



Traditional knowledge of medicinal plants used by the *Chakhesang* Naga tribe in Phek District of Nagaland, India

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Abstract

The present paper deals with the *Chakhesang* Naga traditional knowledge of medicinal plants which are used for the treatment of various ailments and diseases. The paper reports 68 species belonging to 41 families and 66 genera. The ethnobotanical data were analyzed through informant consensus factor (ICF) and fidelity level (FL). The informant consensus factor shows that blood pressure (0.87) has the highest agreement, followed by dermatological problems and inflammation and pain (0.83 respectively). *Saccharum officinarum* has the highest FL value (100%). Leaves were the most commonly used plant part.

Key words: Medicinal plants, *Chakhesang* Naga tribe, Nagaland, Informant Consensus Factor, Fidelity Level

INTRODUCTION

The state of Nagaland situated in Northeast India harbors rich biodiversity and is situated within the Indo-Burma Biodiversity Hotspot as recognized by IUCN. The Naga tribes have a rich knowledge, based on their natural resources of traditional folk medicine which they have developed through their age long, trial-and-error methods. The culture and traditional knowledge has been passed on from generation to generation through oral folklore, tradition, customs, and festivals. The state has 14 officially recognized Naga Tribes and 5 recognized Scheduled Tribes. Each tribe is unique from others in their rich culture and traditional practices.

Chakhesang tribe is a recognized Naga tribe, inhabiting the Phek district of Nagaland. Phek is located in the south-eastern part of Nagaland with an area of 2026 km²; is bounded by Kohima district in the West, Zunheboto and Kiphire districts in the North, Manipur state in the South and Myanmar in the South-East. The district lies between 25°37' N – 25°39'N latitude and 94°35' E – 94°38'E longitude. The altitude ranges from 520 to 2900 m above mean sea level. Phek is blessed with evergreen sub-tropical and temperate coniferous forests supporting varied flora and fauna. The district is very rich in agro-biodiversity and is well known for the production of different types of fruits and vegetables. The *Chakhesangs* are settled agriculturalist and practices both terrace and wet paddy field cultivation. They are also considered as best terrace makers.

During the previous decades a good number of research works on medicinal plants of the North-Eastern region of India have been contributed (Bhattacharjee *et al.* 1980; Bora 1999; Borthakur 1981; Borthakur & Goswami 1995; Lokho 2012; Salam *et al.* 2009; Tag *et al.* 2008; Tiwari *et al.* 2009). Quite a few valuable accounts have been contributed from the state of Nagaland too (Changkija 1999; Changkija *et al.* 2010; Imchen & Jamir 2011; Jamir 1997; Jamir & Rao 1990; Jamir *et al.* 2008; Jamir & Tsurho 2017; Lanusunep & Jamir 2010; Rongsensashi *et al.* 2013; Sangtam *et al.* 2012; Singh *et al.* 2015), yet there is still a lot of work to do on the ethnomedicinal aspects in different parts of the state. Thus, the present work is an attempt to assess and study the traditional knowledge of medicinal plants of the *Chakhesang* Naga tribe.

MATERIALS AND METHODS

At the beginning, mandatory PIC was taken from the village chiefs. The information, concerning the uses of medicinal plants for treatment of various diseases and ailments were collected during field trips from 42 local respondents, including 28 males and 14 females, comprising of the local medicine men, village elders, women folks, and hunters. The informants were between 25 – 90 years of age. The plant specimens collected were physically identified by the respondents and noted of their medicinal values. Plants were then scientifically identified with the help of literature and adjacent flora such as *Flora of Assam* (Kanjalal *et al.* 1934 – 1940), *Flora of Jowai* (Balakrishnan 1981, 1983), and *Forest Flora of Meghalaya* (Haridasan & Rao 1985, 1987). The specimens were mounted and preserved following the standard procedure (Jain & Rao 1977) and have been deposited in the Herbarium of the Department of Botany, Nagaland University, Lumami.

Based on the information obtained from the local informants the ailments were grouped into 8 categories (Table 2) viz., dermatological problems, fever, blood pressure, gastrointestinal problem, eyes & ears, inflammation and pain, urological and urino-genital problem and others.

