

Ethno Botanical Survey of Plants Used For Malaria Treatment in Igboora, Ibarapa Central Local Government of Oyo State, Nigeria

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Abstract— Malaria remains a global scourge particularly in Nigerian rural areas where sanitation is poor and access to health facilities is also poor. An ethnobotanical survey was conducted in Igboora, Ibarapa Central North Local Government Area of Oyo State on latitude 7. 53° and longitude 3.08°. A semi structured questionnaire was administered on thirty three respondents in the study area. Information obtained included the plants used in the treatment of malaria, parts used, time of collection, the availability of the plants, mode of preparation and mode of administration. The respondents were mostly males ranged from 30 to 92 years and were mainly herbalists, farmers and teachers. Twenty eight recipes were obtained from the respondents while thirty three plant species were documented for the management and treatment of malaria in the study area. The plants belong to 25 families. Two plants, *Carica papaya* and *Cymbopogon citratus* were particularly very common in the recipes with a percentage occurrence of 70%. The more prominent families in the recipes obtained were the Asteraceae, Meliaceae, Rutaceae, Anarcadiaceae, Euphorbiaceae, Poaceae and Fabaceae. The major mode of preparation is mainly by concoction while infusion or decoction may be used in a few cases. Leaves are the most common plant parts used although the bark or whole plants are used in some cases. The juice from *Citrus aurantifolia* and water from fermented seeds of *Zea mays* in most cases constitute the solvent in which other plants are boiled. The lists of plant and recipes obtained are provided.

This study highlights potential sources for the development of new antimalaria drugs from indigenous medicinal plants found in Igboora, Nigeria.

Keywords—Malaria, Medicinal plants, Ethnobotanical survey and Igboora.

I. INTRODUCTION

Malaria is a global disease which is predominant in the tropics and caused by blood parasites, *Plasmodium falciparum*, *P. ovale*, *P. malariae* and *P. vivax*. In Nigeria,

malaria is mostly caused by *Plasmodium falciparum* (Alaba and Alaba, 2009). The female anopheles mosquito transmits these parasites to human. Malaria is life threatening and has a great morbidity and mortality than any other infectious diseases of the world (WHO, 2014). Approximately 3.2 billion people of the world's population, mostly in the world's poorest countries, is at risk of malaria infection (Global partnership on Roll back malaria, 2002; WHO, 2014). Moreover, about 1.2 billion of these are said to be at high risk (WHO, 2014). In Nigeria, malaria is quite endemic with about 97% of the population at risk (US embassy in Nigeria, 2011). According to the ministry of health (MOH), malaria is responsible for 60% of outpatient visits to health facilities, 30% of childhood deaths, 25% of deaths in children under one year and 11% of maternal deaths. Moreover, the financial loss from malaria in form of treatment costs, prevention and loss of man hours is estimated to be above 800 million US dollar (MARPS, 2014). The disease is a major obstruction to social and economic development in Africa, causing enormous misery and suffering through the pain of fevers and the anguish of bereavement, with one African child dying every 40 seconds (Kilama, 2005). Ninety percent of deaths from malaria occur in Sub-Saharan Africa, most of victims being children aged less than five years. In 2013, World health organization (WHO) estimated malaria mortality rate for children below five years in Africa to be about 437,000 (WHO, 2014) Indigenous children below the age of 5 years, inhabiting highly endemic areas are highly susceptible to all the manifestations of *Plasmodium falciparum* malaria. Those who survive this critical period achieve a relative tolerance of the infection and become semi-immuned to malaria (Gilles, 2012). These are concentrated among those with poorly developed immunity and generally young children bear the mortality burden. Individuals born into areas of stable *Plasmodium falciparum* transmission frequently acquire and clear infections without becoming ill, but most will, at some stage in their lives, develop an overt clinical response to infection, often manifested as

fever. These clinical events may lead to severe complications, which may resolve naturally require medical intervention, or result in death. Since majority of children who die from malaria do so within 48 hours of onset illness, the burden of the disease minimize the life-threatening consequences of treatment delays. According to the ministry of health, malaria was responsible for one of ten deaths in pregnant women in April 2004. Pregnant women in areas of unstable malaria and non-immuned pregnant mothers originating from non-endemic countries are susceptible to manifestations of severe malaria like anybody else. But they suffer more than those indigenous to the malaria endemic areas. Malaria makes them have an increased risk of abortion, stillbirth, premature delivery and low birth weight of their infants. This group of women has a malaria mortality rate which is 2-10 times higher than in non-pregnant women (Okpere et al., 2010).

