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An 'Avalanche' of Plant Species for the Traditional Cure of *Diabetes mellitus* in South-Western Nigeria

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ABSTRACT

Ethnobotanical survey of the plants used in the treatment of Diabetes mellitus was conducted in some areas of South-Western Nigeria. The survey revealed the use of about 132 different plants species belonging to 56 families in the treatment of Diabetes mellitus. Taxonomic practice of specimen preparation for herbarium storage was performed for each of the plants and some were deposited at the Elikaf herbarium of Olabisi Onabanjo University, Ago Iwoye. The identified plants have been confirmed to possess anti-diabetic properties. Prominent among them are Senna alata Linn, Curculigo pilosa (Schumach & Thonn.) Engl, Cucurmeropsis mannii Naudin, Anthocleista spp, Vernonia amygdalina Del and Allium spp. These species were found to be very important and useful in the treatment of diabetes based on their frequency of occurrence in the recipes obtained, although only few of the recipes are listed in this work. Most of these plants are available in the area of study. A need for further scientific research based on the findings of this work is needed and recommended so that adequate records of indigenous methods of treating Diabetes mellitus can be kept for posterity, especially in the study area.

Key words: Ethnobotany, Diabetes, Medicinal plants, Traditional medicine, Herbal Treatment.

INTRODUCTION

Studies have shown that Nigeria is endowed with abundant forest lands, rich in valuable plants and raw material (1). Nature provides materials for the treatment of diseases and ailments in the different flora and fauna of the world hence there is an extensive worldwide exploration of local flora for bioactive components. The potential of the Nigeria flora as a veritable source for pharmaceuticals and other therapeutic have variously been expressed by several authors (2, 3, 4, 5 & 6).

Phytomedicine as the name suggests means medicine from plants. According to (7), the history of the use of herbs dated back to the time of the early man who had the crudest tools as the implements. The art of using herbs to enhance his health must have come to him in the most unscientific manner. The use of plant extracts in the treatment of diseases is known as herbal medicine, it is the oldest form of medicine dating back to the Genesis of man. Despite the increase in the production of synthetic drugs, natural plant drug materials are still economically significant in the world and large quantities are harvested.

The alarming rate at which traditional medicine is now patronized by all segments of the society- the rich, the poor, educated and the uneducated- clearly signifies one thing, “the realization that traditional medicine which as long been taken for granted and rejected for decades has a crucial role to play in making affordable health care delivery system available to the entire populace” (8). As a result of increase demand for alternative medicine, renewed interest in drugs of plant origin has been growing steadily (9).

Ethnobotanical survey is therefore important in our societies because there is need to have proper and comprehensive documentation of all the plants used in treatment of different diseases. Since the herbalist and local people who are knowledgeable about medicinal plants do not keep record or have scanty records but only passed information (if at all they did) about these plants verbally from generation to generation. Ethnobotanical survey also stimulates research into Medicinal plants and provides scientific evidence for the claimed therapeutic efficacy of those herbs by traditional healers. For instance, *Catharanthus roseus* (L.) G.Don as a source of anti-cancer contains alkaloids- vincristine and vinblastine. Also, dried sclerotium of the fungus- *Claviceps purpurea* (Fr.) Tul. is known to contain alkaloids that are of therapeutic importance; ergometrine and ergotamine (10 & 11). It is no doubt that ethnobotanical survey have greatly contributed to the discovery and development of new drugs from plants kingdom (12), e.g Artemisinin; an anti-malaria drug from *Artemisia annua* L. (13).

In Africa, the diversity of the flora partly explains the strength of traditional medicine and the wide varieties of medicinal recipe utilized by traditional healers (14). Although, much ethnobotanical survey had been carried out on plants, more survey is still necessary with regard to the plants used in treating diabetes as there is increase in the rate of *Diabetes mellitus* manifestation in Nigeria and African countries in general. It is also necessary to carry out survey in order to avert many complications associated with the disease; retinopathy, gangrene, etc (15). (16), suggested that diabetes is a chronic disease, which usually involves loss of weight, excessive urination, and weakness of the body and may also affect any organ or tissue in the body. Similarly, (17) opined that diabetes is the disease presented when the insulin produced by the pancreas in the body is unable to control the level of sugar within the body, with the result that the patient has a high level of sugar (glucose) carried in the blood around the body. However, (18) also suggested that *Diabetes mellitus* (DM) is not a single entity, but rather a group of metabolic disorder sharing a common underlying features of hyperglycemia. Hyperglycemia in diabetes results from defect in insulin secretion, insulin action or most common both. The chronic hyperglycemia and attendant metabolic dis-regulation may be associated with secondary damage in multiple organ systems, especially the kidney, eye, nerves and blood vessels (18). The disease is common and it affects over three million people in Nigeria when the insulin produced by the pancreas in the body is unable to control the level of sugar within the body.

