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ETHNOBOTANICAL ASSESSMENT OF PLANTS USED FOR THE TREATMENT OF MALARIA IN KIYAWA TOWN, JIGAWA STATE NIGERIA

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ABSTRACT

The aim of this study was to make an inventory of medicinal plants for the treatment of malaria and examine how people used them to treat the disease in Kiyawa Town, Jigawa State,with a view to providing benchmark information for health practitioners and policy makers to enhance the medical system in the State. A total of nine respondents (four traditional healers and five herbalists) were sampled using snowball sampling technique. Structured interview was conducted with the respondents to elicit information on the type species used for the preparation of remedies for malaria treatment, methods of administration of such preparations as well as conservation of species with medicinal value. This study found that *Senna occidentalis* and *Azadirachta indica* were the common plants used for the treatment of malaria in the area through oral administration of decoction made from their leaves. This study recommended that integrated research should be conducted in this field because traditional knowledge is continuously changing, evolving and adapting to the new social and environmental conditions in the area.

***Keywords**: biotic diversity, medicinal plants, remedies,*

INTRODUCTION

Malaria is one of the major fatal diseases in the world. The disease is endemic in some 102 countries with more than half of the world population at risk. It affects about 350-500 million people per year worldwide and is responsible for 1.1 million death per year (World Health Organisation, 2013). Malaria is caused by protozoons called plasmodium. It is transmitted to humans through the anopheles mosquito. The disease has various types of the parasites hence it remain a challenge to people and medical experts (WHO, 2003).

In spite of control programmes in many countries there has been very little improvement in the control of malaria which leads to both economic and human loses. Control of malaria is complex. Various factors including the appearance of drug resistant strains of Plasmodium (Srisilam and Veersham, 2003), the discovering that man may become infested with species of simian (monkey) malaria (Symth, 1994) as well as financial stress. Infact, monetary loss due to malaria in Nigeria is estimated to be about 132 billion Naira in terms of treatment cost, prevention and loss of man-hours (Federal Ministry of Health, 2007). Thus it is important to search for new anti-malarial compounds, either synthetic or natural compounds that kill either the vector or parasite. The constant evolution of the malaria parasite has rendered the cheapest and most widely available antimalarial treatment ineffective, more so with their centre ports about increasing resistant of plasmodium falciparum to artemisinin based compounds (Hut, 2009).

Malaria is still an ever-continuing endemic disease that claims hundreds of thousands of lives in the tropical and subtropical countries each year, and the majority of the malarial deaths are due to *Plasmodium falciparum*. The majority of these disease cases and deaths occur in sub-Saharan Africa where the disease is endemic (Greenwood, 2002).

In ethnobotany and natural products chemistry, the mode of preparation and administration of herbal preparations are often crucial variables in determining efficacy in pharmacological evaluation (Lewis et al., 1998). Literature is replete with ethnobotanical survey and its important in the identification, selection and development of the therapeutic agents for malaria and other diseases. Prakash and Unnikrishnan (2013) reported that the five most frequently cited species were *Piper nigrum* L., *Allium sativum* L., *Leucas aspera* (Willd.) Link, *Azadirachta indica* A. Juss. and *Ocimum tenuiflorum* L. in Karnataka, India. In Southwestern Nigeria, studies have been carried out to document utilization of phytomedicines for treatment of fevers (Ajaiyeoba et al., 2006). Etkin (1997) also documented antimalarial plant used by the Hausa in Northern Nigeria. But these are not enough as malaria is taking its toll in Jigawa State and there are inadequate measures to take care of the burden of

this disease and increasing resistance of *Plasmodium falciparum* against the widely available antimalarial drugs.

Previous ethnobotanical studies confirm the rational use of plant recipes by different people or groups from different communities for medicine (Etukudo, 2003). With increasing global momentum for management of malaria through natural medicines (Prakash and Unnikrishnan, 2013), this study was carried with a view to documenting traditional antimalarial plants in Kiyawa Town, Jigawa State. One of the major advantages of choosing plants as the starting point in drug development through ethnobotanical survey is that the active constituents of such plants which have undergone long-term use by man are likely to be safer than the active compounds isolated from plants with no history of ethnomedical use (Fabricant and Farnsworth, 2001).

