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99 Selected Folk Medicinal Plants of East Siang District of Arunachal Pradesh, India.

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ABSTARCT

Present study was carried out to accessed the traditional medicinal bioresources used in the East Siang District of Arunachal Pradesh, India as Arunachal Pradesh is a remote Indian territory where traditional medicines has been the main source of primary health management from time immemorial. This paper reports 99 medicinal plants used among the aborigines in at least 40 types of health problems among the tribal people inhabits the East Siang district of Arunachal Pradesh, India belong to 55 families. With 8 species, Solanaceae was recorded as the highest representing family then followed by Asteraceae and Rubiaceae with 5 species each. Almost all parts of the plants were recorded to use in the folk medical system.

Keywords: Aborigines, Folk Medicine, Traditional knowledge, biologically active compounds.

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INRODUCTION

Nature has endowed the earth with plant kingdom and plant is one among pre-requisite life supporting system of man and animals on this very blue planet. Plant provides almost everything that man needed. The environment around has been influencing the culture of man since antiquity and he started to make use of available natural resources around him. Man must have learnt use of medicinal plant subject to the hungry, accident, injury, bite of insects or serpent or death of fellow men and made man's instinct by luck or observation to get help from available surroundings¹; thus the importance of plants and animals was realized by the early men since the dawn of time. They started to use fruits, leaves and tubers for food and medicine. Such experiences became a knowledge system and assimilated as an integral part of man culture that passed down generation after generation and climaxed into "*traditional knowledge system*". Therefore, Knowledge on the therapeutic and nutritional properties of medicinal herbs and food plants predated recorded history². There are several historical indications that claim the ancient use of natural remedies to resolve primary health problems in different part of the world^{1, 3, 4}. World Health Organization define 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 illnesses⁵. In fact, traditional medicine practice is as old as mountains and hills in a tribal society where primary health care is the totally based on traditional medicines. The WHO fact sheet on traditional medicine reflects that in some Asian and African countries, 80% of the population depend on traditional medicine for primary health care⁵. Traditional medicine is found in various forms, names and practices in different parts of the world. It encompasses alternative medicine, complementary medicine, natural medicine, herbal medicine, non-conventional medicine, indigenous medicine, folk medicine, ethno medicine, Chinese medicine, Ayurveda, Siddha, Unani, Kampo, Jamu, Thai, Homeopathy, Acupuncture, Chiropractic, Osteopathy, bone-setting, spiritual therapies etc. National Centre for Complementary and Alternative Medicine (NCCAM) under the National Institute of Health in the United States of America classifies TCAM therapies based on the clinical approach into five broad groups such as whole medical systems (Chinese medicine, Ayurveda); mind-body medicine; biologically based practices (herbs, food, vitamins); manipulative and body based practices (chiropractic, osteopathy) and energy medicine (bio field therapies)⁶. Among these traditional medicines traditional herbal medicine have been received wide attention and recognition reason being the validation of these traditionally used therapeutic plants with the isolation of large