Diabetes mellitus is common in both young and old people especially in pregnant women. Rare cases have been attributed to diabetes coma. There are two major types of *Diabetes mellitus*;

insulin dependent *Diabetes mellitus* (IDDM) type I and Non-Insulin Dependent *Diabetes mellitus* (NIDDM) type II. The type I occur in young people usually below 35 years of age while the type II occur in older people usually above 35 years old and often overweight. In type I, the pancreas cannot make insulin so the patient must be treated with insulin in the absence of which they cannot survive, since insulin can not be orally administered, the patient receive insulin injections once or twice a day or the patients takes herbal medicine like *Carica papaya* Linn. mixed with *Xylopiya aethiopica* (Dunal) A.Rich to manage the disease which will not cost much money or pain. On the other hand, in type II, the pancreas does make insulin, but the body cannot use the insulin properly (19). In this case, the patient is treated with oral medication. However, during periods of stress or infection, they may need short term insulin treatment; they could take herbal medicines made from *Mangifera indica* Linn, *Azadirachta indica* (Linn.) G.Don. and *Morinda lucida* Benth to cure the disease. Approximately 80-90% of diabetes is type II, and insulin resistance is one of the greatest enemies of their health as opined by (19).

Generally, it is possible for a person to have high level of sugar in his blood without having any symptoms. However, in more cases, the person who has diabetes would complain of feeling thirsty and passing large quantities of urine (20). Effects of uncontrolled diabetes include: inability to see clearly, recurrent boils on the skin, leg ulcers that fail to heal, frequent urination, loss of flesh, inordinate appetite, constant hunger, mental depression, progressive weakness, great thirst and dry tongue (7). The patient could be restless, irritable and morose. It is most helpful to conduct a test for a patient and get a doctor's diagnosis to confirm that such patient is diabetic or not.

While it is clear that the rate of occurrence of diabetes is growing fast, ethnobotanists have taken a firm decision to embark on herbal medicine in the treatment of the disease and indeed taken a specific measure towards achieving it. It is on this note that this work was embarked upon to critically evaluate plants used in the treatment of *Diabetes mellitus* in South-Western Nigeria and also to examine how they are used and the progress made with the use of these plants.

MATERIALS AND METHODS

The ethnobotanical survey of plants used in the treatment of *Diabetes mellitus* was conducted in Ibadan, Abeokuta, Ijebu-Ode, Ijebu-Igbo, Oru-Ijebu, Ago-Iwoye and Lagos all within the area of study, South-Western Nigeria. For the survey, questionnaires were prepared to interview several herb sellers, herbalists and traditional medicine practitioners within the area of study and a number of plants were gathered from this exercise. These plants were then collected from the wild, pressed and dried (showing both the abaxial and adaxial parts) poisoned and mounted on standardized herbarium sheets according to taxonomic practice. The plants were properly poisoned using mercuric chloride solution mixed with phenol in 70% methylated spirit to reduce fungal load and prevent insect attack. Identification and authentication was done by the senior author, a plant taxonomist, and confirmed at the Forest Herbarium, Ibadan (FHI). Some of the identified specimens were later deposited at the Elikaf Herbarium of Olabisi Onabanjo University, Ago-Iwoye; although not listed in (21).

RESULTS

A total of 132 plant species belonging to 56 families were said to be useful in the treatment of diabetics. Plants identified in this work have been tested by the herbalists and according to them are quite efficacious. Tables 1 and 2 give useful information on each of the plants and the distribution of species within each of the families respectively while the method of preparation

and administration of each recipe is shown in Table 3. However, only 14 of the recipes are enumerated below owing to space. Figure 1 is a graphical representation showing the percentage occurrence of each of the families.

