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Medicinal plants used by local people of Jiribam, Manipur for treatment of malaria and its associated symptoms: A step to assess the traditional knowledge of herbal healing

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Abstract
Development of new alternative antimalarial drugs is need of the hour since plasmodium becomes drug resistant and because drugs using nowadays have side effects. This need initiated intensive efforts for developing antimalarial drugs from indigenous medicinal plants. A survey was carried out in Jiribam sub-division, Manipur from November 2014 to September 2015 to explore the medicinal plants normally used by local people for treatment of malaria and its associated symptoms. A total of 21 different species of medicinal plants belonging to 15 families were found to use by local herbal healers and villagers to treat malaria and its associated symptoms. The present study is first of its kind in exploring medicinal plants of this region and an effort to assess the folk medicinal knowledge and practices of local people of Jiribam, Manipur towards treatment of malaria and associated symptoms.

Keywords: Medicinal plants, Manipur, Jiribam, traditional use, malaria

1. Introduction
Malaria is a tropical disease which is caused by single-celled protozoan parasites called *Plasmodium*. It is transmitted by female *Anopheles* mosquito. It is one of the major fatal diseases in the world, especially in the tropics, and is endemic in some 102 countries with more than half of the world population at risk with fatality rates being extremely high among young children below 5 years of age [1]. Control of malaria is complex because f the appearance of drug resistant strains of *Plasmodium* and with the discovery that man becomes infested with species of simian (monkey) malaria [1]. At the same time the *Anopheles* mosquitoes have developed resistance to many insecticides [2].
Spread of multidrug-resistant strains of *Plasmodium* and the adverse side effects of the existing anti-malarial drugs have necessitated the search for novel, well-tolerated and more efficient anti-malarial drugs that kill either the vector or the malarial parasite. The use of plant-derived drugs for the treatment of malaria has a long and successful tradition. Main drugs developed for malaria and used until now were discovered based on traditional use and ethnomedical data [3].
Jiribam is a small sub-division under Imphal East district of Manipur, North East India. The region is dominated by Manipuris and they have got a rich traditional knowledge of herbal healing by traditional methods using varieties of medicinal plants. A lot of medicinal plants are found here which remain unexplored and not properly documented. Being in tropical forest region, Jiribam has many damp forest areas which are home to mosquitoes and as a result maximum cases of malaria are recorded from Jiribam. The local people residing in village areas use many plants as a means to cure fever and other symptoms which are mainly the symptoms of malaria. Since malaria starts with high body temperature, body ache and fever and especially whenever there is fever, it was obvious that the person is suffering from malaria and therefore varieties of plants are used to cure and give relief to malaria and its associated symptoms. The list of antimalarial plants of India has not yet been completely searched out and it is an urgent need to compile this data. The aim of this study was to compile the medicinal plants used by local herbal healers and village elders residing in Jiribam sub-division of Manipur which are used to cure malaria and its associated symptoms. The present study would result in adding the data of antimalarial plants in national level. The findings would help the future phytochemists to evaluate the best antimalarial plants and it would be possible to formulate the most effective medicine from this region of the world.

2. Materials and methods

2.1. Study area: The study was carried out in the Jiribam sub-division of Imphal East district, Manipur. The region includes both valley and hilly areas and thus has varieties of plant species. Jiribam lies in the westernmost part of the state of Manipur and this region is home to many medicinal plants and herbs which the local people used to cure and prevent many ailments including malaria.

2.2. Survey: An ethno-botanical survey was conducted from November 2014 to September 2015 in some of the village areas of Jiribam, Manipur. A semi-structured questionnaire was prepared to be used during the survey and all the related data are collected with the filling up of the questionnaire. A total of 70 informants were interviewed (41 females and 29 males) between the age group 35-80 years. Among them 10 were farmers, 22 housewives, 3 witchcraft doctors, 5 herbal healers and 30 knowledgeable persons. The authenticity of the uses of these medicinal plants was repeatedly verified by interviewing various individuals.

2.3. Data analysis

The scientific names of the plants were identified based on the vernacular names by referring many research papers [4-13] and books [16, 17]. They were then grouped into their respective families and their statuses were found out through IUCN.

