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Documentation and consensus of agreements on Indigenous knowledge of medicinal plants used by the Mog, Reang, Uchai of South Tripura: A preliminary report

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Abstract

Plants have been used both in the prevention and cure of various diseases of humans from time immemorial. The present communication is a preliminary report on the field survey over 192 respondents of the Mog, Reang and Uchai tribes of South Tripura in between 2014-2015 using semi-structured interviews and discussions on ethno medicinal uses of plants. From this the Socio Economic Status (SES) of the respondents, factor informant consensus (Fic), and Fidelity level (FL) were determined. They use about 39 medicinal plants belonging to 27 families and 36 genera for treatment of 54 ailments and the most used families are leguminaceae and malvaceae. The highest Fic value (1) found in poisonous animal bites, blood related disease, reproductive and birth disorder and hair loss could be an indication that these ailments are common in the study area and the species were traditionally used to treat them. The low consensus indicates that the majority of the informants does not agree or exchange information on the use of plant species and this may require bioactivity screening to justify the use for the reported ailments. *Canavalia gladiata* (Jacq.) D.C. for edema in Mog, *Calamus rotang* Linn. for insomnia in Reang, *Amaranthus gracilis* Desf. for edema and *Diospyros malabarica* (Desr.) Kostel. for cough in Uchai were found to have high FL values indicating the medicinal importance of the species. The data obtained from our informants and analysis in the present paper provides basic understanding on the prevalence of herbal remedies in the 3 ethnic tribes of South Tripura. Further studies are on the way for pharmacological analysis of active constituents and recommended the conservation of the most important species.

Keywords: Indigenous knowledge, Tripura, SES, Fic, conservation

Introduction

The investigation of plants and their uses is one of the most primary human concerns and has been practiced by all cultures for tens, if not hundreds, of thousands of years, though it wasn't called 'Ethnobotany' then Ethnobotany is the scientific study of plant lore and agricultural customs of a people (Idu, 2009) [27]. Over a couple of countries, ethno botany has evolved into a specific discipline that looks at the people-plant relationship in a multidisciplinary way including ecology, economic botany, pharmacology, public health and other disciplines as needed (Balick, 1996; Gomez-Beloz, 2002; Khisha *et al.*, 2012) [6, 23, 30]. A large number of plants are being used as medicinal agents by local people, healers, trainees all over the world. Ethno botanical studies of this plants species are often significant in revealing locally important plant species and for the purpose of discovering important drugs of modern day (Khisha *et al.*, 2012; Cox and Balick, 1996; Flaster, 1996) [30, 11, 19]. There is a romantic allure to the life of an explorer and the promise of finding 'gold' in the form of plants or animals as potential sources for life saving drugs that could become important in the treatment of serious diseases such as AIDS and cancer. For all these reasons, Ethnobotany has now become a hot topic.

Out of the total flowering plants reported from the world more than 50,000 are used for medicinal purposes (Goverts, 2001; Schippmann, Leaman and Cunnigham, 2002) [24, 45]. Medicinal plants are local heritage of global importance and its have been used in traditional medicine for hundreds of years with reputation as efficacious remedies (Purohit and Vyas, 2004; Ghani, 1998) [39, 22]. Plant kingdom is undoubtedly valuable source of various therapeutic components (Athokpam, Bawari and Choudhury, 2014) [2]. Phyto therapy seems to be an alternate system of medicine for the people residing in the suburban/rural areas (Nandankunjidam, 2006) [36]. According to the WHO, total 60% of the population of the world

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and 80% of the population in developing countries rely on traditional medicine, mostly plant drugs for their primary health care needs because of better cultural acceptability, better compatibility with the human body and lesser side effects besides being cheap and locally available (Silva, 1997; Shetha and Dhillion, 2003; Behera, 2006; Kamboj, 2000; Pal and Shukla, 2003) [52, 48, 6, 29, 37]. In India about 2500 plant species have been recognized as having medicinal and aromatic values and 70% population of India dependent on traditional plant based as medicines (Purohit and Vyas, 2004; Sherstha, Tiwari and Ghimire, 2000; Choudhary, 1998; Gadgil and Rao, 1998) [39, 47, 10, 21]. The collision of eastern knowledge and western technology has resulted in a unique synthesis of medical belief and practice, along with the development and processing of innovative and effective drugs (Idu, 2009) [27].

North East India is one of the richest biodiversity regions in India. The rich Floristic biodiversity is due to its unique geographical location and comprises of forest range from tropical to alpine. It is an important part of the Indian Floristic Zone and has been identified as one of the twelve 'Genetic Epicenters' for the evolution of the world flora. This region has wealth of threatened and endemic flora (Hazarika, Abujam and Neog, 2012) [25] also. Tripura, one of the smallest 'seven sister' states of North-East India, falls under Indo-Barman hot spot region and it has rich repository of medicinal and aromatic plants due to its tropical geographical position, plenty of rainfall and availability of deep forest (Chakraborty *et al.*, 2012) [9]. There are 19 ethnic communities inhabiting in Tripura out of a total 450 in India. They have the age long intrinsic relationship with the environmental resources mainly plants endowed the modern civilization with many herbal remedies (Chakraborty *et al.*, 2012; Sajem and Gosai, 2006; Das *et al.*, 2009) [9, 42, 12]. The main livelihoods of the tribal community depended on forests that have also built up their socio-economic and cultural life. In addition, such communities are economically and ecologically inseparable from the forests as forests provide them food, fodder, fuel, timber, shelter and medicinal plants (Debnath *et al.*, 2014; Uddin and Mukul, 2012) [18, 54]. These communities are using different formulations made out of different plant parts in their primary health care (Majumder and Datta, 2007; Hazarika, Abujam and Neog, 2012) [33, 25].

This knowledge is passed on orally from generation to another and is still retained them. Documentation of indigenous Knowledge of medicinal plants is important for preserving the knowledge before it diminishes with the knowledgeable people, so that plants can be conserved and sustainably managed and utilized by the local communities.

Information on folk uses is considered more dependable when it satisfies one or more of the following criteria: 1. same or similar use of a species reported by more than one informant, 2. same use reported from different locations (i.e., multi-location), 3. same use reported among different ethnic groups (multi-ethnic) (Saklani and Jain, 1991) [43], 4. same use corroborated also from published literature on that area or literature from other regions and countries. 5. same use recorded on labels of old herbarium sheets or museum specimens.

Documentation of medicinal usages of plants in Tripura has already been reported by various contributors. Some noticeable published works are Das *et al.*, 2009; Shil and Choudhury, 2009; Debnath *et al.*, 2014; Majumdar *et al.*, 2006; Majumder and Datta, 2007; Pandey and Mavincurve, 2014; Das and Choudhury, 2010; Roy *et al.*, 2010; Sen *et al.*, 2011; Das *et al.*, 2012; Deb *et al.*, 2012 [12, 50, 18, 32, 33, 38, 14, 41, 46,

13, 16]. All such works have listed the medicinal plants of particular area or community with their medicinal uses but none of these studies considered any quantitative consensus technique or ethno-directed technique and their potentiality in curing different types of ailments.

With this background, the present paper is an attempt to investigate the traditional use of medicinal plants by three ethnic tribes of South district of Tripura, estimate their socio-economic status and also determine consensus among informants in order to evaluate their potential for new drugs of herbal origin.

Material and Method

The study area

The study area comprises of Paschim Charakbai and Baikhora villages of Santirbazar subdivision; Ratanpur village of Belonia Subdivision of South Tripura. The locations of Paschim Charakbai, Baikhora and Ratanpur are 23°15'52.8" N to 91°03'43.7" E, 23°16'17.6" N to 91°34'31.4" E and 23°15'00.2" N to 91°32'40.0" E respectively (Figure 1). The main livelihood activity of this area is mainly dependent on agriculture which includes cultivation of crops and rearing of cattle, goats, pigs etc. The climate of the region is mostly warm and is characterized by humid summer and dry cool winter with plenty of rains during July to October. Rainfall is received from the southwest monsoon which normally breaks in the month of May. Average annual rainfall in the district is about 2000 mm and the temperature ranges from 7.43° C to 35.23° C. The relative humidity of South Tripura ranges from 90% to 45%.

