banbasa	Devidura

### 2.2 Methodology

#### Documentation of Medicinal Plants and Indigenous Knowledge

The study was carried out in the year 2011 to generate information in all the sites in different seasons (winter, summer and rainy). Following methods were adopted to document and to generate relevant information on the indigenous knowledge of medicinal plants in the study area.

**I Questionnaire Survey:** Taxonomic and ethno botanical information for curing different ailments by rural communities and indigenous conservation approaches was generated with the help of questionnaire following [10]. Randomly selected households (Women and men) from all age groups in the study site were surveyed to gather information. They were interviewed; their methods for curing of various diseases, area of collection of medicinal plants.

**II Participatory Research Method:** In addition to questionnaire survey, participatory research method was used to document the information on all aspects of medicinal plants including conservation practices adopted by the community. Group meetings were conducted in the villages with local peoples and healers and other resource persons. Prior informed consent was obtained with the help of community workers [10] that facilitated interviews, discussions with the local people and sharing their traditional knowledge. The identification of plants was done using the standard

literature and various floras viz. Forest flora of Chakrata, Dehradun and Saharanpur forest division [11], Forest flora of Kumaun [12], Flora Nainitalensis [5]. Herbaria of GBPHID, Kosi- Katarmal, Almora were also consulted to cross check the identity of plant species. Indigenous uses of plants were also gathered from the secondary sources. The data collected was analyzed in MS Excel spread sheet were utilized to make simple calculations, determine proportions and draw graphs.

### 3. Results and discussion

The present study investigates the indigenous medicinal practices and the associated indigenous knowledge preserved by rural communities in respect use of the non-timber forest products in Indian Central Himalaya. A total of 150 respondents selected randomly were interviewed which includes both men (41.33%) and women (58.67%) from all age groups. Knowledge on use of plants in Indigenous medicinal practices by rural communities of the region documented through questionnaire revealed that women possess more knowledge (92.04%) than men. Gender is a widely observed factor in studies on knowledge distribution, and women tend to know more about medicinal plants than men [13]. Such influence is usually related to their work activities in backyards and home-gardens, as well as to care for family health in general [14]. The main occupations of villagers were agriculture followed by manual labour work and service sector (doing jobs in public and private sector) (Table 2).

**Table 2:** Gender and occupation of respondents

Name of district	Rural respondent	Gender				Occupation			
		Male	KIMP	Female	KIMP	AG	SE	ML	RG
Almora	30	12	11	17	8	13	6	9	2
Pithoragarh	30	11	9	18	12	15	6	5	4
Bageshwar	30	13	11	16	10	12	7	8	3
Champawat	30	12	10	16	11	14	5	9	2
Nainital	30	14	12	14	7	10	11	6	3
Total	150	62	53	81	48	64	35	37	14
% of total reespondent		41.33	85.48	92.04	58.00	42.67	23.33	24.67	9.33

\*KIMP - Knowledge of the Indigenous medicinal practices, AG - Agriculture, RG - Rearing of goats, SE - Service (Government or private sector), ME - Manual labour.

On the basis of information gathered about the use of NTFPs as medicine for different diseases by the rural people indicates that those who are using these for the last 40 years and above in their own way constituted 19.34% and undoubtedly they are very old in age presently. They inherited this knowledge from their ancestors (Table 3). It means prior to the popularity of modern medicine people were exclusively dependent on indigenous medicines and the knowledge passes through generation to generation. The hills of the Utrakkhand are still replete with examples of local community using the indigenous (traditional) knowledge for medicines <sup>[15]</sup>.

