

Ethno-Botanical Survey of Plants with Antidiabetic Properties Used by Traditional Practitioners in Nigeria

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ABSTRACT

This review was an Ethno-botanical survey of plants with Antidiabetic properties used by traditional practitioners in Nigeria. A comprehensive literature review was conducted via consultation of different scientific journals relevant to the study from the internet. With case studies in some geopolitical zones. Twenty-five (25) plants from north central, forty-nine (49) plants from North West, one hundred and thirty-five (135) plants from south west and five (5) plants from South East For south west only twenty-five of the most ranked plants were presented in this study. In conclusion, this review documented the rich wealth of knowledge and usage of plants for the treatment of diabetes in Nigeria. The paper will not only serve as a source of information but will also help to make the knowledge accessible for further drug screening and development, and at the same time underlines the need for biodiversity conservation of this traditional wealth.

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder which occurs as result of inability of the body to produce sufficient insulin, or inability of the body to utilize insulin (WHO, 2006). It is a disorder that cuts across carbohydrates, fats, and lipids metabolism and is characterized by a high level of fasting blood sugar (Marx, 2002). The manifestation of the disease includes; prolong hyperglycemia, development of diabetes-specific micro vascular symptoms in the retina, glomerulus and peripheral nerve which eventually results in serious complications affecting various organs like the kidneys, arteries and eyes (Brownlee et al., 2001) ;(Mehdi et al., 2009). A report by the International Diabetes Foundation in (2017) showed that, as at 2015, the total number of people living with diabetes is 415 million (adult aged 20-79) with a projected increase of up to 642 million by 2040 (IDF, 2017). In Nigeria, of the over 180 million populations, 40,329 diabetes related deaths were recorded and had 846.3 adults' undiagnosed and 1.7 million adults between the ages of 29-70 years being affected by the disease which amounts to 2.4% of the population (IDF, 2017). There is no known cure for diabetes currently; however significant

progress has been made in the management of diabetes by oral hypoglycemic agents (Oyedemi et al., 2009). Despite this progress, the search for new drugs continues because the existing synthetic drugs have several limitations including cost, resistance and availability (Matheka and Demaiio, 2013).

Africa is blessed with varieties of natural product for healing practice, with several scientific validation of their activities against different diseases (Lawal et al., 2015; 2016; Ibrahim et al., 2017). Many herbal medicines have been recommended for the management of diabetes mellitus (Ayodhya et al., 2010). Traditional plant management has been used throughout the world for the therapy of diabetes mellitus. The use of medicinal plants as form of traditional healing in the management of diabetes mellitus has been documented in history; this is due to the hypoglycemic and other beneficial properties of such plants, as reported in scientific literatures (Donga et al., 2011). As a result of the high demand of natural products, scientists are investigating various plant species for potential cures. This includes an initial ethno-botanical study to ascertain the most frequently utilized plant species and to further validate their use scientifically (Igoli et

al., 2005). The herbal drugs with anti-diabetic activity are yet to be commercially formulated as modern medicines, even though they have been acclaimed for their therapeutic properties in the traditional systems of medicine (Ayodhya et al., 2010).

Currently, medicinal plants continue to play an important role in the management of diabetic mellitus, especially in developing countries, where many people do not have access to conventional anti-diabetic therapies (Grover et al., 2002; Achaya and Shrivastava, 2008). Nigeria, the most populous country in the African continent with a population of over 180 million, is divided into six geo-political regions (North Central, North-East, North West, South-South, South East and South West) with 36 states and a total of 774 local government areas (Millar et al., 2014). The country is endowed with biodiversity of medicinal plants which are used in the African traditional system of medicine for the management of different diseases (Gbile and Adesina, 1987; Ajose, 2007). In a recent review (Lifongo et al., 2014), the economic/ traditional uses of some of these medicinal plants of Nigeria have been found to be correlated with their biological activities.

However, less attention has been given to this section when compared to plethora of information available in other systems of medicine e.g. India and China. The country has more than 250

different ethnic groups living together. Among the ethnic groups, Hausa and Fulani are the two major tribes which are most commonly found in the north west of the country (Adekunle and Otolurin, 2000) (Abubakar et al., 2007). The medicinal plant used in management of diabetes has been as reported by various ethno-botanical survey conducted in the different geopolitical zones of the country (Aiyelaja and Bello, 2006) ; (Onakpa and owoleke, 2010; Soladoye et al., 2012) ; Oyedemi et al., 2009; Shakir et al., 2015).