STUDY AREA

Kiyawa town is located in Jigawa State, Northwestern Nigeria. It is located between Latitude 11º47'05'' and 11º48'02'' and Longitude 9º35'00'' and 9º38'04''.The estimated population of Kiyawa is put at 200,845 inhabitants with the area majorly populated by Hausa and Fulani ethnic groups. Kiyawa has an average temperature of 34ºC and witnesses two major seasons namely wet and dry coded as Aw in the Koppen's classification. Seasonal variation in rainfall is directly influenced by the interaction of two air masses: the relative warm and moist tropical maritime (mT) air mass, which originates from the Atlantic Ocean associated with Southwest winds in Nigeria; and the relatively cool, dry and stable tropical continental (cT) air mass that originates from the Sahara Desert, also associated with the dry, cool and dusty North-East Trades known as the Harmattan (Abaje, Achiebo, and Matazu, 2018). The boundary zone between these two air masses is called the Inter Tropical Discontinuity Zone (ITDZ). The movement of the ITDZ brings about two main seasons which are the dry season, which starts from November of one calendar year to March of the next year and the wet season which starts from April to October.

The natural vegetation of the area is characterized by moderately tall grasses and shrubs and scattered woody trees. Indigenous trees found include *Parkiabiglobosa, Phoenix dacylifera, Adansonia digitata, Faidherbia albida, Tamarindusindica*, and *Borassus aethiopum*while *Azadirachtaindica*is an exotic species that grow spontaneously and serve many purposes in the area. However, due to high level of human activities, it is difficult to claim the existence of natural vegetation in the area.

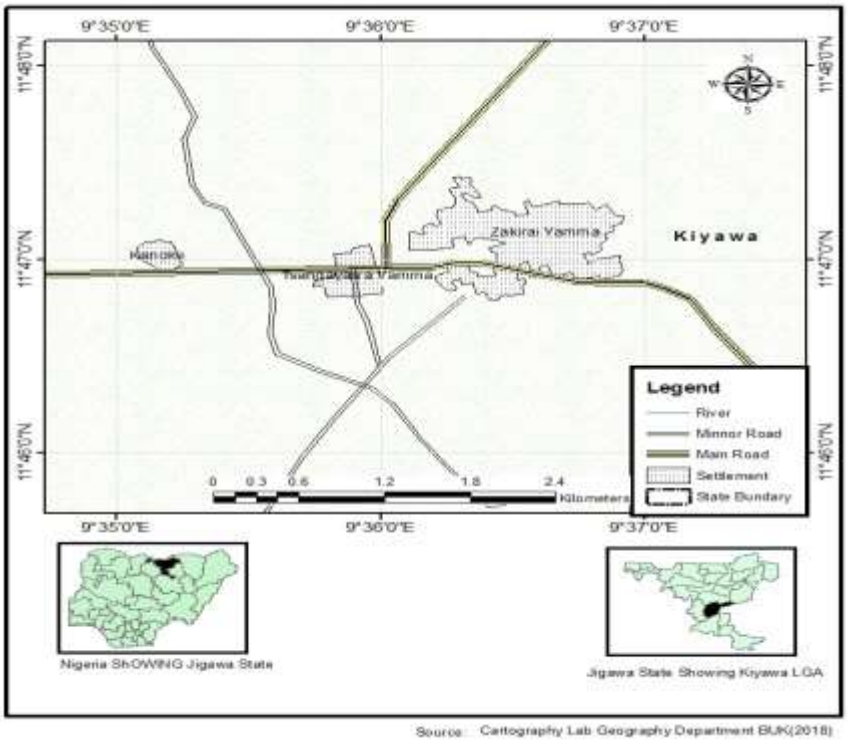

Fig. 1: Map of Kiyawa Town, Northern Nigeria

MATERIALS AND METHODS

A total of nine participants were sampled using snowball technique. This comprises of eight males (four traditional healers and four herbalists males) as well as one female herbalist who has been practising for 29 years. Their ages range from 32 to 68. Structured interview was carried out one-to-one basis with the sampled traditional healers and herbalists. Informants were asked to report the wild, cultivated or bought medicinal plants that had been traditionally used in the area, what ailments were treated with them, and whether they still use or abandoned them. Local names of the plants and how they are collected, conserved, prepared, and administered were also asked. Information provided by each herbal practitioner was carefully recorded and logged.