**Table 3:** History of Indigenous medicinal practices with reference to medicinal plants

Year*	Frequency	Percentage
01 – 10	9	6
11 – 20	25	16.67
21 – 30	41	27.33
31 – 40	46	30.66
41 and above	29	19.34

\* Range of Years from where people acquired Indigenous medicinal practices

The Table 3 also represents the percentage of people who acquired knowledge from different sources under specified levels of age. The data of selected villages showed that 30.66% people of age range 56-65 years using medicinal plants as antidotes of different diseases. The people of this age group constituted 1.33, 23.34 and 7.33 percent who acquired knowledge from training, ancestors and imitation respectively. As a whole 61.33 percent people learned through their ancestors or inherited, 9.50 percent people learned through training and 29.17 percent learned through imitation. Age is another frequent factor analyzed in ethnobotanical studies; the elders tend to have more knowledge of medicinal plants <sup>[13]</sup>. This also concludes that the system of using indigenous medicines has a long history with the rural communities of the Central Himalaya. The information regarding the use of indigenous medicines revealed the fact that 89.33% people using various plants parts (NTFPs), mostly collected from wild forest, of medicinal plants as healers of different ailments. The respondents reported their preference for wild sources compared to planted sources of medicinal plants due to the belief that plant parts collected from the former are more effective than those from planted ones. NTFPs are not only easy to transport but have a relatively long shelf life, the minimal side effects, and are of low cost. Herbal medicines even today play an important role in rural areas with various locally produced drugs still being used as home remedies for various diseases <sup>[16]</sup>. The people who are using indigenous medicinal practices acquired knowledge through different

sources as only 9.50% people received training to learn about this system, 61.33% people learned through their ancestors and 29.17% people learned through imitation that is a mixture of parents and accidental learning processes (Table 4).

**Table 4:** Distribution of age level and source of knowledge in terms of percentage

Source of knowledge	Age groups					Total
	25 - 35	36 – 45	46 - 55	56 - 65	66 and above	
Training	0.67	2.67	3.33	1.33	1.50	9.5
Parents/ ancestors	3.33	8.67	15.33	23.34	12.00	61.33
Imitation	2.00	5.33	8.67	7.33	4.50	29.17
Total	6	16.67	27.33	30.66	19.34	100

They have the view that medicinal plants were in use form time immemorial. The knowledge of traditional healing practices mainly by the use of wild plants is now fast disappearing not only because of modernization, globalization, and the tendency to change traditional lifestyles. But also due to being passed orally from generation to generation and without any written document. Failure to document this indigenous knowledge would represent a tremendous economic and scientific loss to mankind <sup>[18]</sup>. The study about the effectiveness of Indigenous medicinal practices, 42.67% people have told that it is highly effective while 37.50% have the opinion that it is moderately effective and 21.00% viewed it is low effective in the sense that it takes more time to heal the diseases (Table 5).

**Table 5:** Distribution of the degree of effectiveness of Indigenous medicinal practices

Degree of effectiveness	Frequency	Percentage
Highly effective	64	42.67
Moderately effective	56	37.33
Low effective	30	19.84

This indicates that indigenous communities of ICH region are still dependent upon wild plants for their primary health care and have acquired fairly good knowledge of properties of plant resources due to their constant and close association with forest. Many rural people throughout the world rely on medicinal plants because of their effectiveness, lack of modern healthcare alternatives and cultural preferences. Knowledge of the rural communities of study areas, who use NTFPs of as many as 70 plant species belonging 47 families distributed with in different life forms are extensively being used for medicinal purposes for curing 28 common ailments, is very rich (Table 6, Figure 1).