3. Results and discussion

A total of 21 medicinal plants were found to use by local people of Jiribam sub-division for treatment of malaria and its related symptoms. Unfortunately out of these 21 species of medicinal plants, 19 species have not yet been assessed for the IUCN Red List and only 2 species i.e., *Hydrocotyle sibthorpioides* (Lai peruk) and *Magnolia champaca* (Leihao) were placed in the category of Least Concern (LC) [14, 15]. The reason for Lai peruk being placed in LC category is that this plant is widely distributed without any threat to the population [14]. and as regarding Leihao, it is widespread in the Indo-Malaysian tropical region and there are no specific population information data on decline of this species [15].

Table 1: List of the 21 species of medicinal plants used by local peoples residing in Jiribam sub-division of Manipur. The respective scientific names, family, type of plant and IUCN status were given against each species.

Sl. No.	Vernacular name(Manipuri)	Scientific name	Type of plant	Family	IUCN status
1	Kabo langthrei	*Acanthosermum Hispidium*	Herb	Asteraceae	Not assessed yet
2	Pulei manbi	*Alpinia Officinarum*	Herb	Zingiberaceae	Not assessed yet
3	Nongmangkha	*Adhatoda vasica*	Shrub	Acanthaceae	Not assessed yet
4	Chengkruk	*Amaranthus viridis*	Herb	Amaranthaceae	Not assessed yet
5	Bhuguti/Bhubati	*Andrographis paniculata*	Undershrub	Acanthaceae	Not assessed yet
6	Laibakngou	*Artemisia nilagirica*	Undershrub	Asteraceae	Not assessed yet
7	Harikokthong	*Artocarpus lakoocha*	Tree	Moraceae	Not assessed yet
8	Tinshibi	*Caesalpinia bonducella*	Shrub	Caesalpiniaceae	Not assessed yet
9	Neem	*Azadirachta indica*	Shrub	Meliaceae	Not assessed yet
10	Tulsi	*Ocimum sanctum*	Shrub	Lamiaceae	Not assessed yet
11	Sing khanga	*Solanum nigrum*	Shrub	Solanaceae	Not assessed yet
12	Karon akhaba	*Momordica dioica*	Climber	Cucurbitaceae	Not assessed yet
13	Yenam/maroi nakuppi	*Allium hookeri*	Herb	Liliaceae	Not assessed yet
14	Peruk	*Hydrocotyle asiatica*	Creeper	Apiaceae	Not assessed yet
15	Lai peruk	*Hydrocotyle sibthorpioides*	Creeper	Apiaceae	Least concern
16	Kuthap	*Clerodendrum colebrookianum*	Shrub	Lamiaceae	Not assessed yet
17	Sing	*Zingiber officinale*	Herb	Zingiberaceae	Not assessed yet
18	Leihao	*Magnolia champaca*	Tree	Magnoliaceae	Least concern
19	Tejpatta	*Cinnamomum bejolghota*	Tree	Lauraceae	Not assessed yet
20	Ramtulsi	*Ocimum gratissimum*	Shrub	Lamiaceae	Not assessed yet
21	Pongphai	*Dactyloctenium sp.*	Herb	Poaceae	Not assessed yet

The 21 different species of medicinal plants used by the local people belongs to 15 different families viz. Asteraceae, Zingiberaceae, Acanthaceae, Amaranthaceae, Moraceae, Caesalpiniaceae, Meliaceae, Lamiaceae, Solanaceae, Cucurbitaceae, Liliaceae, Apiaceae, Magnoliaceae, Lauraceae and Poaceae. Table 1 depicts the 21 species of medicinal plants, its scientific names, whether the plant is herb, shrub or tree and so on. The families to which each species belong were also given against each species. In addition, the IUCN statuses of each species were also given. As already mentioned above majority of the plants were not assessed for IUCN Red List and even they are not included in the catalogue of life which clearly implies that these plants were not explored in international level and may be in the future get extinct since their statuses were not known to the people and no conservation measures were taken in time.

Table 2 shows the mode of use of these medicinal plants by local people and the part of plant which are used in the preparation. Generally leaves are used for preparation of the decoction or juice. Sometimes the plants are not used individually instead a combination of many plants was used to prepare the medicines generally a combination of 7 herbs or plants. For example, a combination of Tulsi, Leihao, Kuthap, Sing, Bhuguti, Nongmangkha, Neem is given to a person with fever.

