



## **Documentation of Ethno-medicinal Plants used in the treatment of Malaria, Fever and Headache by the Garo Community of West Garo Hills District, Meghalaya.**

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### **ABSTRACT**

The Garo hills districts in Meghalaya persistently contributed most on malarial attributable deaths. The research on documentation of ethnomedicinal uses for the treatment of malaria, fever and headache was conducted in West Garo hills district of Meghalaya during the year 2014-2016. Sources revealed that the West Garo hills district is co-endemic for *Plasmodium falciparum* and *Plasmodium vivax*, but *Plasmodium falciparum* was the predominant infection (> 82%). The study has documented 20 medicinal plant species belonging to 16 families. The study based on the plant parts used reveals that roots (40%) were most commonly used in the treatment, followed by leaves and barks (35%), whole plant (10%) and seeds having (5%). In the study trees (50%) were recorded to have highly used potential followed by herbs (30%), shrubs (15%) and climbing shrubs (5%).

**Keywords:** Ethnomedicine; Malevolent spirits; Oja; West Garo Hills; Meghalaya.

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Received 06 October 2017, Accepted 15 October 2017

## INTRODUCTION

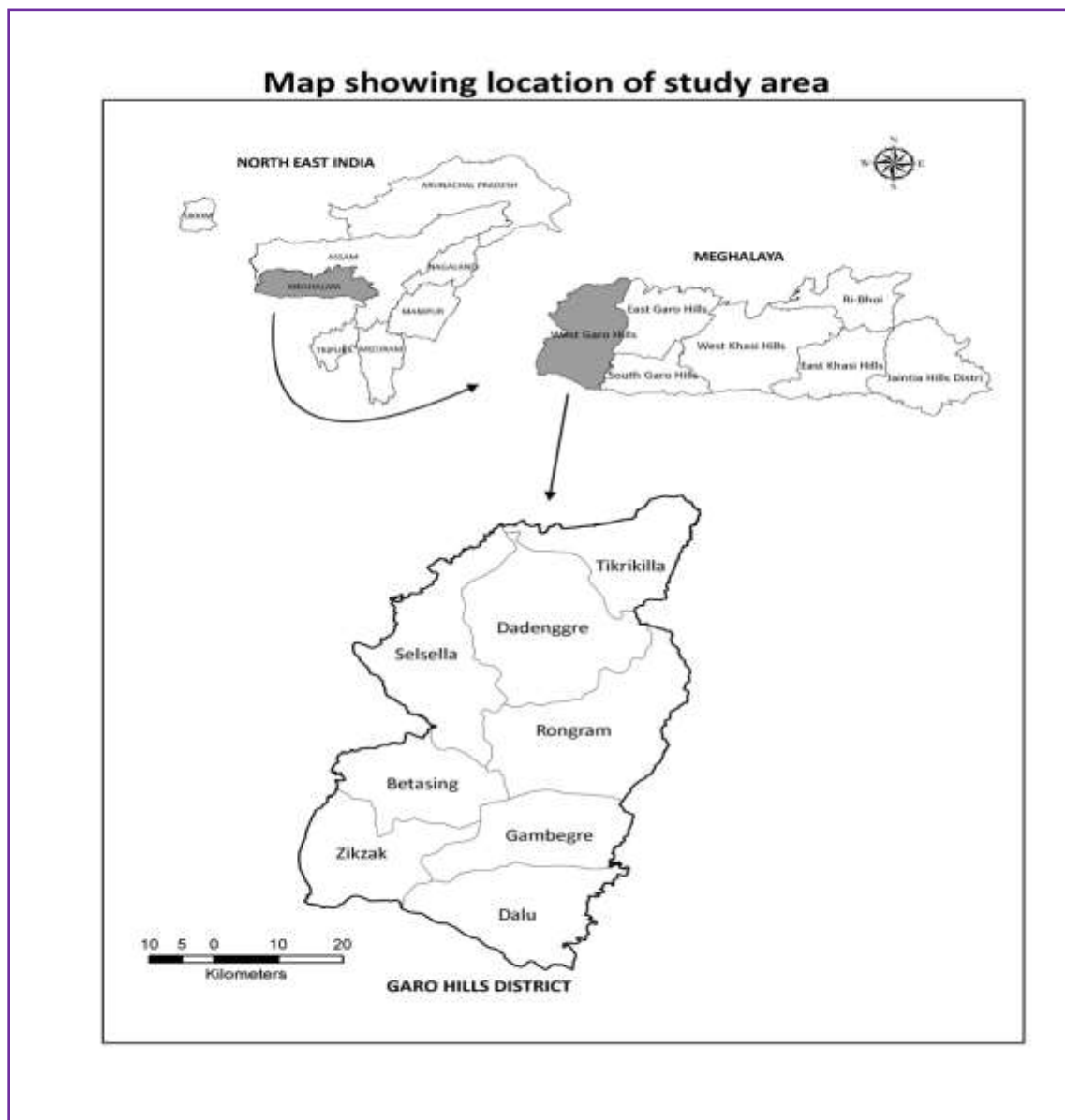
In the olden days Garos believe that if a person is suffering from malaria they considered it as because of malevolent spirits or an evil spirit possessed. Still today some people being believe in those spirits. Before the treatment they invoke god or deity by offering sacrifice to heal the sick person. And sometimes they even believed it can make the person sick because of defilement. The World Health Organization estimates that there are between 300 and 500 million new cases of malaria worldwide, every year, mostly in Africa, Asia, South Pacific Islands and South America, which causes at least 1 million deaths annually. In spite of control programs in many countries, there has been very little improvement in the control of malaria, and infections can reduce the effectiveness of labour and can lead to both economic and