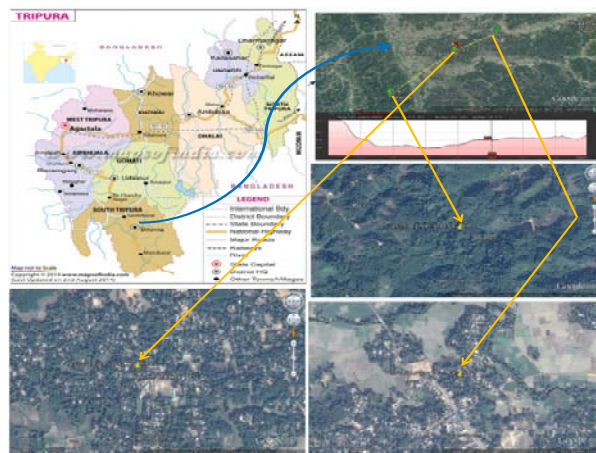


Fig 1: Location of study areas in South Tripura (North-East India)

Selection of ethnic community

According to 'Rajmala' the history of Tripura the powerful Buddhist kings of Tripura were Mog community (Burmese origin). Their language is grouped under Tibeto-Chinese family and their social culture and belief are centralized with Burmese culture, folk medicine is the famous tradition of Mog community. The south Tripura has been selected as representative of the state as this district inhabits the second largest population of Reangs, next to North Tripura, and most of them are rural inhabitants while a good number of rural Reangs of North district are refugee from neighbouring state thus their knowledge on medicinal plants of Tripura may be different. Reang are still a nomadic tribe and they speak Kokborok language. Their origin is Tibeto-Burmese and is locally referred to as Kaubru. Reang folk life and culture have their outstanding cultural components. Uchai community

migrated in Tripura from Arakan hills of Burma. As their special art, the Uchai community is expert on the treatment of various major to minor diseases. Flower, fruit, stem, leaf and root of the plants, pigeon, hen, pig and goats etc. are used for various magical rites and worships for the treatment of various diseases (Debnath *et al.*, 2014; Majumder and Datta, 2007) [18, 33]. Considering their origin, socio cultural condition, workmanship, ethnicity and good knowledge on use of plants as medicine Mog, Reang and Uchai communities were selected for the present study.

Survey on the use of medicinal plants

A self administered questionnaire was prepared following the method of Martin, 1995 [34] and given to the experts to rate and given their views. Modification and changes as suggested by the expert were incorporated and the tool was pretested in a small sample. After pretesting, it was finalized after minor changes and used on the sample. These scale posses a high reliability quotient of 0.51. The informations regarding their ethno medicinal knowledge for curing various ailments, parts used, preparation procedure, ethno medicinal knowledge gathering pattern etc. were recorded. The useful representative plants were collected for each plant species encountered with the exception of some very cultivated plants, which were identified in the field. Preliminary identification of the collected specimens was made in the field and taken into the laboratory, department of Botany, Tripura University. Identification have been done based on the Flora of Tripura by DB Deb, (1981, 1983) [17] and the Bengal Plants written by David and Prain, (1903) (Rep.ed.1963) [15].

Data analysis

Microsoft office excel software 2007 was used in data analysis.

- Socio Economic Status (SES) of 3 ethnic tribes was investigated by following Kuppuswami's rural SES scale updating for 2007 with some modifications according to the need of the present study (Kumar *et al.*, 2007) [31].

-The percentage of respondents who have knowledge (PRK) regarding the use of a species (frequency of citation) in the treatment of diseases was estimated using the formula: (Number of people interviewed citing species/ the total number of people interviewed) X 100 (Alexiades, 1996) [1].

-Factor of informant consensus (Fic) for different ailment categories was calculated for testing homogeneity or consistency of the informant's knowledge about a particular remedy for particular ailments (Heinrich *et al.*, 1998; Trotter and Logan, 1986) [26, 53].

$$Fic = \frac{Nur - Nt}{Nur - 1}$$

Where, Nur= Number of use reports in each category. Nt= Number of species in each category.

The percentage of informants claiming the use of a certain plant for the same major purpose was estimated using the fidelity level index, FL= Ip/Iu X100, where Ip is number of informants who indicate use of a species for the same major ailment, Iu is the total number of informants who mentioned the plant for any other use (Alexiades, 1996; Friedman *et al.*, 1986) [1, 20].

Results

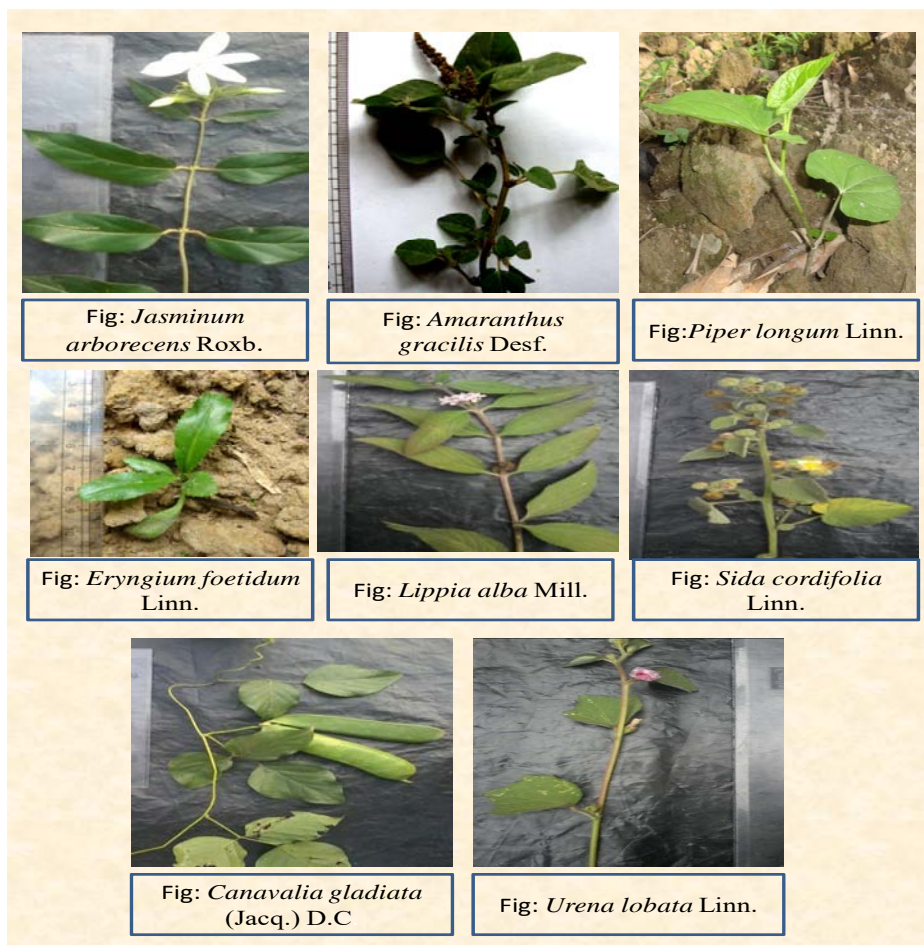


Fig 2: Ethno medicinal plants of Paschim Charakbai, Baikhora and Ratan pur of South District of Tripura.

Table 1: Socio-Demographic Features of Informants Collected During Questionnaire Survey.

Community	Mog (n=83)	Reang (n=32)	Uchai (n=77)
1.Age groups	20 Years and above		
2.Education	(n, %)		
(a) Post graduate	10 (12.04)	5 (15.62)	8 (10.38)
(b) Graduate	18 (21.68)	4 (12.50)	15 (19.48)
(c) Higher secondary	20 (24.09)	5 (15.62)	14 (18.18)
(d) Madhyamik	14 (16.86)	5 (15.62)	12 (15.58)
(e) Senior basic	8 (9.63)	6 (18.75)	7 (9.09)
(f) Primary level	10 (12.04)	7 (21.87)	12 (15.58)
(g) Illiterate	8 (9.63)	0	14 (18.18)
3.Occupation	(n, %)		
(a)Service holder	22 (26.50)	7 (21.87)	14 (18.18)
(b)Farmers	28 (33.73)	11 (34.37)	19 (24.67)
(c) Traders	10 (12.04)	4 (12.50)	17 (22.07)
(d) House wives	23 (27.71)	10 (31.25)	27 (35.06)
4. Income (Rs.) (Mean ±SD)	7375±4442.05	6057.14±3940	7069.15±3953.93
SES (Socio Economic Status)			
Low SES			
number of families	20	11	18
Percent representation	38.46	52.38	38.29
Score (Mean ±SD)*	8.53 ± 1.44	7.82 ± 1.82	7.54 ± 1.58
Middle SES			
number of families	32	10	29
Percent representation	61.53	47.61	61.7
Score (Mean ±SD)*	16.15 ± 3.4	16.2 ± 3.52	15.52 ± 3.43

* Total scores on Education, Occupation and Income

In this study, 192 people (Mog-83; Reang-32; U-77) were interviewed. The age of respondents are minimum 20 years and above. Most informers of Mog are H.S. qualified (24.09%), most of Uchai are Graduates (19.48%) and in case of Reang most of them have Primary level of education (21.87%). Besides during the interview we had consulted with the local healers, Ujas and Bhaidhyas. Majority of the informers of Mog and Reang were farmers (33.73% and 34.37%, respectively). Most of the informers of Uchai communities were house wives (35.06%). The mean monthly income in case of Mog, Reang and Uchai were Rs. 7375±4442.05, 6057.14±3940 and 7069.15±3953.53, respectively. Analysis of the education, occupation and income of the family heads, it was found that 61.53%, 47.61% and 61.7% of Mog, Reang and Uchai, respectively belonged to middle SES and rest of them belonged to low SES. The mean SES score of Mog, Reang and Uchai lie in between 8.53 ± 1.44 to 16.15 ± 3.4, 7.82 ± 1.82 to 16.2 ± 3.52 and 7.54 ± 1.58 to 15.52 ± 3.43, respectively.