**Table 6:** Uses of Non-Timber Forest products in traditional phytotherapy

S. No.	Family /Binomial	Local Name	Life Form	NTFPs used	Use in Indigenous medicinal practices
	Acanthaceae				
1	<i>Justicia adhatoda</i> Linn.	Basa	Shrub	L	Bronchitis Cough and Piles.
	Agavaceae				
2	<i>Agave Americana</i> Linn.	Rambans	Shrub	L	Diarrhea.
	Anacardiaceae				
3	<i>Mangifera indica</i> Linn.	Aam	Tree	FL	Asthma. Diabetes.
	Annonaceae				
4	<i>Annona Squamosa</i> Linn	Sharifa	Tree	LF	Wound healing, Diabetes, Tumors and Cancer.
	Apocynaceae				
5	<i>Holarrhena antidysenterica</i> Linn.	Korya	Tree	LB	Fever, Diarrhea. Piles, Skin diseases, Dysentery.
	Apocynaceae				
6	<i>Carissa spinarum</i> , A. DC	Karonda	Shrub	F	Fever.
7	<i>Catharanthus roseus</i> G. Don	Sadabhar	Shrub	L	Diabetes.
	Asclepiadaceae				
8	<i>Calotropis procera</i> (Ait.) R.Br.	Akha	Shrub	FL	Leprosy, Fever with enlarged liver and Skin diseases.
	Asteraceae				
9	<i>Artemisia nilagirica</i> (Clarke) Pamp.	Nagdona	Shrub	WP	Skin diseases, Burns, Wounds.
10	<i>Artemisia roxburghiana</i> Wallich ex Besser	Kunja	Shrub	WP	Fever and Skin diseases.
11	<i>Xanthium strumarium</i> Linn	Gokru,	Shrub	WP	Malarial fever and Tuberculosis.
	Berberidaceae				
12	<i>Berberis asiatica</i> Roxb.ex D.C	Kilmora	Shrub	R	Diabetes and jaundice.
	Betulaceae				
13	<i>Betua utilis</i> Dn Don	Bhojpatra	Tree	B	Piles.
	Boraginaceae				
14	<i>Arnebia benthami</i>	Balchari	Herb	R	Hair disease.
	Caesalpiniaceae				
15	<i>Cassia fistula</i> L.	Amaltas	Tree	RB SB	Wounds, Ulcers. Leprosy, Jaundice, Skin diseases.
16	<i>Cassia tora</i> Linn.	Chakund	Shrub	R	Diabetes.
	Cannabaceae				
17	<i>Cannabis sativa</i>	Bhang	Herb	L	Piles.
	Celastraceae				
18	<i>Celastrus paniculatus</i> Wild.	Kaunya	Shrub	S,R	Leprosy, Paralysis, Snake bite.
	Combretaceae				
19	<i>Terminalia chebula</i> Retz.	Harar	Tree	F	Leprosy, Piles, Heart disease.
20	<i>Terminalia belerica</i> (TB) (Gaertn.) Roxb.	Bahada	Tree	F	Piles and Diarrhea.
21	<i>Terminalia arjuna</i> (Roxb) ex. DC	Arjun	Tree	BL	Cardiovascular ailments, Kidney stones, Diabetes.
	Cupressaceae				
22	<i>Cupressus torulosa</i> D.Don	Surai	Tree	C	Oil in inflammatory wounds.
	Ericaceae				
23	<i>Rhododendron arboretum</i> Smith	Buransh	Tree	F	Heart and Diarrhea, Blood dysentery.
	Euphorbiaceae				
24	<i>Emblia officinalis</i> Gaerth	Aonla	Tree	B	Diarrhea, Dysentery and Jaundice.
25	<i>Mallotus philippinensis</i> Muell.	Ruina	Tree	F	Thread, Hook, Round, Tape worms.
	Fabaceae				
26	<i>Bauhinia variegata</i> Linn.	Quairal	Tree	B	Ulcers and skin diseases.
27	<i>Pterocarpus marsupium</i> Roxb.	Vijay sal	Tree	HW, L R	Diabetes, Skin diseases. Leprosy.
28	<i>Desmodium elegans</i> DC	Shalaparni	Shrub	R	Nervous disorder.
	Fagaceae				
29	<i>Quercus leucotrichophora</i> cam	Banj	Tree	RH	Diarrhea, Asthma.
	Hippocastanaceae				
30	<i>Aesculus indica</i> (Linn.)	Pangar	Tree	S	Skin diseases, Rheumatic pain.
	Salicaceae				
31	<i>Populus ciliata</i> Wall. ex Royle	Chirata	Tree	B	Tonic, Stimulants, Blood purifier.
	Saxifragaceae				
32	<i>Bergenia ligulata</i> (Wall.) Engl	Silphori	Herb	R	Kidney stone, Piles, Paralysis.
	Juglandaceae				
33	<i>Juglans regia</i> L	Akhor	Tree	L B	Constipation. Bone fractures.
	Lamiaceae				
34	<i>Mentha arvensis</i>	Podina	Herb	L	Constipation.
35	<i>Ajuga parviflora</i> Benth.	Ratpatia	Herb	L	Diabetes.
	Liliaceae				