Quantitative analysis

The ethnobotanical data obtained was analyzed using different quantitative tools such as Informant Consensus Factor (ICF) and Fidelity Level (FL).

Informant Consensus Factor (ICF)

ICF value was used to see the homogeneity in the information given by the informants. It is calculated by using the formula (Trotter & Logan 1986; Heinrich *et al.* 1998):

$$ICF = \frac{N_{ur} - N_t}{N_{ur} - 1}$$

Where N_{ur} is the number of use reports for each disease category and N_t is the number of species used to treat the particular category. The factor provides a range between 0 to 1, where the high value indicates a higher rate of informant consensus.

Fidelity Level (FL)

The fidelity level (FL) determines the most frequently used plant species to treat a particular ailment of the study area. FL is calculated by using the formula (Friedman *et al.* 1986):

$$FL (\%) = \frac{N_p}{N} \times 100$$

Where N_p is the number of informants that claim the use of a plant species for particular treatment and N is the total number of informants that use the plant for any disease.

RESULT AND DISCUSSION

The present survey recorded 68 species of plants those are used by the *Chakhesang* tribe of Nagaland for treating various ailments in their day to day life. In the enumeration, the plant species are arranged alphabetically along with their family and local names followed by the part(s) used and the medicinal uses (Table 1).

Of 68 species of medicinal plants, 66 genera and 41 families has been recorded. Except *Equisetum ramosissimum*, a pteridophyte, all others are angiospermic. Herbs were the primary source of medicine (57 %), followed by trees (22 %), shrubs (17 %) and climbers (4 %). Most of the plant species collected from the wild were used both as vegetables. Some species were also planted in their kitchen gardens. The most dominant family of the present study is Asteraceae (10 spp.), followed by Lamiaceae (6 spp.), and Solanaceae (5 spp.). Based on the informants, the

Table 1. Medicinal plants used by the *Chakbesang* Naga tribe of Nagaland

Botanical name [Family]; Voucher specimen	Local name	Part/s used	Medicinal uses
<i>Abelmoschus moschatus</i> Medik. [Malvaceae]; NL - 198	<i>Muli</i>	Bark	Bark is crushed and used as hair wash for smooth hair and relieve from dandruff.
<i>Ageratina adenophora</i> (Spreng.) R.M.King & H.Rob. [Asteraceae]; NL-193	<i>Japanpru</i>	Leaf	Leaf paste is applied to cuts and wounds as haemostatic
<i>Ageratum conyzoides</i> (L.)L. [Asteraceae]; NL-194	<i>Pru</i>	Leaf	Leaf paste is applied to cuts and wounds as haemostatic.
<i>Allium sativum</i> L. [Amaryllidaceae]; NL-131	<i>Shamure</i>	Bulb	Bulb is taken orally for high blood pressure; helps in digestion; stomach-ache; relieve flatulence; it is also used as febrifuge.
<i>Alnus nepalensis</i> D.Don [Betulaceae]; NL-296	<i>Pasii</i>	Bark and leaf	Bark is soaked in water overnight and the infusion is taken for diabetes; leaf paste is applied to foot sores.
<i>Artemisia indica</i> Willd. [Asteraceae]; NL-144	<i>Apru</i>	Leaf	Leaf paste is applied to cuts and wounds as haemostatic; for skin infection; the fresh plant is also used as insect repellent.
<i>Bidens pilosa</i> L. [Asteraceae]; NL-108	<i>Richanu</i>	Whole plant	Plant is boiled in water and the decoction taken orally for fever and stomach-ache; leaf paste is applied on skin disease.
<i>Brugmansia suaveolens</i> (Willd.) Bercht. & J. Presl [Solanaceae]; NL-183	<i>Abvo</i>	Leaf	Leaf is warmed in fire and applied/dabbed to body ache, muscle pain and sprain.
<i>Cajanus cajan</i> (L.) Millsp. [Leguminosae]; NL- 137	<i>Mukri motosbi</i>	Leaf	The decoction of the leaves is taken in jaundice and for gall bladder.
<i>Cannabis sativa</i> L. [Cannabaceae]; NL-179	<i>Ganjapru</i>	Leaf	Leaf paste is applied to cuts and wounds as haemostatic; leaves boiled in water and the mixture is used for treating muscle pain and sprain; leaf paste is also used as antidote for snake bite.
<i>Capsicum annum</i> L. [Solanaceae]; NL-141	<i>Mushishi</i>	Fruit	Fruit aids in removing or eliminates fever and stimulate appetite; fruit paste is used for rheumatism
<i>Centella asiatica</i> (L.) Urb. [Apiaceae]; NL-145	<i>Revu</i>	Whole plant	Whole plant is taken raw or boiled in water for gastric problem; consumed as blood purifier, and subdue dysentery.
<i>Clerodendrum colebrookeanum</i> Walp. [Lamiaceae]; NL-133	<i>Piduvu</i>	Leaf	Leaf is boiled in water and taken for high blood pressure; decoction of leaf is taken as tonic; use as antipyretic.
<i>Colocasia esculenta</i> (L.) Schott [Araceae]; NL-147	<i>Bi</i>	Stem	Stem sap is applied to bee sting and insect bites.
<i>Crassocephalum crepidioides</i> (Benth.) S. Moore [Asteraceae]; NL-175	<i>Ava tabvo</i>	Leaf	Leaf paste is applied to cuts and wounds as haemostatic
<i>Curculigo capitulata</i> (Lour.) Kuntze [Molineria capitulata (Lour.) Herb.] [Hypoxidaceae]; NL-180	<i>Tukho convi</i>	Root	Root extract is used in eye and ear problem.

