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Original Research Article

Anti-malarial Medicinal Plants Used by the Tribals of District Bastar, Chhattisgarh, India

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Abstract

An ethnobotanical survey for documentation of anti-malarial medicinal plants used by the tribals of district Bastar was conducted from July 2006 to December 2008 in the in the deferent villages of Bastar Chhattisgarh India. The survey aimed at identification and documentation of the medicinal plants used in the treatment of malaria in the district Bastar as well as to study the effectiveness of Region specific traditional Practices of Malaria which help in reducing the incidence of malaria in healthy volunteers residing in endemic regions. The survey involved use of questionnaires filling and interviews with local Baidyas, Guniyas, Sirhas knowledgeable persons and herbalist, house-to-house and the field that have a rich knowledge on the plants. The total of 22 medicinal plants species were recorded to deferent family during the study. The drug was found to prepare from independent plant or from plant parts in combination. In some of the drugs other ingredients like honey, camphor, salt and fresh milk, Jaggery and Sugar and molasses was also mixed for the drug preparation. Most of the drugs were prepared by using traditional methods like pastels and mortals. Tribals did not found to have any modern facilities for drug preparation like grinder mixer, juicers, pulverisers and distillation unit. Drug preparation and administration method for malaria have been documented during the study.

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Introduction

Malaria is a protozoan disease transmitted by the bite of infected female anopheline mosquitoes and occurs throughout the tropics and subtropics at altitudes below 1500m. A tiny (microscopic) parasite known as

Plasmodium causes malaria. Malaria affects more than 500 million people and causing between 1 and 3 million deaths each year. The demographics show fifty-eight percent of malaria deaths occur in the poorest 20% of the population. Malaria has been a problem in India for centuries. In the 30's there was no aspect of life in the

country that was not affected by malaria. The economic loss due to the loss of man-days due to malaria was estimated to be at Rs. 10,000 million per year in 1935. The annual incidence of malaria was estimated at around 75 million cases in 1953 with about 8 lakhs deaths annually (Sharma, 1996). One of the greatest challenges facing malaria control worldwide is the spread and intensification of parasite resistance to anti-malarial drugs. Another major factor is the cost of these drugs and their access.

It is encountered in almost all parts of the rural area. Forest, plains, hilly and coastal areas with numerous streams, rivers, mines, ethnic diversity and various socioeconomic condition pretenses a dreadful challenge to malaria control operation in the state. Besides the natural problem, there are the financial constraints, which adversely influence the need of malaria control program in India.

Malaria and traditional medicine

There have been extensive studies on the role of Traditional Systems of Medicine worldwide in prevention and treatment of malaria. Studies have shown that 80% of febrile episodes are treated at home, frequently with herbal medicines. In some areas, herbs are used for the prevention of malaria; in others, plants with antimalarial effect are included in the diet. Several herbs such as Chiraita (*Swertia chirata*) and others have been mentioned in classical Indian medical texts and dozens of others are used locally by various tribal and folk communities, no systematic studies have been carried out to test their efficacy. Studies on plants for vector control like e.g. neem, prophylactic fever mixtures and prophylactic diet changes have also yet to receive sufficient attention. Studies of plants used in traditional medicine of the treatment of malaria in various cultures have yielded important drugs that are critical to modern medicine.

Thirty four cohort studies on the traditional antimalarials have been retrieved from a comprehensive literary search. Five of them are examined ayurvedic preparations in India; others are the investigated traditional remedies in Uganda Madagascar and Tanzania. These studies provided indications not only on therapeutic and secondary effects but also on the potential to reverse resistance to chloroquine and the feasibility of the plant cultivation and preparation. Interpretation of the results focused on the on the improvements of the clinical symptoms (Merlin Wilcox et al., 2012).

Materials and methods

Traditional medicine in India includes systems like Ayurveda, Siddha, Unani, Tibetan and the oral traditions. The systems like Ayurveda are grounded in a theory of physiological functioning, disease aetiology and clinical practice. The traditional preventive practices for malaria are documented from the local folk healers and are subjected to a participatory rapid assessment. The objective is to: Identify important local health traditions, community validation of these identified traditions along with multi-disciplinary validations and promotion of the valid health traditions among the tribal community in the district Bastar, Chhattisgarh.

There are four stages in the study: (1) Identification of best practice for malaria, (2) Identification of village for the community based study as well as folk healers Baidyas and knowledgeable persons who are treating the malaria, (3) Identification of medicinal plants and herbarium preparation, and (4) Follow-up study.

DALHT documentation and assessment of local health traditions

It has the information regarding the traditional antimalarial from the vaidya, botanical identification of the herbs used by the Baidya.

