



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2017; 6(3): 617-623
Received: 08-03-2017
Accepted: 09-04-2017

Karuna Joshi

Department of Agricultural
Communication, G.B. Pant
University of Agriculture &
Technology, Pantnagar-263145,
U S Nagar, Uttarakhand, India

Neelam Bhardwaj

Department of Agricultural
Communication, G.B. Pant
University of Agriculture &
Technology, Pantnagar-263145,
U S Nagar, Uttarakhand, India

Correspondence**Karuna Joshi**

Department of Agricultural
Communication, G.B. Pant
University of Agriculture &
Technology, Pantnagar-263145,
U S Nagar, Uttarakhand, India

Traditional health care practices: A women centric study in lesser Himalayan region of Uttarakhand (India)

Karuna Joshi and Neelam Bhardwaj

Abstract

The present paper records the plants of ethnomedicinal significance occurring in the lesser Himalayan region of Uttarakhand which may be used in future as plant resources for modern system of medicine. The aim of this study was to analyze the level of knowledge and use of medicinal plants by the women folk and contribute to build a database about useful plants of the region. The Exploratory Research Design was used for the study. A sample of 150 respondents from 08 villages was selected using Stratified Random Sampling through proportional allocation method. The interview was conducted personally by the investigator with the women farmers individually at house hold level about their prevailing traditional health care system. The respondents identified 34 medicinal plant species commonly used as medicine. Majority of the women (PKW=90-99 per cent) had knowledge about *Ocimum sanctum* L, *Zingiber officinale* Rosc, *Curcuma longa* L., *Punica granatum* L, *Ficus palmate* Forsk., and *Cannabis sativa* L for medicinal value. Leaf, fronds, twigs, and flowers for remedies were used from maximum plants (15). Most commonly treated disease category was dermatological problems using 17 plants followed by gastrointestinal problems. For Jaundice and eye problems there was greater homogeneity among women (WCF=1.0). Out of 34 medicinal plants, 18 were observed as bench medicinal plants as they were identified by more than five women for treating same or any given disease. From these bench-medicinal plants 10 plants were in 100% fidelity level category.

Keywords: Traditional health care, lesser Himalaya, medicinal plants, women experts, Uttarakhand

Introduction

Medicinal plant based remedies are considered the oldest forms of health care known to mankind on this earth and still maintained as a great traditional medicines [1]. The World Health Organization has defined traditional medicine as "the sum total of knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures that are used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illnesses." [2] Traditional health practices have emerged from multiple origins through a process of realization and provide a key to understand the traditional and modern system. About 80% of the people in developing countries use traditional medicine for primary health care [3] mainly because it is easily affordable, readily available, cheap and philosophically compatible with indigenous cultures. Out of the total 4, 22, 000 flowering plants reported from the world [5], more than 50,000 are used for medicinal purposes [6]. In India, more than 43% of the total flowering plants are reported to be of medicinal importance [7]. Utilization of plants for medicinal purposes in India has been documented long back in ancient literature [8, 9]. However, organized studies in this direction were initiated in 1956 [10]. At present such studies are gaining recognition and popularity due to loss of traditional knowledge and declining plant population. Right from its beginning, the documentation of traditional knowledge especially on the medicinal uses of plants, has provided many important drugs of modern system of medicine [11, 12]. Plants are the only source of medicine and well-being in remote hilly areas of the state. However, information on the uses of medicinal plants by hill women as traditional medicines has not been documented from various interior areas of Himalaya such as in lesser Himalayan region. Due to various developmental activities of the Government, this area is undergoing rapid transformations and is therefore becoming more market oriented. The role of market economy in eroding traditional knowledge has been documented earlier in Himalayan regions [13]. Thus many important drug discoveries may be lost in absence of proper documentation. In view, the present study was conducted aiming to identify knowledgeable resource women and document their knowledge on the utilization of medicinal plants in Lesser Himalayan region of Nainital district (Uttarakhand).

