

# Ethnobotanical Study of Medicinal Herbs Used by the Naga Tribes of Eastern Himalayas



Khikeya Semy and Ruokuonuo Kuotsu

## 1 Introduction

Therapeutic herbs are the “backbone” of traditional medicine, accounting to more than 3.3 billion people in the less developed countries utilizing medicinal plants on a regular basis [1]. The medicinal potential of plant products’ can be traced back over 5000 years, as the evidence of their use in the treatment of ailments and for body system revitalization are found in India, Egypt, China, Greek and Roman civilizations [2]. In many regions of the world, indigenous peoples’ usage of ethnomedicine as an intrinsic part of their culture has a close relationship with local ecosystems and cultural landscapes. In India, plants with therapeutic potential are widely used as folk remedies in various indigenous medical systems such as Siddha, Ayurveda and Unani as processed pharmaceutical products [3]. Ethnomedicine and traditional knowledge are good examples of disadvantaged populations living in rural places combating even terminal diseases with ancient methods and using herbal treatments [4]. The collection of original data from traditional custodians of such knowledge is necessary in order to acquire a full compilation of medicinal plants that can be employed in disease prevention [5]. Various medicinal weed plants are a serious problem in agriculture and tremendously reduce the productivity of agricultural lands by competing with crop plants for water, mineral nutrients, space and light. Keeping this in view such losses can be compensated by exploring the medicinal utility of weeds. Thus, making use of every medicinal plants widely

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These authors contributed equally to this work.

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K. Semy (✉)

Department of Botany, Don Bosco College Kohima, Kohima, India

R. Kuotsu

Research Scholar, Department of Botany, Nagaland University, Lumami, Nagaland, India

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available for the disposal of human needs. Furthermore, the extraction and development of various medicines and chemotherapeutics from these plants, as well as from traditionally used rural herbal remedies, has been linked to an increased reliance on medicinal plants in industrialized countries.

Northeast Indian states are some of the richest repositories of medicinal and aromatic plants in the world [6]. This region has high medicinal plant diversity due to variance in topography and physiognomy [7]. Nagaland is a part of the Indo-Burma mega biodiversity hotspot, which includes an immense variety of plant species and is one of the wealthiest in terms of biological wealth and endemism in the Indian subcontinent [8]. Naga's are part of the mongoloid race and since time immemorial, forest products have aided in the socio-economic life of the Naga tribes in their ever-growing demands for medicines, food and shelter. They have an inextricable link with their forest and regard it as a provider, guide, healer and protector like most of the North-eastern tribal communities of India. Naga villages encompass parts of the hilly Eastern Himalayas and are secluded from other cities, and hence the local inhabitants developed a sense to rely on indigenous healing knowledge using medicinal plants. However, tribal's knowledge on therapeutic herbs of northeast India and in particular Nagaland, when compared to the rest of the country is still understudied. Meanwhile, the traditional knowledge is rapidly degrading with the advancement of technology and modernization. During the earlier years, many researchers have contributed to the studies on medicinal plants from in and around Northeast India, Assam [9–11], Manipur [12, 13], Arunachal Pradesh [14–17] and Nagaland [18–24]. However, in contrast to those documented plants focused on the three plant forms (herb, shrub and trees), the present investigation has been chiefly focused on the medicinal herbs prevalent in Nagaland. In concern with the growing awareness and need for medicinal herbs, documentation of plants is of vital importance. As a result, the current study was conducted in the region with the following aims: (1) To document medicinal uses of plants, their relative importance and information for future investigation in novel drug applications and (2) to educate locals about the area's declining wealth on traditional and medicinal flora.

## 2 Materials and Methods

### 2.1 Study Area

Nagaland lies in the North-eastern part of India between the latitude of  $25^{\circ} 06' N$  and  $27^{\circ} 04' N$  and longitude of  $93^{\circ} 20' E$  and  $95^{\circ} 15' E$ . The state covers a geographical area of  $16,579 \text{ km}^2$  and is bordered by Assam in the northwest, Myanmar and Arunachal Pradesh in the east and Manipur in the south. The state experience a sub-tropical to warm temperate monsoonal climate with four seasons, viz., winter, spring, summer and autumn. Annually, rainfall ranges between 1800 and 2500 mm

with July and August receiving the highest rainfall. Temperature may rise from 21 to 36 °C in summer and drops from 21 to 4 °C during winter months. Frost is common at high elevations with snowfall in certain places and strong northwest wind blows across the state with the onset of spring season. About 70% of the state's economy is dependent on agriculture along with other prominent economic activities including forestry, tourism and miscellaneous cottage industries. The recorded forest cover of the state in 2021 is 8629.30 km<sup>2</sup> which is about 52% of its geographical area. Tropical and sub-tropical evergreen forests accounts to one-sixth of the forest area including palms, bamboo and timber and mahogany forests.

## ***2.2 Collection and Identification***

The phyto-documentation on herbaceous plants and their uses in traditional healing customs by the Naga tribes was conducted in various districts across Nagaland. Random weed samples were collected, and the representative taxa sampled during the field survey were processed for herbarium following Jain and Rao [25] and later identified with the help of standard literature on regional floras [26–28]. Group discussion was held with native herbalist, village elders, old folks, street vendors, farmers and council members to identify the local names, uses and other required descriptions on their medicinal values. Special attention was paid to record information from traditional healers and practitioners having immense knowledge of plants in local dialect and well versed with their therapeutic uses.