Table 2: Table showing the particular parts of the medicinal plants and their mode of use

Sl. No.	Scientific name	parts used	Using mode
1	*Acanthosermum Hispidium*	Leaf	Leaf extract with honey is given in cough and fever
2	*Alpinia Officinarum*	Rhizome	Dried rhizome paste is chewed against fever, cough and excessive body temperature
3	*Adhatoda vasica*	Leaf	Fresh leaf paste is given in fever, cough, bronchial congestion and muscular sprain
4	*Amaranthus viridis*	Leaf	Leaf is taken along with other vegetables as a health improver and liver tonic
5	*Andrographis paniculata*	Leaf and Seed	Fresh leaf paste and dried seed powder are taken in asthma and chronic fever
6	*Artemisia nilagirica*	Leaf	Leaf shoot paste is used against fever and muscular pain
7	*Artocarpus lakoocha*	fruit	Ripe fruit pulp is taken in constipation and fever
8	*Caesalpinia bonducella*	Seed	The paste obtained after rubbing the seeds on stone surface is given to children to cure fever and wxcwssive body temperature
9	*Azadirachta indica*	Leaf	Crude extract of leaf is given for fever and leaf is used for bathing
10	*Ocimum sanctum*	Leaf	Fresh leaves are chewed or juice is given for fever and stomach problems
11	*Solanum nigrum*	fruit	The decoction of fresh leaves or with fruits is taken for jaundice and malarial fever
12	*Momordica dioica*	Leaf	A bundle of fresh leaves is boiled and the preparation is taken for any type of fever cough and cold
13	*Allium hookeri*	Leaf	Crushed juice of the leaves is taken for fever and cough
14	*Hydrocotyle asiatica*	Leaf, stem, root (whole plant)	The whole plant is taken raw or boiled with water or juice of leaves is taken
15	*Hydrocotyle sibthorpioides*	Leaf, stem, root (whole plant)	The whole plant is taken or crude extract is taken
16	*Clerodendrum colebrookianum*	Leaf	Leaves are boiled in water and the decoction is taken for fever and high body temperature and the leaf paste is applied to overhead
17	*Zingiber officinale*	Root	A thumb size of rhizome is crushed and boiled with water and the decoction is taken for cold, cough and fever
18	*Michelia champaca*	Leaf	Tender leaves are crushed and the juice is given for fever
19	*Cinnamonum bejolghota*	Bark and leaf	The bark and leaves are boiled. The water is used for bathing, the steam inhaled and the water taken internally
20	*Ocimum gratissimum*	Leaf	Fresh leaves are crushed and the decoction is given to fever and headache
21	*Dactyloctenium sp.*	Leaf	Leaf decoction juice is taken in fever

Figure1 shows the composition of plant type of the 21 medicinal plants. There were 6 herbs, which constitutes ~29% of the total plants, 2 under shrubs (~10%), 7 shrubs(~33%), 3 trees(~15%), 2 creepers(~10%) and only 1 climber(~5%). Shrubs scores the highest in use.

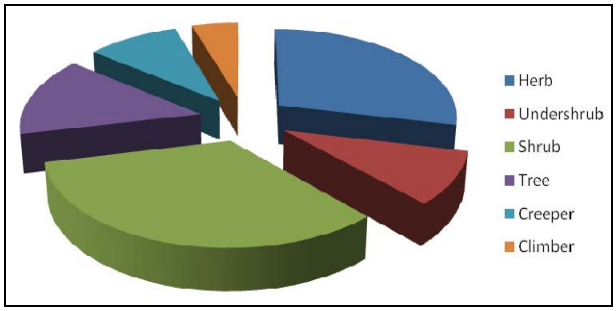

Fig 1: Pie chart showing composition of plant type which are used as medicinal plants

4. Conclusion

This study shows the social importance of these medicinal plants in Jiribam, particularly regarding the significance of folk medicine in treatment of malaria and its associated symptoms. The data being compiled through this study will prove to be a fair contribution towards documentation at national level or higher levels which can serve as a basis to develop larger and more complex scientific studies like formulation and drug designing by future phytochemists. Besides it would be helpful in conservation of these particular plants by making the people aware of the significances of these plants.

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