Medicinal plants and their uses

Amaranthus gracilis Desf.

Family: Amaranthaceae

Vernacular Names: Smooth pigweed (E), Chuisi-pang (M), Khtung maira (R), Moin-su (U)

Availability Status: Wild

Used Parts: Leaves

Use Reports per Ailment: Anaemia (M-5; R-2), Edema (M-4; R-2; U-6)

Mode of Preparation and Administration

For Anaemia: Approx. 5 gm leaves mixed with 2 black pepper, together were crushed and taken once a day for 1 week.

For Edema: Approx. 2-3 leaves have to be boiled 1 cup of water and then the solution taken once a day for 15 days. PRK (n=192):-10.4

Annona reticulata Linn.

Family: Annonaceae

Vernacular Names: Aata (B), Custard-apple (E) Tanglagachi-apang (M), Atang (R) & (U)

Availability Status: Cultivated

Used Parts: - Leaves

Use Reports per Ailment: Blotch (M-8; R-9; U-7), Epilepsy (M-5; R-3; U-2), Head louse (M-8; R-6; U-2)

Mode of Preparation and Administration

For Blotch: 4-5 leaves grained with some salt and the paste coated on the affected area makes it lighter to burst out and reduces the pain.

For Epilepsy: 4-6 leaves extract has to be given to the patient twice a day for 7-8 days.

For Head Louse: Juice of leaves around 2 teaspoonfuls mixed with ½ teaspoonful of water smear on hair causes death of the attacking parasites. The best result comes after abiding the process for 2-3 days.

PRK (n=192):-26

Annona squamosa Linn.

Family: Annonaceae

Vernacular Names: Nona (B), Sugar-apple (E), Talgachi-fang (M), Noang (R) & (U)

Availability Status: Cultivated

Used Parts: - Bark, Root, Fruit

Use Reports per Ailment: Diarrhea (M-5; R-7; U-2), Hematemesis (M-3; R-1; U-3)

Mode of Preparation and Administration

For Diarrhea: 20/25 drops of this plant root mixed with 7-8 teaspoonful of milk brings a good result. Although if the milk is goats then the result develops rapidly. Or Bark extract near about 200 mg has to be taken 1-2 times for 2-3 days.

For Hematemesis: About 2-3 teaspoonfuls ripen fruit juice can be taken every day for the improvement.
PRK (n=192): - 11

***Areca catechu* Linn.**

Family: Palmaceae
Vernacular Names: Supari (B), Areca palm (E), Kuici (M), Kuai (R), Koaithai (U)
Availability Status: Cultivated
Used Parts: Seed, Root
Use Reports per Ailment: Taeniasis (M-3; R-5), Dyspepsia (M-2; R-7; U-5), Blood dysentery (M-4; U-6), toothache (M-2; R-8; U-3), Sore (M-2; R-3; U-8)

Mode of Preparation and Administration

For Teaniasis: 4 gm fresh seeds of areca are crushed and have to boil in 3 cup of water until it comes to 1 cup then filtered it and half of the mixture has to be taken orally in early morning and other half of the evening for 3 days.

For Dyspepsia: The juice of the fresh fruit 2-3 teaspoonfuls every day can be taken for the improvement.

For Blood Dysentery: 4 gm fresh seed are crushed and has to be boiled in 3 cup of water until it comes to 1 cup then filtered it and the decoction taken twice a day as a remedy against blood dysentery.

For Toothache: Equal amount of root powder and dry nut powder are to fry in the pots and make ash out of it. Then the ash may be used for brushing the teeth as a remedy against toothache.

For Sore: Fruit has to be dried in open sunlight and to make dry powder out of it. Then the powder applied on the affected area.
PRK (n=192):-30.2

***Arthocarpus heterophyllus* Lamk.**

Family: Moraceae
Vernacular Names: Kanthal (B), Jack-fruit (E) Pne-bang (M), Thai-fong (R), Thai-pro-ong-trang (U)
Availability Status: Cultivated as well as wild
Used Parts: Leaves, Seed
Use Reports per Ailment: Jaundice (M-4; R-2; U-9), Edema (m-4; R-3), Dermatitis (R-5; U-2), Rheumatism (M-7; U-3)

Mode of Preparation and Administration

For Jaundice: About 8-10 jackfruit seeds are crushed and boiled in 5-6 cup of water until it comes to 2-3 cup and the mixture has to be taken 4 to 5 times per day for 2-3 days.

For Edema: Approx. 4-6 seeds were crushed and boiled in 5-6 cup of water until it comes to 2-3 cup then filtered it and the decoction applied on the affected area.

For Dermatitis: Approx. 2-3 twinges portion of that plant is boiled in 2 cup of water till it comes to 1 cup and filtered it then half of the solution is consumed orally in early morning and other half of the evening for 1 month.

For Rheumatism: After mincing the seeds 4-5 gm has to be boiled in 2 cup of water until it comes to 1 cup then filtered it and half of the mixture is taken orally in early morning and other half of the evening for 1 week.
PRK (n=192):-20.3

***Averrhoa carambola* Linn.**

Family: Oxalidaceae
Vernacular Names: Kamranga (B), Star fruit (E), Chongrabang (M), Kama-ranga (R), Muo-Khoi-prang-Bnoi (U)
Availability Status: Cultivated as well as wild
Used Parts: Leaves, Fruit
Use Reports per Ailment: Piles (M-8; R-9), Fever (R-9; U-9), Dysentery (M-4; U-3), Liver pain (M-4; R-2; U-3)

Mode of Preparation and Administration

For Piles: After slicing the star fruit it has to be boiled in open sunlight for 1 week and to make dry powder out of it. Then 1.5 gm of that powder of star fruit has to be taken with one glass of water twice every day.

For Fever: 2 gm dry powder of star fruit leaves has to be taken with 1.2 cup of water every day morning and evening for ¼ days.

For Dysentery: In an intense stage of these ailments 1 teaspoonful of extract or juice of ripens star fruit has to be taken to improve the situation.

For Liver Pain: 3-4 teaspoonful of ripen star fruit juice to be taken with water to improve this condition.
PRK (n=192):-26.5

***Calamus rotang* Linn.**

Family: Arecaceae
Vernacular Names: Bet (B), Common rattan (E), Kring-pang (M), Rai (R), Khadlingfang (U)
Availability Status: Wild
Used Parts: Root
Use Reports per Ailment: Asthma (M-9; U-2), Insomnia (M-10; R-9), Chronic fever (M-2; U-7)

Mode of Preparation and Administration

For Asthma: Fresh root are crushed and then consumed with honey twice a day.

For Insomnia: Half cup of root juice to be taken with candy palm before sleeping at least 7 days.

For Chronic Fever: about 1 teaspoonful of root juice is boiled in 10 teaspoonful of water and taken twice a daily for 1 week.
PRK (n=192):-20.3

***Canavalia gladiata* (Jacq.) D.C.**

Family: Leguminaceae
Vernacular Names: Tarabari-Shim (B), Sword bean (E), Pithapam (M), Baikang (U)
Availability Status: Cultivated
Used Parts: Seed
Use Reports per Ailment: Insomnia (M-2; U-7), Edema (M-4; U-2)

Mode of Preparation and Administration

For Insomnia: The seeds can be taken by boiling it in the water, the patients get rids of insomnia and experiences a sound sleep.

For Edema: Seeds has to be grained and smeared in the affected place.
PRK (n=192):- 8

***Carica papaya* Linn.**

Family: Passifloraceae

Vernacular Names: Penpe (B), Papaya (E), Samanisi (M), Kuiu (R), Chuof (U)

Availability Status: Cultivated

Used Parts: Fruit, Leaves

Use Reports per Ailment: Bleeding piles (M-7; U-8), Teianiasis (M-7; R-1), Dysentery (R-3; U-3), Ring worm (M-7; R-1; U-5), Eczema (M-3; U-3), Head louse (M-4; R-5; U-2), Belly swelling (M-7; U-7), Dyspepsia (R-7; U-6), Fever (R-8; U-8)

Mode of Preparation and Administration

For Bleeding Piles: About 5-7 drops latex of papaya fruit mixed with 1 sugar cake powder and has to be taken 2 times per day for 2-3 days.

For Teianiasis: Approx. 15 drops of latex of papaya fruit are mixed with 1 teaspoonful of honey and has to be taken orally after ½ hours slightly warm water has to be taken orally and after 1 hours water of lime has to be taken for 3 days.

For Dysentery: About 30 drops of papaya fruit mixed with 1 teaspoonful water of lime and 1 teaspoonful milk then has to be taken orally for 2 days.

For Ring Worm: The latex of papaya fruit is applied on the affected part every one alternate day for 3-4 days.

For Eczema: In case of dry eczema, the latex of papaya may be applied after 1-2 days interval.