## **3 Results and Discussion**

The history of medicinal plants is as long as the history of humans. Nagas have been practicing the use of medicinal plants since time immemorial which has been passed down from generation to generation through traditional practices and oral lore. Before Christianity, Nagas practiced Totemism and Animism, which are primarily indulged with worshipping nature. The core principle of this devotion is abided in respecting and preserving nature through rituals and sustainable norms laid down by the village priest. Supplementing such traditions, the practices of therapeutic healing is also associated with the principles and beliefs of the tribes. In the present study, a total of 161 herbaceous plant species belonging to 58 families and 127 genera were documented during the survey. All the recorded herbs have certain medicinal values and have been extensively used by the tribes for treating several diseases and ailments. The collected plant samples arranged in alphabetical order along with their botanical and vernacular names, plant parts used, preparation and purpose/mode of administration are enumerated in Table 1. The family Asteraceae (24) was reported with the largest number of species followed by Lamiaceae (11), Poaceae (9), Solanaceae (7), Leguminosae, Polygonaceae, Malvaceae and Rubiaceae (6

**Table 1** Ethnomedicinal herbs used by the Naga tribes of Eastern Himalayas

Sl no.	Scientific name	Vernacular name	Family	Parts used	Preparation	Purpose /usage/treatment
1.	<i>Acacia pinnata</i> Link	Chakraaging	Leguminosae	Leaves	Leaf paste is applied on infected tooth	Toothache.
2.	<i>Aconitum palmatum</i> D.Don	Merimezem	Ranunculaceae	Roots	Root is crushed grinded and taken orally	Laryngitis, sedation, asthma.
3.	<i>Acorus calamus</i> L.	Themeprii	Acoraceae	Rhizome	Concoction with therapeutic herbs	Gastritis, stomach ulcer, stomach ailments, anorexia.
4.	<i>Adiantum caudatum</i> L.	Aviinuo	Pteridaceae	Aerial parts	Dried and fresh aerial parts ingested	De-worming, antipyretic, astringent.
5.	<i>Ageratina riparia</i> (Regel) R.M.King & H.Rob.	Nhasa	Asteraceae	Leaves	Fresh paste rubbed on wounds	Treat fresh wound, cuts, and burns.
6.	<i>Ageratum conyzoides</i> (L.) L.	Chinapatta	Asteraceae	Leaves and root	Leaf paste used as haemostatic on cuts and wounds; decoction of root taken orally	Dysentery, diarrhoea, cuts, burns, insect bites.
7.	<i>Ageratum houstonianum</i> Mill.	Chinapatta	Asteraceae	Leaves	Fresh leaf paste applied on cuts and wounds; dried leaf powder mixed with water taken orally	Burns, dysentery, eye problem, pneumonia, urinary tract infection.
8.	<i>Allium porrum</i> L.	Repjee	Amaryllidaceae	Whole plant	Crushed grinded with mustard oil, pond salt and ingested	Antiseptic, tonic, anti-cholesteremic, kidney stones.
9.	<i>Alpinia malaccensis</i> (Burm.f.) Roscoe	Sokriinuo	Zingiberaceae	Rhizome	Fresh or dried rhizome grounded and eaten	Stomach ache, indigestion, emetic, wounds, ringworm.
10.	<i>Amaranthus spinosus</i> L.	Nyedza	Amaranthaceae	Seeds	Dried seeds roasted and eaten with focal red rice	Diuretic, stomach ailments, bowel movements, appetizer, mouth ulcer, eczema, snake bites, boils.
11.	<i>Amaranthus viridis</i> L.	Tierhiitepfii	Amaranthaceae	Seeds	Either dried or roasted	Eye disorder, venereal disease, fever, asthma.

12.	<i>Amorphophallus bulbifer</i> (Roxb.) Blume	Teinyhiimidu	Araceae	Stem	Boiled with pond salt and consumed	Maintain blood pressure, detoxification, cough, breast pain.
13.	<i>Amphineuron opulentum</i> (Kaulf.) Holttum	Maachai	Thelypteridaceae	Leaves	Leaf paste applied on infected tooth	Toothache.
14.	<i>Ardisia crenata</i> Sims	–	Primulaceae	Berries	Taken in small dosage	Rheumatism, earache, traumatic injuries, snake and insect bites, fever, Diarrhoea, improves blood circulation
15.	<i>Artemisia nilagirica</i> (C.B.Clarke) Pamp.	Cienakezhau	Asteraceae	Leaves	Intake of dried grounded leaves with water	Antimicrobial, antiulcer, antifungal, anti-asthmatic, antioxidant, anti-cancer.
16.	<i>Artemisia indica</i> Willd.	Ciena	Asteraceae	Leaves	Leaf paste is applied on infected skin; fresh leaves burnt used as natural mosquito repellent	Skin infection, mosquito repellent.
17.	<i>Asclepias curassavica</i> L.	–	Apocyanaceae	Aerial parts	Fresh paste applied on infected skin; dried precipitated with water and taken orally	Dysentery, skin ulcers, eye treatment, ringworm, sores, anti-prostatic.
18.	<i>Asparagus officinalis</i> L.	Shieprii	Begoniaceae	Young shoot, roots and tubers	Extract from roots taken orally; young shoots and tubers cooked and eaten as vegetable	Obesity, bladder infection, constipation, stomach ulcers.
19.	<i>Begonia picta</i> Sm.	Tichu	Begoniaceae	Whole plant	Either fresh extract or cooked and taken as vegetable	Indigestion, anti-inflammatory, skin infection, insect bites.

(continued)

Table 1 (continued)

Sl no.	Scientific name	Vernacular name	Family	Parts used	Preparation	Purpose /usage/treatment
20.	<i>Bidens pilosa</i> L.	Zorha	Asteraceae	Leaves	Fresh paste applied on wounds; dried leaves taken orally	Blood coagulation, wounds, burns, malaria, and arthritis.
21.	<i>Breynia retusa</i> (Dennst.) Alston	–	Phyllanthaceae	Leaves and roots	Consumed either fresh or dried	Diabetes, antioxidant, reduce blood sugar.
22.	<i>Brugmansia suaveolens</i> (Humb. & Bonpl. ex Willd.) Bercht. & J.Presl	Lalho	Solanaceae	Leaves	Leaves wrapped in banana leaf warmed in fire and dapped on affected area to ease pain	Ulcers, tonsillitis, body ache.
23.	<i>Cannabis sativa</i> L.	Ganja	Cannabaceae	Leaves	Leaf paste used as hemostatic to cuts and wounds; decoction taken orally	Cuts and wounds, malaria, stomach ache.
24.	<i>Cardamine hirsuta</i> L.	Seguoga	Brassicaceae	Whole plant	Cooked with other herbs and eaten with rice	Digestive disorder.
25.	<i>Catharanthus roseus</i> (L.) G.Don	Tsuininaro	Apocyanaceae	Leaves	Leaf extract applied on infected skin; boiled and consumed in small quantity with Neem	Skin disease, irregular blood pressure, stomach problems.
26.	<i>Centella asiatica</i> (L.) Urb.	Gara	Apiaceae	Whole plant Fresh	Boiled or raw leaves	Diabetic, wounds, burns, known to improve memory power, diarrhoea, constipation.
27.	<i>Chloris barbata</i> Sw.	–	Poaceae	Leaves	Leaf paste applied on infected area	Skin infection, antimicrobial.
28.	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	–	Asteraceae	Leaves	Leaf paste or juice rubbed on wounds	Fresh wounds, burns, skin infection.
29.	<i>Clerodendrum bracteatum</i> Wall. ex Walp.	Khriehenyii	Lamiaceae	Leaves	Juice is applied on scalp; paste taken orally	Astringent, remove dandruff.