human losses. Control of malaria is complex because of the appearance of drug-resistant strains of *Plasmodium* and with the discovery that man becomes infested with species of simian (monkey) malaria (Symth JD. Animal Parasitology. Cambridge, England: Cambridge University Press; 1994). The first antimalarial drug was quinine, isolated from the bark of *Cinchona* species (Rubiaceae) in 1820. It is one of the oldest and most important antimalarial drugs, which is still used today. In 1940, another antimalarial drug, chloroquine, was synthesized and is being used for the treatment of malaria (Bharel *et al.*, 1996). Malaria is endemic in Garo hills of Meghalaya, and death cases are reported annually. Garo hills are categorized high-risk for drug-resistant malaria; however, there exists no data on malaria transmitting mosquitoes prevalent in the region. Reports are entomological observations with particular reference to vector biology characteristics for devising situation specific intervention strategies for disease transmission reduction. Malaria is major public health concern in the north-eastern states of India that continues to deter the equitable socio-economic development of the region (Dev V *et al.*, 2003). Among all districts of Meghalaya that are malaria endemic, the Garo hills persistently contribute the majority of *Plasmodium falciparum* cases (> 60%) and attributable deaths, and the district is categorized high-risk for drug-resistant malaria. Investigations revealed that the West Garo hill district is co-endemic for *Plasmodium falciparum* and *Plasmodium vivax*, but *Plasmodium falciparum* was the predominant infection (> 82%). Malaria transmission was perennial and persistent with seasonal peak during May-July corresponding to months of high rainfall. Epidemicgiologically, the state is endemic for Malaria, specially the area along the inter-state and inter-country borders, increase in percentage of Public forum Cases is a cause for concern presence of multiple problem such as

favourable climatic for mosquito breeding, difficult terrain, jhum cultivation, labour migration etc., further aggregate the Malaria situation in the State.