Materials and methods

Study area

Universe of this study consists of the lesser Himalayan areas of Uttarakhand State which is located between latitudes 29°5'-31°25'N and longitudes 77°45'-81°E covering a geographical area of 53,485 km of which 93 percent is mountainous. The region comprises of two administrative units viz., *Garhwal* (northwest portion) and *Kumaon* (southeast portion). *Kumaon* division includes six districts namely, *Almora*, *Bageshwar*, *Champawat*, *Nainital*, *Pithoragarh*, and *Udham Singh Nagar*; while *Garhwal* division consists of seven districts, viz., *Dehradun*, *Haridwar*, *Pauri*, *Rudraprayag*, *Tehri* and *Uttarkashi*. The state has 78 *tehsils*, 95 development blocks, 671 *Nyaya Panchayats*, 7,227 *Gram Panchayats* and 15,793 inhabited villages. The major source of livelihood of the population in the state is agriculture in which almost 70 percent of the population is engaged. The subsistence nature of agriculture in the hill districts provides nothing but a low and unstable annual income to the people, causing a sizeable out-migration of male members from the family, leaving behind a large number of female-headed households. Nainital district forms part of *Kumaon* Division of Uttarakhand State. It lies between 29°0' and 29°36'21" N latitudes and 78°50'53" and 80°0' E longitudes. The district comprises of five *tehsils* namely, *Nainital*, *Ramnagar*, *Dhari*, *Haldwani* and *Kosya Kutoli* and eight developmental blocks viz., *Haldwani*, *Ramnagar*, *Kotabagh*, *Dhari*, *Betalghat*, *Ramgarh*, *Bhimtal* and *Okhalkanda*. The total population of the district is 7,62,909 as per 2011 census. The density of population is 225 persons per sq. km. The geographical area of the district is 4251 km²

Two remote blocks of *Nainital* district viz. *Dhari* and *Okhalkanda* were selected purposely for the study. From these two blocks *Selalekh*, *Majyuli*, *Jalananeel pahari*, *Mahtoliyagaon*, *Thali*, *Harinagar*, *Katna* and *Suni* villages with number of households listed 97, 160, 45, 61, 151, 125, 121 and 212 respectively, were selected for the study. A sample of 150 respondents from above mentioned villages was selected using Stratified Random Sampling through proportional allocation method. Out of 150 respondents, 15 were selected from *Selalekh*, 25 from *Majyuli*, 07 from *Jalananeel pahari*, 09 from *Mahtoliyagaon*, 23 from *Thali*, 19 each from *Harinagar* and *Katna*, and 33 from *Suni*. All respondents were listed and the predetermined number of respondents was selected randomly by simple random sampling without replacement. Among the selected families, those women who shouldered the major responsibility in managing household chores and participated in natural resource management activities were selected as respondents of the study. The 'Exploratory Research Design' was used for the study. This research design is used for obtaining initial information about a new topic. The objective of exploratory research is to gather preliminary information that will help define problems and suggest hypotheses. Finally, the women respondents of the study area were interviewed by researcher individually with the help of semi-structured interview schedule at household level. In the present study, non-participatory observation method was used. The researcher used to start the observation from early morning and continued till evening. Their local terminology was also recorded and then used in the message. They were observed for the activities they were engaged in, both at home and outside and the way they conducted these activities. Observation facilitated comprehensive and effective interviewing, in turn supporting other modes of data

collection.

Statistical analysis of quantitative data is an important aspect of research work, as it facilitates the condensation and interpretation of collected data, interpretation of complicated data in simple form, helps in predicting future trends, in establishing relationship between different variables and provides sound base of policy formulation. Data were analyzed in the light of objectives set forth for the study. The statistical techniques used for data analysis were as follows:

Percentage of Knowledgeable Women (PKW)

It denotes the women who have knowledge about the plant species available in their vicinity. This was calculated using following formula:

$PKW = (\text{Number of women citing species during the interview} / \text{Total number of women interviewed}) \times 100$

Fidelity Level

Fidelity level (FL) for only those medicinal plants was calculated which were cited by more than five women (bench medicinal plants) for being used against same disease. It was worked out to know the percentage of women claiming the use of a certain plant for the same major purpose for the most frequently reported disease using the following formula:

$FL = (N_1/N_2) \times 100$

FL= Fidelity Level

N₁= Number of women that claim use of a particular plant to treat a particular disease

N₂= Number of women that use the plants as a medicine to treat any given disease

Women consensus factor (WCF)

Successive free listening was used to interview 20 knowledgeable informants providing data for the consensus analysis. Knowledgeable women were selected following standard interview protocols [14-16]. Out of 150 women interviewed, 20 knowledgeable women were selected. During this interview documentation of all possible information about a specific plant was done and divided according to utilitarian perspective and local name. The women were also asked to group the plant specimens into different illness categories and also requested to show the plant species on site. Interviews were conducted in the regional Hindi language. The questionnaire was used to obtain information on medicinal plants with their local names, parts used, mode of preparation and administration. Calculation of a women consensus factor (WCF) for testing homogeneity on the women's knowledge was done as per method provided by Trotter and Logan [17] using following formula:

$WCF = NUR - N / NUR - 1$

Where; NUR = Number of use-reports by women for particular illness usage, where a use-report is a single record for use of a plant mentioned by an individual and N = Number of specie used for a particular illness category for all women. The factor provides a range of 0 to 1, where a high value denotes a good indicator for a high rate of women consensus. The majority of illness types are grouped into predefined ethnomedicinal categories, with the additions of a few other illness categories (Table 3), which were commonly mentioned during interviews because they were prevalent in the women of the region. The use of "general categories" is adopted here as recommended by other ethnobotanical researchers [18, 19].