30.	<i>Clerodendrum glandulosum</i> Lindl.	Gathere	Lamiaceae	Leaves	Boiled leaves are eaten	Lowers blood pressure.
31.	<i>Clerodendrum serratum</i> (L.) Moon	Atuksuba	Lamiaceae	Leaves	Decoction of leaves are consumed	Irregular menstruation.
32.	<i>Clerodendrum villosum</i> Blume	Akawa	Lamiaceae	Leaves	Decoction is drunk; juice massage on scalp	Kill lice, liver problems.
33.	<i>Coix lacryma-jobi</i> L.	Kesi	Poaceae	Fruit	Fruits soaked in water overnight and taken orally	Warts, appendicitis, lungs disorder, arthritis.
34.	<i>Commelina benghalensis</i> L.	Akhovepii	Commelinaceae	Aerial parts	Fresh leaves and roots used as poultice	Sun burns, anti-inflammatory, diuretic, laxative.
35.	<i>Colocasia esculenta</i> (L.) Schott	Dzinuo	Araceae	Leaves and tubers	Cooked and consumed	Anti-inflammatory, anti-fungal, inhibit tumor and gastrointestinal problems.
36.	<i>Costus speciosus</i> (J.Koenig) Sm.	Thevobuoto	Costaceae	Stem and rhizome	Boiled or soaked rhizome in water and consumed; stem paste applied on infested skin with maggots	Skin infection, anti-cancer, anti-microbial, obesity, urinary tract infection.
37.	<i>Crassocephalum crepidioides</i> (Benth.) S. Moore	–	Asteraceae	Leaves	Extract used orally with honey	Indigestion, oral problems, epilepsy, inflammation.
38.	<i>Crotalaria juncea</i> L.	–	Leguminosae	Root, pod and leaves	Concoction of root, pods and leaves applied externally or ingested in small dosage	Skin diseases, rashes, high blood pressure, and astringent.
39.	<i>Curculigo capitulata</i> (Lour.) Kuntze	Koritong	Hypoxidaceae	Root, flowers and leaves	Decoction of young plant parts; root soaked overnight in water; and the liquid is applied	Conjunctivitis, ear-ache, antiseptic, haemostatic.

(continued)

Table 1 (continued)

SI no.	Scientific name	Vernacular name	Family	Parts used	Preparation	Purpose /usage/treatment
40.	<i>Curculigo orchitoides</i> Gaertn.	Koritong	Hypoxidaceae	Root, flowers and leaves	Decoction of young plants with lime	Ear-ache, antiseptic.
41.	<i>Curcuma angustifolia</i> Roxb.	Chiecie	Zingiberaceae	Flower and rhizome	Consumed both fresh and dried with other herbs	Fever, cough, antifungal, analgesics, anticancer.
42.	<i>Curcuma aromatica</i> Salisb.	Hutou	Zingiberaceae	Flower and rhizome	Taken both fresh and dried with therapeutic herbs	Gastrointestinal disorder, arthritis, skin infections and rashes.
43.	<i>Cuscuta chinensis</i> Lam.	Tsuiali	Convolvulaceae	Aerial parts	Paste applied on pain affected area; juice taken orally	Anti-depression, urinary bladder problem, liver ailments, joint pain.
44.	<i>Cuscuta reflexa</i> Roxb.	Tsuiali	Convolvulaceae	Aerial parts	Juice extract is boiled and consumed; paste applied on affected area	Urination disorder, muscle cramp, cold cough, warts, carminative.
45.	<i>Cyanotis vaga</i> (Lour.) Schult. & Schult.f.	–	Commelinaceae	Whole plant	Plant extract is ingested in small quantity with honey	Liver dysfunction, weight loss, enhance energy metabolism.
46.	<i>Cyperus iria</i> L.	–	Cyperaceae	Leaves	Boiled with honey and juice is consumed	Stomach ache, diuretic, regulate menstruation, cure itching.
47.	<i>Datura innoxia</i> Mill.	Lhalho	Solanaceae	Flower and leaves	Either fresh or dried use as poultice	Malaria, antiseptic, cardiac arrest, stomach ulcers.
48.	<i>Dicranopteris linearis</i> (Burm.f.) Underw.	Kajangtong	Gleicheniaceae	Leaves	Poultice on painful body parts	Fever, wounds, asthma, sores, ulcers.
49.	<i>Dioscorea alata</i> L.	Thecu	Dioscoreaceae	Tuber	Boiled and taken	Gastritis, constipation, stomach ache.
50.	<i>Diplazium esculentum</i> (Retz.) Sw.	Gasilo	Athyriaceae	Leaves	Taken either boiled or raw with aromatic rice and pond salt	Measles, gastrointestinal, diabetes, glandular swelling, bone fracture, constipation.
51.	<i>Drynaria cordata</i> (L.) Willd. ex Schult.	Pfiipfiinyii	Caryophyllaceae	Whole plant	Squeezed along with mustard oil and juice applied on infected area; taken orally	Sinusitis, migraine, bronchitis.