## MATERIALS AND METHOD

### **Study Area:**

A study was conducted in predominantly Garo dominated area in the West Garo Hills district of Meghalaya (Given in Figure 1). It is situated approximately between the latitudes 90°30' and 89°40'E, and the longitudes of 26° and 25°20'N and has an area of 3,677 Sq. Km. The population is pre-dominantly inhabited by the Garos, a tribe with a matrilineal society. The district is mostly hilly with plains fringing the northern, western and south-western borders. There are three important mountain ranges in the districts viz., Tura Range, Arbella Range and Ranggira Range. The staple cereal food is rice. The climate of the district is largely controlled by South-West monsoon and seasonal winds. The district being relatively lower in altitude to the rest of Meghalaya, experiencing fairly high temperature for most part of the year. The district has mostly dense tropical mixed forest, and a small patch of temperate forest in the higher parts of the Tura Range.



**Figure 1: Map of West Garo Hills.**

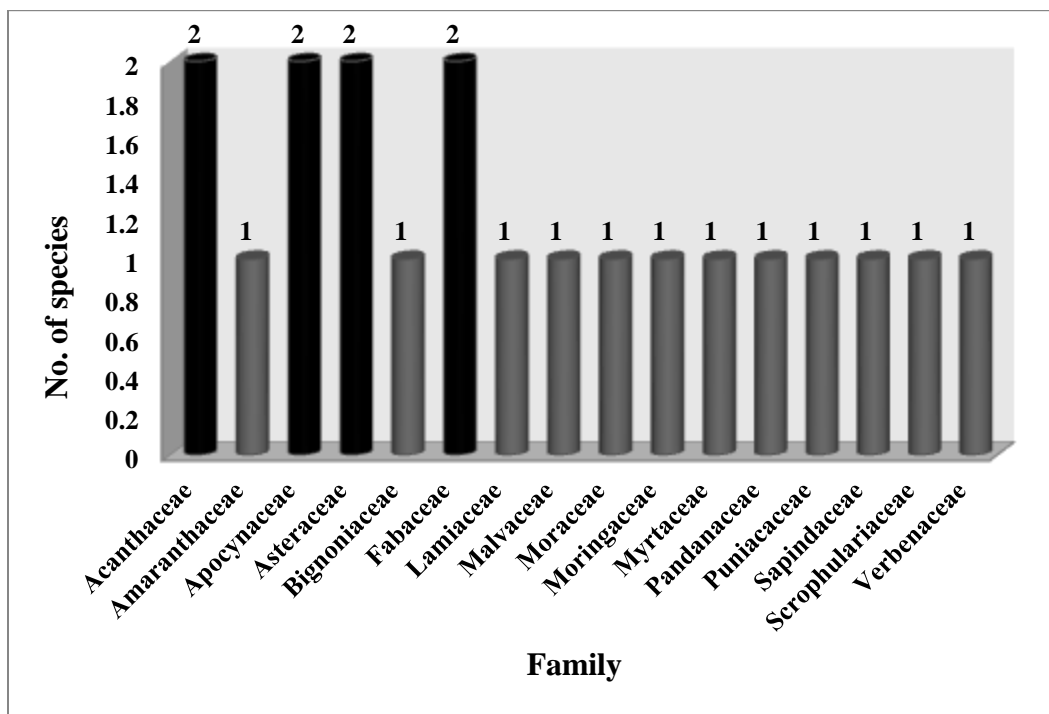
### **Methodology:**

The ethno-medicinal study was conducted in six developmental blocks of West Garo Hills district of Meghalaya predominantly inhabited by Garo community during the year 2014-2016. A total of 18 individuals from 15 villages were interviewed who were identified with the help of local administrators and community leaders. The study was based on the primary survey and data collected through conducting personal interviews or group interviews at different places, occasions and according to convenience. The chief informants in these interviews were real practitioners or oja, people who use their knowledge of medicinal plants on their immediate families and knowledgeable persons of men, women, young folks who had some knowledge on the subjects handed down by their parents and who were being treated with medicinal plants.