For Head Louse: About 1 teaspoonful papaya latex mixed with 7-8 teaspoonful of water smear on hair causes death of the attracting parasites.

For Belly Swelling: 2-3 piece of mesoderm of mature *Carica* fruit mixed with small amount of salt and powder of black pepper and consumed orally for 2 days.

For Dyspepsia: About 2-3 drops latex of papaya fruit mixed with water and taken early morning for every day.

For Fever: Approx. 1-1.5 teaspoonful leaves juice of *Carica* mixed with 1 cup of water and then consumed 2 times per day for 7 days.

PRK (n=192):- 49.4

***Cinnamomum zeylanicum* Blume**

Family: Lauraceae

Vernacular Names: Dalchini (B), Cinnamon (E), Sagrafu-fang (M), Darang Chingning (U)

Availability Status: Cultivated

Used Parts: Leaves, Root, Bark

Use Reports per Ailment: Muscular rheumatism (U-4), Taeniasis (M-5). Piles (M-7; U-9)

Mode of Preparation and Administration

For Muscular Rheumatism: About 5-6 no of leaves are crushed and mixed with 1 cup of water and then the mixture taken orally 3-4 times per day for 5-6 days.

For Teianiasis: About 3-4 gm of root are crushed and boiled in 2 cup of water till it come to the quantity of ½ cup and filtered it. Half of the liquid is administered orally in early morning and half of the evening for 2-3 days.

For Piles: Stem bark of this are crushed and boiled in 2 cup of water till it comes to ½ cup and filtered it. Then the decoction

taken orally for 1 month.

PRK (n=192):- 13.1

***Combretum decandrum* Roxb.**

Family: Combretaceae

Vernacular Names: Bejuco-clavo or Bush Willows (E), Chinari (M), Pehengla (U)

Availability Status: Wild

Used Parts: Leaves, Root, Bark

Use Reports per Ailment: Malaria (M-4; U-5), Sore (M-3; U-5), Dysentery (M-4; U-2)

Mode of Preparation and Administration

For Malaria: About 3 gm of bark powder of this plant soaked in a glass of water over night. Then the liquid is administered orally in early morning for 5-7 days.

For Sore: Leaves are crushed and applied on the affected area.

For Dysentery: About 200 gm of root of this plant is boiled in 7 cup of water till it comes to 3 cup and taken orally 3 times per day for 4 days.

PRK (n=192):- 11

***Cyperus haspen* Linn.**

Family: Cyperaceae

Vernacular Names: Sheathed Cyperus (E), Kraich-bang (M), Saris (U)

Availability Status: Wild

Used Parts: Root

Use Reports per Ailment: Fever (M-5; U-3), Diarrhea (M-4; U-5)

Mode of Preparation and Administration

For Fever: Fresh root are crushed and boiled in 5 cup of water reduced to 3 cup then filtered it and the decoction has to be taken twice per day.

For Diarrhea: About 5 gm of crushed root are soaked overnight in 3 cup of water and taken twice daily for 3-5 days.

PRK (n=192):- 9

***Diospyrus malabarica* (Desr.) Kostel.**

Family: Ebenaceae

Vernacular Names: Gaub (B), Indian persimmon (E), Gab-pang (M), Khro (U)

Availability Status: Cultivated

Used Parts: Fruit, Leaves

Use Reports per Ailment: Dyspepsia (M-5), Cough (M-4; U-5)

Mode of Preparation and Administration

For Dyspepsia: About 15 mg fruit powder macerated with little amount of water to make a paste and then taken orally twice daily for 3-4 days.

For Cough: Approx. 2 gm of leaves powder is boiled in 5 cup of water till it come to the 2 cup then half of the liquid is administered orally in early morning and other in the evening for 7 days.

PRK (n=192):- 7.2

***Dolichos lablab* Linn.**

Family: Leguminaceae

Vernacular Names: Shim (B), Kidney-bean (E), Kulbi-pang (M), Sibai (R), Subai (U)

Availability Status: Cultivated

Used Parts: Seed

Use Reports per Ailment: Fever (M-5; R-2; U-3), Dyspepsia (M-2; R-3; U-3), Epistaxis (M-4; R-3; U-4)

Mode of Preparation and Administration

For Fever: Seeds of Kandy-bean are to fry on the sands and then powder it. After 500 mg of this powder mixed with 1 cup of water then consumed 3 times per day.

For Dyspepsia: 500 mg of seed powder mixed with ½ cup of warm water and consumed twice per day against the remedy of dyspepsia.

For Epistaxis: 200 mg seed powder of this plant mixed with cold water and has to be taken twice per day against the remedy of epistaxis.
PRK (n=192):- 15.1

***Eryngium foetidum* Linn**

Family: Apiaceae

Vernacular Names: Boro dhanian (B), Long coriander (E), Chengna-dhanian (M), Dhangnia (R), Bari-ba-Khong (U)

Availability Status: Cultivated as well as wild

Used Parts: Leaves, Root

Use Reports per Ailment: Malaria (R-4; U-4), High blood pressure (M-6; R-6), Asthma (M-3; R-4; U-5). Headache (M-4; U-3)

Mode of Preparation and Administration

For Malaria: About 1 teaspoonful leaves juice of long coriander mixed with 7-8 teaspoonful of water and boiled it. Then the liquid consumed twice per day for 4-5 days.

For High Blood Pressure: One teaspoonful leaf juice of Long coriander mixed with equal amount of centella and taken twice daily for 15-20 days to reduce high blood pressure.

For Asthma: About 5 gm leaves are crushed then soaked 2 hours in ½ glass of water and filtered it then the liquid is taken twice per day.

For Headache: Root juice of this plant applied on the head as a remedy against the headache.
PRK (n=192):- 20.3

***Ficus religiosa* Linn.**

Family: Moraceae

Vernacular Names: Ashwatta (B), Sacred fig (E), Iang-fang (M), Burai-fang (R), Borfang (U)

Availability Status: Wild

Used Parts: Leaves, Bark

Use Reports per Ailment: Epilepsy (M-5; R-2; U-2), Fever (M-4; U-3), Jaundice (M-2; R-2), Leucorrhoea (R-2; U-3), Sore (R-2; U-3)

Mode of Preparation and Administration

For Epilepsy: 1 teaspoonful bark juice of this plant are mixed with 1-2 teaspoonful of milk and taken orally per day.

For Fever: 2-3 gm of bark are soaked in a ½ glass of warm water for 7-8 hours and then filtered it. Then the solution taken 2-3 times per day for 1 week.

For Jaundice: 1 teaspoonful leaves juice macerated with little amount of milk (goats) and then taken orally morning and evening as a remedy against jaundice.

For Leucorrhoea: 10-20 gm bark is boiled in a 3 cup of water until it comes to 2 cup. Then the solution taken orally per day for 7 days.

For Sore: Bark are to be fry in the pots and make ash out of it. Then the ash can be applied on the affected area for 2-3 days as a remedy against sore.

PRK (n=192):- 16

***Fimbristylis miliacea* (Linn.) Vahl.**

Family: Cyperaceae

Vernacular Names: Agor (B), Grass Like Fimbry (E), Chebangbra-pang (M), Sathang-thai (U)

Availability Status: Wild

Used Parts: Whole plant

Use Reports per Ailment: Fever (M-3; U-2), Dysentery (M-2; U-1)

Mode of Preparation and Administration

For Fever: About 5 gm dry powder of this grass soaked in a glass of water for 1 hours then that mixture consumed twice a day for 3 days.

For Dysentery: Approx. 2-3 gm dry powder of this boiled in a glass of water for 15 minutes. Half of the liquid is administered orally in early morning and other half in the evening for 2-3 days.
PRK (n=192):- 4.1

***Gardenia jasminoides* (Ellis.)**

Family: Rubiaceae

Vernacular Names: Gandharaj (B), Cape Jasmine (E), Jing-Sua (M), Khru-Mali (U)

Availability Status: Wild

Used Parts: Leaves, Root

Use Reports per Ailment: Insomnia (M-4; U-3), Liver pain (M-3; U-3), Fever (M-2; U-2), Tumors (M-3; U-4)

Mode of Preparation and Administration

For Insomnia: About 2-3 leaf juice has to be taken with sugar before sleeping and experiences a sound sleep.

For Liver Pain: Approx. 2 gm of leaves powder are soaked in a 1 cup of water and filtered it then the solution taken 2-3 times per day.

For Fever: About 4-5 leaves is boiled in a 4-5 cup of water till it comes to 1 cup then taken 2 times per day for 4-5 days.

For Tumors: After mincing the root, its boiled in water and then applied on the affected area.

PRK (n=192):- 12.5

***Hibiscus mutabilis* Linn**

Family: Malvaceae

Vernacular Names: Sthala-Padma (B), Confederate Rose (E), Kraha-Pang (M)

Availability Status: Cultivated

Used Parts: Bark, Fruit, Flower

Use Reports per Ailment: Amenorrhoea (M-7), Gonorrhoea (M-9)

Mode of Preparation and Administration

For Amenorrhoea: 4-5 teaspoonful flower juice macerated with little amount of water and then 1 teaspoonful sugar are mixed with it and then taken 2 times per day for 2-3 days.