Botanical name [Family]; Voucher specimen	Local name	Part/s used	Medicinal uses
<i>Debregeasia longifolia</i> Wedd. [Urticaceae]; NL-225	Melibo	Bark, fruit	The bark is crushed and used as shampoo; the fruit aids in digestion.
<i>Elaeocarpus floribundus</i> Blume [Elaeocarpaceae]; NL-375	Tisbi	Fruit	Fruit is taken for blood pressure and nausea.
<i>Elsholtzia blanda</i> (Benth.) Benth. [Lamiaceae]; NL-537	Khromve	Leaf	The decoction of leaf is used for treating hypertension and diarrhoea.
<i>Entada rheedei</i> Spreng. [Leguminosae]; NL-248	Zali	Seed	The cotyledon is used as soap and also used as vegetable.
<i>Equisetum ramosissimum</i> D.Don [Equisetaceae]; NL-168	Abou	Whole plant	The decoction of the plant is taken orally to treat kidney problem and urinary tract infection.
<i>Gynura bicolor</i> (Roxb. ex Willd.) DC. [Asteraceae]; NL-109	Tabovu	Leaf, young stem	Tender aerial part of the plant is boiled in water and taken orally for gastritis, stomach-ache, and constipation.
<i>Hellenia speciosa</i> (J.Koenig) S.R.Dutta [Cheilocostus speciosus (J.Koenig) C.D.Specht] [Costaceae]; NL-191	Rhamabi	Rhizome leaf	Rhizome paste is used in rheumatism. Decoction of the leaf is taken for diabetes and urinary problems.
<i>Hibiscus sabdariffa</i> L. [Malvaceae]; NL-163	Khrevu	Leaf, sepal	Fresh as well as dried leaves and sepals is boiled and taken as a stimulant, for high blood pressure and to treat veisalgia.
<i>Hibiscus syriacus</i> L. [Malvaceae]; NL-111	Menapan yi	Leaf	The decoction of the leaf is taken for menstrual problem.
<i>Houttuynia cordata</i> Thunb. [Saururaceae]; NL-178	Sama	Whole plant	The whole plant is consumed raw or cooked to treat diarrhoea, stomach-ache; blood pressure.
<i>Juglans regia</i> L. [Juglandaceae]; NL-295	Khushi	Bark, fruit	The inner layer of the bark is used to treat gum bleeding and tooth plague. The bark and unripe fruit is used as fish poison.
<i>Justicia adhatoda</i> L. [Acanthaceae]; NL-246	Kekipa	Leaf	Leaves boiled with water and massage to relieve body ache.
<i>Kalanchoe pinnata</i> (Lam.) Pers. [Crassulaceae]; NL-135	Lotsitse	Leaf	The decoction of the leaf is taken for kidney problem.
<i>Laggera crispata</i> (Vahl) Hepper & J.R.I Wood [Asteraceae]; NL-251	Khana	Leaf, inflorescence	The inflorescence and leaves are made into paste and applied over skin infection; the leaves are crushed and applied for piles problem.
<i>Leucosceptrum canum</i> Sm. [Lamiaceae]; NL-155	Chutupu	Leaf, inflorescence	The white tomentum is scrap from the leaves and applied as haemostatic; inflorescence is soaked in water and the infusion taken as a tonic.
<i>Litsea cubeba</i> (Lour.) Pers. [Lauraceae]; NL-158	Tirashi	Fruit	It is used as a carminative and stimulant; fruit also taken as spices.