52.	<i>Eclipta prostrata</i> (L.) L.	Bhringraj	Asteraceae	Leaves	Extract mixed with honey, milk and ingested; leaf paste rubbed on wounds	Hepatitis, snake bites, jaundice, liver tonic, asthma, respiratory ailments.
53.	<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Gajo	Urticaceae	Leaves	Leaves boiled and eaten with rice	Gastrointestinal problems.
54.	<i>Eleusine indica</i> (L.) Gaertn.	–	Poaceae	Whole plant	Boiled and drunk	Laxative, hypertension, fever, cold cough, malaria, relieves pain, astringent, asthma.
55.	<i>Elsholtzia blanda</i> (Benth.) Benth.	Niepfii	Lamiaceae	Leaves and flower	Consumed both fresh and dried	Reduce tonsil swell, fever, cough, and maintain blood pressure.
56.	<i>Entada pursaetha</i> DC.	Tholi	Leguminosae	Seed	Cleansed in running water for several days, roasted and consumed in small dosage.	Burns, jaundice in children, after-effects of stroke, helps in blood circulation, parasitic infection.
57.	<i>Equisetum arvense</i> L.	Sithie	Equisetaceae	Aerial parts	Boiled with water and lemon juice	Kidney stone, bladder problems, tuberculosis, heal ulcer.
58.	<i>Erigeron linifolius</i> Willd.	–	Asteraceae	Aerial parts	Plant paste applied on infected area	Antibacterial, anti-inflammatory.
59.	<i>Eryngium foetidum</i> L.	Dumia	Apiaceae	Whole plant	Consume both fresh and cooked with other herbs	Infertility complications, ear ache, de-worming, malaria.
60.	<i>Eupatorium adenophorum</i> Spreng.	Japan nha	Asteraceae	Aerial parts	Fresh paste applied on infected area	Anti-inflammatory, anti-microbial, analgesic, blood coagulation.
61.	<i>Euphorbia heterophylla</i> L.	–	Euphorbiaceae	Leaves	Boiled with pond salt and consumed	Asthma, anti-cancer, diarrhea.
62.	<i>Euphorbia hirta</i> L.	Dudiya	Euphorbiaceae	Aerial shoots	Consumed either fresh or dried mixed with other herbs	Cold cough, bronchitis, gonorrhoea, anti-diabetic.

(continued)

Table 1 (continued)

Sl no.	Scientific name	Vernacular name	Family	Parts used	Preparation	Purpose /usage/treatment
63.	<i>Fagopyrum esculentum</i> Moench	Garei	Polygonaceae	Aerial parts	Either fresh or dried young leaves cooked with local rice and consumed	Cardiovascular, antioxidant, stomach congestion, diabetic.
64.	<i>Galinsoga parviflora</i> Cav.	Bomara	Asteraceae	Leaves	Fresh paste applied on infected area	Eczema, skin infection, rashes, bleeding wounds.
65.	<i>Gomphrena celosioides</i> Mart.	–	Amaranthaceae	Whole plant	Extract taken orally; fresh paste applied on skin rashes	Gastrointestinal, breathlessness, skin rashes.
66.	<i>Gynura bicolor</i> (Roxb. ex Willd.) DC.	Liezienuo	Asteraceae	Aerial parts	Young leaves boiled with local rice and taken orally	Constipation, diabetes, post-labour recovery, migraines, haemoptysis.
67.	<i>Hibiscus sabdariffa</i> L.	Gakhro	Malvaceae	Leaves and flower	Consumed either dried-fresh or made into porridge with rice	Blood pressure, aids in digestion, skin rashes, inflammatory, food poisoning.
68.	<i>Hibiscus syriacus</i> L.	Chakha ga	Malvaceae	Flower and leaves	Flower paste applied on scalp; young leaves boiled and eaten	Antifungal, hair and skin treatment, gastrointestinal.
69.	<i>Hodgsonia macrocarpa</i> (Blume) Cogn.	Ketsamo	Cucurbitaceae	Seeds	Roasted seeds mixed with aromatic herbs, pond salt and consumed	Bacterial infection in feet, heal wounds, fever, nose ulcers, cure burns.
70.	<i>Houttuynia cordata</i> Thunb.	Gatha	Saururaceae	Whole plant	Fresh plant mixed with fermented soya bean and eaten	Diuretic action, detoxification, hypertension, improve appetite.
71.	<i>Hydrocotyle javanica</i> Thunb.	–	Araliaceae	Leaves and tender shoots	Crushed leaf paste applied on wounds; young shoots cooked and consumed	Gastritis, eye infection, fresh cut wounds.
72.	<i>Impatiens latiflora</i> Hook.f. & Thomson	Cikanyii	Balsaminaceae	Leaves	Fresh paste is applied on skin infection; leaves taken orally	Insect bites, allergies, indigestion, analgesic.

73.	<i>Imperata cylindrica</i> (L.) Rausch.	Azu	Poaceae	Aerial shoots	Paste is applied on wounds; leaves are consumed	Diuretic, gastrointestinal, urinary tract infection.
74.	<i>Ipomoea involucreata</i> P. Beauv.	–	Convolvulaceae	Roots and leaves	Extract is taken orally	Hypertension, diabetes, analgesic, psychotomimetic, antimicrobial, fatigue.
75.	<i>Ipomoea purpurea</i> (L.) Roth	–	Convolvulaceae	Leaves and flower	Plant extract taken orally	Constipation, oedema in lungs, mental disorders, jaundice.
76.	<i>Ipomoea quamoclit</i> L.	Tamlata	Convolvulaceae	Leaves and flower	Leaf paste applied on infected skin; young parts are consumed	Insect bites, rashes, hairfall, antidiabetic, antimicrobial.
77.	<i>Justicia adhatoda</i> L.	Tsiesenyii	Acanthaceae	Leaves	Decoction of young shoots with therapeutic herbs	Carminative, paralysis, gonorrhoea, chronic rheumatism.
78.	<i>Kaempferia rotunda</i> L.	Bhuichampa	Zingiberaceae	Flower and rhizome	Paste applied on wounds; taken orally	Stomach ache, food poisoning, emetic, thermogenic.
79.	<i>Kalanchoe pinnata</i> (Lam.) Pers.	Tsatsovo	Crassulaceae	Leaves	Fresh grinded with therapeutic herbs and ingested	Pulmonary infection, kidney stones, stomach ache, gastric ulcer, allergies, diabetes.
80.	<i>Lantana camara</i> L.	Anitong	Verbenaceae	Leaves and flowers	Boiled with honey and juice taken in small dosage	Fever, cold cough, antimicrobial, chicken pox, ulcers, skin rashes, wheezing cough.
81.	<i>Leucas aspera</i> (Willd.) Link	Chota halkusa	Lamiaceae	Leaves	Paste is applied on infected area	Antimicrobial, snake bites, insect bites.
82.	<i>Ludwigia perennis</i> L.	–	Onagraceae	Flower	Fresh paste applied on infected tooth	Toothache and fever.
83.	<i>Lycopodium cernuum</i> L.	Mangrang naro	Lycopodiaceae	Aerial parts	Dried-grinded, boiled with other herbs and taken orally	Constipation, chronic lung disorder, bronchitis.