RESULT AND DISCUSSION

Biotic Diversity of Plants Used for the Treatment of Malaria

Biotic diversity here entails varieties of all plants found in the study area. As indicated the study area is endowed with varieties of species used for traditional healing. The contribution of plants to health is an established fact in the world. Plants are sources of medicine for household especially during rural areas. A total of seven plants are essential to livelihoods of most rural communities; they are considered widely for their application in malaria treatment in Kiyawa Town (Table 1).

Table 1: Locally Available Plants used for the Treatment of Malaria

SN	Plant Type	Location names	Conservation Status
1	*Senna occidentalis*	Rai dore	Decreasing
2	*Azadirachta indica*	Maina	Stable
3	*Cassia singueana*	Runhu	Threatened
4	*Magnifera indica*	Magwaro	Stable
5	*Boscia salicifolia*	Anza	Threatened
6	*Khaya senegalensis*	Madaci	Decreasing
7	*Commiphora kerstingii*	Ararrabi	Decreasing

It has been found that traditional herbalists operate closer to the people, taking advantage of the biodiversity of plant species in such areas to cure various diseases and ailments.This shows that not all species but those tested by people as having the potential of curing malaria are used in the area. This finding is in line with Etkin (2002) who reported that *Azadirachta indica* and *Magnifera indica*are commonly used in Hausaland as antimalarial remedy for *Plasmodium falciparum*. Different parts of *Azadirachta indica* and *Khaya grandifoliola* (Meliaceae) are also used in West Africa for traditional preparations to treat malaria (Lifongo et al., 2014). *Azadirachta indica*, *Khaya senegalensis* and *Magnifera indica* have been listed as priority species in the study area. The variations observed in the location found and conservation status of these species provides opportunities for development of varieties of local breeding techniques.

Methods of Administration of Remedies Used for Malaria Treatment

Several methods are available for preparation of herbal remedies in the study area. It has been noted that various plants parts have been used through for different indications in the study area. This study found that only bark and leaves are used by people of the area to prepare remedies for malaria (Table 2). These remedies are administered orally although products such as honey and red potash are added in the decoction/concoction depending on the methods used by the herbalist.

Table 2: Mode of Administration of Herbal Remedies

	Botanical Name of Plant	Preparation Form	Route of Administration	Parts Used
1	*Azadirachta indica*	Pounded and soaked	Oral	Leaf and bark
2	*Boscia salicifolia*	Concoction	Oral	Leaf
3	*Cassia singueana*	Concoction	Oral	Leaf
4	*Khaya senegalensis*	Boiling	Oral	Leaf and bark
5	*Magnifera indica*	Boiling	Oral	Leaf
6	*Senna occidentalis*	Boiling	Oral	Leaf
7	*Commiphora kerstingii*	Decoction	Oral	Leaf

This study corroborates Davies (1994) which reported that the bark of the *Azadirachta indica* is perceived to be effective in the treatment of malaria in various parts of West Africa. In line with WHO (2008) artemisinin is extracted from the Chinese herbal wormwood plant *Artemisia annua* which is the basis of more effective antimalarial drugs in the world today. Mudi and Bukar, (2011) reported the anti-plasmodia effects of the leaf extracts of *Calotropis procera*. Mohammed, Danjuma, and Abdulkarim, (2015) also reported the use of *Azadirachta indica* to treat malaria in Kano Metropolis.

