



## **Ethnobotanical survey of medicinal plants used in the treatment of malaria in Sokoto State, North Western Nigeria**

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### ***Abstract:***

*This Ethnobotanical survey was carried out in selected Local Government areas of Sokoto State, North Western Nigeria in order to collect and document information on medicinal plants that were used in the area by traditional healers for the treatment of malaria. A total of 39 medicinal plants belonging to 31 families, were reported as been used locally for the treatment of malaria. The scientific, common, local (Hausa) names of the plants, part used and method of preparation were presented. The survey shows that 28 (71.8% ) of the plants have been scientifically validated to have anti-plasmodium/anti-malarial activities. The methods of preparation that were used were 38.5% decoction, 30.7% maceration, 2.6% infusion while 28.21% include the use of decoction/infusion, decoction/maceration, concoction/tincture and tincture/decoction. Some of the medicinal plants were found to be solely indigenous.*

***Key words:*** Ethnobotany; Sokoto State; medicinal plants; malaria

**Introduction**

Malaria is known to be a life threatening disease caused by parasites (Plasmodium) that are transmitted to people via sting/bites of mosquitoes (WHO, 2012). Plasmodium falciparum infection is known to be one of the most common causes of haemolytic anaemia in the world, though many other factors are also involved (Hoffbrand et al ., 1999).

On World Malaria Day 2012, WHO hails global progress in combating malaria but highlights the need to further reinforce the fight. The Global Malaria Programme's new initiative, T3: Test. Treat. Track, urges malaria-endemic countries and donors to move towards universal access to diagnostic testing and antimalarial treatment, and to build stronger malaria surveillance systems (WHO, 2012).

The World Health Organization Guidelines for the treatment of malaria provides evidence-based and up-to-date recommendations for countries on malaria diagnosis and treatment which help countries formulate their policies and strategies (WHO, 2009).

Since 1999, WHO has published four volumes of the WHO monographs on selected medicinal plants: One of the objectives of WHO monographs is to provide a model that will support countries in developing their own national or regional monographs on medicinal plants or national formula on herbal medicines (WHO, 2005 ).

In 2010, malaria caused an estimated 655 000 deaths (with an uncertainty range of 537 000 to 907 000), mostly among African children. Malaria is preventable and curable. (WHO, 2010)

According to the World malaria report 2011, there were about 216 million cases of malaria (with an uncertainty range of 149 million to 274 million) and an estimated 655 000 deaths in 2010 (with an uncertainty range of 537 000 to 907 000). Malaria mortality rates have fallen by more than 25% globally since 2000 and by 33% in the WHO African Region. Most deaths occur among children living in Africa where a child dies every minute from malaria. Malaria is caused by a parasite called Plasmodium, which is transmitted via the bites of infected mosquitoes. In the human body, the parasites multiply in the liver, and then infect red blood cells.

Symptoms of malaria include fever, headache, and vomiting, and usually appear between 10 and 15 days after the mosquito bite. If not treated, malaria can quickly become life-threatening by disrupting the blood supply to vital organs. In many parts of the world, the parasites have developed resistance to a number of malaria medicines (Godwin, 2010)

Most of the drugs used for treatment of malaria have developed drug-resistant parasites or have serious side effects. Plant kingdom has throughout the centuries proved to be efficient source of efficacious malarial drugs like quinine and artemisinin. Since these drugs have already developed or in the process of developing drug resistance, it is important to continuously search the plant kingdom for more effective anti-malarial drugs (Tolu et al ., 2007)

In preparation of herbal recipes for malaria therapy, single plants (monotherapy) can be used or in combination of more than one plant. The combination of these different plants is claimed to cure several ailments and dysfunctions associated with malaria in the body. For instance, plants claimed to cure coated tongue and those that replenish blood cells during malaria attack are included in herbal recipes for malaria. They are also regarded as plants useful for malaria therapy. The treatment is observed to be traditional with deep socio-cultural expression as recognized by the WHO (Tolu et al ., 2007).