(continued)

Table 1 (continued)

Sl no.	Scientific name	Vernacular name	Family	Parts used	Preparation	Purpose /usage/treatment
84.	<i>Meniha arvensis</i> L.	Pudina	Lamiaceae	Aerial parts	Consumed either fresh or boiled	Hypertension, heart disease, inflamed joints and arthritis.
85.	<i>Mikania micrantha</i> Kunth	Japanza	Asteraceae	Leaves	Fresh leaves are grinded and extract applied for sinus; extract taken orally	Lower blood pressure; reduce blood sugar level, sinusitis.
86.	<i>Mimosa pudica</i> L.	Keringanha	Leguminosae	Root and leaves	Freshly grinded and taken orally	Asthma, jaundice, ulcer, small pox, conjunctivitis.
87.	<i>Mirabilis jalapa</i> L.	Jamtangnaro	Nyctaginaceae	Roots and leaves	Concoction of roots and leaves taken orally	Purgative, cathartic inflammation, antiviral, diuretic.
88.	<i>Mussaenda macrophylla</i> Wall.	Seirhobie	Rubiaceae	Fruits	Boiled and juice consumed	Antiviral, male impotency, gastrointestinal problems
89.	<i>Ocimum sanctum</i> L.	Nieco	Lamiaceae	Aerial parts	Mixed with ginger, honey and taken orally	Asthma, eye sore, dysentery, arthritis, gastritis, antimicrobial.
90.	<i>Ocimum tenuiflorum</i> L.	Nieco	Lamiaceae	Flower and leaves	Either dried, fresh and mixed with other herbs and consumed	Anti-ageing, cough, headache, acne, anticancer, heartache, fever, eye health.
91.	<i>Oenanthe javanica</i> (Blume) DC.	Gakra	Apiaceae	Young aerial parts	Boiled or raw with soyabeans, garlic, ginger, pond salt and eaten with aromatic red rice	Jaundice, abdominal pain, leukaemia, hepatitis.
92.	<i>Oxalis corniculata</i> L.	Keve	Oxalidaceae	Whole plant	Fresh plants are eaten wholly	Aids in digestion, antiseptic, fresh cut wounds, burns.
93.	<i>Oxalis debilis</i> Kunth	Thezutsiituo	Oxalidaceae	Whole plant	Fresh plants are eaten wholly	Indigestion, constipation, acid-reflux.
94.	<i>Paederia foetida</i> L.	Menyiero	Rubiaceae	Aerial parts	Boiled with water, herbs, pond salt and ingested	Gastrointestinal, abdominal pain, rheumatism, stomach oedema, gastritis, ulcers.

95.	<i>Panax ginseng</i> C.A.Mey.	Tsudiemozu	Araliaceae	Root, leaves	Extract mixed with sorghum oil, pond salt, water and drunk; dried powdered mixed with honey and water	Heart problems, diabetes, cancer, tuberculosis, ulcers.
96.	<i>Panax pseudoginseng</i> Wall.	Takumtsu mozu	Araliaceae	Root and leaves	Dried or fresh root and leaves grounded and taken orally	Anticancer, tuberculosis, diabetes.
97.	<i>Paris polyphylla</i> Sm.	–	Melanthiaceae	Rhizome	Fresh or dried rhizome applied on infected area or taken orally	Diarrhoea, analgesic, burn, cut, anticancer, snake, spider and scorpion bite, antispasmodic.
98.	<i>Paspalum distichum</i> L.	–	Poaceae	Whole plant	Either fresh or dried plants are boiled and ingested	Bronchitis, arthritis, blood tonic, antibacterial.
99.	<i>Passiflora edulis</i> Sims	Bel	Passifloraceae	Leaves and fruits	Consumed either steamed or fried; fruits eaten fresh or fermented	Asthma, snakebite, liver- tonic, heart problems, maintains blood pressure, malaria.
100.	<i>Peperomia pellucida</i> (L.) Kunth	–	Piperaceae	Leaves	Paste applied on infected skin; eaten either fresh or boiled	Anti-inflammatory, rheumatism, fatigue, acne, boils.
101.	<i>Perilla frutescens</i> (L.) Britton	Kenye	Lamiaceae	Leaves and seeds	Leaves consumed either fresh or steamed; seeds are roasted made into paste and ingested	Stomach problems, gastritis, haemostatic.
102.	<i>Persicaria chinensis</i> (L.) H. Gross	Priizie	Polygonaceae	Whole plant	Young leaves and stem are boiled with pond salt and ingested	Antibacterial, snake bite, eye treatment, mosquito repellent.
103.	<i>Persicaria hydropiper</i> (L.) Delarbre	Priizie	Polygonaceae	Leaves	Fresh leaves boiled and taken	Neuro-protective effect, anti-cancer, against rheumatism.
104.	<i>Phyllanthus fraternus</i> G.L. Webster	–	Phyllanthaceae	Whole plant	Paste directly applied on infected area; grounded dried leaves ingested	Diuretic, laxative, gonorrhoea, spasms. It is directly applied on skin for skin infection.

(continued)

Table 1 (continued)