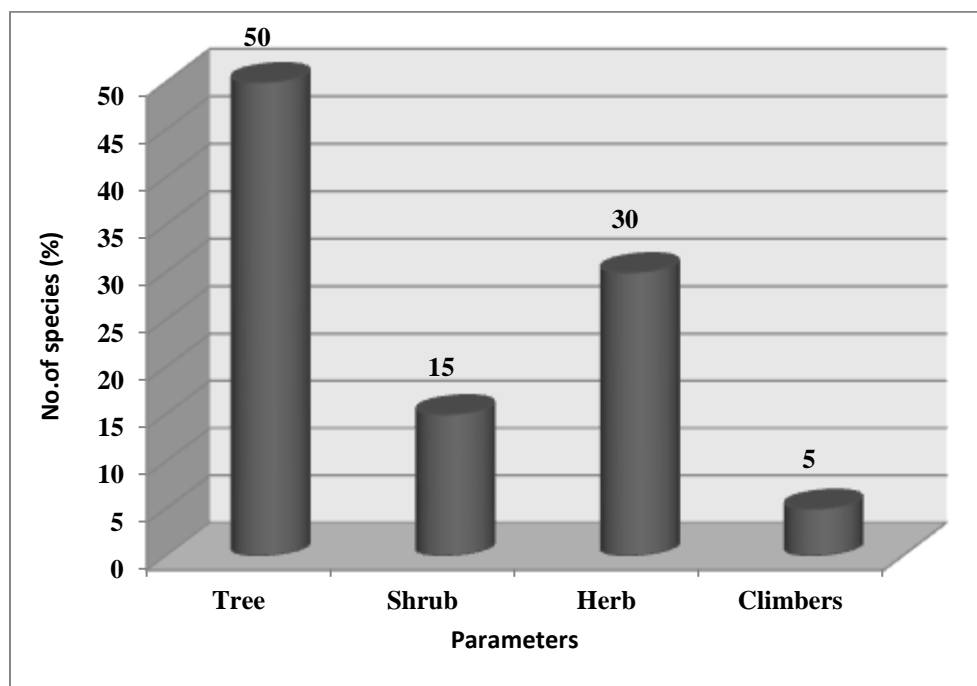
Some homoeopaths and faith-healers were also interviewed. The plants were snapped and their specimens collected, prepared herbarium (techniques followed from Jain and Rao 1977; Womersley, 1981; Mehrotra, 1989) and authenticated with the help of literature (Flora of Assam Vol I-IV (Kanjilal et al., 1934-1940; and Botanical Survey of India, Shillong. The local literatures which have collected and consulted for this particular work are as follows: *Handbook on Local Health Traditions in Meghalaya* (Rynjah P.S.1995); *Journal of Garo Medicines* (Samachik) ,Dr.Vidyanist Marak .2008; *Samachik ni Ki'tap* (Therapeutic Notes on Sam A'chik or Traditional Herbal Garo Medicines) , Dr.Vidhyanist Marak.2006.

## RESULTS AND DISCUSSION

A total of 20 medicinal plant species (Table 1) which are used traditionally in treatment of Malaria, fever and headache have been documented belonging to 20 genera and 16 families (Table 2 and Figure 2) which includes botanical name of the plant, prevalent local name, uses, formulations and also mode of administration. The study based on the plant parts used (Table 3) reveals that roots (40%) were most commonly used in the treatment, followed by leaves and barks (35%), whole plant (10%) and seeds having (5%). In the study (Figure.3), trees (50%) were recorded to have highly used potential followed by herbs (30%) and shrubs (15%), climbing shrubs (5%). In terms of mode of applications (Table 4 and Figure.5), people mostly used as infusion (45%) followed by decoction (40%), tied with clad on the forehead and paste form (15%). The family with highest number of medicinal plant species used in the treatment of malaria, fever and headache belongs to Acanthaceae, Apocynaceae, Asteraceae and fabaceae. In terms of demographic profile (Table 6), most of respondents were male (94%) and mostly aged between 51 - 60 (44%). These informants were mostly herbal healers (50%) followed by Government servant (28%), Farmer (17%) and birth attendants (6%)



**Figure 2: Family wise species arrangement**



**Figure 3: Diversity of growth forms.**

Out of total 20 medicinal plant species 50% were trees, 15% were shrubs, 30% were herbs, 5% were climbing shrubs.