RALHT rapid assessment of local health traditions

It is aimed at selecting the best home remedies for promotion in primary health care by means of rapid assessment exercise. This form of assessment is termed 'Rapid' as it does not involve laboratory or clinical studies. The entire RALHT exercise is conducted in two phases: RALHT workshop with the community at the village level and Desk Research.

General description of the study area

Bastar district of the Chhattisgarh state was selected as a study site for the present work. Bastar is one of the tribal districts of the state. Before splitting in to three districts in the year 1999, was one of the largest district in India, the area of the district was even larger than the area of Kerala state and some other countries like Belgium, Israel etc. Bastar district was divided in to three districts namely Bastar, Kanker and Dantewada. Later in new state of Chhattisgarh Bastar incorporated five districts namely Bastar, Kanker, Dantewada, Narainpur and Bijapur. In the

year 2007 Bastar became one of the districts amongst the five divided districts of old Bastar. The district of Bastar is

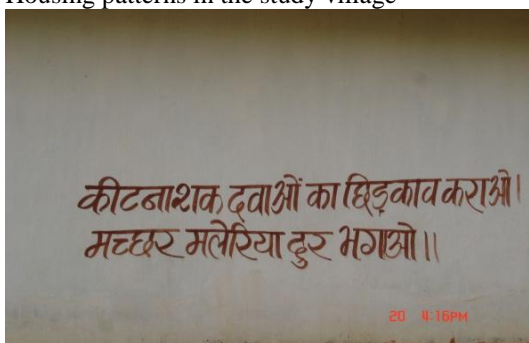
located in the southern part of Chhattisgarh state, situated at the height of 2000' M above plateau MSL.



Housing patterns in the study village



Water resource (pond) utilized by the villagers



Awareness about malaria



Drinking water facilities in the study area



Documentation sessions



Andrographis paniculata



Acorus calamus

Fig. 1: Study area depicting the housing pattern, water sources, awareness and documentation sessions of medicinal plants used for malaria and important medicinal plants used by tribals of Bastar district.

Bastar district is surrounded by Kanker district in the north Maharashtra state in the west Dantewada district in the south and Odisha state in the east. The total forest area of the Bastar is 7112 sq km, which is more than the 75% of total area of the district. Out of the total population, more than 70% are tribals like Gonds, Abujhmaria, Dardamaria, Muriya, Doriya, Dhruva, Bhatra, Halba, etc. The largest and the most important river in the Bastar districts is the Indrāvati, neither the river nor its tributaries dry of in the hot session. As per 2001 census, the population of Bastar is 1302253, out of them 648068 are male and 654185 are female. Majority of population 1172265 lives in rural area. The study area and interactions sessions are depicted in Fig. 1. The present research work was on the anti-malarial medicinal plants used by the tribals of district Bastar, Chhattisgarh, India which was conducted in tribal villages. The village chosen for the study is 70 km away from Jagdalpur, located in the plane region surrounded by the paddy fields. The village lacks basic infrastructure like roads, electricity and sanitation. The hygiene is moderate. Primary school up to 5th standard is in the village.

Socio-epidemiological factors

Agricultural patterns: Majority of the people depend on the agriculture. They practice shift cultivation.

Housing patterns: Majority of the houses has tiled /sheeted houses. Rest is thatched. Cattle sheds are accumulated at the entrance of the village.

Drinking water sources and water bodies: People depend on the open well. No pacificatory methods for drinking water are followed. Water bodies are scarcely located around the village.

Results and discussion

The present study survey has provided information about 22 species of medicinal plants used in the treatment of malaria in the district Bastar, Chhattisgarh state (Table 1). The study has also revealed how different interviewing methods can influence the scope of information obtained about the uses of each species like questioner format and transact walk with the knowledgeable person on the field area like Bastar to the best of available knowledge. The tribal people in the study area utilized different parts of the plant for malaria, whole plant, leaves and roots, stem, bark, flowers, etc. (Fig. 2). The 22 anti-malarial medicinal plants were belonging to the families, Acanthaceae, Rutaceae, Amaranthaceae, Acanthaceae, Meliaceae, Araceae, Anacardiaceae, Combretaceae, Zingiberaceae, Asclepiadaceae, Oleaceae, Bignoniaceae, Labiatae, Leguminocae, Piperaceae, Euphorbiaceae, Apocynaceae, Menispermaceae, Combretaceae and Lythraceae (Table 1).

Table 1. List of Anti malarial medicinal plants and uses documented during the year 2006-2008.