numbers of bioactive compound from plants and prevalence of herbal medicinal practices all over the world. Traditional herbal medicines include “naturally occurring, plant derived substances with minimal or no industrial processing that have been used to treat illness within local or regional healing practices”⁷. At least 50 pharmaceutical drugs have been discovered from ethnobotanical leads⁸. Fabricant and Farnsworth have identified 122 compounds of defined structure obtained from mere 94 plant species used as traditional medicines⁹. World market of herbal medicine based on traditional medicine is estimated at US \$60 billion (WHO 2002) and it is steadily growing. With the emerging worldwide interest in adopting and studying traditional systems and exploring their potential based on different health care systems, the evaluation of rich heritage of traditional medicine is essential¹⁰. There are many records on ancient traditional medicinal knowledge world around like the Chinese traditional medicine systems believed to be 5000 years old and belief two theories; “Yin and Yang”, and the five elements (wuxing), the famous “*De material medica*” written by Greek physician Dioscoredes in the first century AD, the archaeological records of Shanider IV, Sumerians herbal records- the cuneiform; the antique “Ebers papyrus” and the Ayurveda etc^{1, 3}. Indigenous people of Arunachal Pradesh also has predated knowledge on medicinal plants and their uses. But no written records is exist in this part of territory but still exists in form of traditional knowledge and need to record before its lost forever. One of the prerequisites for the success of primary health care is the availability and use of suitable drugs. Plants have always been a common source of medicaments, either in the form of traditional preparations or as pure active principles¹¹. In more recent past, the use of plants as medicines has involved the isolation of active compounds, beginning with the isolation of morphine from the opium in the early 19th century¹². The traditional knowledge has been the main clue to lead the search of bioactive compound for phytochemists; 80% of globally used drugs are obtained from ethno medicinal plants origin⁹. Drug analysis from medicinal plants led to the isolation of important drugs like cocaine, codeine, digitoxin, and quinine¹³. Arunachal Pradesh lies in Myers’ biodiversity hotspot list (among ten threatened biotas “hot spots” in tropical forests in the world and (among the 25 hotspot biodiversity in the world¹⁴. The aborigines of Arunachal Pradesh use many medicinal plants in their local health practices. Haridasan and Bhuyan have reported 500 species of important medicinal plants used by different tribes of Arunachal Pradesh 500 medicinal plants¹⁵ and still more numbers to be added. The present study was carried out to access the rich knowledge on folk medicinal plant and their uses among aborigines of the East Siang District of Arunachal Pradesh.

MATERIAL AND METHOD

The East Siang District of Arunachal Pradesh approximately lies between latitude $27^{\circ} 42''$ and $29^{\circ} 20''$ North latitudes and $94^{\circ} 42''$ and $95^{\circ} 35''$ East latitudes with an area of 4005 sq.km. The altitude starts from 130 mtrs to 752 mtrs above sea level¹⁶. Data were collected from the local people using interviews and questionnaires from focus groups along with field observations to collect traditional medicinal plants and their uses in the management of local health practices in the study area. About 50 years old aged people and herbal healers were selected as focus group from twenty villages of the Study area (Yagrung, Mirem, Bilat, Renging, Sika-Bamin, Sille, Runne, Miglung, Ngorlung, Ledum, Korang, Renging, Boleng, Riew, Pankang, Tarak, Lokpeng, Mebo, Ngupok and Ayeng villages of East Siang district of Arunachal Pradesh were visited from time to time from 2009-2013.

RESULTS AND DISCUSSION

In this study, a total of 99 plants which are used among the aborigines of the East Siang district of Arunachal Pradesh, India in the management of primary health care is reported (Table 1). These 99 folk medicinal plants belong to 55 families. Five families represent four and above species. Solanaceae was recorded as the highest representing family with 8 species followed by Asteraceae and Rubiaceae with 5 species each (Figure.1). Almost all parts of the plants (stem, leaf, fruit root etc.) were recorded used in their folk medical treatment in forty types of health problems (Figure 2).