Ethnobotany is the most important approach to study natural resource management of indigenous people. An ethnobotanical survey of medicinal plants used for treatment of Malaria had been done in different part of Africa but there is probably no data available from this side of North Western Nigeria. This survey was undertaken to document medicinal plants and the part of each plant that is used locally and the method of preparation in Sokoto State for the treatment of malaria.

### **Methodology**

The present ethnobotanical survey was conducted in Sokoto State according to the method developed by Ahmad et al., 2003. The people that are living in the local governments that were visited are majorly hausa by tribe.

The traditional healers were identified by sign post, enquiries in the neighbourhood; some of them sell the medicinal plants as much as they treat patient with one ailment or the other, while others have some of the plants they use for the treatment being planted beside their houses(inform of Botanical gardens) . The information was gotten by interviews based on the local name, parts used, and method of preparation. Also their ages, tribe and years of experience were noted.

### **Results**

Some traditional healers were interviewed in the targeted L.G.As for this ethnobotanical survey. Over 90% of the traditional healers were males, between the age of 35 – 80

years; About 98% of them were hausa by tribe. 69% of them said that, malaria is used interchangeably with fever, 30% gave a clear difference between malaria and fever while 1% remain indifferent.

They traditional healers said that their diagnosis of malaria is based on the patient complain such as constant headache, increase in body temperature, bitterness of the mouth or tongue; it was also said that the treatment do continue as long as the malaria persist or until the patient says that his or her urine is very clear.

39 plants from 31 families were documented in this survey, as being used in the treatment of malaria in Sokoto State, North Western Nigeria; the Scientific names, common names, local (hausa) names, family names and the parts used for malaria treatment were also documented (Table 1).

There was documentation of those plants that have been scientifically authenticated to have anti-plasmodium (anti-malarial) activities (Table 2).

Data obtained from the survey on medicinal plants used for treatment of malaria in Sokoto State, Nigeria.

S/N	Scientific Name	Common Name	Local Name	Family Names	Morp.Parts used
1.	Khaya grandifoliola	Mahogany (broad leave)	Male	Meliaceae	Bark
2.	Azadirachta indica	Neem	Dogonyaro	Meliaceae	Bark, leaves
3.	Mangifera indica	Mango	Màngwàrò	Anacardiaceae	Bark, leaves
4.	Physalis angulata	angular winter cherry	Màtsármamáá	Solanaceae	Leaves, whole plant
5.	Carica papaya	Pawpaw	Gwándapl. gwándóójí	Caricaceae	Leaves, fruit
6.	Psidium guajava	guava	Gúróbàà	Myrtaceae	Bark, leave
7.	Zingiber officinale	ginger	Sakanzabur	Zingiberaceae	Rhizome
8.	Nauclea latifolia	African peach	Igiyàà	Rubiaceae	Root, bark, leaves
9.	Citrus aurantifolia	Lime	Lèèmóó	Rutaceae	Root, bark, stem-twigs, leaves, fruit

S/N	Scientific Name	Common Name	Local Name	Family Names	Morp.Parts used
10.	Citrus aurantium	Lime of Mecca or Sour Lime	LèémúnMákkà	Rutaceae	Root, bark, stem-twigs, leaves, fruit.
11.	Gossypium barbadense	Cotton	BàGwándàráá	Malvaceae	Leaves
12.	Gossypium hirsutum	Cotton	Cikwii	Malvaceae	Leaves
13.	Parquetin anigrescens		Kwànkwánín tsa tsumbe	Periplocaceae	Whole plant, leaves
14.	Ananas comosus	Pineapple	Fiinááfuür	Bromeliaceae	Unripe Fruit
15.	Xylopi aethiopia	Guinea pepper	Kimbáá	Annonaceae	Fruits, bark, leaves.
16.	Vernonia amygdalina	Bitter leave	Shiwáákáá	Compositae	Leaves
17.	Anacardium occidentale	Cashew	Fisáá	Anacardaceae	Bark, leaves
18.	Canna indica	Indian shot	Gwangwa	Cannaceae	Leaves
19.	Ocimum gratissimum	Scent leave	Dàdđóoyátágidá á	Labiatae	Leave
20.	Ceiba pentandra	silk-cotton tree	Riimiípl. riimááyéé	Bombacaceae	Leaves
21.	Trema orientalis	Charcoal tree	Ajenana°	Ulmaceae	Leaves, bark
22.	Musa sapientum	Banana	Ayabá	Scitamineae	Fruits
23.	Capsicum frutescens	Chilli pepper	Bàrkòónóó	Solanaceae	Fruits
24.	Allium sativum	Garlic	Táfánnúúwáá	Liliaceae	Bulb
25.	Diospyros mespiliformis	Ebony tree	Yààríí	Ebeneceae	Bark,
26.	Bridelia ferruginea		Kírníí/kizni	Euphorbiaceae	leaves
27.	Antidesma venosum	Tassel Berry	Kírníí	Euphorbiaceae	Bark, leaves
28.	Heliotropium indicum	Indian heliotrope	KàrkáshínKòòrà màá	Boraginaceae	Whole plant.