SI no.	Scientific name	Vernacular name	Family	Parts used	Preparation	Purpose /usage/treatment
105.	<i>Physalis peruviana</i> L.	Chahacasi	Solanaceae	Fruit and leaves.	Fresh fruits and leaves grounded and taken in small dosage	Antihistamine, antiviral, cancer, asthma, dermatitis, gout, urinary tract disorder.
106.	<i>Pilea microphylla</i> (L.) Liebm.	–	Urticaceae	Aerial parts	Plant extract rubbed on infected skin	Antibacterial, skin infection, antifungal, allergies.
107.	<i>Piper betle</i> L.	Seipanyii	Piperaceae	Leaves	Fresh paste applied on wound	Haemostatic.
108.	<i>Piper longum</i> L.	Pipali	Piperaceae	Leaves	Eaten raw or steamed with pond salt	Chronic malaria, spleen, tumours, tongue paralysis, respiratory infection.
109.	<i>Plantago asiatica</i> L.	Gapa	Plantaginaceae	Leaves	Leaves are boiled and eaten	Urinary tract infection, promote urination, relieve phlegm discomfort.
110.	<i>Plantago erosa</i> Wall.	Isabgol	Plantaginaceae	Whole plant	Boiled with other herbs with local pond salt and taken with aromatic rice	Bleeding and inflammation, constipation, antibacterial, indigestion.
111.	<i>Plantago major</i> L.	Gapa	Plantaginaceae	Whole plant	Boiled and eaten	Cuts and burns, sprains.
112.	<i>Polygonum molle</i> D. Don	Gazie	Polygonaceae	Leaves and young stem	Fresh leaves poultice on infected area; young leaves and stem taken orally	Anti-inflammatory, anticancer, skin rashes, astringent properties.
113.	<i>Polygonum plebeium</i> R.Br.	–	Polygonaceae	Leaves	Taken either fresh or boiled	Bowel movement, constipation, stomach ailments.
114.	<i>Pouzolzia hirta</i> Blume ex Hassk.	–	Urticaceae	Leaves	Extracts are drunk	Bowel movement, constipation, stomach ailments.
115.	<i>Pouzolzia zeylanica</i> (L.) Benn.	–	Urticaceae	Aerial parts	Poultice on infected area	Ulcers, syphilis, gonorrhoea, galactagogue, stomachache.

116.	<i>Psophocarpus tetragonolobus</i> (L.) DC.	Charkona	Leguminosae	Fruit	Consumed fresh mixed with pond salt, king chili and soybean	Blood purifier, anti-oxidant, diabetes.
117.	<i>Pteridium aquilinum</i> (L.) Kuhn	–	Dennstaedtiaceae	Roots	Steam bath	Diuretic, arthritis, old wound, aphrodisiac, de-worming.
118.	<i>Ricinus communis</i> L.	Louca	Euphorbiaceae	Leaves	Dried leaves grounded and taken in small dosage	Backache, cramp, menstrual problems, constipation.
119.	<i>Rubia coriifolia</i> L.	Chenhu	Rubiaceae	Whole plant	Extract or paste applied on infected skin rashes	Ringworm, leucoderma, skin disease.
120.	<i>Rubus ellipticus</i> Sm.	Ruomvii	Rosaceae	Berries and leaves	Grinded with water and consumed	Cold cough, sore throat, indigestion, constipation, diuretic.
121.	<i>Rubus niveus</i> Thunb.	Temeirom	Rosaceae	Berries and leaves	Grinded with water and consumed	Snake bite, rheumatic, detoxification, dysentery, menstrual bleeding.
122.	<i>Rumex patientia</i> L.	Meza garkrie	Polygonaceae	Roots and leaves	Poultice on infected area; juice of roots and leaves taken in small dosage	Constipation, fresh cut wounds, skin rashes, aids in digestion.
123.	<i>Rungia pectinata</i> (L.) Nees	–	Acanthaceae	Leaves	Fresh leaf paste applied on the body	Small pox, body ache, aperients effects.
124.	<i>Scutellaria rivularis</i> Wall. ex Benth.	Angamejep talula	Lamiaceae	Whole plant	Paste mixed with sorghum oil and rubbed	Insect and spider bites.
125.	<i>Selaginella involvens</i> (Sw.) Spring	–	Selaginellaceae	Aerial parts	Taken orally with other herbs	Internal haemorrhoid bleeding, blood expediting.
126.	<i>Senecio cappa</i> Buch.-Ham. ex D. Don	Mesakraza	Asteraceae	Whole plant	Extract applied externally	Skin disease, boils.

(continued)

Table 1 (continued)

Sl no.	Scientific name	Vernacular name	Family	Parts used	Preparation	Purpose /usage/treatment
127.	<i>Senna hirsuta</i> (L.) H.S.Irwin & Barneby	–	Leguminosae	Leaves	Dried, grinded-applied on infected skin and taken orally in small dosage	Dysentery, ringworm, skin infection, germicide, antiparasite.
128.	<i>Sesamum orientale</i> L.	Pingnak	Pedaliaceae	Seeds	Roasted, consumed, or applied on skin and scalp	Laxative, skin hydration, hair growth.
129.	<i>Setaria glauca</i> (L.) P. Beauv.	–	Poaceae	Whole plant	Boiled and ingested	Fever, cough.
130.	<i>Setaria pumila</i> (Poir.) Roem. & Schult.	–	Poaceae	Aerial parts	Boiled with other herbs, mixed with salt and consumed	Rheumatic, fever.
131.	<i>Sida acuta</i> Burm. f.	Bala	Malvaceae	Leaves	Dried, grinded with oil and taken orally	Asthma, tuberculosis, oral problems, urinary tract infection, testicular swelling.
132.	<i>Smilax zeylanica</i> L.	Fiipro	Smilacaceae	Leaves and roots	Fresh paste rubbed on infected skin; boiled with cow milk and ingested	Skin infections; maintain blood pressure, indigestion, joint pain, sexual vigor.
133.	<i>Solanum gilo</i> Raddi	Ciepfi	Solanaceae	Fruits	Roasted in hot ash and eaten	Aids in digestion, maintains blood pressure.
134.	<i>Solanum nigrum</i> L.	Gadzii	Solanaceae	Fruits	Consumed either fresh or boiled with pond salt	Mouth ulcers, skin infections, asthma, tonic, and cough.
135.	<i>Solanum torvum</i> Sw.	Tsociepfi	Solanaceae	Fruits	Roasted in ash, fried with sorghum or boiled with pond salt	Cardiac arrest, ulcers, fever, cough, wounds, liver disorder.
136.	<i>Solanum vitarum</i> Dunal	Chitkrii	Solanaceae	Fruits	Dried and mixed with other therapeutic herbs and taken orally	Anticancer, antifungal, anti-inflammatory.