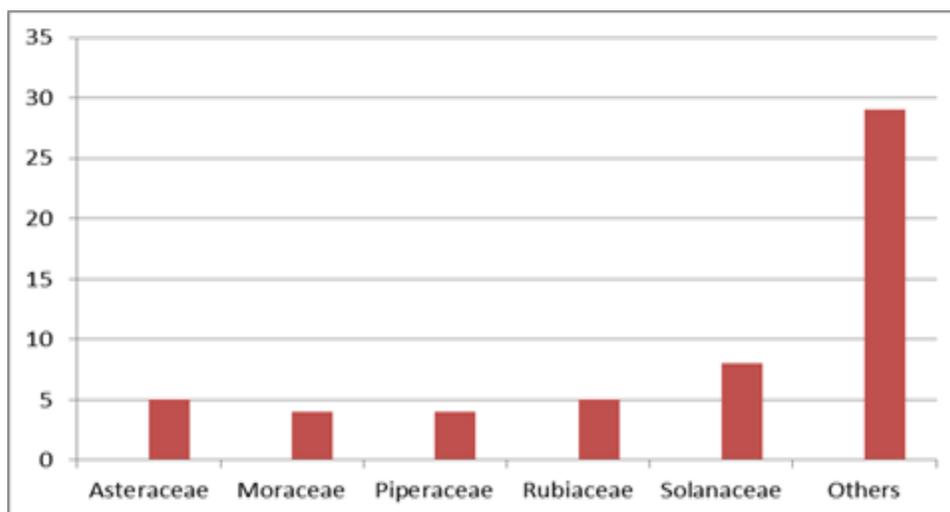


Figure 1: Family-wise representation.

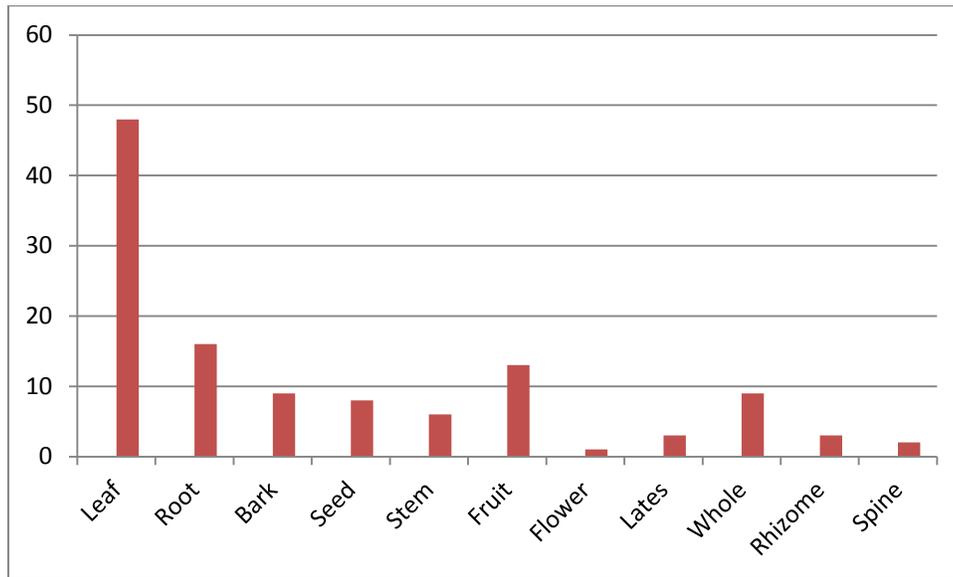


Figure 2: Different plant parts used in folk medical treatment in the study area.

Species enumeration

Table 1: Folk medicinal plants used among the aborigines of the East Siang district of Arunachal Pradesh.