Table1. List of Medicinal Plants Used by the Traditional Healers in South-Western Nigeria in treating diabetes

S/No	Botanical Names	Family	Local Names	Common Names
1	<i>Abelmoscus esculentus</i> (Linn.) Moench	Malvaceae	Ila	Okra
2	<i>Abrus precatorius</i> L.	Leguminosae-Papilionoideae	Oju ologbo	Crab eye
3	<i>Adansonia digitata</i> L.	Bombacaceae	Ose	Baobab
4	<i>Adenopus breviflorus</i> Benth	Cucurbitaceae	Tagiri	Pseudo colocynth
5	<i>Aerva lanata</i> (L.) Juss. ex Schult.	Amaranthaceae	Eweowo	Morning leave
6	<i>Aframomum melegueta</i> (Loskoe) K. Schum	Zingiberaceae	Atare	Alligator pepper
7	<i>Ageratum conyzoides</i> L	Asteraceae/Compositae	Imi esu	Goat weed
8	<i>Alafia barteri</i> Oliv.	Apocynaceae	Agbari etu	Guinea-fowl's crest
9	<i>Albizia adianthifolia</i> (Schumach.) W. Wight	Leguminosae-Mimosoideae	Bonabona	Flatcrown albizia
10	<i>Alchornea cordifolia</i> (Schurn &Thonn.) Mull. Arg.	Euphorbiaceae	Ipa	Christmas bush
11	<i>Allium ascolanicum</i> Linn	Liliaceae	Alubosa elewe	Spring onion
12	<i>Allium cepa</i> L	Liliaceae	Alubosa	Onion
13	<i>Allium sativum</i> Linn	Liliaceae	Ayu	Garlic
14	<i>Alstonia boonei</i> L	Apocynaceae	Ahun	Stoolwood
15	<i>Amaranthus spinosus</i> L	Amaranthaceae	Tete elegun	Prickly amaranthus
16	<i>Ananas comosus</i> (L.) merr	Bromeliaceae	Ope oyinbo	Pineapple
17	<i>Annona senegalensis</i> Pers.	Annonaceae	Abo	Sour sap
18	<i>Anthocleista djalonenis</i> A.chew	Loganiaceae	Shapo	Cabbage tree
19	<i>Anthocleista nobilis</i> G. Don	Loganiaceae	Shapo	Cabbage tree
20	<i>Anthocleista vogelii</i> Planch	Loganiaceae	Sapo	-
21	<i>Argemone mexicana</i> L.	Papaveraceae	Ikanekun	Mexican poppy
22	<i>Aristolochia albida</i> Duch.	Aristolochiaceae	Paran funfun	ducthman's pipe
23	<i>Asparagus africanus</i> Lam.	Liliaceae	Aluki	African asparatus
24	<i>Azadirachta indica</i> (Linn.) G.Don	Meliaceae	Dongoyaro	Neem Tree
25	<i>Bambusa vulgaris</i> Wendel.	Poaceae/Graminae	Oparun	Bamboo
26	<i>Blighia sapida</i> K.D.Koenig	Sapindaceae	Isin	Akee apple
27	<i>Bombax buonopozense</i> P. Beauv	Bombacaceae	Ponpola	Silk cotton tree
28	<i>Brachystegia eurycoma</i> Harms	Leguminosae-Caesalpinioideae	Itipase eku nla	-
29	<i>Bridelia ferruginea</i> Benth	Euphorbiaceae	Ira	Ira
30	<i>Caesalpinia bunduc</i> (Linn.) Roxb	Leguminosae-Caesalpinioideae	Ayo	Nicker nut
31	<i>Calotropis procera</i> R.B	Asclepiadaceae	Bomubomu	Giant milk week
32	<i>Canarium schweinfurthii</i> Engl.	Burseraceae	Awogbaarun	Bush candle tree
33	<i>Capsicum frutescens</i> L.	Solanaceae	Ata wewe	African pepper
34	<i>Carica papaya</i> L.	Caricaceae	Ibepe	Pawpaw
35	<i>Chenopodium ambrosioides</i> Linn	Chenopodiaceae	Arunpale	India worth seed
36	<i>Milicia exelsa</i> (Welw.) C.C. Berg	Moraceae	Igi-Iroko	Iroko
37	<i>Chrysophyllum albidum</i> Linn.	Sapotaceae	Agbalumo	African star apple
38	<i>Cissampelos mucronata</i> A. Rich.	Menispermaceae	Jenjoko	Pareira brava
39	<i>Citrullus colocynthis</i> (Linn.) Schrad	Cucurbitaceae	Egusi bara	Bitter gourd
40	<i>Citrullus lanatus</i> (Thumb) mansf	Cucurbitaceae	Egusi-baara	Water melon
41	<i>Citrus aurantifolia</i> (Christm.) Swingle.	Rutaceae	Osan wewe	Lime