Results and discussion

Medicinal plants of the area

The information in Table 1 deals with the traditional knowledge of local people about the health care practices, which is mostly done by the use of locally available plants/plant parts. Women in the study area were using about

34 such plants for health care. During present study, it was found that the knowledge about utilization of medicinal plant species is generally accumulated by observations and experiences and transferred to the next generation by words of mouth [20-22].

Table 1: Traditional knowledge of medicinal plants

Sl.no	Botanical name (Family) / Local name	Parts used and mode of application
1	<i>Acorus calamus</i> L (Araceae)/ghurbach	Root decoction is taken as Anthelmintic and pyretic. Root paste is applied on boils and blisters.
2	<i>Aegle marmilos</i> (L.) Corhzrns (Rutaceae) /Bel	Fruit pulp syrup is used for stomach problems.
3	<i>Alliaria petiolata</i> (Beib) Cavara & Goande (Brassicaceae) / Lahsunia	The plant extract is used as a disinfectant, diuretic and to heal wounds
4	<i>Aloe barbadensis</i> Wall. (Xanthorrhoeaceae) / Ghiqwar	Leaf gel is used in skin problems and juice is used as tonic
5	<i>Asparagus racemosus</i> Willd (Asparagaceae) / Satawar	Crushed roots boiled with milk, sugar is taken to increase lactation in women and cattle, and in debility.
6	<i>Berberis aristata</i> DC. (Berberidaceae)/ Kilmoda	Stem bark juice in eye trouble and root bark for diabetes
7	<i>Bergenia ligulata</i> (Wall.) Engl.(Saxifragaceae) / Silphod	Leaves are used orally as tonic, antidesyntric and wormicide. Roots are used externally for Boils, wounds, burns.
8	<i>Cannabis sativa</i> L (Cannabinaceae) /Bhang	Seeds and leaf juice are used against stomach problems
9	<i>Cinnamomum tamala</i> Nees. (Lauraceae) /Tej patta	Leaves are carminative, used in colic and diarrhea
10	<i>Crataegus oxyacantha</i> L.(Rosaceae)/ Ghingaru	Fruits are used as heart tonic
11	<i>Curcuma longa</i> L.(Zingiberaceae) /Hald	Rhizome paste is applied externally on skin, also taken orally in inflammations after any accident.
12	<i>Cynoglossium lanceolatum</i> Forsk (Gentianaceae)/ Litakur	Root decoction taken orally against vomiting. Leaf paste is used as antiseptic on wound.
13	<i>Dioscorea bulbifera</i> L. (Dioscoreaceae) /Gethi	Tubers are used in asthma, bronchitis and leaves are used as febrifuge
14	<i>Diplazium esculentum</i> Retz.(Athyriaceae) / Lingura	Fronds are used to facilitate easy child birth and as vegeTable particularly in cold and cough. Rhizomes against stored grain pests
15	<i>Evernia prunastri</i> (L.) Ach (Parmeliaceae)/Jhula	Whole mass is externally used as paste for healing wounds and infections.
16	<i>Fagopyrum esculentum</i> Moench. (Polygonaceae)/Ugal	Seed powder taken as blood purifier and against gallstone.
17	<i>Ficus cunia</i> Buch-Ham. ex Roxb.(Moraceae) /Dudhil/Khin	Fruits are edible and laxative. Seeds are used when the grass is stuck in the throat of cattle.
18	<i>Ficus palmate</i> Forks.(Moraceae)/ Bedu	Fruits are used as laxative Fresh fruit paste is used externally for boils and small tumors. Latex for removal of warts and spines from skin.
19	<i>Juglens regia</i> Linn.(Juglandaceae)/Akhori	Fruit bark, leaves and green twigs are used for cleaning teeth.
20	<i>Hedichium spicatum</i> Buch. Ham. ex Smith(Zingiberaceae)/Kapur kachri	Rhizomes are eaten in respiratory and digestive disorders, fevers and as liver tonic.
21	<i>Micromeria biflora</i> Benth (Lamiaceae) /Garurh buti	Root paste is used to treat toothache and plant paste is used against wounds
22	<i>Morechella esculenta</i> L.(Morchelaceae) / Mith Cheun	The fruiting body of mushroom is eaten to treat diabetes and for strength
23	<i>Myrica esculenta</i> Buch.-Ham. ex Don(Myricaceae))/Kaphov	Fruits are eaten for nutrition and as laxative. Stem bark used against inflammation and leaf/flower extract for digestive and respiratory disorders and for head ache.
24	<i>Nerium indicum</i> Miller (Apcynaceae) /Kaner	Twig extract in earache and as antiseptic. Leaf extract is applied on skin inflammation
25	<i>Ocimum sanctum</i> L.(Lamiaceae)/Tulsi	Leaf decoction is taken against different fevers, cold and cough
26	<i>Punica granatum</i> L(Punciaceae)/Darhim	Dried pericrap is chewed in cold and cough. Seeds are eaten.
27	<i>Rubus ellipticus</i> Sm.(Rosaceae)/ Hinsalu	Fruits are eaten which checks stomach disorders and to control diabetes.
28	<i>Solena amplexicaulis</i> (Lam.)Gandhi (Cucurbitaceae)/Mat kakeri	Roots and seeds are used in cold and cough, stomach disorder and leaves for skin allergy.
29	<i>Tinospora cordifolia</i> (Willd.) Miers(Menispermaceae)/ Giloy	Stem decoction is used in Jaundice and to cure fever.
30	<i>Terminalia bellerica</i> Roxb (Combretaceae) /bairh(bahad	Fruits powder is used against stomach problems.
31	<i>Urginea indica</i> (Roxb.)Kunth.(Liliaceae) /Ghesua	The bulbs are used in cold cough, asthma and as cardiac tonic.
32	<i>Urtica diosia</i> L (Urticaceae)/Sisun	Roots used against fever. Leaf juice is given to diabetes and in urinary disorders.
33	<i>Zanthozylum alatum</i> Roxb.(Rutaceae)/Timur	Seeds decoction in cold and cough,stem pieces for tooth cleaning
34	<i>Zingiber officinale</i> Rosc,(Zingiberaceae)/ Aada	Juice of crushed rhizome in honey is used in cold and cough, as carminative and digestive stimulant.