S/N	Scientific Name	Common Name	Local Name	Family Names	Morp.Parts used
29.	<i>Nauclea diderrichi</i>	Africa peach	Tafaashia	Rubiaceae	Root
30.	<i>Cordia africana</i>		Alilibaa	Boraginaseae	Leaves
31.	<i>Acacia nilotica</i>	Egyptian mimosa	Bùùshéé	Mimosaceae	Barkroot
32.	<i>Terminalia macroptera</i>		Kandare	Combretaceae	Bark, root
33.	<i>Khaya senegalensis</i>	mahogany	Madacii	Meliaceae	Bark
34.	<i>Typha domingensis</i>	Bulrush	Geeranya	Typhaceae	Bark, root
35.	<i>Senna occidentalis</i>	coffee senna	Sangaasangaa	Leguminosae	Leave
36.	<i>Balanite aegyptiaca</i>	Desert date	Aduúwää	Zygophyllaceae	Leave, bark
37.	<i>Borassus aethiopum</i>	fan, deleb palm	Giginyä	Palmaceae	Leaves
38.	<i>Cochlospermum tinctorium</i>	The red fruit	Bálgéé	Cochlospermacae	Root
39.	<i>Holarrhena floribunda</i>	False rubber tree	Bààkin mááyúú	Apocynaceae	Root

Table 1

S/N	Scientific Names	Method of preparation	Proof	Citation
1.	<i>Khaya grandifoliola</i>	Decoction, infusion	Yes	37
2.	<i>Azadirachta indica</i>	Decoction	Yes	29
3.	<i>Mangifera indica</i>	Decoction	Yes	50
4.	<i>Physalis angulata</i>	Maceration	Yes	23
5.	<i>Carica papaya</i>	Infusion	Yes	16
6.	<i>Psidium guajava</i>	Decoction	Yes	24
7.	<i>Zingiber officinale</i>	Decoction	Yes	28
8.	<i>Nauclea latifolia</i>	Tincture, decoction	Yes	22
9.	<i>Citrus aurantifolia</i>	Maceration	No	11
10.	<i>Citrus aurantium</i>	decoction	No	10
11.	<i>Gossypium barbadense</i>	Maceration	Yes	12
12.	<i>Gossypium hirsutum</i>	Maceration	Yes	18