42	<i>Citrus aurantifolia</i> (Christm.) Swingle.	Rutaceae	Osan wewe	Lime
43	<i>Citrus aurantium</i> L.	Rutaceae	Osan jagun	Bitter orange
44	<i>Citrus medica</i> L.	Rutaceae	Tanjarin	
45	<i>Citrus sinensis</i> L.	Rutaceae	Orombo	Sweet orange
46	<i>Cnestis ferruginea</i> Linn	Connaraceae	Omu-aja	Allium plant
47	<i>Cocos nucifera</i> Linn.	Palmae	Agbon	Coconut palm
48	<i>Cola acuminata</i> (P.Beauv.) Schott & Endl.	Sterculiaceae	Obi-abata	Kola
49	<i>Cola sp</i>	Sterculiaceae	Obi-onisana	Kola
50	<i>Corchorus olitorius</i> L	Tiliaceae	Ewedu	Jute plant
51	<i>Crateva adansonii</i> Dc.	Capparaceae	Taniya ewe	Garlic pear tree
52	<i>Crotalaria retusa</i> Linn.	Leguminosae-Papilionoideae	Koropo	Rattleweed
53	<i>Croton lobatus</i> Linn.	Euphorbiaceae	Eru	Cascarilla
54	<i>Cucumeropsis mannii</i> Naudin	Cucurbitaceae	Egusi	Melon
55	<i>Curculigo pilosa</i> (Schumach. & Thonn.) Engl.	Hypoxidaceae	Epakun	Golden eye grass
56	<i>Cyathula prostrate</i> (L.) Blume	Amaranthaceae	Sawerepepe ewe	Pastureweed
57	<i>Cylicodiscus gabunensis</i> Harms.	Leguminosae-Mimosoideae	Olosan	Okan lumber
58	<i>Dalbergia welwitschii</i> Baker f.	Leguminosae-Papilionoideae	Paran	West African black wood
59	<i>Elaeis guineensis</i> Jacq	Palmae	Ope	Red oil palm
60	<i>Enantia chlorantha</i> Oliv.	Annonaceae	Oso pupa, Awopa	African yellow wood
61	<i>Entandrophagma utile</i> Sprague	Meliaceae	Jebo	
62	<i>Entandrophagma macrophylla</i> A. Chev.	Meliaceae	Aranje/ Arunje ewe	West African Cedar
63	<i>Eugenia aromatica</i> Linn	Myrtaceae	Kanafuru	Clove
64	<i>Ficus asperifolia</i> Miq.	Moraceae	Epin	Sand paper leaf
65	<i>Ficus capensis</i> Thumb	Moraceae	Opoto	Ficus
66	<i>Ficus exasperata</i> Vahl.	Moraceae	Epin	Sand paper leaf
67	<i>Ficus platyphylla</i> Del.	Moraceae	Igbagba ewe	-
68	<i>Garcinia kola</i> Heckel	Guttiferae	Orogbo	Bitter kola
69	<i>Gladiolus psittacinus</i> Hook.f.	Iridaceae	Ibaka/baka	Sword lily
70	<i>Glyphaea brevis</i> (Spreng.) Mon.	Tiliaceae	Atori	masquerade stick
71	<i>Gongronema latifolium</i> Benth.	Asclepiadaceae	Madunmaro	-
72	<i>Grewia pubescens</i> P.Beauv	Tiliaceae	Ora igbo	Raisin
73	<i>Hevea brasiliensis</i> Mull. Arg.	Euphorbiaceae	Ewe rubber	Rubber
74	<i>Hoslundia opposita</i> Linn	Labiatae	Efirin-oso	Hoslundia
75	<i>Icacina trichanta</i> Oliv.	Icacinaceae	Gbegbe	-
76	<i>Ipomea batata</i> Linn	Convolvulaceae	Odunkun	Potato
77	<i>Jatropha curcas</i> Linn.	Euphorbiaceae	Botuje/Lapalapa	Purging nut
78	<i>Khaya ivorensis</i> A. Chev.	Meliaceae	Oganwo	Mahogany
79	<i>Kigelia africana</i> Benth	Bignoniaceae	Pandoro	African Sausage tree
80	<i>Lagerstroemia speciosa</i> Linn.	Lythraceae	Abere	Queen crape-myrtle
81	<i>Lawsonia inermis</i> Linn	Lythraceae	Laali	Henna plant
82	<i>Macaranga barteri</i> Muell.Arg	Euphorbiaceae	Agbosa	-
83	<i>Mangifera indica</i> Linn.	Anacardiaceae	Mangoro	Mango
84	<i>Manihot spp</i>	Euphorbiaceae	Ege	Cassava
85	<i>Markhamia tomentosa</i> Schum (Benth.) K	Bignoniaceae	Oruru	Bell bean tree
86	<i>Momordica charantia</i> Schum & Thonn.	Cucurbitaceae	Ejirin wewe	African Cucumber
87	<i>Morinda lucida</i> Benth	Rubiaceae	Oruwo	Brimstone tree
88	<i>Moringa oleifera</i> Lam.	Moringaceae	Ewe igbale	Horse radish
89	<i>Musa paradisiaca</i> Linn.	Musaceae	Ogede agbagba	Plantain