36	<i>Asparagus racemosus</i> Willd.	Shataver	Herb	R	Diabetes.
	Meliaceae				
37	<i>Albizia lebbek</i> Benth.	Siris	Tree	SB	Infantile dysentery, Cough, Ulcer, Bronchitis, Leprosy.
38	<i>Toona ciliata</i> M. Roem.	Toon	Tree	L	Gum, Teeth.
39	<i>Azadirachta indica</i>	Neem	Tree	YT	Pyorrhea.
	Moraceae				
40	<i>Ficus racemosa</i> Linn. Juss.	Gular	Tree	F	Diabetes.
41	<i>Ficus benghalensis</i> Linn.	Bargad	Tree	B	Diabetes.
42	<i>Ficus carica</i> L.	Anjiir	Tree	F B	Paralysis, Spleen, Piles. Fruits and bark for diabetes.
43	<i>Ficus palmata</i> Forsskal.	Bedu	Tree	F,L	Constipation, Skin diseases.
44	<i>Ficus auriculata</i> L.	Timla	Tree	F	Diabetes.
	Menispermaceae				
45	<i>Tinospora cordifolia</i> (Willd.) Miers ex Hook.	Giloy	Climber	ST,L	Fever, Jaundice, Diarrhea, Cancer, Diabetes, Skin disease.
	Myrtaceae				
46	<i>Syzygium cumini</i> (h.) Skeels	Jamun	Tree	B,S F,L	Anaemia, Diabetes. Dysentery, Bleeding gums.
	Myricaceae				
47	<i>Myrica esculenta</i> Buch Ham.	Kaphal	Tree	B	Cough, Asthma, Cancer.
	Oleaceae				
48	<i>Fraxinus micrantha</i> Lingelsheim	Ango	Tree	B	For liver enlargement, Jaundice.
	Pinaceae				
49	<i>Cedrus deodara</i> Roxb. Loud.	Dyar	Tree	B	Piles, Arthritis.
50	<i>Pinus roxburghii</i> Roxb.	Chir	Tree	R,GN	Snake bite, Increase Urine flow.
	Poaceae				
51	<i>Cenchrus biflorus</i> Roxb.	Kutta ghash,	Shrub	ST	Easy child birth.
	Punicaceae				
52	<i>Punica granatum</i> Linn.	Anar	Shrub	F,B	Piles, Dysentery, Bronchitis.
53	<i>Punica granatum</i> L.	Darim	Tree	FB	Cough, Diarrhea.
	Primulaceae				
54	<i>Primula denticulata</i> Sm.	Jayan	Herb	F,R	Diabetes, Urinary ailments.
	Rosaceae				
55	<i>Pyracantha crenulata</i> D. Don	Ghigharu	Shrub	F	Burns.
56	<i>Prunus persica</i> Stokes	Aaru	Tree	F FL	Blood pressure, cholesterol, Kidney Jaundice.
57	<i>Pyrus pashia</i> Buch. & Ham.	Mehal	Tree	F	Constipation.
58	<i>Prinsepia utilis</i> Royle	Danthali	Shrub	S	High blood pressure, Cholesterol.
	Rubiaceae				
59	<i>Rubia cordifolia</i> Linn.	Mangitha	Climber	WP	Diabetes.
	Rutaceae				
60	<i>Murraya koenigii</i> (L.) Spreng.	Gandhela	Tree	L	Diarrhea, Diabetes.
61	<i>Aegle marmelos</i> (L.) Corr.	Bel	Tree	L F	Diabetes. Constipation.
62	<i>Zanthoxylum armatum</i> DC.	Timur	Shrub	S BR	Constipation. Cleaning teeth.
63	<i>Murraya koenigii</i> (L.) Spreng.	Karipata	Shrub	L	Diabetes.
	Sapindaceae				
64	<i>Sapindus mukorossi</i> Gaertn.	Reetha	Tree	S	External parasites, Skin diseases and Snakebite.
	Taxaceae				
65	<i>Taxus baccata</i> Linn	Thuner	Tree	SB, L	Tuberculosis, Anti- cancer.
	Urticaceae				
67	<i>Boehmeria regulosa</i> Wedd.	Genthi	Tree	B	Bone Fracture.
	Urticaceae				
68	<i>Urtica dioica</i> Linn.	Sisuna	Shrub	R L	Diabetes, Goiter.
	Ulmaceae				
67	<i>Holoptelea integrifolia</i> (Roxb.)	Papri	Tree	B	Rheumatic pain.
	Verbenaceae				
68	<i>Vitex negundo</i> Linn.	Nirgundi	Shrub	L,Fl	Asthma, Diarrhea, Fever.
69	<i>Clerodendrum serratum</i> Linn.	Banbakr	Shrub	L	Herpes.
	Zingiberaceae				
70	<i>Hedychium spicatum</i> Buch. Ham Ex. Smith	Van Haldi	Shrub	R	Liver disorder, Fever, Diarrhea.