MATERIALS AND METHOD

A comprehensive literature review was conducted via consultation of different scientific journals relevant to the study from the internet. Words like medicinal plants, treatment of diabetes, geopolitical zones of Nigeria were used in conducting the search. Where articles on the geopolitical zone could not be obtained, case study of particular state within such geopolitical zone was obtained.

RESULTS

In all, 118 plant species were encountered across the different geopolitical zones. Twenty-five plants from North Central (Table 1), forty nine plants from North West (Table 2), one hundred and thirty-two plants from south west (Table 3) and five plants from South East (Table 4). For South West, only twenty five of the most ranked plants were presented in this study

Table1. List of traditional medicinal plants used by the traditional medical practitioners for the treatment of diabetes in North-central Nigeria.

PLANT NAME	LOCAL NAME	BOTANICAL NAME	FAMILY
Onion	Albasa	<i>Alluvium cepa</i>	Liliaceae
Lemon	Lemun tsami	<i>Ctrus medica</i>	Rutaceae
Locust bean	Dorowa	<i>Parkia biglobosa</i>	Mimosaceae
Egyptian priest	Lalle	<i>Lawsonia inermis</i>	Lythraceae
Shea butter	Kade	<i>Vitillarta paradoxa</i>	Sapotaceae
Neem	Dogon yaro	<i>Azadirachata indica</i>	Meliaceae
Desert date	Aduwa	<i>Balanitesaegyptiaca</i>	Zygophylliaceae
Black plum	Dunya	<i>Vitex gekowskii</i>	Verbenaceae
Camel foot tree	Kalgo	<i>Bauhinia reticulate</i>	Casalpiniaceae
Egyptian mimosa	Bagaruwa	<i>Acacia nilotica</i>	Mimosaceae
Tree of life	Baure	<i>Ficus sycomorus</i>	Moraceae
Garlic	Tafarnuwa	<i>Allium sativum</i>	Liliaceae
Buffalo	Magarya	<i>Zizyphus mucronata</i>	Rhamnaceae
Corn cob cactus	Nonon kurciya	<i>Euphorbiaconvuluidodes</i>	Euphobiaceae
Loin cloth fig	Cediya	<i>Fiscus thonnigii</i>	Moraceae
Sweet potatoes	Dankali	<i>Ipomoea batatas</i>	Convolvulaceae
Guava	Gwaiba	<i>Psidium guajava</i>	Myrtaceae
Cotton	Auduga	<i>Gossypium hirsutum</i>	Malvaceae
Coffee senna	Zangazanga	<i>Cassia occidentalis</i>	Fabaceae
Drum stick tree	Zogale	<i>Moringa oleifera</i>	Moringaceae
Giant fern	Marke	<i>Angeissusleiocarpus</i>	Combretaceae

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African Mahogany	Madaci	Madaci	Meliaceae
Sodom apple	Tunhahiya	<i>Calotropis procera</i>	Asclepiadaceae
Bitter leaf	Shuwaka	<i>Vernonia amygdalina</i>	Asreraceae
Mango	Mangoro	<i>Mangifera indica</i>	Anacardiaceae

Source: Onakpa and Owoleke, 2010

Table 2. List of traditional medicinal plants used by the traditional medical practitioners for the treatment of diabetes in Sokoto. North-west Nigeria