90	<i>Musa sapientum</i> Linn.	Musaceae	Ogede	Banana
91	<i>Nauclea latifolia</i> Smith	Rubiaceae	Egbesi	Nauclea
92	<i>Newbouldia laevis</i> (P.Beauv.) Seem. Ex Bureau	Bignoniaceae	Akoko	Tree of life
93	<i>Nicotiana tabacum</i> Linn.	Solanaceae	Taba	Tobacco
94	<i>Nymphaea lotus</i> Linn	Nymphaeaceae	Osibata	White pond lily
95	<i>Ocimum basilicum</i> Linn	Labiatae	Efirin	Sweet basil
96	<i>Ocimum gratissimum</i> Linn	Labiatae	Efinrin-nla	Sweet basil
97	<i>Olax subscorpioidea</i> Oliv.	Olacaceae	Ifon	-
98	<i>Parinari macrophylla</i> Sabine	Chrysobalanaceae	Abere	Ginger bread plum
99	<i>Peperomia pellucida</i> (Linn.) H.B. & K	Piperaceae	Rinrin	Cowfoot
100	<i>Pergularia daemia</i> (Forsskal) Chiov.	Asclepiadaceae	Kuleri-ogba	-
101	<i>Phyllanthus niruri</i> L.	Euphorbiaceae	Fehinsowo	-
102	<i>Picralima nitida</i> (Stapf) Th. & H. Dur.	Apocynaceae	Eso abere	Picralima
103	<i>Picralima umbellata</i> (K.Schum.) Stapf	Apocynaceae	Erin	-
104	<i>Piliostigma thonningii</i> (Schum.) Milne Readhead	Leguminosae- Caesalpinioideae	Abafe	
105	<i>Piper guineense</i> Schum & Thonn	Piperaceae	Iyere	West African Black pepper
106	<i>Portulaca spp</i>	Portulacaceae	Papasan	Purslove
107	<i>Rauvolfia vomitoria</i> Afzel	Apocynaceae	Asofeyeje	Rauvolfia
108	<i>Saccharum officinarum</i> L.	Poaceae/Graminae	Ireke	Sugarcane
109	<i>Sansevieria liberica</i> Ger. & Labr.	Dracaenaceae	Pasan-ikooko	Bowstring Hemp
110	<i>Securidaca longepedunculata</i> Fres.	Polygalaceae	Ipeta	Violet tree
111	<i>Senna alata</i> Linn	Leguminosae- Caesalpinioideae	Asunwon Oyinbo	Candle bush
112	<i>Sida acuta</i> Burm. F.	Malvaceae	Isekotu	Horn beam,
113	<i>Sida veronicifolia</i> Lam.	Malvaceae	Eesin ile	Sida
114	<i>Solenostemon</i> <i>Monostachys</i> (P.Beauv) Briq	Labiatae	Agogoigun	Catrip
115	<i>Sorghum caudatum</i> (Hack.) Stapf	Poaceae/Graminae	Oka baba	Sorghum
116	<i>Spilanthes uliginosa</i> Sw.	Asteraceae/Compositae	Awere pepe	Brazil cress
117	<i>Spondias mombin</i> L.	Anacardiaceae	Iyeye	Hog plum
118	<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Verbenaceae	Apari-igun	Devil's coach
119	<i>Strophantus hispidus</i> D.C	Apocynaceae	Sagere	Arrow poison
120	<i>Syzygium aromaticum</i> (L.) Merrill & Perry	Myrtaceae	Konafuru	Clove
121	<i>Terminalia catappa</i> L.	Combretaceae	Furutu	Almond
122	<i>Tetracarpidium conophorum</i> (Mull.-Arg.) Hutch. & Dalz.	Euphorbiaceae	Asala	Walnut
123	<i>Tetrapleura tetraptera</i> (Schun & Thonn) Taub.	Leguminosae- Mimosoideae	Aidan	-
124	<i>Triumfetta cordifolia</i> A. Rich.	Tiliaceae	Akeenii	-
125	<i>Tylophora spp</i>	Asclepiadaceae	Esiriju	-
126	<i>Uvaraia chamae</i> P. Beauv.	Annonaceae	Gbongbose	Bush banana
127	<i>Vernonia amygdalina</i> Del.	Asteraceae/Compositae	Ewuro	Bitter leaf
128	<i>Viscum album</i> Linn.	Loranthaceae	Afomo	Mistletoe
129	<i>Viscum rotundifolium</i> L.f.	Viscaceae	Afomo osan	Mistletoe
130	<i>Xylopia aethiopica</i> (Dunal) A. Rich	Zingiberaceae	Atale	Ethiopian pepper
131	<i>Zea mays</i> L.	Poaceae/Graminae	Agbado	Maize
132	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Lali-funfun	Ginger