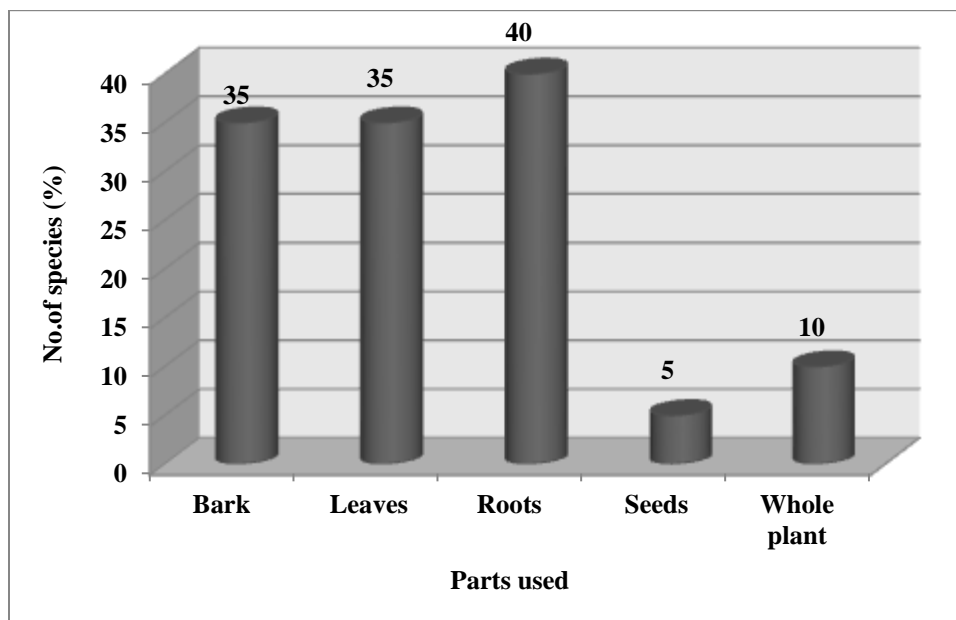


Figure 4: Bar diagram showing number of plant species used for skin disorders.