Sl. No.	Name of the Species	Family	Local Name	Parts and usage
1	<i>Acacia farnesiana</i> L. Willd.	Mimosaceae	Ramreng	Boiled bark extract is given in dysentery and diarrhea problem.
2	<i>Acacia concinna</i> (Willd.) DC	Fabaceae	Ramreng	Stem is crushed to use as hair shampoo.
3	<i>Acanthus sp.</i>	Acanthaceae	Engot	Leaf paste is used as antiseptic in wound and skin infection. Also used in tattoo works, ankle ring made of cane as dye.
4	<i>Aesculus punduana</i> Wall. ex Hiern.	Sapindaceae	Aeespeeh	Bark paste is applied on fracture.
5	<i>Ageratum conyzoides</i> L.	Asteraceae	Namnyingeing	Leaf paste is used to stop bleeding.
6	<i>Allium hookeri</i> Thwaites.	Amaryllidaceae	Disang-talap	Whole plant is used in stomach pain, cold and cough. Necklace made of this plant is used to avoid epidemic diseases ¹⁴ .
7	<i>Alangium sp.</i>	Cornaceae	Taktong	Paste made from leaves is slightly warmed and applied on the abdomen of children to deworm.
8	<i>Alocasia macrorrhiza</i> (L.) Schott.	Araceae	Enge	Stem juice is given to relieve scorpion and nettle sting ¹⁴ .
9	<i>Alstonia scholaris</i> (L.) R. Br.	Apocyanaceae	Singar	Latex is used in wound against infection.
10	<i>Alpinia malaccensis</i> (Burm.f.) Roscoe	Zingiberaceae	Puprere	Rhizome is used in stomach pain and given in case of loose motion.
11	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Guboroying	Leaf is used as antidote in snake bite, root for gonorrhoea and menorrhagia ¹⁴ .
12	<i>Ammomum subulatum</i> Roxb.	Zingiberaceae	Taje	Rhizome is used in urination infection ¹⁴ .
13	<i>Amphineuron opulentum</i> (Kaulf.) Holttum.	Thelypteridaceae	Rukji	Leaves are used to kill tick in chicken. Fresh juice is given to typhoid patient.
14	<i>Artocarpus heterophyllus</i> Lam.	Moraceae	Bellang	Fermented fruit juice is useful for tuberculosis. Latex enhances lactation to breast feeding mother ¹⁴ .
15	<i>Bambusa tulda</i> Roxb.	Poaceae	Dibang	Tender leaf juice is given cancer patient; shoot is used in gastric problem. Dry bamboo shoot powder is used in viral infection and anti-scars ¹⁴ .
16	<i>Bannaya reptans</i> Sprengel	Scrophularaceae	Kat-buk	Leaves are slightly warm and make paste and apply locally on nail infection.
17	<i>Barberis wallichiana</i> DC.	Berberidaceae	Tripetire	Spines are used in tooting on chin and forehead.
18	<i>Bischofia javanica</i> Blume.	Phyllanthaceae	Sitir	Tender leaves are used in gastric ¹⁴ .

19	<i>Blumea fistulosa</i> (Roxb.) Kurz.	Asteraceae	Rumbdum	Boiled leaf is used in case of diarrhea.
20	<i>Blumea balsamifera</i> (L.) DC.	Asteraceae	Tangloti	Leaves are used in menstrual problems.
21	<i>Bombax ceiba</i> L.	Bombacaceae	Singhey	Root extract soup is given in pneumonia and typhoid. Tender shoot is used as hair conditioner. Powdered paste of thorn is used in pimples, bark in gastric and tuber remain under the ground is used in infertility.
22	<i>Bryophyllum calycinum</i> (Lam.) Oken.	Crassulaceae	Nebin-elam	Boiled leaf is used in dysentery. Juice of leaves is applied on the burnt skin locally; fresh leaves are eaten to stop bleeding. Fresh leaves are warm over fire and make paste and applied on the fracture.
23	<i>Elsholtzia blanda</i> Benth.	Lamiaceae	Papitduli	Leaves are used in gastric.
24	<i>Calotropis procera</i> (Aiton) W.T.Aiton.	Asclepiadaceae	Peroklego	Boiled root extract is given in dysentery. Boiled leaf extract mixed with chilly to gargle in case of cold and cough as well as remedy for toothache also. Antidote in case of snake bite.
25	<i>Carica papaya</i> L.	Caricaceae	Omri tang	Root paste is given in case of headache. Root is also use in Gastric and malaria.
26	<i>Casearia vareca</i> Roxb.	Flacourtiaceae	Barbi	Boiled extract of the whole plant is given in general body weakness. Bark paste is used in bone fracture, leaves juice in post-delivery. Seed in kidney problem.
27	<i>Cassia tora</i> L.	Caesalpiniaceae	Donyigori	Seed is used in infertility. Leaves in ringworm and malaria.
28	<i>Citrus sp.</i>	Rutaceae	Sipayegra	Boiled extract of the fruit is used in liver problem.
29	<i>Clacaria macrophylla</i> Wall.	Rubiaceae	PemiLagyin	Fluids from stem are applied on conjunctivitis or eye infection. Root paste in used in fracture.
30	<i>Clerodendrum colebrookianum</i> Walp.	Verbenaceae	Ongin	Leaf juice given in blood pressure problem or cooked leaf is taken for the same purpose ¹⁴ .
31	<i>Clerodendrum serratum</i> Sprengel.	Verbenaceae	Pakkomleyo	Steamed cooked leaf is taken to reduce blood pressure.
32	<i>Cuscuta reflexa</i> Roxb.	Convolvulaceae	Talengrimang	Whole plant is used as plaster for dislocation of bone; fresh juice is used in piles and pimples.
33	<i>Datura metel</i> L.	Solanaceae	Datura	Seed paste is used as antiseptic in cattle, as antidote in rabies.
34	<i>Dendrocalamus strictus</i> (Roxb.) Nees.	Poaceae	Bulukang	Powdered made from culm is used in blood clotting ¹⁴ .
35	<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Uli	Bulb is eaten to stop loose motion ¹⁴ .
36	<i>Dysoxylum alliaceum</i> Blume.	Meliacea	Sitti	Bark is used as contraceptive.