In this study, the taxonomic classification indicated that the women of the study area were aware of 34 plant species belonging to 34 genera of 27 families by local name (Table 2). With the similar altitudinal gradient (300 to 2400 m) in Garhwal region of Central Himalaya, a total of 61 plants

species used by the local inhabitants for curing various diseases (e.g., dysentery, cold, scabies, rheumatism, cholera, malarial fever, etc.) were recorded [24]. From Haigad watershed area of Kumaon Himalaya, 32 medicinal plant species belonging to 26 families were observed [25].

Table 2: Taxonomic categorization of plants identified

Sl. No.	Taxonomic Categories	Number
1.	Families	27
2.	Genera	34
3.	Species	34

Majority of the women (PKW=90-99 per cent) had knowledge about *Ocimum sanctum* L, *Zingiber officinale* Rosc, *Curcuma longa* L., *Punica granatum* L, *Ficus palmate* Forks., and *Cannabis sativa* L for medicinal value. Since these plants are used widely for home consumption in the study area and lot of people are engaged in cottage industry based on these plants as well as selling raw economic parts; these are well known to the women as they depended on it for their livelihood and health care. *Berberis aristata* DC, *Dioscorea bulbifera* L. and *Urtica diosia* L are next known to

80-90 per cent women because *Berberis aristata* is commonly used for bio-fencing and fuel wood while rest are common as vegetable among the inhabitants. *Rubus ellipticus* Sm., an evergreen plant of the region is valued for its juicy fruits as well as for medicine, is known to 73 per cent women. Six plants as medicine are known to 60-80 per cent and 08 plants to 50-60 per cent women. The plants which are used solely for medicine are known to least number of women (PKW=30-40%). Here it is important to note that *Fagopyrum esculentum* Moench, which is used as most favored leafy vegetable and seeds flour on religious ceremonies in the region, is known for its medicinal value to least women (PKW=30%). The study reveals that majority of women have ethnomedicine knowledge about those plants which are used for other purposes like fragrance, vegetable, fuel wood, spices and fodder (Table 3).