PLANT NAME	LOCAL NAME	BOTANICAL NAME	FAMILY
Tamarind	Tsamiya	<i>Tamarindus indica</i>	Leguminosae
-	Taro	<i>Combretum sericeum</i>	Combretaceae
Boire	Taura	<i>Detarium senegalense</i>	Leguminosae
African peach	Tafashiya	<i>Sarcocephalus russeggeri</i>	Rubiaceae
Violet tree	Sanga-sanga	<i>Cassia occidentalis</i>	Caesalpinaceae
Coffee senna	Sanya	<i>Securidacal longipe dunculata</i>	Polygalaceae
Moshi medicine	Sabara	<i>Guiera senegalensis</i>	Combretaceae
Axle wood tree	Marke	<i>Anogeissus leiocarpus</i>	Combretaceae
Mango	Mangwaro	<i>Mangifera indica</i>	Anacardiaceae
W. African laburnum	Malga	<i>Cassia sieberiana</i>	Caesalpinaceae
A.copaiba balsam	Majee	<i>Daniellia oliveri</i>	Leguminosae
Ujube fruit	Magarya	<i>Zizyphus jujube</i>	Rhamnaceae
African mahogany	Madacci	<i>Khayasene galensis</i>	Meliaceae
Nigeria grass	Kyasuwa	<i>Pennisetum pedicellatum</i>	Gramineae
Calabash	Kwarya	<i>Crescentia cujete</i>	Bignoniaceae
Baobab	Kuka	<i>Adansonia digitata</i>	Malvaceae
-	Kizni.	<i>Bridelia ferruginea</i>	Euphobiaceae
-	Kasheshe	<i>Heeria insignis</i>	Anacardiaceae
King tuber mushroom	Katala	<i>Pleurotus tuber-regium</i>	Pleurotaceae
Water melon	Kankana	<i>Citrullus lanatus</i>	Cucurbitaceae
Hair potato	Kamumuwa	<i>Dioscorea bulbifera</i>	Dioscoreaceae
Camel's foot	Kalgo	<i>Piliostigma reticulatum</i>	Caesalpinaceae
American waterlily	Kainuwa	<i>Nymphaea odorata</i>	Nymphaeaceae
Hairy indigo	Mashekiya	<i>Indigofera hirsute</i>	Fabaceae
Sand paper tree	Ararrabii	<i>Commiphora kerstingii</i>	Burseraceae
Sand paper tree	Borai	<i>Ficus exasperate</i>	Moraceae
-	Gardaye	<i>Acacia albida</i>	Leguminosae
Black plum	Dunya	<i>Vitexdoniana</i>	Verbenaceae
Red robber tree	Gamji	<i>Ficus platyphylla</i>	Urticaceae
African cucumber	Garahuni	<i>Momordica balsamina</i>	Cucurbitaceae
Olive	Faru	<i>Odina barteri</i>	Anacardiaceae
Africa locus bean	Dorawa	<i>Parkia fillicoides</i>	Leguminosae
Neem	Dogon yaro	<i>Azadarachta indica</i>	Meliaceae
--	Dandana	<i>Schwenckia americana</i>	Solanaceae
Barbados nut	Cini dazugu	<i>Jatropha curcas</i>	Euphobiaceae
Black afara	Baushe	<i>Terminalia macroptera</i>	Combretaceae
Egyptian wild	Bagaruwa	<i>Acacia nilotica</i>	Mimosaceae
Soap berry tree	Aduwa	<i>Balanites aegyptiaca</i>	Zygophyllaceae
Zakara Rosarypea	Idon	<i>Abrus precatorius</i>	Leguminosae
Neutral henna	Collad	<i>Cassia obovata</i>	Leguminosae
Frankincense tree	Hano	<i>Boswellia dalzielii</i>	Burseraceae
A.custard-apple	Gwadda-daji	<i>Annona senegalensis</i>	Anonaceae
Pawpaw	Gwadda	<i>Carica papaya</i>	Papayacea
Doum palm	Goriba	<i>Hypphaene thebaica</i>	Palmeae
African fan palm	Giginya	<i>Borassus flabellifer</i>	Palmeae
Winter thorn	Gawo	<i>Acacia macrostachya</i>	Leguminosae
--	Geza	<i>Combretum altum</i>	Combretaceae
Waterleaf	Gaudi	<i>Talinumtri angulare</i>	Portulacaceae

Source: Tijjaniet al., 2015

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Table3. List of Medicinal Plants Used by the Traditional Healers in South-Western Nigeria in treating Diabetes