37	<i>Drymaria cordata</i> Willd.	Caryophyllaceae	Peroktapen	Leaf paste is used in skin burn, Vapour of boiled leaf is used in pneumonia and nasal trouble or raw juice of leaf is used in nasal blockage, paste of whole plant is used in ring worm.
38	<i>Eclipta prostrata</i> L.	Asteraceae	Keharaj	Decoction of leaf is given in dysentery with vomiting. Leaves are also used as hair conditioner as well as tonic.
39	<i>Entada scandens</i> Benth.	Fabaceae	Pyopa	Seed is used in fracture, seed paste down the mums, believed as the first food eaten by human being as per Adi mythology.
40	<i>Eryngium foetidum</i> L.	Apiaceae	Ori-ritak	Leaves are used for burns, fevers, asthma and worms ¹⁴ .
41	<i>Equasetum</i> sp.	Equisetaceae	Sisidungki	Stem paste is used in bone fracture.
42	<i>Erythrina stricta</i> L.	Fabaceae	Tagat	Paste made from bark is slightly warmed and locally apply to treat scorpion bite, anti-poisoning the action of aconite.
43	<i>Eupatorium odoratum</i> L.	Asteraceae	Telimbabo	Leaf juice in used in bleeding and as pain reliever.
44	<i>Imperata cylindrical</i> (L.) P.Beauv.	Poaceae	Tassedibin	Root is used in deworming.
45	<i>Ficus cordata</i> Thunberg.	Moraceae	Takuk	Root is used in dysentery and also acts as tonic ¹⁴ .
46	<i>Grewia sapida</i> Roxb, ex D.C.	Tiliaceae	Barbi	Boiled root extract mixed with croton spp. spadix of banana, ginger and oxyphyllumhamiltonianum is used to flash out menstruation.
47	<i>Gynocardia odorata</i> R. Br.	Achariaceae	Takhhisidik	Leaf and bark is used in cancer, fruit as swelling of scrotum. Leaf as pesticides.
48	<i>Houttuynia cordata</i> Thunb.	Sauraceae	Roram	Whole plant is used in deworming, and also in leucorrhea ¹⁴ .
49	<i>Hibiscus rosa sinensus</i> L.	Malvaceae	Matiappun	Flower extract is used in flatulence; leaf paste is used anti-hair fall.
50	<i>Homononia riparia</i> Lour.	Euphorbiaceae	Asipumi	Leaf extract is used against insects poisoning, locally known as "taridignam". Also used as antidote in snake bite and pain reliever in joint pain.
51	<i>Hydrocotyle sibthorpioides</i> Lam.	Apiaceae	Killing- kiro	Raw juice of whole plant is used to treat blood dysentery ¹⁴ .
52	<i>Laportea crenulata</i> Gaud.	Urticaceae	Peji	Leaf paste is used as antiseptic. Boiled root extract is given in colic pain and pneumonia ¹⁴ .
53	<i>Leucas aspera</i> (Willd.) Hook.F.	Lamiaceae	Ekisipyak	Leaf paste is used in sinus/headache, leaf juice extract is used in dysentery, boiled root extract is used in fever and whole cooked plant is used as appetizer.
54	<i>Litsea cubeba</i> L.	Lauraceae	Rajil	Fruit is used in cold and cough ¹⁴ .
55	<i>Melothria leuocarpa</i> Cong.	Cucurbitaceae	Pumrol	Leaf paste as antiseptic and also used in abortion.