Traditional medicines have been used to treat malaria for thousands of years and medicinal plants contain active principles which are responsible for their medicinal properties (Nkunya, 1996). The efficacies of herbal medicines in the treatment of malaria have been recognized for a long time (WHO, 2003). Over 80 per cent of the world population use alternative medicine as the basis of the healthcare system (Larsen, 1999) and herbal preparations account for 30-50 % of the total medicine consumption. People are turning to alternative medicine because it is safe and it works. The usefulness of medicinal plants may hold the key to another new and effective anti malaria drug (UNESCO, 1998). African continent has a long history with the use of plants for medicinal purposes (Borokini et al., 2013). Despite the proliferation of medical centers, as at 1985, WHO survey reported that more than 75% of Nigerians still depend on medicinal plants for primary health care. Indigenous medicinal plants in various parts of Nigeria used in combating malaria are yet to be well documented and presented in spite of the rich floral diversity. Therefore, this present study has the main objective of documenting medicinal plants used for malaria treatment in Igboora, Ibarapa Central Local Government Area of Oyo State, and South-Western Nigeria as part of the ongoing ethno botanical surveys of medicinal plants in Nigeria.

II. MATERIALS AND METHOD

Ethnobotanical survey

This survey was conducted in Igboora, Ibarapa Central North Local Government Area of Oyo State on latitude 7. 53° and longitude 3.08° and with a population of 102,979 according to the 2006 population census. The main occupations of the people in the survey area are farming, teaching, hunting and petty trading. Some are also artisans, traditionalists and herbalists.

A semi structured questionnaire was administered on thirty four respondents in the study area. Selections of these respondents were based on social status, occupation and those adjudged by the community to be knowledgeable in the ethno botanical uses of plants. Questions bothered on types and parts of plants often used for malaria therapy; mode of preparation and administration. Information on medicinal plants obtained was compiled according to Generic name, family names, local name or common name and parts of plants used. Fresh samples of the plants were obtained from respondents in some cases and were dried using absorbent paper, moistened with methylated spirit and mounted in accordance with conventional herbarium practice. These samples were identified by Professor A. E. Ayodele of the Department of Botany, University of Ibadan, Ibadan and authenticated at the University of Ibadan Herbarium (UIH).

III. RESULTS

Twenty eight recipes were obtained from the respondents while thirty three species were documented for the management and treatment of malaria in the study area. The plants belong to 25 families (Table 1). The more prominent families in the recipes obtained were the Asteraceae (3 or 9.1%), Meliaceae (2 or 6.1%), Rutaceae (2 or 6.1%), Anarcadiaceae (2 or 6.1%) Euphorbiaceae (2 or 6.1%), Poaceae (2 or 6.1%) and the Fabaceae (2 or 6.1%). The rest of the families had 1 or 3.0% occurrence. The respondents who were mostly males ranged from 30 to 92 years and were mainly herbalists, farmers and teachers. The plants documented in this study, according to the respondents are usually available and better collected in the morning because they believed the sun has an effect by reducing the potency of the plants. The major mode of preparation is mainly by concoction while infusion or decoction may be used in a few cases. Leaves are the most common plant parts used although the bark or whole plants are used in some cases. The juice from *Citrus aurantifolia* and water from fermented seeds of *Zea mays* in most cases constitute the solvent in which other plants are boiled.

Table.1: Medicinal plants that are used for malaria treatment in Igboora, Oyo State