PLANT NAME	LOCAL NAME	BOTANICAL NAME	FAMILY
W. African Black wood	Paran	<i>Dalbergia welwitschii</i>	Leguminosae - Papilionoideae
--	Tanjarin	<i>Citrus medica</i>	Rutaceae
Bitter orange	Osan jagun	<i>Citrus aurantium</i>	Rutaceae
Lime	Osan wewe	<i>Citrus aurantifolia</i>	Rutaceae
Ficus	Opoto	<i>Ficus capensis</i>	Moraceae
Sand paper leaf	Epin	<i>Ficus asperifolia</i>	Moraceae
Water melon	Egusi-baara	<i>Citrullus lanatus</i>	Cucurbitaceae
Bitter gourd	Egusi bara	<i>Citrullus colocynthis</i>	Cucurbitaceae
Pseudo colocynth	Tagiri	<i>Adenopus breviflorus</i>	Cucurbitaceae
Guinea-fowl's crest	Agbari etu	<i>Alafia barteri</i>	Apocynaceae
Rauwolfia	Asofeyeje	<i>Rauwolfia vomitoria</i>	Apocynaceae
Stoolwood	Ahun	<i>Alstonia boonei</i>	Apocynaceae
Arrow poison	Sagere	<i>Strophantus hispidus</i>	Apocynaceae
Cascarilla	Eru	<i>Croton lobatus</i>	Euphorbiaceae
--	Ira Ira	<i>Bridelia ferruginea</i>	Euphorbiaceae
Walnut	Asala	<i>Tetracarpidium conophorum</i>	Euphorbiaceae
--	Fehinsowo	<i>Phyllanthus niruri</i>	Euphorbiaceae
Christmas bush	Ipa	<i>Alchornea cordifolia</i>	Euphorbiaceae
Okan lumber	Olosan	<i>Cylicodiscus gabunensis</i>	Leguminosae - Mimosoideae
--	Itipase eku nla	<i>Brachystegia eurycom</i>	Leguminosae - Caesalpinioideae
Flat crown albizia	Bonabona	<i>Albizia adianthifolia</i>	Leguminosae - Mimosoideae
Crab eye	Oju ologbo	<i>Abrus precatorius</i>	Leguminosae - Papilionoideae
Candle bush	Asunwon Oyinbo	<i>Senna alata</i>	Leguminosae - Caesalpinioideae

Source: Soladoye et al, 2012

Table4. List of Plants Used In the Treatment of Diabetes by Herbal Sellers in Enugu State South -East Nigeria.

PLANT NAME	LOCAL NAME	BOTANICAL NAME	FAMILY
Sweet orange	Oroma	<i>Citrus sinensis</i>	Rutaceae
Cocoyam	Akaso/ede/uli/ mmuo	<i>Xanthosoma sagittifolium</i>	Araceae
Black tumbler	Icheku	<i>Dialium guinenses</i>	Caesalpinacea
Locust beans	Ugba/ogiri	<i>Parkia bigglossa</i>	Papilionaceae
Candle wood	Aga	<i>Zanthocylum zanthoxyloides</i>	Rutaceae
Shea butter	Osi	<i>Vitellaria paracloxum</i>	Sapotaceae
Bitter kola	Adu/aku-inu	<i>Garcinia kola</i>	Clusiaceae
Curry leaf	Nchanwu	<i>Thymus vulgaris</i>	Lamiaceae
Biter leaf	Onugbu/olubu	<i>Vernonia amygdalina</i>	Asteraceae
Kolanut	Orji	<i>Cola nitida</i>	Sterculiaceae
Alligator pepper	Ose-orji/okwa	<i>Elaeis guineensis</i>	Arecaceae
Palm kernel	Aku	<i>Elaeis guineensis</i>	Arecaceae
Fluted pumpkin	Ugwu	<i>Telfairia occidentalis</i>	Cucurbitaceae
Garden egg	Ayanra/afefea	<i>Solanum melongena</i>	Solanaceae
Avocado /pear	Ehuru	<i>Persea americana</i>	Lauraceae
Nutmeg	Ehuru	<i>Myristica fragrans</i>	Myristicaceae
Pepper	Ose/totashi	<i>Capsicum annum</i>	Solanaceae
Okoro	Okwuru	<i>Abelmoschus esculentus</i>	Malvaceae
Plantian	Abrika	<i>Musa paradisiaca</i>	Musaceae
Banana	Ule/uneru	<i>Musa nana/ sapientum</i>	Musaceae

Source: Aiyelaja and Bello, 2006

DISCUSSION

Trado-medical knowledge of indigenous people worldwide has played a significant role in the identification of therapeutic agents. For example, Nigeria has been shown to be endowed with biodiversity of medicinal plants which are used in

the African traditional system of medicine for the management of different diseases (Gbile and Adesina, 1987; Ajose, 2007). This study has shown that over 118 plants have been documented from different surveys across the country. This reflects that Nigeria is indeed endowed with wide biodiversity in spite unfavorable climatic

conditions in certain parts of the country as recognized by Scoones et al. (1995).