Table 2. Distribution of species within the families

S/No	Family	No. of Species	S/No	Family	No. of Species
1	Amaranthaceae	3	30	Liliaceae	4
2	Anacardiaceae	2	31	Loganiaceae	3
3	Annonaceae	3	32	Loranthaceae	1
4	Apocynaceae	6	33	Lythraceae	2
5	Aristolochiaceae	1	34	Malvaceae	3
6	Asclepiadaceae	4	35	Meliaceae	4
7	Asteraceae/Compositae	3	36	Menispermaceae	1
8	Bignoniaceae	3	37	Moraceae	5
9	Bombacaceae	2	38	Moringaceae	1
10	Bromeliaceae	1	39	Musaceae	2
11	Burseraceae	1	40	Myrtaceae	2
12	Capparaceae	1	41	Nymphaeaceae	1
13	Caricaceae	1	42	Olacaceae	1
14	Chenopodiaceae	1	43	Palmae	2
15	Chrysobalanaceae	1	44	Papaveraceae	1
16	Combretaceae	1	45	Piperaceae	2
17	Connaraceae	1	46	Poaceae	4
18	Convolvulaceae	1	47	Polygalaceae	1
19	Cucurbitaceae	5	48	Portulacaceae	1
20	Dracaenaceae	1	49	Rubiaceae	2
21	Euphorbiaceae	9	50	Rutaceae	5
22	Guttiferae	1	51	Sapindaceae	1
23	Hypoxidaceae	1	52	Sapotaceae	1
24	Icacinaceae	1	53	Solanaceae	2
25	Iridaceae	1	54	Sterculiaceae	2
26	Labiatae	4	55	Tiliaceae	4
27	Leguminosae- Caesalpinioideae	4	56	Verbenaceae	1
28	Leguminosae- Mimosoideae	3	57	Viscaceae	1
29	Leguminosae- Papilionoideae	3	58	Zingiberaceae	3

Table 3. Preparation of Anti-diabetic Recipes

Recipe A

Plants	Vernacular Name	Plant part used
<i>Morinda lucida</i>	Oruwo	Leaves
<i>Momordica charantia</i>	Ejinrin	Leaves
<i>Vernonia amygdalina</i>	Ewuro	Leaves
<i>Musa sapientum</i>	Ogede	Fruit

Preparation: The leaves of *Morinda lucida*, *Momordica charantia*, *Vernonia amygdalina*, and unripe fruit of *Musa sapientum* are boiled together with fermented *Zea mays* liquor.

Application: Two tablespoonful of the preparation is taken three times daily.

Recipe B

Plants	Vernacular Name	Plant part used
<i>Magnifera indica</i> .	Mongoro	Stem bark
<i>Alstonia boonei</i>	Ahun	Stem bark

Preparation: The stem bark of *Magnifera indica* and *Alstonia boonei* are boiled together in fermented corn water for about 15 minutes.

Application: Half glass cup full of the extract is taken twice daily.

Recipe C

Plants	Vernacular Name	Plant part used
<i>Musa sapientum</i>	Ogede	Fruit.
<i>Allium sativum</i>	Ayun	Leaves and bulb
<i>Tetracarpidium conophorum</i>	Asala	Seeds
Other ingredients:	Alcohol	

Preparation: The listed plant parts are ground together and soaked for 24 hours in alcohol before administration.

Application: One tablespoonful is taken after meal.

Recipe D

Plants	Vernacular Name	Plant part used
<i>Vernonia amygdalina</i>	Ewuro	Leaves
<i>Citrus aurantifolia</i>	Osan wewe	Fruit juice

Preparation: Scotch the leaf of *Vernonia amygdalina* with the juice from *Citrus spp* and separate the extract.

Application: The patient takes one glass cup of the preparation daily.