Botanical name [Family]; Voucher specimen	Local name	Part/s used	Medicinal uses
<i>Lobelia nummularia</i> Lam. [Campanulaceae]; NL-172	<i>Murusako</i>	Whole plant	The decoction of the plant is used for urinary infection; leaf paste is used to stop bleeding.
<i>Maesa indica</i> (Roxb.) Sweet [Myrsinaceae]; NL-215	<i>Rharn</i>	Leaf	Leaves are consumed directly to get instant energy from fatigue.
<i>Melia azedarach</i> L. [Meliaceae]; NL-391	<i>Thosiibu</i>	Leaf	Leaves are boiled in water and bath for treating skin disease.
<i>Mentha arvensis</i> L. [Lamiaceae]; NL-132	<i>Pubupru</i>	Leaf, young stem	Leaves are taken raw or boiled for stomach-ache and as a carminative.
<i>Mimosa pudica</i> L. [Leguminosae]; NL-134	<i>Nuovipru</i>	Root and leaf	Roots and leaves decoction is used to treat leucorrhoea, urinary problem; leaf paste is applied on skin infections.
<i>Musa paradisiaca</i> L. [Musaceae]; NL-124	<i>Vii</i>	Stem and fruit	Stem is sliced and soak in water overnight and the infusion is taken orally for kidney problem; fruit is taken to subdue diarrhoea.
<i>Nicotiana tabacum</i> L. [Solanaceae]; NL-187	<i>Makbrwuu</i>	Leaf	The leaves are crushed and mixed in water and used as pesticides for cultivated vegetable; leaf paste is haemostatic; relieves rheumatic swelling; it is also used as a laxative.
<i>Ocimum basilicum</i> L. [Lamiaceae]; NL-104	<i>Nepiu</i>	Leaf, inflorescence	Leaves and inflorescence are taken raw or boiled in water for fever, stomach-ache, carminative, heartburn.
<i>Oxalis corniculata</i> L. [Oxalidaceae]; NL-107	<i>Natume muta</i>	Whole plant	The decoction of the plant is taken to treat diarrhoea. Leaf juice is used to remove warts, treat wounds and eczema; leaves are crushed and used to wash latex or sap stains from hands.
<i>Paederia foetida</i> L. [Rubiaceae]; NL-345	<i>Theburo</i>	Leaf	Leaf extract is applied to ease ear pain; leaf juice is taken for diarrhoea, dysentery.
<i>Passiflora edulis</i> Sims [Passifloraceae]; NL-182	<i>Stabon</i>	Leaf	Leaves are boiled in water and taken for high blood pressure and diabetes.
<i>Phyllanthus emblica</i> L. [Phyllanthaceae]; NL-728	<i>Rboshi</i>	Fruit	Fruits eaten to treat cough, cold and high blood pressure; stimulate appetite; blood purifier. Juice extracted from raw fruit is applied to treat eye infection.
<i>Plantago asiatica</i> subsp. <i>erosa</i> (Wall.) Z.Yu Li [Plantaginaceae]; NL-110	<i>Dzuvu parvu</i>	Whole plant	Plant is boiled in water and taken for stomach-ache, dysentery and kidney problem; leaf paste applied to cuts and wounds.
<i>Prunus persica</i> (L.) Batsch [Rosaceae]; NL-123	<i>Krisbi</i>	Leaf	Leaf paste is applied to ring worm.
<i>Psidium guajava</i> L. [Myrtaceae]; NL-127	<i>Muduram</i>	Leaf and fruit	Tender leaves are taken raw or decoction of the leaf is taken for stomach-ache, diarrhoea and dysentery. Fruit is also consumed for subduing diarrhoea. Leaves are chewed for toothache.