Table 3: Percent knowledgeable women (PKW) about medicinal plants and their use

Sl.no	Botanical name (Family)	Local name	Women citing same species	PKW (%)
1	<i>Acorus calamus</i> L (Araceae)	Ghurbach	65	43
2	<i>Aegle marmilos</i> (L.) Corhzrns (Rutaceae)	Bel	80	53
3	<i>Alliaria petiolata</i> (Beib) Cavara & Goande (Brassicaceae)	Lahsunia	60	40
4	<i>Aloe barbadensis</i> Wall. (Xanthorrhoeaceae)	Ghiqwar	95	63
5	<i>Asparagus racemosus</i> Willd (Asparagaceae)	Satawar	78	52
6	<i>Berberisaristata</i> DC. (Berberidaceae)	Kilmoda	130	87
7	<i>Bergenia ligulata</i> (Wall.) Engl.(Saxifragaceae)	Silphod	45	30
8	<i>Cannabis sativa</i> L (Cannabinaceae)	Bhang	140	93
9	<i>Cinnamomum tamala</i> Nees. (Lauraceae)	Tej patta	98	65
10	<i>Crataegus oxyacantha</i> L.(Rosaceae)	Ghingaru	140	93
11	<i>Curcuma longa</i> L.(Zingiberaceae)	Hald	145	97
12	<i>Cynoglossium lanceolatum</i> Forsk (Gentianaceae)	Litakur	95	63
13	<i>Dioscorea bulbifera</i> L. (Dioscoreaceae)	Gethi	120	80
14	<i>Diplazium esculentum</i> Retz.(Athyriaceae)	Lingura	100	67
15	<i>Evernia prunastri</i> (L.) Ach (Parmeliaceae)	Jhula	75	50
16	<i>Fagopyrum esculentum</i> Moench. (Polygonaceae)	Ugal	45	30
17	<i>Ficus cumia</i> Buch-Ham. ex Roxb.(Moraceae)	Dudhil/Khin	102	68
18	<i>Ficus palmate</i> Forks.(Moraceae)	Bedu	140	93
19	<i>Juglens regia</i> Linn.(Juglandaceae)	Akhor	79	53
20	<i>Hedichium spicatum</i> Buch. Ham. ex Smith (Zingiberaceae)	Kapur kachri	45	30
21	<i>Micromeria biflora</i> Benth (Lamiaceae)	Garurh buti	51	34
22	<i>Morechella esculenta</i> L.(Morchelaceae)	Mith Cheun	65	43
23	<i>Myrica esculeanta</i> Buch.-Ham. ex Don(Myricaceae))	Kaphov	80	53
24	<i>Nerium. indicum</i> Miller (Apcynaceae)	Kaner	92	62
25	<i>Ocimum sanctum</i> L.(Lamiaceae)	Tulsi	148	99
26	<i>Punica granatum</i> L(Punciaceae)	Darhim	137	91
27	<i>Rubus ellipticus</i> Sm.(Rosaceae)	Hinsalu	110	73
28	<i>Solena amplexicaulis</i> (Lam.)Gandhi (Cucurbitaceae)	Mat kakeri	63	42
29	<i>Tinospora cordifolia</i> (Willd.) Miers (Menispermaceae).	Giloy	77	51
30	<i>Terminalia bellerica</i> Roxb (Combretaceae)	Bairh/bahad	82	55
31	<i>Urginea indica</i> (Roxb.)Kunth.(Liliaceae)	Ghesua	89	59
32	<i>Urtica diosia</i> L (Urticaceae)	Sisun	132	88
33	<i>Zanthozylum alatum</i> Roxb.(Rutaceae)	Timur	141	94
34	<i>Zingiber officinale</i> Rosc.(Zingiberaceae)	Aaad	146	97

Parts used and formulations

Among plant parts used, twigs, which include leaf, fronds, twigs, and flowers were used from maximum plants (15)

following Fruit (9), Root and Stem/ rhizome/ tuber (each of 8 plants, Seeds (6), whole plant and bark (3plants each), Latex and Bulb 1 plant each (Table 4).

Table 4: Number of plants according to parts used for remedies

Sl. No.	Plant Parts used for remedies	Number of Plants
1.	Twigs	15
2.	Seeds	6
3.	Stem	8
4.	Latex	1
5.	Bulb	1
6.	Bark	3
7.	Root	8
8.	Fruit	9
9.	Plant	3

Leaves have been found as the most widely used plant part accounting for 32 plant species in a total of 68 reported plants [26]. The present study showed that most of the formulations were prescribed in Extract form (paste, extract/ juice/ gel) 18, followed by Decoction: 6 and Powder: 2 (Table 5).

Table 5: Number of formulations made from plant parts that are used in different forms.

Sl. No.	Form	Number of formulations
1.	Powder	2
2.	Decoction	6
3.	Extract	18

In another study juice, raw items, paste and decoction of plant species were the common method of usages [27]. In spite of the establishment of modern western styled medical centers,

traditional practices on the uses of medicinal plants will continue to play a significant role in socio-cultural life of people.

Diseases categories

The total 36 diseases were clustered into 11 usage categories (Table 6). It was observed that most commonly treated disease was dermatological (boils/ blisters/ warts/ wounds/ inflammation/ Allergy) using 17 plants followed by gastrointestinal (digestive/ desyntric/ vomiting/ laxatives/ anthelmintic):15, respiratory(asthma/ bronchitis/ could/ cough): 13, general health (strength/ cardiac/ debility/ blood purifier Gynacal/ Gall stone): 12, fever (6), infections (5), ache/ pain (4), ENT(2), urinary problems (2), one plant each for jaundice and eye trouble.