137.	<i>Sonchus arvensis</i> L.	Nhana	Asteraceae	Leaves, stem, young roots	Fresh leaves steamed and eaten	Cough, digestive disorder, increase appetite and improve eyesight.
138.	<i>Sonchus asper</i> (L.) Hill	Nhana	Asteraceae	Leaves and stems	Young leaves cooked and eaten	Sedative, anti-cancer, blood purifier, antidepressant.
139.	<i>Spermacoce hispida</i> L.	–	Rubiaceae	Aerial parts	Consumed fresh young shoots	Gallstones, conjunctivitis, haemorrhoids, tonic.
140.	<i>Spermacoce keyensis</i> Small	–	Rubiaceae	Aerial parts	Young shoots consumed either fresh or dried	Malaria, boils, haemorrhage, skin infection.
141.	<i>Spermacoce latifolia</i> Aubl.	–	Rubiaceae	Aerial parts	Dried and mixed with water and taken orally	Leukemia, digestive problems, skin rashes, urinary tract infection, respiratory ailments.
142.	<i>Sphaeranthus indicus</i> L.	–	Asteraceae	Aerial parts	Either dried or fresh mixed with other herbs	Skin infection, cough, diabetic, epilepsy.
143.	<i>Spilanthes acmella</i> (L.) L.	Kevenha	Asteraceae	Flower and leaves	Fresh flowers paste is applied on infected tooth.; leaves are boiled and taken orally	Toothache, inflammation, pain-reliever, diuretic, gastric ulcer.
144.	<i>Sporobolus diandrus</i> (Retz.) P.Beauv.	–	Poaceae	Aerial parts	Boiled and consumed orally	Gonorrhoea, pain reliever, blood circulation.
145.	<i>Synedrella nodiflora</i> (L.) Gaertn.	–	Asteraceae	Leaves	Dried, grinded and taken orally	Cardiac problems, epilepsy, liver disease, inflammatory.
146.	<i>Thunbergia coccinea</i> Wall.	Nulidongmoli	Acanthaceae	Tubers	Extracts taken orally in small dosage	Aphrodisiac and tonic.
147.	<i>Thysanotus latifolia</i> (Roxb. ex Hornem.) Honda	Phipfe	Poaceae	Leaves and roots	Plant extract mixed with lime, pond salt and ingested	Treat boils, sore in eye, fever, and reduce inflammation.

(continued)

Table 1 (continued)

Sl no.	Scientific name	Vernacular name	Family	Parts used	Preparation	Purpose /usage/treatment
148.	<i>Tagetes erecta</i> L.	Puja niepou	Asteraceae	Leaves and flower	Decoction of leaves	Intestinal problems, gastritis, mumps, sore eyes.
149.	<i>Taraxacum officinale</i> (L.) Weber ex F.H. Wigg.	–	Asteraceae	Whole plant	Decoction and brewed for tea	Reduce cholesterol, maintain blood sugar level, improve eyesight, cleans intestinal tract.
150.	<i>Tinospora sinensis</i> (Lour.) Merr.	Tsula mesukzu	Menispermaceae	Stem	Poulticed on affected area	Applied to burns, bone fractures, sprains, stomach problems.
151.	<i>Tithonia diversifolia</i> (Hemsl.) A.Gray	Mochitsinara	Asteraceae	Leaves	Paste applied on skin; dried or fresh mixed with therapeutic herbs ingested in small dosage	Antiseptic, indigestion, stomach ache, constipation, diabetes, menstrual pain.
152.	<i>Tridax procumbens</i> (L.) L.	–	Asteraceae	Leaves	Paste rubbed on infected skin	Anti-fungal, skin disease, insect bites, anti-coagulant.
153.	<i>Triumfetta pilosa</i> Roth	Kuchii	Malvaceae	Leaves	Dried and taken orally	Inflammation, stomach ache, jaundice.
154.	<i>Triumfetta rhomboidea</i> Jacq.	Kuchii	Malvaceae	Leaves	Dried and taken orally	Gum problems, stomach ache, hepatitis, asthma.
155.	<i>Typha angustata</i> Bory & Chaub.	–	Typhaceae	Shoot	Concoction of leaves, honey, ginger and consumed orally	Male impotency, menstrual pain, haemostatic.
156.	<i>Urena lobata</i> L.	Kouchii	Malvaceae	Root, stem and leaves	Concoction of leaves, root, stem with water and taken orally	Anticancer, anti-diabetic, diarrhoea.
157.	<i>Urtica dioica</i> L.	Zozie	Urticaceae	Leaves	Leaves paste mixed with essential oil and applied on scalp; leaves boiled and taken orally	Hair fall, inflammations, prostate cancer, hay fever, lower blood pressure, maintains blood sugar level.

158.	<i>Wedelia chinensis</i> (Osbeck) Merr.	Omni	Asteraceae	Leaves	Extract of leaves is rubbed on scalp and ingested in minute dosage	Hair growth, analgesic, antimicrobial, headache.
159.	<i>Zanthoxylum acanthopodium</i> DC.	Ganyasei	Rutaceae	Leaves and fruits	Consumed either raw or cooked with salt or soya beans; paste applied on infected tooth	Fever and toothache.
160.	<i>Zanthoxylum oxyphyllum</i> Edgew.	Ganyanyii	Rutaceae	Fruits, leaves, inflorescence	Poultice on infected area; cooked with sorghum oil, pond salt and eaten with aromatic rice	Liver-tonic, toothache and fever.
161.	<i>Zanthoxylum rhetsa</i> DC.	Ganya	Rutaceae	Fruits and leaves	Poultice on forehead; boiled and eaten with sticky rice	Fever.

species each), Convolvulaceae and Urticaceae (5 species each), Zingiberaceae (4), Acanthaceae, Amaranthaceae, Apiaceae, Araliaceae, Plantaginaceae, Piperaceae and Rutaceae (3 species each), Apocynaceae, Araceae, Begoniaceae, Commelinaceae, Hypoxidaceae, Oxidaceae, Phyllanthaceae, Pteridaceae and Rosaceae (2 species each) while the rest 32 families had one species each. Most plants were found to grow in wild conditions and very few cultivated. Some weed plants like *Bidens pilosa*, *Cannabis sativa* and *Datura innoxia* have often been used as antiseptics for treating cuts and wounds, burns and skin infections. Some of the common plants like *Ageratum conyzoides*, *A. houstonianum* and *Spilanthes acmella* found in this region are traditionally used as decoction with other therapeutic herbs for treating diarrhoea and as an effective pain reliever against toothache. Invasive plants such as *Lantana camara*, *Chromoleana odorata* and *Ageratina riparia* growing abundantly in kitchen gardens are frequently considered a threat to the native flora but at the same time highly efficient and useful in treating numerous diseases. Rare and endangered species like *Paris polyphylla*, *Panax pseudoginseng* and *Curculigo orchiodes* are known for their ample benefits in treating various diseases and their anticancer properties.