Recipe E

Plants	Vernacular Name	Plant part used
<i>Allium sativum</i>	Ayuu	Bulb.
<i>Vernonia amygdalina</i>	Ewuro	Leaves
<i>Ocinum gratissimum</i>	Efirin nla	Leaves

Preparation: Boil the three plant parts together with concentrated fermented corn water (omi ogi oromidun-yoruba) or ordinary water for 30 minutes.

Application: One glass cup is taken every morning until ailment disappears.

Recipe F

Plants	Vernacular Name	Plant part used
<i>Carica papaya</i>	Ibepe	Leave
<i>Xylopia aethiopica</i>	Eru	Fruit

Preparation: Boil the dried leaves of *Carica papaya* and fruit of *Xylopia aethiopica*, add one teaspoonful of salt, and allow the mixture to settle.

Application: Half a glass cup is taken every morning.

Recipe G

Plants	Vernacular Name	Plant part used
<i>Cocos nucifera</i>	Agbon	Bark
<i>Elaeis guineensis</i>	Ope	Bark
Potash	Kanbilala	Black soap

Preparation: The bark of *Cocos nucifera* and *Elaeis guineensis* are burnt together, and then added to ground potash in a bottle of schnapps.

Application: One tea spoon to be taken 3 times daily.

Recipe H

Plants	Vernacular Name	Plant part used
<i>Sena alata</i>	Asuwon	Leaves
<i>Anthocleista djalensis</i>	Sapo	Bark
<i>Curculigo pilosa</i>	Epakun	Corm
<i>Gladiolus ferruginea</i>	Baka	Bulb
<i>Citrus aurantifolia</i>	Osan wewe	Juice
<i>Cucurmeropsis mannii</i>	Bara	Fruit

Preparation: All the plant parts mentioned above are soaked with lime water for 3-7 days before being administered.

Application: One glass cup to be taken once daily.

Recipe I

Plants	Vernacular Name	Plant part used
<i>Senna alata</i>	Asuwon	Leaves
<i>Bambusa vulgaris</i>	Oparun	Leaves
<i>Ocimum gratissimum</i>	Efinrin	Root
<i>Hoslundia opposita</i>	Efinrin oso	Root

Preparation: The leaves and roots are rinsed in clean water and boiled in a clay pot with enough water for about 30-35 minutes and drank when warm.

Application: Half a glass cup to be taken 3 times daily. This recipe is only effective in the early stage of diabetes and not the chronic situation.

Recipe J

Plants	Vernacular Name	Plant part used
<i>Senna alata</i>	Asuwon	Leaves
<i>Picalima nitida</i>	Abeere	Pod
<i>Lawsonia inermis</i>	Laali	Leaves
<i>Gladiolus ferruginea</i>	Baka	Bark
<i>Citrus medica</i>	Jaganyin	Juice

Preparation: *Citrus medica* is cut into four and boiled together with the remaining plant parts for 40 minutes.

Application: To be taken 3 times daily with a glass cup.

Recipe K

Plants	Vernacular Name	Plant part used
<i>Khaya grandifoliola</i>	Oganwo	Bark
<i>Kigelia africana</i>	Pandoro	Bark
<i>Garcinia kola</i>	Orogbo	Fruit
<i>Allium ascolanicum</i>	Alubosa-elewe	Root

Preparation: All the plant parts are ground together after sun-drying.

Application: Small quantity of the prepared material is taken on the palm with water. This should be done in the morning and later at night.

Recipe L

Plants	Vernacular Name	Plant part used
<i>Nauclea latifolia</i>	Egbesi	Bark
<i>Gongronema latifolium</i>	Madunmaro	Root
<i>Xylopia aethiopica</i>	Eeru	Pod
<i>Anthocleista djalonensis</i>	Sapo	Bark
<i>Aristolochia albida</i>	Paranfunfun	Root

Preparation: The plant parts are cut into pieces, rinsed with clean water and soaked in half a bottle of schnapps for about 12 hours.

Application: One glass cup to be taken in the morning and at night.

Recipe M

Plants	Vernacular Name	Plant part used
<i>Aframomum melegueta</i>	Atare	Fruit
<i>Strophantus hispidus</i>	Sagere	Bark
<i>Gladiolus ferruginea</i>	Baka	Bulb
<i>Curculigo pilosa</i>	Epakun	Corm

Preparation: All the plant materials are cut into pieces, sun-dried and grounded smoothly.

Application: Small quantity on the palm is taken with adequate water in the morning and later at night.