Table 6: Diseases categories in relation to medicinal plants used

Disease category	Number of Taxa (N)	Diseases
Gastrointestinal	15	Digestive/desyntric/vomiting/laxatives/ anthelmintic
Jaundice	01	Jaundice
Urinary	02	Urinary disorders, Semen passing in Urine
Eye problems	01	Eye trouble, Eye inflammation
Dermatological	17	Boils/blisters/wounds/inflammation/ Allergy
Fever	06	Fever due to any recession, Malarial fever
Infections	05	Disinfectants/antiseptic/pesticides
Respiratory	13	Asthma/bronchitis/could/cough
Ache/pain	04	Tooth ache, head ache
ENT	02	Ear, nose, throt problems
General health	12	Strength/cardiac/debility/bloodPurifier/Gynecal/Gall stone

Fidelity Level

The plant based remedies for frequently reported diseases leads to higher fidelity level (FL) value and those with low number of reports have lowest FL values. In the highest FL value category (100 per cent), the medicinal plants are *Asparagus recimosus*, *Crataegus oxyacantha* L., *Ocimum sanctum* L., *Berberis aristata* DC., *Ficus cunia* Buch.-Ham. ex oxb., *Urginea indica* (Roxb.) Kunth., *Evernia prunastri* (L.) Ach, *Zingiber officinale* Rosc, *Curcuma longa* L., *Zanthozylum alatum* Roxb. It was followed by *Aloe barbadensis* Wall. (87.69 per cent), *Urtica diosia* (86.21 per cent) and *Cinnamomum tamala* Nees. (85.48 per cent). The higher FL values are because these plants are being frequently used by the people of the study area. The remedies using

Dioscorea bulbifera L. have the lowest FL value (20.83 per cent) because the majority of the informants do not know the dosage and the methods of preparation of the remedies (Table 7). Women are the real custodians of the indigenous knowledge system as 52% of them have knowledge on thirty health practices against that of 26% for males [28]. The local inhabitants and the forest dwellers have their own knowledge about the utilization and conservation of plants which passes from generation to generation [29, 30], so it is important to record such knowledge from these people for proper assessment and conservation to the benefit of mankind. This study indicates the majority of the bench medicinal plants (10) are frequently used by the women for treating same or any given diseases.

Table 7: Fidelity Level (F.L.) value (%) for bench medicinal plants cited by more than five women for being used against same disease.

S. No.	Botanical name	Diseases	Women claiming disease		F.L. (%)
			Same	Any given	
1.	<i>Asparagus recimosus</i>	Debility	37	37	100.00
2.	<i>Crataegus oxyacantha</i> L.	Heart tonic	27	27	100.00
3.	<i>Zanthozylum alatum</i> Roxb.	Cold/ cough	33	33	100.00
4.	<i>Berberis aristata</i> DC.	Eye trouble	64	64	100.00
5.	<i>Ficus cunia</i> Buch.-Ham. ex Roxb.	Laxative	29	29	100.00
6.	<i>Urginea indica</i> (Roxb.) Kunth.	Cardiac tonic	37	37	100.00
7.	<i>Evernia prunastri</i> (L.) Ach	Blood purifier	22	22	100.00
8.	<i>Curcuma longa</i> L.	Inflammation	78	78	100.00
9.	<i>Zingiber officinale</i> Rosc,	Cold/cough	12	12	100.00
10.	<i>Ocimum sanctum</i> L.	Fever	92	92	100.00
11.	<i>Aloe barbadensis</i> Wall.	Skin problem	57	65	87.69
12.	<i>Cinnamomum tamala</i> Nees.	Diarrhea	25	29	86.21
13.	<i>Urtica diosia</i>	Fever	53	62	85.48
14.	<i>Tinospora cordifolia</i> (Willd)Miers.	Jaundice	12	16	75.00
15.	<i>Micromeria biflora</i> Benth	Tooth ache	17	23	73.91
16.	<i>Diplazium esculentum</i> Retz.	Child birth	14	22	63.64
17.	<i>Rubus ellipticus</i> Sm.	Digestive	10	19	52.63
18.	<i>Dioscorea bulbifera</i> L.	Asthma	05	24	20.83

Women consensus factor

High consensus factor may indicate that there is some key phytochemical ingredient (s) in these plants which requires phyto-pharmacological analyses. Our research revealed that the category jaundice and eye problems included only 01 species (N), resulting in a highest WCF of 1.00, indicating greater homogeneity about this knowledge among women (Table 8). Although, these disease categories were not used by Cook [19], in his study it is an integral part of the hill women's medicinal concepts. The jaundice is sporadic throughout India and is cured effectively by *Phyllanthus amarus*, a botanical remedy that is known to strengthen the liver [31, 32]. However, women informants consistently reported the use of *Tinospora cordifolia* (Willd) Miers to treat jaundice. In *Ayurveda* the use of *Berberis aristata* DC root bark is recommended for the treatment of dibates but women consistently reported the use of this plant for eye problems because it is most common health care system in the area. The consensus factor for

ache/pain and ENT was similar (WCF=0.97). Also it was same for respiratory and general health categories (WCF 0.92). Such observations are indicative of the most common consensus of the hill women. The low consensus factor (WCF=0.62) for the dermatological category may be indicative of the lack of dermatological disorders among the people of the region. While the actual reason for this is unclear, the ratio of use-reports to number of taxa might be a reason for this [33, 34]. There may be a logical explanation for the lower consensus factors in present study which may be due to the availability of easily accessible pharmaceuticals providing many alternatives to traditional medicine thereby reducing the use of some traditional remedies which could reduce consensus for some common ailments such as dermatological /urinary problems and alternatively there are a variety of plants being used for a variety of dermatological/ urinary cautions.