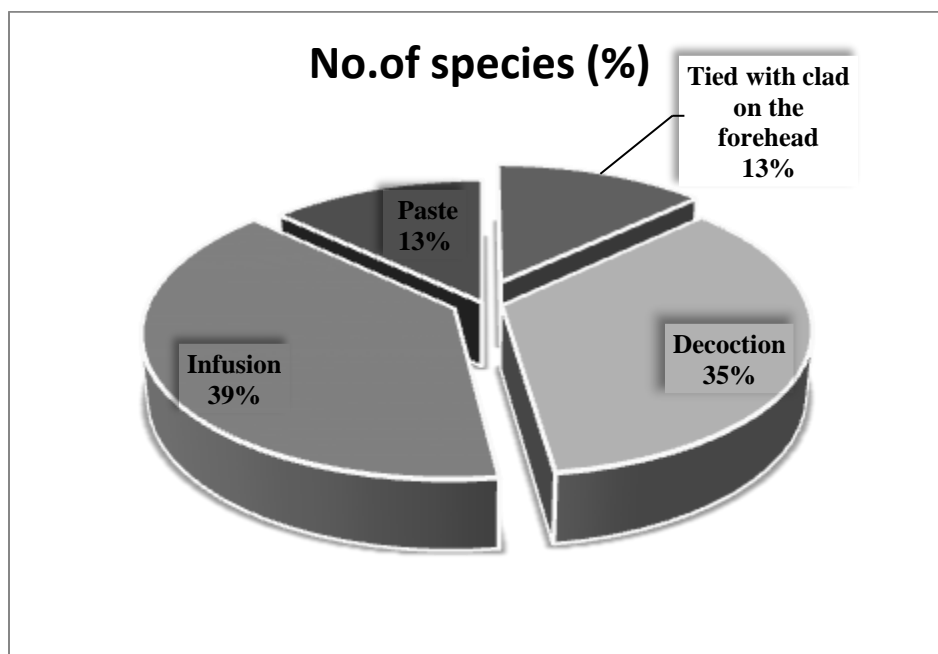
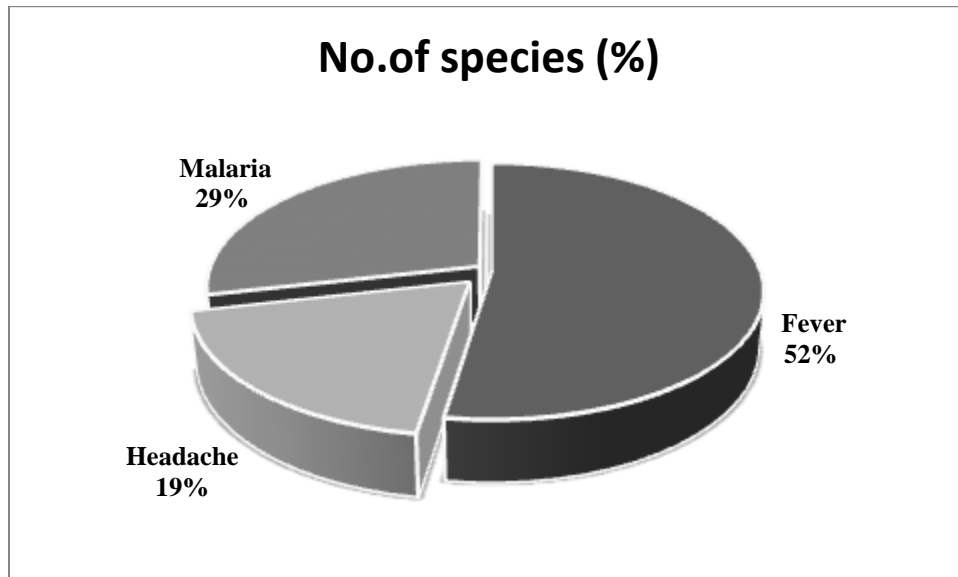


Figure 5: Showing mode of application of Ethno-medicinal plants.



**Figure 6** Bar diagram showing number of plant species used for treatment of skin disorders

Table 1: Plant Species Used

Botanical Name/Collection No.	Vernacular Name (Garo)	Locality	Family	Habit	Diseases	Parts used	Formulations
1. <i>Achyranthes aspera</i> Linn.-47109	Me'mang katchi	Balsri gittim	Amaranthaceae	Herb	Fever	Whole plant	Infusion of whole plant parts can be taken orally by adding water at the rate of 1 cup daily after food.
2. <i>Aesculus punduana</i> Wall.-47126	Babare	Arbella Range	Sapindaceae	Tree	Fever, Headache	Leaves	Infusion of leaves is applied on forehead and all over the body.
3. <i>Alstonia scholaris</i> Linn. R. Br.-33505	Sokchon	Rongbakre	Apocynaceae	Tree	Malaria	Barks	Barks are to be boiled with 1 litre of water along with barks of <i>Delonix regia</i> (B.Hook) and <i>Punica granatum</i> Linn. The mixture has to be taken at the rate of 3 cups per day.
4. <i>Andrographis paniculata</i> (Burm.f.Nees)-47199	Kalmek	Rongbakgre	Acanthaceae	Herb	Fever, Malaria	Whole plant	Decoction of whole plant parts can be drink at the rate of 1-2 cups twice daily after food.
5. <i>Artemisia vulgaris</i> Linn.-33593	Kil pul	Rongbakgre	Asteraceae	Herb	Malaria	Roots	Infusion or roots can be taken at the rate of 2 tablespoonfuls twice daily after food.
6. <i>Artocarpus lakoocha</i> Roxb.-47110	Arimu	Sampalgre	Moraceae	Tree	Fever	Bark	Infusion of bark and adding a pinch of sugar can be taken at 1 teaspoonful morning and evening after food.
7. <i>Careya arborea</i>	Gimbil	Balsri gittim	Myrtaceae	Tree	Fever	Bark	Decoction of bark can be