The following plants has been documented from the geo-political zones showing Southwest (23), North West (Sokoto) (48), north central (27) and south east (Enugu) (20). A possible explanation for this could be the vegetation belt to which each zone belongs to as well as annual rain fall of each zone. Other factors could be availability of research articles relevant to the field. Whereas case studies had to be implored in the case of Northwest and South East, materials could not be obtained for North East and South South. The reason could not be ascertained by the authors as at the time of compiling this paper. Plant species such as *Alliumcepa*, *Veronia amygdalina* and *Allium sativum* are common to both north and south. Despite these similarities however, there exists certain differences in their mode of preparation. In the north for instance most herbal drugs (mono or poly herbal) are sold in the powdered form (Shakir et al., 2015) where as crude liquid from maceration and decoction were sold in the market as herbal recipes in the south (Gbolade, 2009).

Similarly, a Comparative analysis of this study with other ethnobotanical surveys of plants used traditionally in treating diabetes in Mali (Besancon et al., 2005), Morocco (Besancon et al., 2005), North centre region of Morocco (Jouad et al., 2001), South Eastern Morocco (Tahraoui et al., 2007), Eastern Cape Province of South Africa (Erasto et al., 2005), Tanzania (Moshi and Mbwambo, 2002), and India (Subbulakshmi et al., 2001), revealed some similarities in the plants cited in these surveys. Out of the 211 plant species cited in this study, five (5) species: *Aframomummelegueta*, *Azadirachta indica*, *Carica papyra*, *Manihot esculenta* and *Vernonia amygdalina* were also documented for the same purpose in North central region of Morocco (Jouad et al., 2001), South Eastern Morocco (Tahraoui et al., 2007) and India (Subbulakshmi et al., 2001). Similarly, in an ethno botanical survey conducted in Tanzania (Moshi and Mbwambo, 2002), two of the cited plants were also identified in this study (*Carica papaya* and *Ficus exasperata*). *Vernonia amygdalina* was the only plant species mentioned by informants Of the 14 plants documented as used in Eastern Cape province of South Africa (Erasto et al., 2005), while *Parkia biglobosa* and *Citrus* species cited in the study carried out in Sikasso Mali (Besancon et al., 2005) were also identified in this study. *Phyllanthus amarus*, *Zingiber*

officinale, *Citrusaurantifolia*, *Momordica charantia* and *Carica papaya* identified in this study have also been shown to be used traditionally in Trinidad and Tobago (Mahabir and Gulliford, 1997) for treating diabetes.

Experimentally, some of the plants cited in this study have been shown to possess antidiabetic properties. The antidiabetic activity of aqueous leaves of *Magnifera indica* had been reported by Aderibigebe et al. (1999), Matin et al. (2001) and Aunyachulee et al. (2017). Also the activity of *Vernonia amygdalina* aqueous leaves extract in rats was reported by Erasto et al (2005). The antidiabetic potentials of *Aframomum melegueta* (Chidi et al., 2016), *Caricapapaya* (Isela et al., 2012) and *Momordicachirantia* (Chatruvedi, 2012) have also been documented.

A large number of medicinal plants used in the treatment of diabetes have been documented. While Nigeria has not been completely left behind, there is a need to give more attention to the field of bio-exploration as a means of alternative medicine as the country presents a rich biodiversity with huge potentials.

CONCLUSION

The use of medicinal plants for disease management is an age long practice among humans. Nigeria possesses a rich bio-diversity with medicinal plant potentials. On regional basis, South-west Nigeria presents the highest number of plants documented in the treatment of diabetes. This is also the case as regards other parts of Africa such as north central Morocco, south eastern Morocco, Mali, Tanzania and Eastern Cape Province of South Africa. This reflects the need to give more attention to Bio-exploration as well as drug development from the active ingredients of plants.

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