For Gonorrhea: 500 mg of bark powder mixed with water and consumed it for 7 days.
PRK (n=192):- 8.3

***Ipomea batatas* Lamk.**

Family: Convolvulaceae
Vernacular Names: Misti aloo (B), Sweet Potato (E), Marar (M), Denga-thak-tai (U)
Availability Status: Cultivated
Used Parts: - Leaves, Tuber
Use Reports per Ailment: Edema (M-4; U-7), Dysentery (M-3; U-4)

Mode of Preparation and Administration

For Edema: At least 10-12 leaves are paste and used in the affected area for at least 1 month.

For Dysentery: Sweet potato grained with appropriate amount of water and 1 teaspoonful filtered extract of it has to be taken 15-20 minutes alternately to hibernate the disease.
PRK (n=192):- 9.3

***Ixora coccinea* Linn**

Family: Rubiaceae
Vernacular Names: Rangan (B), Jungle Flame (E), Paibang (M)
Availability Status: Cultivated as well as wild
Used Parts: Root, Leaves
Use Reports per Ailment: High blood pressure (M-11), Sprain (M-3), Dermatitis (M-3)

Mode of Preparation and Administration

For High Blood Pressure: The root is boiled in water and consumed it, which also control high BP.

For Sprain: The leaves are boiled in water and gargle it, that reduce the sprain.

For Dermatitis: Leaves are crushed and then applied on the dry skin for 7 days, and then the dry skin improves glossy or smooth Skin.
PRK (n=192):- 9

***Jasminum arborecens* Roxb.**

Family: Oleaceae
Vernacular Names: Kunda (B), Simply Jasmine (E), Ukhuru-Pang (M)
Availability Status: wild
Used Parts: Leaves
Use Reports per Ailment: Dyspepsia (M-14), Cough (M-3), Snake bites (M-4), Sore (M-4)

Mode of Preparation and Administration

For Dyspepsia: Approx. 1/2 teaspoonful leaves juice mixed with 3/4 teaspoonful of water and boiled it then the solution taken 2 times per day for 2-3 days.

For Cough: About 1/2 teaspoonful leaf juice is slightly boiled in 5-6 teaspoonfuls of water then the mixture taken morning and evening at least 3 days.

For Snake Bites: Snake venome is rapidly transported throughout the body and in that case if leaves juice is applied to the bite site and bendarid, the venome can not spread.

For Sore: At first leaves were washed in warm water and crushed it and then applied on affected area for 2-3 days.
PRK (n=192):- 13

***Jasminum sambac* (Linn.) Ait.**

Family: Oleaceae
Vernacular Names: Ballika (B), Arabian Jasmine (E), Muli-bai-pang (M), Maliste (U)
Availability Status: wild
Used Parts: Leaves
Use Reports per Ailment: Pimple (M-5; U-3), Blotch (M-4; U-4), Mouth ulcer (M-3; U-4), Urticaria (M-4; U-4)

Mode of Preparation and Administration

For Pimple: Leaf juice of this plant is applied on the face at least 7-8 days, which reduce excess oil, pimple or dark spots to give clearer skin.

For Blotch: Leaf juice is applied on the affected parts, which cure blotch.

For Mouth Ulcer: 4-5 leaves are boiled in the water and then gargle it against the remedy of mouth ulcer.

For Urticaria: 1 teaspoonful leaf juice mixed with 4-5 teaspoonful of water and boiled it and then taken orally 2-3 times per days.
PRK (n=192):- 10

***Lippia alba* (Mill.)**

Family: Verbenaceae
Vernacular Names: Bhutbhuti (B), Bushy Lippia (E), Tangda-Apang (M)
Availability Status: wild
Used Parts: Leaves, Root
Use Reports per Ailment: High blood pressure (M-7), Headache (M-4), Nausea (M-3), Cough (M-5)

Mode of Preparation and Administration

For High BP: 2-3 teaspoonful leaves juice has to be taken orally for 2 weeks as a remedy against high BP.

For Headache: 2-3 teaspoonful root juice mixed with milk then boiled it, which quickly cure headache.

For Nausea: The filtrate of the slurry of 10 gm smashed leaf was mixed with double amount of sunned rice water and 1/2 teaspoon sugar was added. This mixture of about half cup is to taken twice after half an hour interval.

For Cough: 10 gm root is boiled in 4 cup of water till to reduce 1 cup and then taken orally morning and evening per day for 2-3 days.
PRK (n=192):- 10

***Luffa cylindrica* (Linn.) Roem.**

Family: Cucurbitaceae
Vernacular Names: Dhandul (B), Sponge-Gourd (E), Sabuai-Fang (M), Fur (R), Frong (U)
Availability Status: Cultivated as well as wild
Used Parts: Leaves, Fruit
Use Reports per Ailment: Leprosy (M-3; R-2; U-4), Piles (M-4; R-1; U-5), Headache (M-4; R-2; U-4)

Mode of Preparation and Administration

For Leprosy: 1.5 teaspoonful of this plant leaves extract taken twice a day for 2 month since effective to cure it up.

For Piles: After mincing the sponge ground it has to be dried in open sunlight for 1 week and more to make dry powder out of it and this powder has to be filtered and 1 gm powder has to be mixed with 1/2 cup of warm water and taken twice a day for 1 week.

For Headache: 2-3 drops of fruit juice has to be inhaled and 2 teaspoon of fruit juice taken directly reduces intensity of headache.

PRK (n=192):- 15

***Mucuna monosperma* DC ex Wight**

Family: Leguminaceae

Vernacular Names: Banar-ghila (B), Thunka (M), Chabina (R), Tong-fai (U)

Availability Status: wild

Used Parts: Root, Fruit

Use Reports per Ailment: Bone fracture (M-10; R-1; U-2), Glaucoma (M-10; R-2; U-13)

Mode of Preparation and Administration

For Bone Fracture: Approx.50 gm mature seeds are crushed and one egg (Hen's) Mixed with it and made into paste, warmed up and then applied on the fractured area of the body and covered with a young banana leaf and bandaged with some hard materials (Bamboo stick).After 15 days bandaged should be open and repeat the treatment with the above formulation at least 3 times or more.

For Glaucoma: 2-3 g root is wash in warm water and then paste it and soaked in a ½ cup of hot water for 7-8 hours and then filtered it then the solution applied on the eye as drop wise.

PRK (n=192):- 20

***Phyllanthus reticulatus* Linn.**

Family: Phyllanthaceae

Vernacular Names: Chirgodi (B), Potato-Bush (E) Khruingchu-Pang (M), Taocharfo-Ofang (U)

Availability Status: wild

Used Parts: Leaves, Root

Use Reports per Ailment: Diarrhea (M-3; U-15), Malaria (M-5; U-14), Epilepsy (M-15; U-5)

Mode of Preparation and Administration

For Diarrhea: 10 g leaves are soaked into 3 cups of water for overnight and then the water is administered orally in early morning for 3-5 days.

For Malaria: 20 gm root is boiled with 4-5 cups of water till it comes to 1 cup and half of the liquid is administered orally in early morning and other half in the evening for 4-5 days.

For Epilepsy: 10 gm roots are crushed and soaked in a 1 litre of water for 10-12 hours and then the solution taken 4-5 days.

PRK (n=192):- 30

***Piper longum* Linn.**

Family: Piperaceae

Vernacular Names: Pippali (B), Indian Long Pepper (E) Takair (M), Mukhuipaupi (R)

Availability Status: wild

Used Parts: Leaves

Use Reports per Ailment: Dyspepsia (M-14; R-4), Asthma (M-3; R-2), Rheumatism (M-3; R-13), Fever (M-5; R-4)

Mode of Preparation and Administration

For Dyspepsia: 250 mg (leaf) dust of this plant has to be taken with one glass of water for 1 week.

For Asthma: 250 mg leaves dust of this plant has to be mixed with one glass of water and to be orally administered after meal.

For Rheumatism: 250 mg leaves powder of this plant mixed with 1 teaspoonful of ginger extract has to be taken 2 times daily.

For Fever: A habit showed be grown to take 250 gm leaves dust of this plant mixed with 5-10 drops of ghee for at least one month to maintain the medicinal efficiency level in the blood to get permanent effect.

PRK (n=192):- 25

***Plumeria acutifolia* (Pair.)Woodson**

Family: Apocynaceae

Vernacular Names: Garur Chanpa (B), Frangipani (E), Aangra-Pang (M), Buc (R), Aagrang (U)

Availability Status: Cultivated as well as wild

Used Parts: Bark, Latex, Leaves

Use Reports per Ailment: Dyspepsia (M-12; R-2; U-4), Constipation (M-2; U-14), Muscular rheumatism (M-3; R-4; U-3), Blotch (R-3; U-4), Dermatitis (M-4; R-14)

Mode of Preparation and Administration

For Dyspepsia: Reed paste of this plant at around 500 mg mixed with 1 cup of water has to be taken for 7 days twice daily.