Botanical name [Family]; Voucher specimen	Local name	Part/s used	Medicinal uses
<i>Punica granatum</i> L. [Lythraceae]; NL-138	Radushi	Leaf	Leaf decoction is taken in fever & typhoid.
<i>Ranunculus diffusus</i> DC. [Ranunculaceae]; NL-174	Achuthibho	Whole plant	The aerial part is crushed and applied to wounds.
<i>Rhododendron arboreum</i> Sm. [Ericaceae]; NL-428	Dupa	Flower	Dried or fresh petal is used in removal of fish bone from throat.
<i>Rhus chinensis</i> Mill. [Anacardiaceae]; NL-254	Mvu	Fruit	Decoction of fruit is used in indigestion, colic, vomiting, hypertension and allergy. It is also a detoxifier.
<i>Ricinus communis</i> L. [Euphorbiaceae]; NL-113	Midziipru	Leaf	Leaf warmed over fire or in hot water is massaged to relieve muscle pain, sprain & body-ache; leaf paste is applied on sores
<i>Rubia sikkimensis</i> Kurz [Rubiaceae]; NL-217	Elbi	Whole plant	The decoction of the plant is taken for urinary problem.
<i>Rubus ellipticus</i> Sm. [Rosaceae]; NL-430	Ramusbe	Bark of shoot & root	The decoction of root and shoot bark is used for stomach-ache.
<i>Saccharum officinarum</i> L. [Poaceae]; NL-117	Mukbrupru	Culm	Juice is used as demulcent, and taken in jaundice, gall bladder problem.
<i>Scutellaria discolor</i> Colebr. [Lamiaceae]; NL-307	Rucie nba	Leaf	The decoction of leaf is used in malaria.
<i>Senecio scandens</i> Buch.-Ham. ex D.Don [Asteraceae]; NL-421	Mbubi nba	Leaf	Leaf extract is used for eye treatment.
<i>Solanum indicum</i> L. [Solanaceae]; NL-142	Akbasbi	Fruit	Fruit is taken raw or boiled for high blood pressure; fever; asthma; flatulence.
<i>Solanum myriacanthum</i> Dunal [Solanaceae]; NL-148	Kekathitsbe	Fruit	Fruit is used for toothache.
<i>Sonchus wightianus</i> DC. [Asteraceae]; NL-195	Gazu	Aerial part	The aerial part is boiled with water and taken for treatment of kidney problem and high blood pressure.
<i>Spilanthes paniculata</i> Wall. ex DC. [Asteraceae]; NL-751	Vevu	Aerial part	Inflorescence is crushed and applied to subdue toothache; decoction of the plant is used in abdominal pain.
<i>Spondias pinnata</i> (L.f.) Kurz [Anacardiaceae]; NL-128	Muzaosbi	Fruit	Fruit is taken for high blood pressure and vomiting.
<i>Swertia bimaculata</i> Hook.f. & Thomson ex C.B. Clarke [Gentianaceae]; NL-103	Akba-pru	Stem, leaf	Aerial part of the plant is boiled in water and taken for gastritis and fever.
<i>Tainia viridifusca</i> (Hook.) Benth. & Hook.f. [Orchidaceae]; NL-384	Kopa	Tuber	The fleshy tuber is crushed and applied to heal crack heel.
<i>Thalictrum foliolosum</i> DC. [Ranunculaceae]; NL-312	Tebapru	Root	The roots are boiled in water and taken to treat fever, malaria and typhoid.
<i>Urtica dioica</i> L. [Urticaceae]; NL-201	Angu	Leaf	Fresh leaves are crushed and paste is applied to treat mumps and scabies.
<i>Zanthoxylum armatum</i> DC. [Rutaceae]; NL-475	Ngachu	Leaf, fruit	Soup of leaf/fruit with garlic and chilly is taken to reduce fever; fruit is used as carminative, subdue toothache.
<i>Zingiber officinale</i> Roscoe [Zingiberaceae]; NL-130	Vou	Rhizome	Decoction of rhizome is taken for cough; cold and sore throat; carminative; paste used for rheumatism; urinary problems.

most cited species are *Allium sativum*, *Gynura bicolor* and *Phyllanthus emblica* (23), *Capsicum annum* (22), *Alnus nepalensis*, *Equisetum ramosissimum* and *Juglans regia* (21), *Centella asiatica* and *Hibiscus sabdariffa* (20), *Elaeocarpus floribundus*, *Psidium guajava* and *Rhus chinensis* (19), and *Cannabis sativa* (18).