Roxb.-33557							taken orally
8. <i>Clitoria ternatea</i> L.- 33594	Kali budu	Rongbakgre	Fabaceae	Climber	Fever	Roots	The roots are to be ground and made into powder. The powdered roots can be taken with 1 teaspoonful of water daily after food.
9. <i>Delonix regia</i> (B.Hook)-47114	April bol	Galwanggre	Fabaceae	Tree	Malaria	Barks	Barks are to be boiled with 1 litre of water along with barks of <i>Punica granatum</i> Linn. The mixture has to be taken at the rate of 3 cups per day.
10. <i>Elephantopus scaber</i> Linn.-47127	Achak sre/Samramma	Amphanggre	Asteraceae	Herb	Fever	Leaves	Leaves are pounded along with leaves of <i>Phyllanthus urinaria</i> Linn., <i>Gomphostemma ovatum</i> Wall and paste can be tied with clad on the forehead. The paste can also be drink by adding water at the rate of 1 teaspoonful morning and evening.
11. <i>Gmelina arborea</i> Roxb.-33586	Gambari	Sellsella A'palgre	Verbenaceae	Tree	Malaria	Roots	Infusion of roots can be taken at the rate of 3 teaspoonfuls three times in a day.
12. <i>Gomphostemma ovatum</i> Wall.-47140	Kimprang	Asanang	Lamiaceae	Shrub	Fever	Leaves, Roots	Leaves and roots are pounded together and tied with clad on the forehead. Infusion can also be taken orally every day.
13. <i>Holarrhena antidyserterica</i> Wall.-	Gol'matra/Bol'matra	Chidekgre	Apocynaceae	Tree	Malaria	Roots, Seeds	Roots and seeds are to be crushed together and the

33599							mixture can be taken along with water at the rate of 1 tablespoonful twice daily after food.
14. <i>Moringa oleifera</i> Lam-47143	Sojona	Rongram	Moringaceae	Tree	Headache	Bark, Roots	Decoction of bark and roots can be taken orally daily after food.
15. <i>Phlogacanthus thyrsoiflorus</i> Nees-47153	Alot	Turam	Acanthaceae	Shrub	Fever	Leaves	Decoction of leaves can be taken at the rate of 2 teaspoonfuls daily after food.
16. <i>Pandanus odoratissimus</i> Roxb.-47156	Burungni anaros	Galwanggre	Pandanaceae	Shrub	Headache	Roots	Roots are grounded on the stone and boiled with water until it makes a good paste. The paste can be taken orally along with 1 cup of water.
17. <i>Punica granatum</i> Linn.-33598	Dallim	Megonggre	Puniaceae	Tree	Malaria	Barks	Barks are to be boiled with 1 litre of water along with barks of <i>Alstonia scholaris</i> Linn. R. Br and <i>Delonix regia</i> (B.Hook) . The mixture has to be taken at the rate of 3 cups per day.
18. <i>Stereospermum tetragonum</i> D.C.-47172	Bolsil	Sadolpara	Bignoniaceae	Tree	Headache	Bark, Leaves	Bark and leaves are pounded properly and tied with clad on the forehead
19. <i>Scoparia dulcis</i> L-33558	Samkireng/Me'mang te'brong	Burny hills	Scrophulariaceae	Herb	Fever	Leaves	Decoction of leaves can be taken at the rate of 2 teaspoonfuls twice daily after food.
20. <i>Urena lobata</i> L.-47176	Samte	Wadanang	Malvaceae	Herb	Fever	Leaves, Roots	Infusion of leaves and roots can be taken orally.