Sl. No.	Botanical name	Vernacular name	Family	Part(s) used	Method of use
1	<i>Andrographis paniculata</i> Burm.f.	Bhuileem	Acanthaceae	Whole plant	Leaf extract is mixed with juice of turmeric and Honey and is taken twice daily for malaria. About 250 gm of dried whole plant is boiled in 1.5 liter of water till the water remains approximately 1 liter mixed with 100 gm of sugar taken 2 tea spoonfuls twice daily to treat the malaria.
2	<i>Aegle marmelos</i> Correa.	Belphar	Rutaceae	Fruit	Mature inner fruit pulp are separate from seed then dried in sunlight, known as Belguda. These pieces are soaked in water overnight and taken in the morning in empty stomach for 4-5days for malaria.
3	<i>Achyranthes aspera</i> Linn.	Chirtita	Amaranthaceae	Leaves	The extract of leaves and whole plant given to children to kill the parasite of malaria.
4	<i>Adhatoda zeylanica</i> Medik.	Adusa	Acanthaceae	Leaves	Matured leaf powder along with sugar candy one tea spoonful twice a day for 5 days is given for treatment of malaria. The flower bud is given to treat severe the malaria the leaf decoction is taken three times a day for one 6 days for the treatment of malaria.

Sl. No.	Botanical name	Vernacular name	Family	Part(s) used	Method of use
5	<i>Azadiricta indica</i> A. Juss.	Neem	Meliaceae	Leaves, bark	The plant has antimalarial properties. Leaf and Bark extract is mixed with juice of Bhuileem and sugar and is taken twice daily for 5 days for malaria.
6	<i>Acorus calamus</i> Linn.	Bach	Araceae	Rhizome	The dried rhizome of <i>Acorus calamus</i> make a fine powder with help of mortal and pistil, one tea spoon of powder with little amount of honey taken twice in a day for treatment of malaria.
7	<i>Anacardium occidentale</i>	Kaju	Anacardiaceae	Bark	The dried fine powder of bark of <i>Anacardium occidentale</i> , one cup of water, taken for three days for treatment of malaria.
8	<i>Anogeissus latifolia</i> Wall.	Dhawra	Combretaceae	Root, stem bark	The stem and root bark of Dhawra is boiled together with water and taken two spoonful for four days.
9	<i>Curcuma langa</i> , Linn.	Haldi	Zingiberaceae	Rhizome	The dried powder mix with the neem bark add some of honey and taken for five days for malaria.
10	<i>Hemidesmus indicus</i> (Linn.) Schult.	Anantmool	Asclepiadaceae	Leaves and root	The root and leaves of Anantamool boil with the water, filter it and take two spoon of this formulation with the honey twice in a day for three days long treating as malaria.
11	<i>Mangifera indica</i> Linn.	Aama	Anacardiaceae	Bark and fruit	Fruits are chopped and seeds are dried in sunlight and immersed five to ten leave both three ingredients for 30 minutes in cold water. These are crushed and the extract taken daily for three days for malaria.
12	<i>Nyctanthes arbortristis</i> Linn.	Harsinghar	Oleaceae	Leaves	About 10 ml of tender leaf decoction is given twice a day to cure Malaria.
13	<i>Oroxylum indicum</i>	Padal	Bignoniaceae	Bark	Decoction of fresh or dried bark is taken in one cup of water. Twice daily for 4-6 days for curing of malaria
14	<i>Ocimum sanctum</i> Linn.	Tulasi	Labiatae	Whole plant	Decoction of whole plant is made with water add some quantity of honey. One spoon Decoction is taken orally twice in a day for treatment of malaria.
15	<i>Pongamia pinnata</i> (Linn.)	Karanji	Leguminocae	Bark	Dried seed powder is directly use with honey once in a day for malaria.
16	<i>Piper nigrum</i>	Lendi pipal	Piperaceae	Fruit	Dried seeds with the cup of water include some salt used twice in day for three days.
17	<i>Phyllanthus niruri</i> , Linn.	Bhui aonla	Euphorbiaceae	Whole plant	Decoction of whole plant is made with water. One spoon decoction is taken orally.
18	<i>Rauvolfia serpentina</i> , (L) Benth.	Bhuikurva	Apocynaceae	Root	Fresh roots of <i>Rauvolfia serpentina</i> , is crushed with water to make paste. One part of paste is used directly, while second part is boiled with water for 15 minutes. One cup of this decoction is taken and paste is applied over the forehead for the treatment of malaria.
19	<i>Semicarpus anacardium</i> , Linn.	Bhelwa Beeja	Anacardiaceae	Root Bark	Ripped fruit is dried and grinded. One spoon powder is taken with juice or water in morning and evening twice daily for 5 days or up till relief.