The most prevalent ailments are blood pressure, fever, cough and cold, stomachache, cuts and wounds, muscle pain/sprain, eyes and ears problem, skin infection, and diarrhoea. The maximum number of plants reported to treat ailments against blood pressure (10), fever (9), stomachache (9), cuts and wounds (8), diarrhoea (8), skin infection (6), muscle pain (5) and kidney problem (5).

The most common part of the plant utilized for treatment is leaves 44%, followed by fruits 16%, whole plant 11%, bark and flower 6%, root and aerial part 4%, stem and rhizome 3%, bulb, seed and tuber 1%. Usually the mode of preparation is from raw plant materials. The different methods of usage are decoction, paste, infusion, soup, extract, cooked, heat pressed, etc. Decoction is the most common method of preparation, followed by paste. The mode of application are either taken internally or applied externally. Fruits of *Elaeocarpus floribundus*, *Phyllanthus emblica*, *Solanum indicum*, *Rhus chinensis*, *Spondias pinnata* are consumed raw for blood pressure and is highly recommended by the local informants for the above mentioned ailments. *Solanum indicum*, *Rhus chinensis* and *Spondias pinnata* fruits are also taken as soup cooked along with *Allium chinensis* to bring down high blood pressure and relieve from headache. The locals believe that taking *Rhododendron arboreum* petals either fresh or dried before sleep removes the fish bone stuck in the throat, which is an age old practice. Thus, almost every house in the village keeps dried petals of the plant. Many of the plant species were found to be used to treat cuts and wounds, and this may be due to the fact that almost all the informants are farmers and are prone to bruises.

The present study indicates a high level of consensus, the value of ICF in the study area showed the ranges from 0.77 to 0.87. To calculate the ICF value, the ailments were grouped into 8 categories. The use report was highest for gastrointestinal problem with 139, followed by dermatological problem with 105 use report, and others with 79 use report. ICF value was highest for blood pressure with 0.87, followed by dermatological problems and inflammation with 0.83 and fever with 0.82 (Table 2). According to the consensus factor it can be said that blood pressure is prevalent in the study area. Within the dermatological category the most common ailments was cuts and wounds (47), and in gastrointestinal category the most reported ailment was stomach-ache (44).

Fidelity level (FL) indicates the informants choice of plant species in each disease category. For the analysis the plants mentioned once was not considered. The FL of plant species in the study area ranged from 25 to 100 % (Table 3). *Saccharum officinarum* showed 100 % FL against jaundice. *Psidium guajava*, *Gynura bicolor*, *Phyllanthus emblica*, *Zingiber officinale*, *Allium sativum*, indicated 69.6 %, 78.9 %, 69.6 %, 66.7 %, 60.9 % FL against diarrhoea, gastritis, hypertension, cough and cold, fever respectively.

Artemisia indica is used as hemostats and insect repellent by the *Chakbesang* tribes, whereas, the dried plant is burnt and smoke is inhaled to treat sinusitis and headache by the villagers of Humla district of Western Nepal (Rokaya *et al.* 2010). The infusion of the bark of *Juglans regia* is used for oral care (Rokaya *et al.* 2010) which is also used for the similar purpose by the *Chakbesang* tribe. *Justicia adhatoda* is used for the treatment of pneumonia and cough by the *Reang* tribes (Shil *et al.* 2014) where as it is used chiefly for bodyache by the *Chakbesangs*. *Allium sativum* root is used to treat warts and rheumatism by the people of Tlanchinol, Hidalgo, Mexico (Andrade-Cetto 2009) which is extensively used to treat hypertension by the *Chakbesangs*. Leaf juice of *Senecio scandens* is used for eye treatment by the *Chakbesang* tribe whereas; the same is given to treat asthma, gastritis and skin disease by the ethnic people in Parbat district of

Table 2. Informant Consensus Factor (IFC) by categories of diseases.