For Constipation: 500 mg reed paste of this plant can be taken with hot water at night before sleep. To get better result ½ gm of myrobanan paste me be added with the preparation.

For Muscular Rheumatism: 4-5 drops of latex of this plant mixed with ½ teaspoon of ginger extract, added with 7-8 teaspoon of milk daily helps to come round the pain.

For Blotch: Grinded leaves of this plant can be used in the affected area by smearing.

For Dermatitis: Latex of this plant mixed with coconut oil smeared in the affected place of the skin has to be kept for 1 hour before bathing and this process has to be followed 3-4 days.

PRK (n=192):- 36

***Sida cordifolia* Linn.**

Family: Malvaceae

Vernacular Names: Bala (B), Heart Leaf Sida (E), Nengkha-Bang (M)

Availability Status: wild

Used Parts: Whole plant, Root, Leaves

Use Reports per Ailment: Asthma (M-7), Bleeding piles (M-3), Gonorrhoea (M-3), Rheumatism (M- 4)

Mode of Preparation and Administration

For Asthma: 10 g root juice smeared and boiled in 4-5 cup of water till it comes to 2 cup, filtered and the decoction is taken twice daily for 1 month.

For Bleeding Piles: 5-6 young leaves are crushed and applied on the affected area at least 15-20 days.

For Gonorrhoea: 2-3 seedlings are boiled in a 1 litre of water till it comes to 250 ml then the solution taken orally in early morning.

For Rheumatism: 2-3 saplings are finely crushed, mixed with little amount of mustered oil, boiled it and then the solution is taken orally for 4-5 days.

PRK (n=192):- 9

***Sida rhombifolia* Linn.**

Family: Malvaceae

Vernacular Names: Ati-Bala (B), Arrow Leaf Sida (E), Inglabang (M), Knutha-Toi-Frang (U)

Availability Status: wild

Used Parts: Leaves, Fruit, Root

Use Reports per Ailment: Cold and cough (M-3; U-3), Headache (M-4; U-4), Fever (M-4; U-3)

Mode of Preparation and Administration

For Cold and Cough: About 2-3 gm dry leaf powder is boiled in 1 glass of warm water. Half of the liquid is administered orally in early morning and other half in the evening for 20-25 days.

For Headache: 8-10 fruits are chewed as a remedy against headache.

For Fever: 100-200 mg of root powder are soaked in a 1 glass of water for 1 hour and then taken the solution orally. PRK (n=192):- 11

***Spilanthes acmella* Murr**

Family: Asteraceae

Vernacular Names: Akarkara (B), Hangpua-Pang (M), Uchuinoi (R), Osondoi (U)

Availability Status: wild

Used Parts: Root, Flower

Use Reports per Ailment: Blood dysentery (M-14; R-2; U-3), Toothache (M-2; R-4; U-13), Ring worm (M-7; R-11; U-2)

Mode of Preparation and Administration

For blood Dysentery: About 250 gm root are crushed and boiled with a 5 cup of water, reduced in to 2 cup and then taken 2 teaspoonful twice per day for 3 days.

For Toothache: Leaves and flower are to fry in the pots and make it ash out of it and then the ash can be used for brushing the teeth as a remedy against toothache.

For Ring Worm: Leaves and flower are crushed and applied on the affected area of ring worm. PRK (n=192):- 30

***Stephania hernandifolia* (Willd.)Walp.**

Family: Menispermaceae

Vernacular Names: Maknadi (B), Snake Vine (E), Tang-Pang (M)

Availability Status: wild

Used Parts: Root, Leaves

Use Reports per Ailment: Edema (M-7), Gonorrhoea (M-4), Headache (M-2)

Mode of Preparation and Administration

For Edema: About 5-6 leaves are soaked in a 1 glass of water for 2 hours and then crushed it and boiled with more 4-5 cups of water till it reduce 3 cups and filtered it. Half of the solution is administered orally in early morning and other ½ in the evening for 1 month.

For Gonorrhoea: About 5-6 leaves are finely washed and soaked in a one glass of water for overnight. It was then filtered and the filtrate is taken orally 4-5 times per day for 7-9 days.

For Headache: About 2 gm root are crushed and mixed with little amount of salt and then taken orally in the morning and

evening per day for 7 days.

PRK (n=192):- 7

***Tabernaemontana divaricata* Linn**

Family: Apocynaceae

Vernacular Names: Tagar (B), Crape Jasmine (E), Chle-Pang (B), Mali (R), Boi-Fong-Fang (U)

Availability Status: Cultivated

Used Parts: Leaves, Root

Use Reports per Ailment: Taeniasis (M-2; R-2; U-1), Scabies (M-1; U-2), Cough (R-2; U-4), Glaucoma (M-4; R-2)

Mode of Preparation and Administration

For Taeniasis: about 2 gm leaves powder soaked in a 1 glass of water for overnight and then taken early in the morning per day for 1 week.

For Scabies: The leaves juice of this plant applied on the affected area.

For Cough: 2-3 leaves and 1 mincing onion are mixed together and smashed it and the juice has to be taken twice per day for 4-5 days.

For Glaucoma: Roots are smashed, and then the juice is applied on the eye as drop wise as a remedy against Glaucoma. PRK (n=192):- 10.4

***Tagetes erecta* Linn**

Family: Compositae

Vernacular Names: Gandaphool (B), Marigold (E), Khetra-Fang (M), Khuiti (R)

Availability Status: Cultivated

Used Parts: Leaves

Use Reports per Ailment: Blotch (M-4), Tuberculosis (M-3; R-5), Ear pain (R-2), Blood dysentery (M-6)

Mode of Preparation and Administration: -

For Blotch: Leaves are smashed and the paste is applied on the blotch after slight warming to make it lighter to burst out and reduces the pain.

For Tuberculosis: About 250 mg leaves powder mixed with little amount of goat-milk and have to be taken in the morning and evening per day for 1 month.

For Ear Pain: Leaves are smashed and boiled it and applied on the ear as drop wise for 2-3 days.

For Dysentery: Approx. 2 teaspoonfuls leaves juice mixed with 2 teaspoonfuls of sugar and has to be taken 2-3 times per day for 2-3 days.

PRK (n=192): 10.4

***Tamarindus indica* Linn.**

Family: Leguminaceae

Vernacular Names: Tentul (B), Tamarind (E), Fagia-Apang (M), Teing-Toi (R), Te-In-Toi (U)

Availability Status: Cultivated as well as wild

Used Parts: Seed, Leaves

Use Reports per Ailment: Dyspepsia (M-3; R-2; U-2), Blood dysentery (M-4; R-2; U-3)

Mode of Preparation and Administration

For Dyspepsia: 200 mg dry seed powder is boiled with 3 cups of water till to reduce 2 cups and then taken orally twice daily for 7-9 days.

For Blood Dysentery: 100 gm leaves are boiled in a 1 litre of water till it comes to ½ litre then the solution is taken 2 times per day for 5-6 days.
PRK (n=192):- 8.3

***Tectona grandis* (Linn.)F**

Family: Lamiaceae

Vernacular Names: Segun (B), Teak (E), Rong-Bang (M), Segunang (R), Segun (U)

Availability Status: Cultivated as well as wild

Used Parts: Fruit, Wood powder, Seed

Use Reports per Ailment: Edema (M-2; R-1), Headache (M-2; U-2), Bone fracture (M-3; U-3), Teaniasis (M-2; R-2), Hair loss (R-2; U-5)

Mode of Preparation and Administration

For Edema: 500 mg fruit powder mixed with little amount of water and applied on the affected area.

For Headache: Wood powder of this plant mixed with water and applied on the fore-head that quickly cure headache.

For Bone Fracture: Wood powder of this plant mixed with water and applied on the fractured area.

For Teaniasis: 4-5 gm wood powder is boiled in 2 cup of water till it comes to ½ cup, filtered and then the solution taken orally in the morning and evening per day for 7-8 days.

For Hair Loss: 1 teaspoonful seeds oil mixed with 2 teaspoonfuls coconut oil and then applied on the head after bathing

PRK (n=192):- 10.4

***Urena lobata* Linn**

Family: Malvaceae

Vernacular Names: Caesar Weed (E), Naid-Apang (M), Sathaing-Fang (U)

Availability Status: - Wild

Used Parts: Root, Stem, Flower

Use Reports per Ailment: Rheumatism (M-3; U-4), Colitis (M-4; U-4), Cough (M-3; U-4)

Mode of Preparation and Administration

For Rheumatism: Root juice of this plant is slightly boiled with 2 teaspoonfuls of water and then taken twice daily for 2-3 days.

For Colitis: About 2 gm stem, 1 teaspoon ghee, 1 teaspoon honey and 1 teaspoon sugar were mixed together and then taken 2 times daily after meal.

For Cough: 2-3 leaves have to be fried, mixed with ghee and taken orally every day.