L-Leaves, F-Fruit, R-Root, Fl- Flower, B-Bark, S-Seed, ST-Stem, SB-Stem bark, RB-Root bark, BR-Branch, C-Cones, WP-Whole plant, HW-Heart wood, R- Resin, GN-Green needle, RH- Rhizome, TW- Twig.

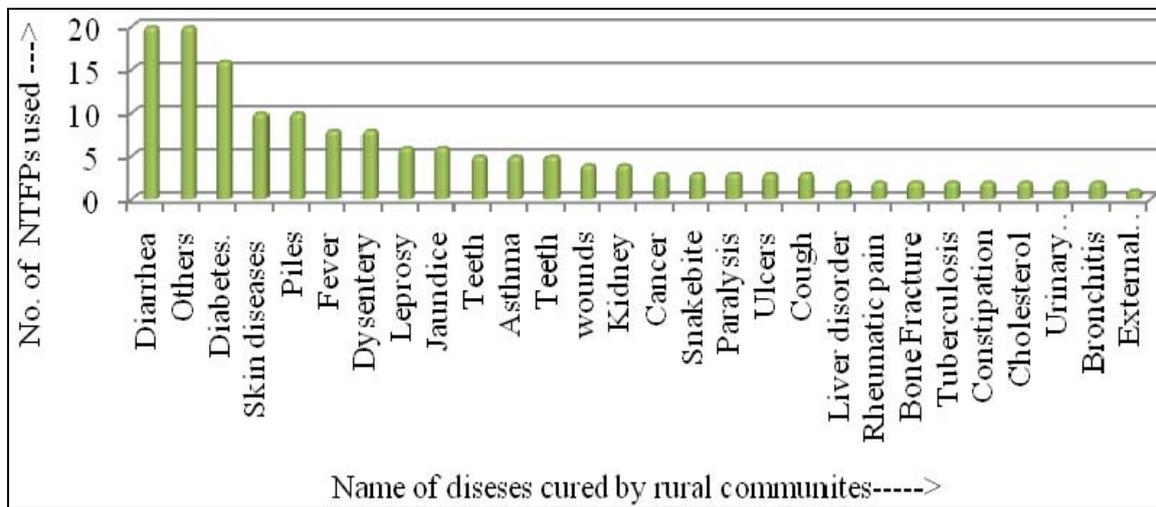


Fig 1: Traditional Phytotherapy uses of NTFPs in Central Himalaya

All the reported species grew naturally in the area, reflecting the social importance of the local floristic resources mountain region of Uttarakhand Himalaya is a well known treasure of medicinal plants diversity, since antiquity as many plant species of this area have medicinal value and are being used by local people for curing a variety of ailments [19], for each family species wise binomial names are followed by local names, habit of plant, NTFPs (plant parts) and their use in indigenous medicinal practices. Broadly these medicinal plant species can be classified into different categories on the basis of life forms viz., Trees, herbs, shrubs, creepers and grasses. Out of the total recorded plants majority of them are belonged to trees (57%) followed by shrubs (31%), Herb (9%), and climber (3%) (Table 6, Figure 2).