S/No	Taxa	Family	Common/Local name(s)	Parts used
1	<i>Ocimum gratissimum</i> L.	Lamiaceae	Scent leaf	Leaf
2	<i>Mormodica charantia</i> L.	Cucurbitaceae	Bitter Gourd	Whole plant
3	<i>Morinda lucida</i> Benth.	Rubiaceae	Ugugo	Leaf/bark
4	<i>Moringa oleifera</i> Lam.	Moringaceae	Moringa	Leaf/seed
5	<i>Cymbopogon citratus</i> (DC.)Stapf.	Poaceae	Lemon grass	Leaf
6	<i>Vernonia amygdalina</i> Del.	Asteraceae	Bitter leaf	Leaf
7	<i>Chromolaena odorata</i> (L.)R. M. King & H. Rob.	Asteraceae	Siam weed	Leaf
8	<i>Aspilia africana</i> (Pers.)C. D. Adams	Asteraceae	Haemorrhage plant	Leaf
9	<i>Citrus aurantium</i> L.	Rutaceae	Orange	Fruit
10	<i>Citrus aurantifolia</i> Swingle	Rutaceae	Lime	Fruit
11	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Neem	Leaf
12	<i>Khaya ivorensis</i> A. Chev.	Meliaceae	Mahogany	Bark
13	<i>Anacardium occidentale</i> L.	Anacardiaceae	Cashew	Leaf
14	<i>Mangifera indica</i> L.	Anacardiaceae	Mango	Leaf/bark
15	<i>Tectona grandis</i> L. f.	Verbenaceae	Teak	Leaf
16	<i>Psidium guajava</i> L.	Myrtaceae	Guava	Leaf
17	<i>Allium sativum</i> L.	Alliaceae	Garlic	Whole plant
18	<i>Capsicum frutescens</i> L.	Solanaceae	Pepper	Fruit
19	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Ginger	Seed
20	<i>Enantia chlorantha</i> Oliv.	Annonaceae	African Yellow wood	Bark
21	<i>Dioscorea dumentorum</i> (Kunth.)Pax.	Dioscoreaceae	Water Yam	Leaf
22	<i>Carica papaya</i> L.	Caricaceae	Pawpaw	Leaf
23	<i>Lecaniodiscus cupanioides</i> Planch.	Sapindaceae	Bondjamba	Leaf/stem/root
24	<i>Lophira alata</i> Banks.ex C. F. Gaertn.	Ochnaceae	Azobe	Bark

25	<i>Terminalia catappa</i> L.	Combretaceae	Almond	Leaf/bark
26	<i>Lawsonia inermis</i> L.	Lythraceae	Laali	Leaf
27	<i>Phyllanthus amarus</i> Schum. & Thonn.	Euphorbiaceae	Eyin-olobe	Whole plant
28	<i>Cajanus cajan</i> (L.)Millsp.	Fabaceae	Pigeon pea	Leaf
29	<i>Gliricidia sepium</i> (Jacq.)Walp.	Fabaceae	Mata Raton	Leaf
30	<i>Ananas comosus</i> (L.)Merr.	Bromoliaceae	Pineapple	Whole plant
31	<i>Musa parasidiaca</i> L.	Musaceae	Plantain	Unripe fruit
32	<i>Zea mays</i> L.	Poaceae	Maize	Seed
33	<i>Phyllanthus reticulatus</i> Poir	Euphorbiaceae	Potato plant	Leaf

IV. ENUMERATION OF THE RECIPES

- The leaves and bark of *Mangifera indica*, leaves of *Ocimum gratissimum*, and cut fruits of *Citrus aurantifolia* are rinsed and boiled together in a pot for about twenty minutes. A glass cup is taken three times daily for about two weeks for full recovery from malaria.
- Leaves of *Mangifera indica*, *Carica papaya*, *Cymbopogon citratus*, *Vernonia amygdalina* and *Tectona grandis* are first rinsed and then boiled together in a pot for about fifteen minutes. A glass cup is taken three times daily.
- The leaves of *Carica papaya* and *Ocimum gratissimum*, leaf and bark of *Mangifera indica*, cut fruits of unripe *Ananas comosus*, and *Citrus aurantifolia* are soaked in cold water for three days after which a small cup is taken three times daily. Alternatively, the materials can be boiled together for about twenty minutes and taken as above.
- The leaves of *Carica papaya*, *Cymbopogon citratus*, *Moringa oleifera*, *Mangifera indica*, cut unripe *Ananas comosus* and juice from *Citrus aurantifolia* are boiled together in a pot. A cup is taken three times daily or as desired.
- The leaves of *Morinda lucida* and *Phyllanthus amarus* are boiled for about ten minutes. A cup is taken three times daily.
- The leaves of *Citrus aurantifolia*, *Mangifera indica*, and *Cymbopogon citratus* are either boiled together for about fifteen minutes or soaked in water for some days until fermented. This is taken as desired.
- The leaves of *Musa parasidiaca*, *Anacardium occidentale*, *Azadirachta indica*, *Cymbopogon citratus* and cut fruits of *Citrus aurantifolia* are boiled for twenty minutes. About 100ml of the concoction is taken thrice daily by the adult while younger people take half the dosage of adult.
- The leaves and bark of *Mangifera indica*, leaves of *Cymbopogon citratus* and cut fruits of *Citrus aurantifolia* are boiled for ten minutes. A cup is taken three times daily.
- The leaves of *Ocimum gratissimum*, *Momordica charantia*, *Morinda lucida*, *Cymbopogon citratus*, *Vernonia amygdalina*, *Lophira alata* and *Moringa oleifera* are boiled for twenty minutes. A cup is taken twice daily.
- The leaves of *Azadirachta indica*, *Cymbopogon citratus*, *Citrus sinensis* and dry leaves of *Carica papaya* are boiled all together with water from fermented *Zea mays* seeds in a pot for thirty minutes. A glass cup is taken three times daily.
- Leaves of *Psidium guajava*, *Azadirachta indica*, *Alstonia booneii* and *Morinda lucida* and cut fruits of *Citrus aurantifolia* are boiled together for a few minutes. A small glass cup is taken three times daily.
- The leaves of *Azadirachta indica*, *Aspilia africana*, *Moringa oleifera* and sliced fruits of *Citrus aurantifolia* are boiled together in a pot for about twenty minutes. A tea cup is taken thrice daily.
- The leaves of *Azadirachta indica*, *Anacardium occidentale*, *Cymbopogon citratus* and *Gliricidia sepium* are boiled together for about ten minutes. A