PRK (n=192):- 11.4

***Zizipus jujuba* Mill.var.**

Family: Rhamnaceae

Vernacular Names: Kul (B), Jujube (E) Ji-Bang(M), Boroi (R), Boroing-Frang (U)

Availability Status: Cultivated as well as wild

Used Parts: - Fruit, Bark, Leaves

Use Reports per Ailment: Insomnia (M-7; R-2; U-3), Epilepsy (M-7; R-2; U-3), Scabies (M-5; R-4; U-5), Glaucoma (M-4; R-3; U-7)

Mode of Preparation and Administration

For Insomnia: about 10-12 fruit powder mixed with honey and taken orally as a remedy against insomnia.

For Epilepsy: Approx. 7-8 gm stem bark is soaked in a glass of warm water, filtered and then the solution is taken 3-4 times daily for 2 weeks.

For Scabies: Bark are smashed and mixed with turmeric powder and applied on the whole body as a remedy against scabies.

For Glaucoma: 2-3 drops of leaves juice of this plant is applied on both eyes 2 times daily for 7 days.

PRK (n=192): - 27

*** B= Bengali, E=English, M=Mog, R=Reang, U=Uchai.**

According to the survey and people information on some medicinal plants and also field guides, it was found that 39 medicinal plants used by Mog, Reang and Uchai tribes of south Tripura district. The scientific name of the plants, their family names, vernacular names, availability status, used parts, use reports per ailment, mode of preparation and administration and PRK were described above. These species belong to 27 families and 36 genera. Most frequently used families are Leguminaceae and Malvaceae. Out of 39 medicinal plants 18 species are wild, 12 are cultivated and 9 are cultivated as well as wild. Among the 39 plants, leaves of 28, root of 18, fruit of 8, bark of 7, seed of 7, flower of 3, 2 whole plants, tuber of 1 plant, latex of 1, wood powder of 1, stem of 1 and twig of 1 have been medicinally used.

These 39 medicinal plants used by the local tribes as a cure for 54 different types of ailments and all the plants used for curing more than 1 ailments. Out of 39 plants *Carica papaya* Linn. was reported to cure 9 different types of ailments and maximum plants (9) were reported to treat normal fever. Several plants are reported to cure dyspepsia (7), edema (6), head louse (6), teaniasis (5), dysentery (5), cough (5) etc. The analysis of data reveals that leaves are used in 37 ailments; roots are used in 18 ailments; fruits are used in 16 ailments; seeds are used in 12 ailments; bark is used in 11 ailments; wood powder is used in 3 diseases; whole plant is used in 2 diseases; latex is used in 2 ailments and twig, tuber, flower and stem used in 1, 1, 1 and 1 ailment, respectively. It was noticed that in most of the cases plant sample are crushed with water, filtered and then the filtrate is taken orally. From the survey, it was noticed that the plant parts were preserved by mixing different preservatives such as honey, salt, milk, ghee etc. From data analysis the highest PRK value was found in *Carica papaya* Linn. (49.4%) followed by *Plumeria acutifolia* (Pair.) Woodson. (36%), *Areca catechu* Linn. (30.2%).

Table 2: Frequency of plant parts used for the preparation of remedies.

Plant parts used	Number of medicinal plant species	Percentage (%)
Leaf	28	36
Root	18	23
Fruit	8	10.2
Bark	7	9
Seed	7	9
Flower	3	4
Whole plant	2	2.5
Tuber	1	1.2
Latex	1	1.2
Wood powder	1	1.2
Stem	1	1.2
Twig	1	1.2

This table shows frequency of plant parts used for the preparation of remedies. Most frequently used parts are leaves (36%) followed by Root (23%), Fruit (10.2%), Bark (9%), Seed (9%), Flower (4%), Whole plant (2.5 %) and rarely used plant parts are tuber (1.2%), latex (1.2%), wood powder

(1.2%), Stem (1.2%) and twig (1.2%).

Informants' knowledge and consensus about medicinal plants

Table 3: Consensus of agreement of Mog community about use of medicinal plants.

Ailment category	N _{taxa}	N _{ur}	Fic
Gastrointestinal disorders and parasite infections (diarrhea, dysentery, blood dysentery, colitis, teianiasis, belly swelling, nausea, constipation, dyspepsia, piles, bleeding piles)	31	157	0.80
Liver disorders (liver pain, jaundice)	4	13	0.75
Blood related disease (anemia, hematemisis)	2	8	0.85
Febrile diseases characterized by fever, chronic fever, malaria	10	39	0.76
Swelling (non-infectious or infectious swelling) and Cancer-blotch and tumors	4	19	0.83
Skeletal muscular pain and inflammation (headache, bone fracture)	8	83	0.78
Respiratory infections (cough, tuberculosis)	6	21	0.75
Anaphylactic disorder (asthma, rheumatism, muscular rheumatism, urticaria)	10	46	0.80
Cardiovascular (High blood pressure, edema)	10	56	0.83
Neurological problems (epilepsy, insomnia)	7	48	0.87
Ear, nose and teeth problem (toothache, epistaxis, sprains, mouth ulcer, cold)	5	14	0.69
Eye disorder (Glaucoma)	3	18	0.88
Skin disorder (dermatitis, pimple, leprosy, sore, ring worm, scabies, eczema)	11	47	0.78
Poisonous animal bites (Snake bites)	1	4	1
Reproductive and birth disorder (non-infectious or infectious) – amenorrhea, leucorrhoea, gonorrhoea	4	23	0.86
Parasitic disorder (head louse)	2	12	0.90
Total	118	558	0.78

Table 3 shows consensus of agreement of Mog community about use of medicinal plants. The reported ailments were grouped into 16 categories based on the information gathered from the interviews. From data analysis it was noticed that Fic

values varied from 0.69 to 1 with an average value of 0.78. The highest Fic (1) scored for the poisonous animal bites and least Fic (0.69) scored for the Ear, nose and teeth problems.

Table 4: Consensus of agreement of Reang community about use of medicinal plants.

Ailment category	N _{taxa}	N _{ur}	Fic
Gastrointestinal disorders and parasite infections (diarrhea, dysentery, blood dysentery, teianiasis, dyspepsia, piles)	16	59	0.74
Liver disorders (liver pain, jaundice)	3	6	0.60
Blood related diseases (anemia, hematemisis)	2	3	0.50
Febrile diseases characterized by fever, malaria	6	31	0.83
Swelling (non-infectious or infectious swelling) and Cancer-blotch	2	12	0.90
Skeletal muscular pain and inflammation (headache, bone fracture)	2	3	0.50
Respiratory infections (cough, tuberculosis)	2	7	0.83
Anaphylactic disorder (asthma, rheumatism, muscular rheumatism)	3	19	0.88
Cardiovascular (High blood pressure, edema)	4	13	0.75
Neurological problems (epilepsy, insomnia)	5	18	0.76
Ear, nose and teeth problem (toothache, epistaxis, mouth ulcer, ear pain)	4	17	0.81
Eye disorder (Glaucoma)	3	7	0.66
Skin disorder (dermatitis, pimple, leprosy, sore, scabies)	8	42	0.82
Reproductive and birth disorders (non-infectious or infectious) –leucorrhoea	1	2	1
Parasitic disorder (head louse)	2	11	0.90
Hair loss	1	2	1
Total	64	252	0.74

Table 4 reveals consensus of agreement of Reang community about use of medicinal plants. The reported ailments were grouped into 16 categories based on the information gathered from the interviews. From data analysis, it was found that Fic values varied from 0.50 to 1 with an average value of

0.74. The highest Fic (1) scored for the reproductive and birth disorders and hair loss. The least Fic (0.50) scored for the blood related disease and skeletal muscular pain and inflammation.

Table 5: Consensus of agreement of Uchai community about use of medicinal plants.

Ailment category	N _{taxa}	N _{ur}	Fic
Gastrointestinal disorders and parasite infections (diarrhea, dysentery, blood dysentery, colitis, teaniasis, belly swelling, constipation, dyspepsia, piles, bleeding piles)	23	115	0.80
Liver disorders (liver pain, jaundice)	3	15	0.85
Blood related disease (hematemesis)	1	3	1
Febrile diseases characterized by fever, chronic fever, malaria	12	63	0.82
Swelling (non-infectious or infectious swelling) and Cancer-blotch and tumors	4	19	0.83
Skeletal muscular pain and inflammation (headache, bone fracture)	5	19	0.69
Respiratory infections (cough)	4	16	0.80
Anaphylactic disorder (asthma, rheumatism, muscular rheumatism, urticaria)	7	25	0.75
Cardiovascular (edema)	3	15	0.85
Neurological problems (epilepsy, insomnia)	7	25	0.75
Ear, nose and teeth problem (toothache, epistaxis, sprains, mouth ulcer, ear pain, cold)	5	28	0.85
Eye disorder (Glaucoma)	2	20	0.94
Skin disorder (dermatitis, pimple, leprosy, sore, ring worm, scabies, eczema)	11	42	0.75
Reproductive and birth disorder (non-infectious or infectious) – leucorrhoea	1	3	1
Parasitic disorder (head louse)	2	4	0.66
Hair loss	1	5	1
Total	91	412	0.78

Consensus of agreement of Uchai community about use of medicinal plants is presented in the table 5. The reported ailments were grouped into 16 categories based on the information gathered from the interviews. From data analysis it was found that Fic values varied from 0.66 to 1 with an

average value of 0.78. The highest Fic (1) scored for the 3 categories of ailments such as blood related disease, reproductive and birth disorder and hair loss. The least Fic (0.66) scored for the parasitic disorder (head louse).