Category of Diseases	Number of use reports	Number of taxa used	ICF
Dermatological problems (Hair, skin, cuts & wounds)	105	19	0.83
Fever (Malaria, typhoid, cough & cold, nausea)	82	15	0.82
Blood pressure	68	10	0.87
Gastrointestinal problem (Stomach-ache, gastritis, diarrhoea, constipation, piles)	139	29	0.79
Eyes & Ears problem	14	4	0.77
Inflammation & Pain (Body ache, sprain, toothache, mumps)	47	9	0.83
Urological & urino-genital problems	47	11	0.78
Others (Diabetes, snake bite, insect bite, veisalgia, tonic, fish bone stuck in throat, pesticides)	79	17	0.79

Table 3. Fidelity Level (FL) of highly utilized medicinal plants of the study area

Sl.No	Species name	N_I	N_A	Major ailment treated for	N_P	FL
1.	<i>Allium sativum</i>	23	5	Fever	14	60.9
2.	<i>Gynura bicolor</i>	23	3	Gastritis	16	69.6
3.	<i>Phyllanthus emblica</i>	23	5	Blood pressure	16	69.6
4.	<i>Capsicum annum</i>	22	3	Fever	11	50.0
5.	<i>Juglans regia</i>	21	3	Bleeding gum	5	23.8
6.	<i>Centella asiatica</i>	20	3	Blood purifier	7	35.0
7.	<i>Hibiscus sabdariffa</i>	20	4	Veisalgia	5	25
8.	<i>Psidium guajava</i>	19	4	Diarrhoea	15	78.9
9.	<i>Rhus chinensis</i>	19	6	Colic	10	52.6
10.	<i>Cannabis sativa</i>	18	5	Bodyache	7	38.9
11.	<i>Litsea cubeba</i>	18	3	Carminative	7	38.9
12.	<i>Artemisia indica</i>	17	3	Wounds	8	47.1
13.	<i>Passiflora edulis</i>	16	3	Blood pressure	8	50.0
14.	<i>Cheilocostus speciosus</i>	15	3	Rheumatism	7	46.7
15.	<i>Plantago major</i>	15	4	Stomach ache	5	33.3
16.	<i>Zingiber officinale</i>	15	5	Cough & cold	10	66.7
17.	<i>Clerodendrum glandulosum</i>	13	3	Blood pressure	7	53.8
18.	<i>Oxalis corniculata</i>	13	5	Skin problem	4	30.8
19.	<i>Ricinus communis</i>	12	3	Body ache	6	50.0
20.	<i>Saccharum officinarum</i>	12	3	Jaundice	12	100
21.	<i>Bidens pilosa</i>	11	3	Fever	4	36.4
22.	<i>Mimosa pudica</i>	11	3	Leucorrhoea	5	45.5

N_I - Number of total informant; N_A - Number of ailment treated; N_P - Number of informant who reported use of species; FL- Fidelity level

western Nepal (Malla *et al.* 2015). The infusion and decoction of whole plant of *Ageratum conyzoides* is used against leprosy, bone dislocation and fever by the Kel village, Neelum Valley, Azad Kashmir, Pakistan (Ahmad 2017), whereas the *Chakbesang* tribe uses the leaf paste chiefly as haemostat.

CONCLUSION

Present study has revealed that the traditional method of medicinal plants is still practiced by the *Chakbesang* tribe in spite of modernization. And the community still largely depends on the medicinal plants for treating various health issues. It has also been observed that many of the plant species have a broad spectrum for treating various diseases with the same plant. In spite of the richness of plant wealth in the area the numbers are declining every passing day due to deforestation for agricultural practices and various developmental activities. Also rampant collection of medicinal plants, especially uprooting of plants to harvest good income has led to fast decline of some valuable medicinal plants. Therefore there is an urgent need to educate, conserve, protect and manage the forest for sustainability of man and nature. There is also a pressing need to assess and document the ethnomedicinal plants for further scientific study so as to tap the plant rich resources for a vibrant healthcare product.

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