Table 8: Women consensus factor (WCF) for different ailment categories

Disease category	Number of Taxa	Number of use reports	Consensus factor
Gastrointestinal	15	95	0.85
Jaundice	01	12	1.0
Urinary	02	05	0.75
Eye problems	01	64	1.0
Dermatological	17	44	0.62
Fever	06	84	0.84
Infections	05	95	0.96
Respiratory	13	145	0.92
Ache/pain	04	107	0.97
ENT	02	37	0.97
General health	12	135	0.92

The research in traditional practices can lead to add the knowledge on new and less known medicinal plants. Therefore, it is essential to explore and conserve such knowledge hidden in the different parts of the country by way of proper documentation and people should be encouraged to use herbal medicines for the ever increasing requirements of human health care which has less or no side effects. The medicinal plant resources used in the local health traditions are gradually destroyed by developmental activities, population explosion and dependency of readily available allopathic alternates with immediate relief. In order to reverse this trend, the domestication of wild medicinal species is of high importance. The cultivation of medicinal plants would augment the income of local residents and in turn help in the conservation of the species.

Conclusions

The women of the study area had a broad and integrated view of health, perceiving the importance of the medicinal plants within the areas of lesser Himalaya for the health and well-being of the local population. In this study the women of the study area are aware of 34 plant species belonging to 34 genera of 27 families by local name. Among plant parts used, twigs (leaf, fronds, twigs, and flowers) were used from maximum plants for herbal preparations. Most of the formulations were prescribed in extract (paste, extract/ juice/ gel) form followed by decoction. Most commonly treated disease was Skin problems (boils/ blisters/ warts/ wounds/ inflammation/ Allergy) followed by Gastrointestinal (digestive/ desyntric/ vomiting/ laxatives/ anthelmintic). The majority of the medicinal plants are frequently used by the women for treating same or any given diseases. For Jaundice and eye problems there was greater homogeneity among

women. The results of the present study provide evidence that medicinal plants continue to play an important role in the healthcare system of lesser Himalayan community.

Acknowledgements

The authors dedicate this paper to all the hill farmers specifically to the hill women farmers of study area. The authors would like to express their thanks to the Directorate of Experiment Station, G B Pant university of Agriculture and Technology, Pantnagar, Uttarakhand (India) for allowing the study as Ph D Thesis research.

References

- Mukherjee PK, Wahil A. Integrated approaches towards drug development from Ayurveda and other systems of medicine. *Journal of Ethnopharmacology*. 2006; 103: 25-35.
- WHO, General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine, WHO/EDM/TR/2000.1, World Health Organization, Geneva, 2000.
- Zhang Qi. Traditional Medicine: Definitions
- <http://www.who.int/medicines/areas/traditional/definition/en/> Accessed 10 may, 2015.
- Govaerts R. How many species of seed plants are there? *Taxon*. 2001; 50:1085-90.
- Schippmann U, Leaman DJ, Cunningham AB. Impact of Cultivation and Gathering of Medicinal Plants on Biodiversity: Global Trends and Issues. In (FAO) Biodiversity and the ecosystem approach in agriculture, forestry and fisheries Satellite event on the occasion of the Ninth regular session of the commission on genetic resources for food and agriculture Rome 12 – 13 October