S/N	Scientific Names	Method of preparation	Proof	Citation
13.	Parquetina nigrescens	Maceration	No	22
14.	Ananas comosus	Maceration	No	22
15.	Xylopi aethiopica	Decoction	Yes	22
16.	Vernonia amygdalina	Infusion/decoction	Yes	23
17.	Anacardium occidentale	decoction	Yes	22
18.	Canna indica	Decoction	Yes	11
19.	Ocimum gratissimum	decoction	Yes	14
20.	Ceiba pentandra	Maceration	Yes	21
21.	Trema orientalis	Decoction/maceration	Yes	22
22.	Musa sapientum	Maceration	No	25
23.	Capsicum frutescens	Decoction	No	24
24.	Allium sativum	Concoction, tincture	Yes	23
25.	Diospyros mespiliformis	Decoction	Yes	19
26.	Bridelia ferruginea;	Decoction/infusion	Yes	11
27.	Antidesma venosum;	Maceration	No	10
28.	Heliotropium indicum	Maceration	Yes	18
29.	Nauclea diderrichi	decoction	No	19
30.	Cordia Africana	decoction	No	19
31.	Acacia nilotica	Maceration	Yes	22
32.	Terminalia macroptera	Decoction	Yes	18
33.	Khaya senegalensis	decoction	Yes	23
34.	Typha domingensis	Decoction	No	18
35.	Senna occidentalis/Cassia occidentalis	decoction	Yes	11
36.	Balanite aegyptiaca	Decoction	Yes	14
37.	Borassus aethiopum	Maceration	No	18
38.	Cochlospermum tinctorium	Decoction, cold maceration	Yes	22
39.	Holarrhena floribunda	Decoction/maceration	Yes	20

Table 2

### Discussion

The objective of this ethnobotanical survey was to collect and document information on medicinal plants that are used locally in Sokoto State, North Western, Nigeria for the treatment of malaria. Thirty –nine indigenous medicinal plants belonging to 31 families were documented in this ethnobotanical survey. This is an indication that Sokoto state, North Western region of Nigeria is rich in plant diversity despite its climatic risk.

The method used in this survey was similar to that of Ahmad et al (2003) who studied the ethnobotanical potentials of some cultivated plants in Chung region.

The anti-malarial potential of 29 of these medicinal plants has proven scientifically as shown in table 2. They are *Khaya grandifoliola* (Agbedahunsi et al., 1998), *Azadirachta indica*(Fatima et al., 2005; Godwin avwioro, 2010), *Mangifera indica*, *Physalis angulata*, *Carica papaya* and *Psidium guajava* (Godwin avwioro, 2010), *Zingiber officinale*, *Diospyros mespiliformis* and *Xylopia aethiopica* (V.S.Satyanaraya Kantamreddi, Colin W.Wright, 2008), *Nauclea latifolia* (Traore et al., 2010), *Gossypium barbadense* (Olanrewaju A. Salako, Olufunsho Awodele, 2012 ), *Gossypium hirsutum* (Angela et al., 2005), *Vernonia amygdalina* (Donatus Eberke Okwu, Nneka Ukanwa, 2010), *Anacardium occidentale* and *Cochlospermum tinctorium*(Benolt-vical et al., 1999), *Canna indica* (A. Abdul Umar, 2011), *Ocimum gratissimum*(Tchoumboungang et al., 2005), *ceiba pentandra* (Tran et al., 2003), *Trema orientalis* (Abiodun et al., 2011), *Allium sativum* (Fatima et al., 2005), *Bridelia ferruginea* (Merlin et al., 2011), *Heliotropium indicum*(Joame et al., 2011), *Acacia nilotica* (Alli et al., 2011 and Fatima et al., 2005 ), *Terminalia macroptera* (Sanon et al., 2003), *Khaya senegalensis* (Gbadamosi et al., 2011), *Senna occidentalis* (Tona et al., 2011), *Balanite aegyptiaca* (Fatima et al., 2005), *Holarrhena floribunda* (Jean et al., 2005).

The potential of others are yet to be scientifically proven as having anti-malarial properties.

### Conclusion

With this survey there was an attempted to highlight medicinal plants that the traditional healers of Sokoto State claimed to use or associated with malaria treatment.

Beside the evaluation that have been carried out on some of these medicinal plants, there may be probably contain yet undiscovered anti-malarial properties, which can serve as a template for the production of cheap anti-malaria drug from indigenous plants found in



Sokoto State, North Western Nigeria. This survey has also revealed several plants with potential as anti-malarial agents for scientifically rationalization.

However, there is a need for a multidisciplinary approach to develop potentially effective drugs without discarding any useful medicinal plants.

#### **Acknowledgement**

We appreciate Mal. Rabi of Kasua Kara, Sokoto for helping to translate some of the local names of the plants to English names.

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