Table 6: Fidelity level values of the frequently and rarely reported plants by Mog, Reang and Uchai community.

Community	Plant species	Therapeutic uses	No. of informants	Total no of informants	Fidelity level (%)
Mog	<i>Canavalia gladiata</i> (Jacq.) D.C.	Edema	4	6	66.66
	<i>Spilanthes acmella</i> Murr.	Toothache	2	23	8.69
Reang	<i>Calamus rotang</i> Linn.	Insomnia	9	9	100
	<i>Carica papaya</i> Linn.	Teaniasis	1	25	4
		Ring worm	1	25	4
Uchai	<i>Amaranthus gracilis</i> Desf.	Edema	6	6	100
	<i>Diospyrus malabarica</i> (Desr.) Kostel.	Cough	5	5	100
	<i>Carica papaya</i> Linn.	Head louse	2	42	4.76

As reported by informers of Mog community, the highest FL value for *Canavalia gladiata* (Jacq.) D.C. that cure edema is 66.66% and the lowest fidelity level for *Spilanthes acmella* Murr. is 8.69% that cure toothache. For the Reang community informers 100% FL value is for *Calamus rotang* Linn. to cure insomnia and least FL value for *Carica papaya* Linn. (FL=4%) to cure teaniasis and ring worm. As informed by Uchai community 100% FL value for *Amaranthus gracilis* Desf. and *Diospyrus malabarica* (Desr.) Kostel. for treating edema and cough respectively and 4.76 % FL value for *Carica papaya* Linn. to cure head louse.

Discussion

Peoples of all cultures have always depended on plants for their primary needs (food, shelter, warmth, medicines, etc.) and have naturally learned diverse applications of plants. In the course of nomadic roaming this knowledge was exchanged with neighboring tribes, friends and foe, and was gradually expanded upon. Thus, plant knowledge has been passed around the world since the beginning of time, and frequently,

the actual plants themselves have spread along as well (Mukul, Uddin and Tito, 2007; Shroff, 1997; Uddin and Mukul, 2012) [34, 51, 54].

The application of scientific knowledge relating to bio-resources for human welfare demands data on socio-economic aspects, impact on environment or conservation of biodiversity. Ethics demand preservation of the knowledge base, capacity building among the indigenous people and fair sharing of benefits accruing from commercial use of the indigenous knowledge. Modern scientific approach to the study of ethno botany demands precision in information, statistical support to data and quantitative or semi quantitative analysis of field observations (Bano *et al.*, 2014; Idu, 2009) [5, 27]. Indian Ayurvedic system is one of the noteworthy systems of traditional medicine practice that utilized mainly certain plants for the treatments of ailments in man and animals. The harmful side effects and high cost of the other forms of treatments and their non-availability to the poor peoples, who live in the remotest areas, are also the reasons for the demand for herbal medicine (Raman *et al.*, 2009) [40].

Demographic profile of the respondents

Due to the comparative little cost of home remedy with other system of treatment, the medical allowance of the study tribes were found to be less as the raw materials for home remedy was found to be available to them in plenty in forest. Most of the villagers in present study had shown their interest in establishing medicinal garden for treatment through home remedy. A portion of them were engaged in rubber plantation. Due to high use herbal remedies, a major portion (>50%) of individuals of the three ethnic tribes belonged to middle SES. Our findings are inconsistent with the findings of previous authors (Shih *et al.*, 2012) [49]. This indicates the applications and economic potential of plants to native people. Although most of the respondents use medicinal plants to treat ailments, they are not necessarily herbal medicine practitioners.

Medicinal plants and their uses

According to the study, it was found that the 3 ethnic communities (Mog, Reang and Uchai) of South Tripura frequently use plants of Leguminaceae and Malvaceae family. Biswas and coworkers, 2010 [8] confirmed that Chakma, Marma and Tripura tribes in the Chittagong Hilltracts, Bangladesh used the highest number of plants species of Fabaceae containing medicinal properties for their daily treatments. Bekalo and Colleagues [7] reported in their study that Fabaceae and Lamiaceae were the most commonly used reported medicinal plants with 16 (13.3%) and 14 (12%) species respectively. They frequently procure herbal medicines from different parts of the plants species of those families. From the study, it was found that the most frequently used parts are leaves (36%). In the year 2010, Ugulu and Baslar [56] reported that leaves are found to be the most frequently used parts in ethno botany. Debnath *et al.*, 2014 [18] also confirmed the frequent use of leaves in curing diseases by Mog and Reang community of South Tripura District. The data obtained from the informants of the present study and their analysis clearly shows that in spite of vital placing of modern pharmaceuticals; the place of folk cures in many parts of the world cannot be ignored. Many such studies of this types offer supportive evidence on increasing acceptability of herbal medicine to the general mass (Ugulu and Baslar, 2010) [56]. The utilization of medicinal plants for home remedies and folk knowledge of medicinal plants still takes vital importance of the study area.

It was noticed that the plant parts were preserved by mixing different preservatives such as honey, salt, milk, ghee etc. Other purposes of use of such preservatives are to increase the tastes and facilitate the mobilization and utilization of active constituents present in herbal medicine to the site of action of human body (Savrikar and Ravishankar, 2010) [44]. According to the present study, *Carica papaya* Linn. to cure bleeding piles, teianiasis, dysentery, ring worm, eczema, head louse, belly swelling, dyspepsia and fever with highest PRK value (49.4%). This could be an indication of the therapeutic value of this species in the treatment of reported diseases (Kamatnesi, Acipa and Oryem-Origa, 2011) [28].

Informants' knowledge and consensus about medicinal plants

Analysis of table 2, 3 and 4 factor informant consensus was used to highlight plants of particular cultural relevance and agreement in the use of plants. Informants' consensus of 3 ethnic communities and between cultural groups indicates which plants are widely used and thus aids in the selection of

plants for pharmacological and phytochemical studies. In order to use this tool, illness was classified into categories (16 in each community). Fic values range from 0-1, where increasing values of the factor indicates high rate of informants' consensus among the illness category. A value near to zero (0) indicates that there is low degree of consensus/agreement among the informants about the use of plant species for the treatment of particular ailments category or the plants used are chosen randomly. The average value was 0.78 in Mog and Uchai community and 0.74 in Reang community. The highest Fic (1) was found in poisonous animal bites, blood related disease (Hematemesis-Uchai), reproductive and birth disorders and hair loss depending on the agreement of 3 ethnic communities. This could be an indication that these ailments are common in the study area (Paschim Charakbai, Baikhora and Ratanpur of South district of Tripura state) and the species were traditionally used to treat these ailments are worth searching for bioactive compounds. The least Fic was observed in ear, nose and teeth problems (Fic=0.69); blood related disease (Anemia, hematemesis-Reang) (Fic=0.50); skeletal muscular pain and inflammation (Fic=0.50); and parasitic disorder (Fic= 0.66). This could be due to lack of communication among people in different areas (Uddin and Hassan, 2014) [55].

Fidelity level (FL) of the commonly used plants

Depending on the informers, the highest fidelity level found in *Canavalia gladiata* (Jacq.) D.C. for curing Edema (66.66%), *Calamus rotang* Linn. for curing Insomnia (100%), *Amaranthus gracilis* Desf. for curing Edema (100%) and *Diospyrus malabarica* (Desr.) Kostel. for curing Cough (100%). This could be an indication of the high potentiality of these species in healing (Ugulu, 2011; Ayyanara and Ignacimuthu, 2011) [57, 3]. The lowest FL value found in *Spilanthes acmella* Murr. (Toothache-8.69%) and *Carica papaya* Linn. (Teianiasis-4%, ring worm-4% and head louse-4.76%).

Conclusion

The data obtained from informers and their quantitative analysis in the present report provide basic understanding on the prevalence of herbal remedies in the 3 ethnic tribes of South Tripura. Further studies are on the way for pharmacological analysis of active constituents present in the most frequently used plants with highest fidelity. Conservation of the most important species is recommended.

This documentation of indigenous practices may contribute to national drug development if it receives the attention it deserves. Qualitative and quantitative numerical analysis of the data represents a high level of efficacy from the herbal remedies. It is important to standardize the drug preparation, dosage and mode of administration so as to match western medicine procedures. The outcomes of our findings suggest that there is a need for validation of the reported species for their medicinal efficacy.

Though our present approach to the documentation of indigenous herbal remedies is not a new one, still the potential lies in the systematic analysis of the data obtained to evaluate the general use of plants for herbal remedies.

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