56	<i>Mesona wallichiana</i> Benth.	Lamiaceae	Pepitnamdung	Boiled root extract is given in pneumonia, malaria and jaundice.
57	<i>Meyna spinosa</i> (Roxb.) ex.Link.	Rubiaceae	songkir	Boiled seed extract is used as medicine for heart burning sensation problem.
58	<i>Mirabilis jalapa</i> L.	Nyctaginaceae	Donyiapun	Boiled root extract is given for smooth delivery of baby.
59	<i>Morus alba</i> L.	Moraceae	Lirang	Gargling in case of cold and cough, root is used in jaundice ¹⁴ .
60	<i>Musa sapientum</i> L.	Mosaceae	Kolung	Boiled fruit is used in dysentery and urinary trouble ¹⁴ .
61	<i>Mussaenda glabra</i> Vahl.	Rubiaceae	Taksap	Tender shoot is used to relieve constipation ¹⁴ .
62	<i>Oxalis corniculata</i> L.	Oxalidaceae	Puakiyup	Used in dysentery, relieves intoxication from wine. Leaf extract is used in sugar problem, ring worm, cancer and stone problem ¹⁴ .
63	<i>Paederia foetida</i> L.	Rubiaceae	Yepe tare	Tender shoot is used in gastritis, malaria, anemia, asthma and allergy.
64	<i>Papaver somniferum</i> L.	Papaveraceae	Kani	Latex is used as pain killer, and also in stomach ache and dysentery.
65	<i>Persicaria barbata</i> (L.) H. Hara.	Polygonaceae	Dikuo-tamu.	Whole plant is used in fish poisoning and menstrual problem.
66	<i>Piper pedicellatum</i> C.DC.	Piperaceae	Lori	Fruit is used as stomach in disorder, loose motion and cold and cough ¹⁴ .
67	<i>Piper nigrum</i> L.	Piperaceae	Nemar	Fruit is used in cold and cough.
68	<i>Pouzolzia bennettiana</i> Wight.	Urticaceae	Oyik	Tender shoot is given breast feeding mother to enhance lactation ¹⁴ .
69	<i>Pseudostachyum polymorphum</i> Munro.	Poaceae	Tador	Young leaves or shoots are used in tonsillitis.
70	<i>Psidium guajava</i> L.	Myrtaceae	Mudurianne	Leaf juice is used in diarrhea.
71	<i>Polygonum chinense</i> L.	Polygonaceae	Tasummomi	Leaf paste is applied for treating boils and infected wounds ¹⁴ .
72	<i>Pothos scandens</i> L.	Araceae	Loma-losut	Whole plant is used in fracture and diabetes.
73	<i>Randia fasciculata</i> (Roxb.)DC.	Rubiaceae	Bimona	Boiled leaf extract is given in malaria and jaundice.
74	<i>Ricinus communis</i> L.	Euphorbiaceae	Aki-rokmi	Bark and leaves are lightly warm and wrap on fracture. Seed is used as contraceptive.
75	<i>Rubus</i> sp.	Rosaceae	Tasintaein	Leaf mixed with piper nigrum and their boiled juice extract is given during malaria. Leaves in liver problems and berry are a tonic ¹⁴ .
76	<i>Solanum khasiana</i> Clarke.	Solanaceae	Kosiyang kopi	Seeds used as contraceptive properties as well as deworm ¹⁴ .
77	<i>Solanum nigrum</i> L.	Solanaceae	Okomamang	Used in Diarrhea, Malaria and conjunctivitis. Lightly warm the leaves and put on eyes, it cures conjunctivitis. Low pressure and anemic patient are advised to use as vegetable ¹⁴ .
78	<i>Solanum kurzii</i> Prain.	Solanaceae	kopir	Fume of burning fruit are inhaled for toothache. Fruit made into a paste mixed with chilli and is applied locally to relieve toothache ¹⁴ .