- 2002 Inter departmental working group on biological diversity for food and agriculture, Rome, 2002.
7. Pushpangadan P. Ethnobiology in India: a status report, GOI New Delhi, 1995.
 8. Charak, Drdhhala. In: The Charak Samhita explained by K. Sastri and G.N. Chaturvedi. 22nd revised. Sastri R, Uapadhayaya Y, Pandeya GS, Gupta B, Misra B, editor. Chaukhamba Bharti Academy, Varanasi, 1996.
 9. Tulsidas: Ramcharitmanas (1631 samvat)
 10. Rao RR. Traditional knowledge and sustainable development key role of ethnobiologists. *Ethnobotany*. 1996; 8:14-24.
 11. Anon. Ethnobotany and the search for new drugs. John Wiley and Sons, England, 1994.
 12. Cox PA, Ballick MJ. The ethnobotanical approach to drug discovery. *Scientific American* (June) 1994, 82-87.
 13. Fabricant DS, Farnsworth NR. The Value of Plants Used in Traditional Medicine for Drug Discovery. *Environ Health Perspect*. 2001; 109:69-75.
 14. Uniyal SK, Awasthi A, Rawat GS. Developmental processes, changing lifestyle and traditional wisdom: analyses from western Himalaya. *The Environmentalist*. 2003; 23:307-12.
 15. Bernard HR. *Research Methods in Anthropology: Qualitative and Quantitative Approaches*. 2nd edition, Newbury Park, California Sage, 1994.
 16. Weller SC, Romney AK. *Systematic Data Collection* Newbury Park, California: Sage, 1988.
 17. Werner O, Fenton J. Method and theory in ethnoscience or ethnoepistemology. In *A Handbook of Method in Cultural Anthropology* Edited by : Naroll R, Cohen R. New York: Columbia University Press, 1973, 537-78.
 18. Trotter R, Logam M. Informant consensus: a new approach for Indigenous medicine and diet: biobehavioural approaches Edited by: Etkin NL Bedford hills, New York: Redgrave Publishers: 1986, 91-112.
 19. Heinrich M. Ethnobotany and its role in drug development. *Phytother Res*. 2000; 14:479-88.
 20. Cook FEM. *Economic Botany Data Collection Standard*; Prendergast, Royal Botanic Gardens, Kew. 1995 ;<http://www.Rbgkew.org.uk/tdwguses/rpt16MasterList.htm> Accessed 26 April, 2013.
 21. Behera SK, Mishra MK. Indigenous phytotherapy for genito-urinary diseases used by the Kandha tribe of Orissa. India. *J Ethnopharmacol*. 2005; 102:319-25.
 22. Rajkumar N, Shivanna MB. Traditional herbal medicinal knowledge in Sagar taluk of Shimoga district, Karnataka, India. *Indian J Nat Prod Res*. 2010; 1:102-8
 23. Saikia AP, Ryakala VK, Sharma P, Goswami P, Bora U. Ethnobotany of medicinal plants used by Assamese people for various skin ailments and cosmetics. *J Ethnopharmacol*. 2006; 106:149-57
 24. Bussmann RW, Sharon D. Traditional medicinal plant use in Northern Peru: tracking 2000 years of healing culture. *J Ethnobiol Ethnomed*. 2006; 2:4724.
 25. Kumar M, Bussmann RW, Joshi M, Gusain M. Ethnomedicinal uses of plant close to rural habitation in Garhwal Himalaya. *Ethnobotany Research Application*, 2008;
 26. Joshi M, Kumar M, Bussmann RW. Ethnomedicinal Uses of Plant Resources of the Haigad Watershed in Kumaon Himalaya, India. *Medicinal and Aromatic Plant Science and Biotechnology*. 2010, 43-46.
 27. Buragohain J, Konwar BK. Ethnomedicinal Plants used in Skin Diseases by some Indo-Mongoloid Communities of Assam. *Asian J. Exp. Sci*. 2007; 21(2):281-88.
 28. Ripu MK, Adhikari N. Ethnomedicine of Dolpa district, Nepal: the plants, their vernacular names and uses. *Lyonia*. 2005; 8(1):43-49.
 29. Samal PK, Dhyani PP. Gender in the management of indigenous knowledge: reflections from Indian Central Himalaya. *Current Science*. 2006; 91(1):104-8.
 30. Sharma J, Gaur RD, Painuli RM. Folk Herbal Medicines Used by the Gujjar Tribe of Sub-Himalayan Tracts, Uttarakhand. *Journal of Economic and Taxonomic Botany*. 2011; 35(1):224-30.
 31. Gaur RD, Sharma Jyotsana. Indigenous knowledge on the utilization of medicinal plants diversity in Siwalik region of Garhwal Himalaya, Uttarakhand. *Journal of Forest Science*. 2011; 27(1):23-31.
 32. Venkateswaran PS, Millman I, Blumberg BS. Effects of an extract from *Phyllanthus niruri* on hepatitis B and woodchuck hepatitis viruses: in vitro and in vivo studies. *Proc Natl Acad Sci USA*. 1987; 84(1):274-78.
 33. Huang RL, Huang UL, Ou JC, Chen CC, Hsu FL, Chang CL. Screening of 25 compounds isolated from *Phyllanthus* species for antihuman hepatitis B virus in vitro. *Phytother Res*, 2003; 17(5):449-53.
 34. Amiguet VT, Arnason JT, Maquin P, Cal V, Sanchez Vindas P, Poveda L. A consensus ethnobotany of the Q'eqchi' Maya of southern Belize. *Econ Bot*. 2005; 59(1):29-42.
 35. Phillips O, Gentry AH. The useful plants of Tambopata, Peru. Statistical hypotheses tests with a new quantitative technique. *Econ Bot*. 1993; 47:15-32.