- glass cup is taken three times daily for about three days.
14. The leaves of *Mangifera indica*, *Azadirachta indica*, *Carica papaya*, *Cymbopogon citratus*, *Citrus aurantifolia* and *Psidium guajava* as well as the juice of fruits of *C. aurantifolia* are boiled for about twenty minutes. A glass cup is taken thrice daily.
 15. The leaves of *Morinda lucida*, *Cymbopogon citratus*, *Citrus aurantifolia*, *Ocimum gratissimum*, *Moringa oleifera* and *Vernonia amygdalina* are boiled for about twenty minutes. A glass cup is taken thrice daily.
 16. The following plants are chopped and either soaked in water or alcohol in a container or boiled together in a pot: *Allium sativum*(whole plant), *Citrus aurantifolia* (juice), *Capsicum frutescens*(fruit), *Zingiber officinale*(seed), *Dioscorea dumentorum*(leaves), *Enantia chlorantha*(bark), *Khaya ivorensis*(stem, bark and leaves), and any part of *Lecaniodiscus cupanioides*. If boiled, a glass cup is taken morning and evening. If soaked in water or alcohol, a shot (about 10ml) is taken morning and evening as well for three days.
 17. The leaves of *Mangifera indica*, *Azadirachta indica*, *Chromolaena odorata*, *Cymbopogon citratus*, *Lawsonia inermis* and *Terminalia catappa* together with the juice from *Citrus aurantifolia* are boiled together in a pot for about twenty minutes. One cup is taken three times daily.
 18. The leaves of *Morinda lucida* and *Cymbopogon citratus* and the bark of *Mangifera indica* are boiled together for about four hours sometimes with *Allium sativum* bulbs. A glass cup is taken twice daily in the morning and evening.
 19. Dry leaves of *Carica papaya* and *Mangifera indica* are boiled with fresh leaves of *Lawsonia inermis* for about three hours. A glass cup is taken twice daily in the morning and in the evening.
 20. The leaves of *Cymbopogon citratus*, *Carica papaya* (dry), *Momordica charantia*, *Psidium guajava*, *Tectona grandis* are boiled with the juice from *Citrus aurantifolia* fruits and water from fermented *Zea mays* seeds. No dosage is required but taken as tolerated by the body.
 21. The leaves of *Mangifera indica*, *Carica papaya* and *Phyllanthus reticulatus* are boiled together for about one hour. A glass cup is taken twice daily in the morning and evening.
 22. Dry and fresh leaves of *Carica papaya*, fresh leaves of *Cajanus cajan* and *Cymbopogon citratus* are boiled for thirty minutes. One cup is taken morning and evening.
 23. Leaf and bark of *Mangifera indica* and leaves of *Moringa oleifera* and *Carica papaya* are boiled in a pot. A glass cup is taken three times daily.
 24. The leaves of *Carica papaya*, *Citrus aurantifolia*, *Moringa oleifera*, and bark of *Mangifera indica* are boiled together with water from fermented *Zea mays*. A cup is taken three times daily.
 25. Leaves of *Carica papaya*, *Tectona grandis*, *Moringa oleifera* and *Mangifera indica* are boiled together for about twenty minutes. A cup is taken twice or thrice daily.
 26. The leaves of *Moringa oleifera*, *Carica papaya*, *Psidium guajava*, *Vernonia amygdalina*, *Mangifera indica* and fruits of *Citrus aurantifolia* are boiled together in a pot for about fifteen minutes. A cup is taken three times daily.
 27. The leaves of *Carica papaya*, *Cymbopogon citratus*, *Moringa oleifera* and *Mangifera indica* are boiled together with unripe fruit of *Ananas comosus* and sliced fruits of *Citrus aurantifolia* for about thirty minutes. A glass cup is taken two or three times daily.
 28. Leaves of *Moringa oleifera* and *Vernonia amygdalina* are first dried at room temperature and then powdered. The powder is infused in water and taken as tea in the morning and evening. Alternatively a cold water extract of the leaves of both plants may be obtained. A tablespoon full is taken twice daily.