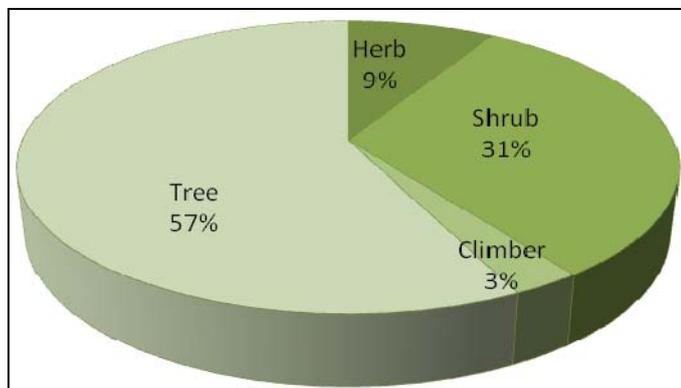


Fig 2: Life form-wise distribution of recorded plants

The reported species are presented with a highest representative of 5 species (7.14%) Moraceae, 4 species (5.71%) Rosaceae, 3 species each (25.71%) Apocynaceae, Asteraceae, Combretaceae, Fabaceae, Meliaceae, Rutaceae, followed by 2 species each (17.14%) Caesalpiniaceae, Euphorbiaceae, Lamiaceae, Verbenaceae, Pinaceae, Punicaceae. Besides these, 31 species (44.30%), 1 species each, were found to be used in Indigenous medicinal practices by local communities. Different parts of these plants (NTFPs): leaf, stem, bark, root, tuber, flower, fruit, seeds, etc. have been used for curing different disease. The utilization pattern of NTFPs (plants parts) shows that leaves were the most commonly used parts of plants (28%), followed by Fruit, Corn (22%), Fruit bark, Stem bark (18%), Root, Rhizome (11%), Seeds (7%), whole plant extract (5%), flower (4%) and others parts (5%) having medicinal values and contributes in curing a

variety of diseases (Table 6, Figure 3).

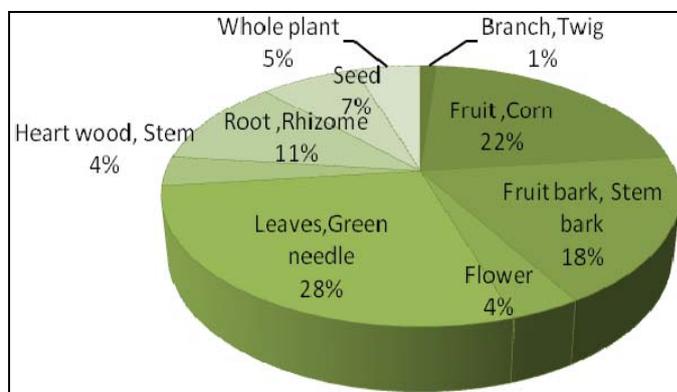


Fig 3: Utilization pattern of NTFPs of the documented plants by rural communities

The use of leaves in indigenous medicine practices offers the advantage of utilising the biodiversity on a sustainable basis over the root or whole plant, since the leaves are regenerative, relative easiness of finding this plant part and they not only remain green but also available in plenty for most periods of years. The reason why leaves are used mostly is that they are easily accessible and are active in photosynthesis and production of metabolites [20]. It was observed that, most of the remedies consisted of single plant part and more than one method of preparation. However, many of the remedies consisted of different parts of the same plant species to treat single or more diseases. Out of observed plant species NTFPs of 62.86% plants are used to cure more than one ailment mostly related to diarrhea, diabetes and skin etc. Reported [21] that a single plant may be used for curing more than one ailment.

This study has generated some fundamental data for NTFPs from medicinal plants found in ICH forests are extraordinarily important for curing diseases in remote areas where modern health services do not exist, further studies aimed at conservation of bio-diversity and traditional knowledge system.

**4. Conclusions**

Indigenous uses of medicinal plants are time-tested and used by people worldwide. The therapy has negligible side effects and cost effective compare to other system of medicine. The indigenous knowledge, hidden among the local people, can

therefore play considerable role in sustainable use, development and conservation of the natural resources, particularly on the face of fast growing globalization the strengthening of the systems would be more advantageous to generate potential for enterprise and sustainable development of the region. There is an urgent need to preserve, document the traditional knowledge before some of them disappear from the areas, or before these inhabitants swing over to modern system of remedies.

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