79	<i>Solanum spirale</i> Roxb.	solanaceae	Bangko	Tender leaves in gastric, seed in infertility, root in malaria and high blood pressure ¹⁴ .
80	<i>Solanum torvum</i> Sw.	Solanaceae		Fume of burning fruit are inhaled for toothache ¹⁴ .
81	<i>Solanum virginianum</i> L.	Solanaceae	Kopi taang	Root is used as expectorant in asthma and chest pain. Juice of leaves with black pepper is given in rheumatic pain, ripen fruit is powdered and used as toothache.
82	<i>Sambucas hookeri</i> Rehder.	Caprifoliaceae	Senibani	Leaf paste is used in swelling muscle.
83	<i>Sarcandra glabra</i> (Thunb.) Nakai.	Chloranthaceae	Mernekotung	Leaf juice used in nose bleeding and steamed leaf is taken for stomach ache.
84	<i>Scoparia dulcis</i> Linn.	Scrophulariaceae	Mita- miti. ()isiuntra	Boiled leaf extract is used for stomach cooling, antidote against rabies, snake bite and sugar problem.
85	<i>Seleginella spp.</i> P.Beauv.	selaginellaceae	Mane okang	Leaf paste is used for treating infection in between toes and fingers.
86	<i>Sida rhombifolia</i> Linn.	Malvaceae	Jaruessing	Boiled root extract is given in post-delivery problem.
87	<i>Spilanthus acmella</i> Linn	Cyperaceae	Marsang	Seed and leaves are used in toothache, cough and asthma ¹⁴ .
88	<i>Spondias pinnate</i> (L.) Kurz.	Anacardiaceae	Derge	Fruit juice with salt is used in blood dysentery.
99	<i>Stixis suaveolens</i> (Roxb.) Pierre.	Capparaceae	Madhoi maloti	Boiled root extract is given in stomach trouble.
90	<i>Syzygium sp.</i>	Myrtaceae	Adijamun	Fruit is used in anemia; bark is used as tonic, seed in infertile couple.
91	<i>Tacca integrifolia</i> Karl-Gawl.	Teccaceae	Tagoon	Leaves with salt are used for blood dysentery and diarrhea.
92	<i>Thunbergia grandiflora</i> Roxb.	Acanthaceae	Kingoriebi	Stem is soaked in water overnight and extract is given for gastritis.
93	<i>Traoia involcrata</i> L.	Euphorbiaceae	Pezi-pemang	Leaves used as deworming cattle.
94	<i>Trachelospermum fragrans</i> Hook.	Apocynaceae	Lotabagini	Boiled leaf extract is given for treating infertility and menstruation problems.
95	<i>Urena lobata</i> L.	Malvaceae	Egg tangom	Boiled leaf extract is used to reduce fever.
96	<i>Vitex negundo</i> L.	Verbenaceae	posotia	Boiled leaf extract is used in skin diseases. Leaves paste are used in back pain.
97	<i>Zanthoxylum rhetsa</i> . Roxb.	Rutaceae	Onger	Bark is used for treatment of Rheumatism. Roots are good for controlling toothache. Seed is used in fever, cholera, pain killer and cold –cough problems ¹⁴ .
98	<i>Zanthoxylum hamiltonianum</i> Wall. Ex Hook.	Rutaceae	Ombenmg	Leaf extract is given to women in delivery problem.
99	<i>Zingiber officinale</i> Roscoe.	Zingiberaceae	Kekir	Used in toothache, cold and cough, soup is given to relieve post-delivery pain ¹⁴ .

CONCLUSION

The present study raise question on the need of the phytochemical studies of traditionally used medicinal plants to validate the traditional knowledge. Some biologically active compounds are expected from these folk medicinal plants which may be employed for the service of mankind.

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