Sl. No.	Botanical name	Vernacular name	Family	Part(s) used	Method of use
20	<i>Tinospora cordifolia</i> Willd.	Giloy	Menispermaceae	Stem	Stem are ground with water and orally taken by mixing with honey two times in a day for 3 days for cure malaria.
21	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Tahaka	Combretaceae	Fruit	Pulp is separated from seeds and dried in sunlight. The Fruit pulp powder is used as a tonic and treatment of malaria.
22	<i>Woodfordia fruticosa</i> , Salisb.	Dhavaiphul	Lythraceae	Flower	Flowers are collected and dried in the sun light and make fine powder add one tea spoon in one cup of water twice in a day for treatment of malaria.

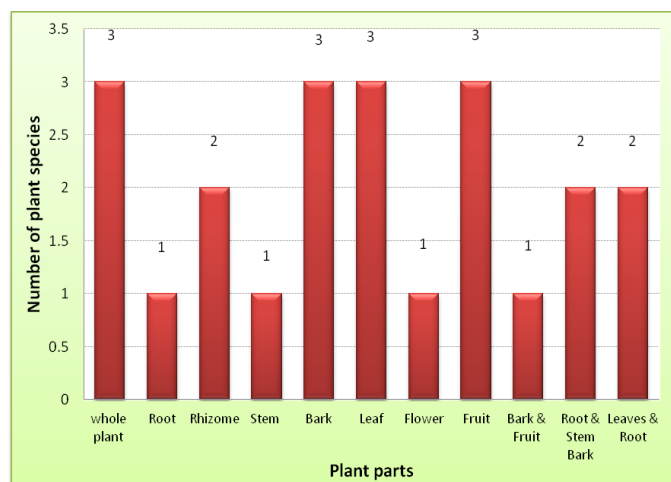


Fig. 2: Utilization of different parts of the medicinal plants for malaria by tribal peoples of Bastar district, Chhattisgarh.

None of the 23 previously investigated plants have passed the stages of orthodox clinical trials for their anti-malarial properties, but *in vitro* and *in vivo* analyses with significant anti-malarial activity have been reported. Thus, further studies that might lead to the identification of new and cheaper anti-malarial drugs will be required. The other 6 plants have been traditionally used for the treatment of malaria, but no scientific study has been carried out to confirm their activity. The result of the study has also revealed the usage of plants in combination which has proven effective at eradicating the *Plasmodium faciparum* and this may be due to the synergistic effect of these plants in the destruction of the *Plasmodium* species. Though various other plants (traditionally used in the treatment of malaria) have been identified by other ethnobotanical studies of Bussmann (2006), Njoroge and Bussmann (2006) in Kenya, Asase et al. (2005) in Ghana, Titanji et al. (2008) in Cameroon, and Akadiri et al. (2009), Kayode et al. (2009), Olowokudejo et al. (2008), Ajibesin et al. (2008) and Odugbemi et al. (2007) in Nigeria. In the present study, it was found that the drug

preparation methods were very old and traditional. Most of the drugs were prepared either by making fine powder in pastel and mortar or paste or decoction or extract from plants and used directly. In some of the drugs, it was noted that tribal people mix other ingredients such as, honey, milk, curd, jaggery, sugar, molasses, oil, etc. Sudhakar and Reddy et al. (2008) have also reported the use of similar ingredients in administration of ethnomedicine. The administration of drug was found to be oral and in some drugs it was observed to be applied over the forehead for quick relief. The cost of preparation of different drugs was cheaper; however, it was observed to be less than the other methods of treatment like allopathic treatments done outside the village. The time taken for complete relief from the malaria was also noted during the study.

Conclusion

Present investigation Anti-Malarial Medicinal Plants used by the tribals of district Bastar, Chhattisgarh, India reveals the traditional health care practice systems of medication among the tribe is very high and deeply rooted with their culture and emotion. The survey has revealed that, plants continue to be natural, cheaper and most affordable means of treatment methods for various ailments like malaria for the tribal people. Plants have also proven to be a source of major drug lead for synthetic counterpart. Tribals are using medicinal plants through their traditional health care practices, because they believe on their traditional practices. Another major region behind the inclination towards their own medical practice is due to high cost medicine which make them in big hurdle to afford the cost of allopathic medicine. The present study is helpful for the documentation of herbal plants and their scientific investigation and effectiveness, which will be useful for the formulation of effective health care policy, especially in tribal regions where health facility is alarming.

Conflict of interest statement

Authors declare that they have no conflict of interest.

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