V. DISCUSSION

Malaria remains a scourge in tropical African countries such as Nigeria where the rate of population increases with much burden on the carrying capacity of the very minimal. The consequence of this is the increasing environmental pollution all around various homes thereby providing an enabling environment for the breeding of mosquitoes which are the hosts for the causal organisms. Towards achieving a healthier environment and in consequence for a better health of Nigerians, many of the state governments have introduced different periods of environmental sanitation exercises with a view to calling the people out for environmental cleanliness and personal hygiene. As there exists different synthetic drugs for malaria treatment in Nigeria particularly the present artemisin based therapy, each community in the country has got different plants and recipes for the treatment of malaria. Actually very many

plants have been implicated in the treatment of malaria than any known disease in tropical Africa. Ibarapa area of Oyo state, Nigeria is not left out in the scourge and local treatment of malaria. In the present study, 33 different plants and 28 recipes have been documented for the area covered.

Two plants, *Carica papaya* and *Cymbopogon citratus* are particularly very common in the recipes with a percentage occurrence of 70%. Both plants have been traditionally used over the years by different Yoruba speaking communities in Nigeria. The leaves of *Carica papaya* are known to contain carpaine, an alkaloid with amoebicidal action and also inhibit *Mycobacterium tuberculosis* (Oliver-Bever, 1986). Nambiar and Matela (2012) reviewed the potentials of *Cymbopogon citratus* lemon grass in health and disease. The infusion or decoction of the aerial parts of the plant is used to treat health problems such as digestive disorders, nervous disorder, inflammation, fevers, menstrual disorder, rheumatism and joint pains (Simon *et al.*, 1984; Carlin *et al.* 1986; Nambiar and Matela, 2012). Asaolu *et al.* (2009) identified alkaloids, saponins, tannins, anthraquinones, steroids, phenols and flavonoids in *C. citratus* while terpenes, alcohols, ketones, aldehyde and esters have been reported as the main compounds in the plant (Nambiar and Matela, 2012). However, lime juice (*Citrus aurantifolia*) and the water from fermented *Zea mays* are mostly used as basal solvent for the decoction of all other plants in the different recipes. The family Asteraceae recorded the highest occurrence of 9.1% among the plants with *Vernonia amygdalina*, *Aspilia africana* and *Chromolaena odorata* as component species. As stated in previous works (Ashidi *et al.*, 1999; 2005) this survey is just a phase in an attempt to identify various plants for pharmaceutical research with a view to producing drugs for the treatment of various diseases in the country. It is important to document this knowledge before the repositories i.e. the older generation dies with the knowledge.

Therefore, these findings suggest that medicinal plants used for malaria treatment in Igboora, Oyo State, Nigeria are potential sources for the development of new antimalarial drugs from indigenous plants in Nigeria in support to the work of (Ashidi *et al.*, 1999; 2005 and Tolu *et al.*, 2007).

Herbal medicine may be slow in the treatment of diseases; the advantage over synthetic drug is that it builds the total health of the patient reinforcing the ability of the body for defense against diseases.

VI. CONCLUSION

The results of this project has attempted to highlight medicinal plant claimed to be used or associated with malaria therapy in the indigenous Yoruba community as

prescribed or suggested by individuals or groups in Igboora, Southwest, Nigeria. And some drugs in plants that may compete existing western drugs such as fansidar for use as antimalaria agents.

These medicinal plants may probably contain yet undiscovered anti-malarial properties, which can serve as a template for the production of cheap anti-malaria drug from indigenous plants in Nigeria. There is a need for a multidisciplinary approach to develop potentially effective drugs while noting dangerous drugs and practices that should be discarded.

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