The most common plant parts used are the leaves followed by shoots, roots, rhizomes, seeds, flowers and fruits. Many plants were found to possess multiple therapeutic properties in treating different ailments. Leaves of *Acacia pinnata*, *Amphineuron opulatum*, *Cannabis sativa*, *Catharanthus roseus*, *Chloris barbata*, *Hydrocotyle javanica*, *Ipomoea quaolit*, *Rungia pectinata*, *Centella asiatica*, *Clerodendrum glandulosum*, *C. serratum*, *Commelina benghalensis*, *Hibiscus syriacus*, *Phyllanthus fraternus*, *Pilea microphylla*, *Polygonum molle* and *Rumex patientia* are used for treating skin infections (cuts, wounds, ringworm, skin ulcers and skin rashes) and insect bites. Leaves of *Ricinus communis*, *Rubus niveus*, *Tithonia diversifolia* and *Typha angusta* are used for treating menstrual cramps. The tender shoots or aerial parts of *Asparagus officinalis*, *Adiantum caudatum*, *Asclepias curassavica*, *Euphorbia hirta* and *Imperata cylindrica* are used for dysentery, deworming, chronic lung diseases. Tender shoots of *Cuscuta chinensis* and *C. reflexa* are used in the treatment of urinary tract infection, urinary bladder problems and chronic liver ailments. Rhizome of *Acorus calamus*, *Alpinia malaccensis*, *Costus speciosus*, *Curcuma angustifolia*, *C. aromatic* and *Kaemferia rotunda* is extensively used as a remedy for treating fever, indigestion and cough. Seeds of *Amaranthus spinosus*, *A. viridis*, *Entada pursaetha*, *Hodgsonia macrocarpa*, *Perilla frutescens* and *Sesamum orientale* are used for constipation, appetizer, skin hydration and hair growth. Flowers of *Curculigo capitula* and *C. orchiodes* are used for the treatment of conjunctivitis and earache. Fruits (berries) of *Psophocarpus tetragonolobus*, *Solanum gilo*, *S. nigrum*, *S. torvum*, *S. viarum*, *Zanthoxylum oxyphyllum* and *Z. rhetsa* are used as liver tonic, aids in digestion, maintains blood pressure, reduce fever, appendicitis including warts. Extracts of *Eclipta prostrata*, *Amaranthus spinosus*, *Persicaria chinensis*, *Paris polyphylla*, *Leucas aspera* and *Impatiens latiflora* are used as antidotes against snake and insect bites.

Traditionally, the mode of preparation is by using either fresh or dried plant materials depending on the types of ailments the herbs are employed for treatment.

Most of the plants are processed in different ways like grinding, macerating, paste, juice extracts and decoction in combination with other herbs or ingredients like sorghum oil, pond salt, honey, milk and aromatic local rice. A warm poultice of various medicinal herbs with sorghum oil is also applied to get relief from muscle cramp, soreness, joint pain, body inflammation, body ache, fever and stomach congestion. The gastronomic culture of Nagas involves in the intake of spicy and fermented foods (bamboo shoots, soyabeans, mustard leaves, pickles, king chilies, etc.) including smoked meat (pork, beef, mutton and wild animals). These habits could have been a key reason for various health issues such as stomach pain, intestinal disorders, asthma, chronic liver disease and lungs infection prevalent within the tribal population. However, with these problems, the Nagas have developed a sense to find sources in treating the associated ailments and thus majority of the plants documented are known to be utilized for treating such gastrointestinal and other associated ailments. In total, 34 herbs were recorded for treating gastrointestinal problems (*Acorus calamus*, *Alpinia malaccensis*, *Amaranthus spinosus*, *Asparagus officinalis*, *Cannabis sativa*, *Catharanthus roseus*, *Curcuma aromatic*, *Colocasia esculenta*, *Cyperus iria*, *Datura innoxia*, *Dicranopteris linearis*, *Dioscorea alata*, *Diplazium esculentum*, *Elatostema sessile*, *Fagopyrum esculentum*, *Gomphrena celosioides*, *Gynura bicolor*, *Hibiscus syriacus*, *Hydrocotyle javanica*, *Kaempferia rotunda*, *Kalanchoe pinnata*, *Ocimum sanctum*, *Imperata cylindrica*, *Mussaenda macrophylla*, *Paederia foetida*, *Polygonum plebium*, *Pouzolzia hirta*, *P. zeylanica*, *Tagetes erecta*, *Tinospora sinensis*, *Tithonia diversifolia*, *Triumfetta pilosa*, *T. rhomboidea* and *Typha angusta*). From the present study, it is evident that medicinal plants play a vital role in aiding to the health of indigenous people in this region. Many of the tribes in the studied area still depend on the medicinal plants for their daily healthcare routine over the modern system of medicines. But over the years, this system may deteriorate due to the absence of interest among the younger generations as most are influenced by modern technology and their cultural importance are put aside. Moreover, the traditional healing systems are passed down orally and hence detailed information is lost in the process. Therefore, necessary steps should be taken up to encourage the upcoming generations as well as penned down the necessities in proper text for future references. With the help of the government or village councils, robust regulations and management plans should be laid to protect and educate the tribes about the benefits, medicinal purposes and conservation of these valuable herbs.

#### 4 Conclusion

The study elucidated a very high number of therapeutic herbs accounting for 161 plants, which is one of the highest recorded data from Northeast India. According to the current research, medicinal herbs will continue to play an essential role as a health aid to the tribal communities of Eastern Himalayas. Traditional healing treatments employing medicinal plants are widely used on a normative basis by the

Nagas. Furthermore, due to the rising costs of personal health maintenance, herbal therapies have grown more popular in these regions for treating various disorders. However, as a result of developmental activities, deforestation, population growth and indiscriminate exploitation, native medicinal plants are rapidly depleting and have even lead to some plant species being endangered. Therefore, efforts must be geared towards preserving them through sustainable management and enhance the effectiveness, efficacy and rational use of medicinal plants, especially through the integration into national, regional and local health policies and programmes. In situ conservation techniques in home gardens and on-farm cultivation should be encouraged for socio-economic and sustainable growth. Also, these plants can fill the void in the medical sector and become a new trend for upcoming research.

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