Oral administration of drugs is found in various studies to be famous among all routes of administering herbal drugs (Shinkafi, Bello, Hassan, and Ali, 2015). In-depth discussions with the traditional healers further revealed that even when the healers prescribe treatment to their patients, only the traditional doctor can prepare it through concoction, boiling, and soaking of leaves and bark to the patients.

Participants' Sources of Products for Preparation of Herbal Remedies

Herbal medicines are mostly obtained from various sources including but not restricted to relatives, herbal practitioners, farms, bush and pharmacy or markets. Findings of this study depicted that the majority of the respondents (about 46 percent) obtained herbal products for medicine forest, only 10 percent obtained products from market (Figure 2). This signifies that most users have much knowledge about the products used in herbal medicine and therefore can source it.

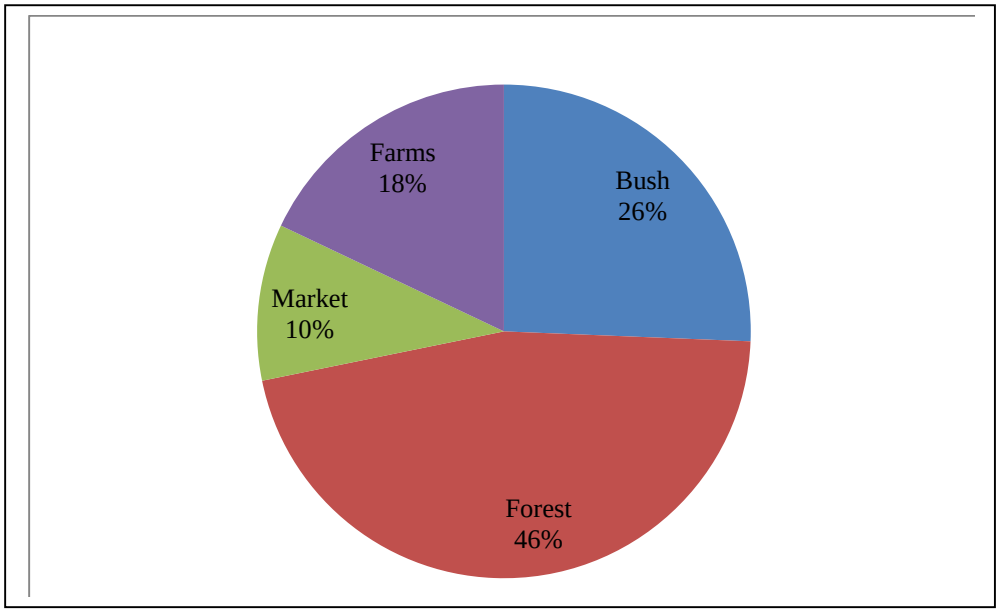

Fig. 2: Sources of Products for Herbal Medicine

Symptoms of Malaria in the Area

The respondents had good knowledge about malaria and could identify it from fevers and on the basis of locally accepted characteristic symptoms that included headache, joint pains, sweating, loss of appetite, thirst, shivering, and bitter taste in the mouth.

CONCLUSION

Plants have remained the most affordable and easily accessible source of treatment in the healthcare system of Kiyawa Town. A total of 7 plant species were mentioned by the informants as effective against malaria and vector mosquitoes. Though pharmacopoeia of the town had not been compiled yet, the documentation of traditional medicinal plants used by the people in the study is effective when compared to other cultures of the area. Hence, this study concluded that thorough documentation of medicinal plants used by different cultures of the area is necessary. The documentation on medicinal plant uses has concurred with other studies conducted in different cultural setups and locations; hence, it could be a lead for future phyto-chemical and pharmacological studies.

RECOMMENDATIONS

1. The Ministry of Health should provide uniform training or training in general of traditional medical practitioners with a clearly defined organizational framework within which traditional healers should operate.

2. There should be screening of all the mentioned plants for anti-malarial activity by the appropriate authority in order to justify their local usage. These studies might lead to the isolation (and possibly the identification) of potentially active compounds, which may be regarded as future promising phyto-therapeutics in the treatment of malaria.

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