**Table 2: Family wise arrangement of species.**

Sl. No.	Family	No. of species
1	Acanthaceae	2
2	Amaranthaceae	1
3	Apocynaceae	2
4	Asteraceae	2
5	Bignoniaceae	1
6	Fabaceae	2
7	Lamiaceae	1
8	Malvaceae	1
9	Moraceae	1
10	Moringaceae	1
11	Myrtaceae	1
12	Pandanaceae	1
13	Puniacaceae	1
14	Sapindaceae	1
15	Scrophulariaceae	1
16	Verbenaceae	1
Total		20

**Table 3: Arrangement of species distribution and percentage with respect to part use.**

Parts used	Number of species (%)
Bark	35
Leaves	35
Roots	40
Seeds	5
Whole plant	10

**Table 4: Species distribution and percentage with respect to mode of applications.**

Characteristics	Count	Percentage (%)	Characteristics	Count	Percentage (%)
Gender	<b>Male</b> 17	<b>94</b>	<b>Occupation</b>	Farmer	3 17
	Female 1	6			
Age	41-50 3	17	<b>Herbal Healer</b>	<b>9</b>	<b>50</b>
groups	<b>51-60</b> 8	<b>44</b>	Birth attendant	1	6
	61-70 4	22	Government servant	5	28
	71-80 1	6	<b>Mode of</b>	<b>Inheritance</b>	<b>17</b>
	81-90 2	11	<b>acquisition</b>	Proper training	1 6
			<b>of knowledge</b>		

**Table 5: Arrangement of species distribution and percentage with respect to disease wise.**

Formulations	Number of species (%)
Tied with clad on the forehead	15
Decoction	40
Infusion	45
Paste	15

**Table 6: Demographic profile of the informants:**

Diseases	Number of species (%)
Fever	55
Headache	20
Malaria	30

## CONCLUSION

In rural areas in West Garo hills district of Meghalaya, traditional medicines are trusted and affordable because sometimes modern medicines are not available when they need. Local health practitioners or Oja were able to detect those patients having a high chance of cure with their treatment, and those with low chance. From the results it has been observed that based on the plant parts used (**Table 3**) roots (40%) were most commonly used in the treatment which will directly affect diversity of those particular plant species. In that case, we need to develop large-scale cultivation of medicinal plant species which may also provide income to communities and preserve traditional medicinal knowledge and biodiversity as well. Since North Eastern India is rich in tropical and sub-tropical forests, area is prone to malaria. Garo hills region in the state has been recorded to contribute the most number of death cases related with malaria. *Plasmodium falciparum*, a major parasite, is solely responsible for each malaria- death case. Since the Garo hills being relatively lower in altitude to the rest of Meghalaya, experiencing fairly high temperature for most part of the year thereby it favours climate for mosquito breeding. Good documentations are necessary because information on traditional practices may provide complementary or alternative solutions particularly in malaria control programmes. In rural areas in Garo hills of Meghalaya, the indigenous method of treatment based on the medicinal plants are still being part practiced. The claimed documented species in this paper has to be validated through pharmacological investigations to know more of their effectiveness and chemical compositions.

Based on the data analysis and results it is found out that roots were most commonly used in the treatment of malaria, fever and headache .Large-scale harvest of roots can have a negative effect on the existence and survival of medicinal plants and multiplies effect on sustainable use. So to conserve those medicinal plants it is important to be well informed of sustainable harvest of medicinal plant parts to the indigenous people of those areas. And also need to develop large-scale cultivation of medicinal plants so that it may provide income to the communities and preserve traditional knowledge and biodiversity.

## ACKNOWLEDGEMENT

The authors are thankful to University Grants Commission for providing financial assistance through National Fellowship for Higher Education (NFHE) of ST students.

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