Recipe N

Plants	Vernacular Name	Plant part used
<i>Markhamia tomentosa</i>	Oruru	Stem bark
<i>Khaya ivorensis</i>	Oganwo	Stem bark
<i>Tetrapleura tetraptera</i>	Aidan	Seed/pod

Preparation: The dried stem bark of the three plant parts and ginger (*Zingiber officinale*) are properly grinded together to a powdery form. The remnant from the grinded ginger is again mixed with *Khaya ivorensis* and *Tetrapleura tetraptera* and boiled for 20 minutes. Allow to cool.

Application: The prepared concoction is used to wash the wound on the leg, while the dried powder is applied to the washed wound and allowed to dry. It should be noted that this recipe is only meant to work for wounds on the leg of a diabetic patient.

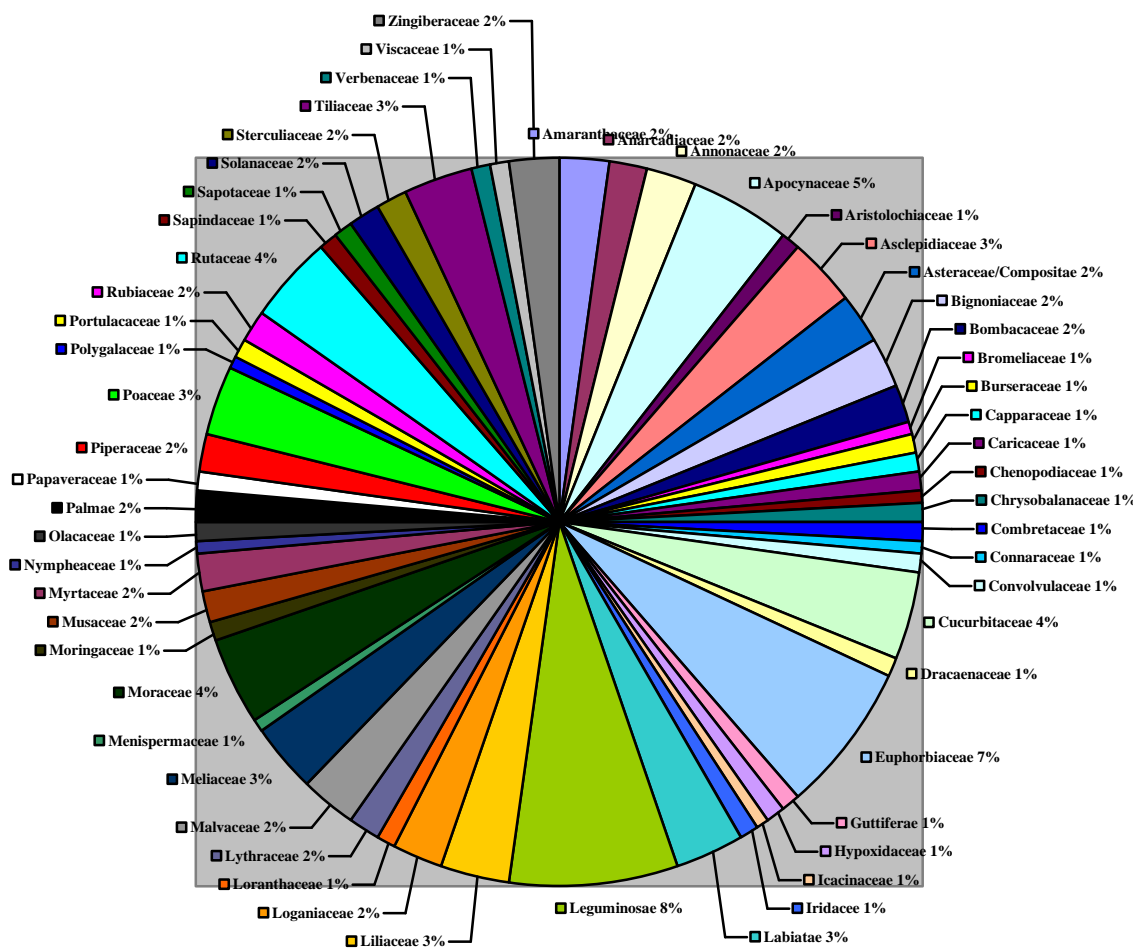


Figure 1. Graphical representation of percentage occurrence of species in each family

DISCUSSION AND CONCLUSION

The families with the highest occurrence of species include Leguminosae with 10 species, followed by Euphorbiaceae (9), Apocynaceae (6), Cucurbitaceae, Moraceae, and Rutaceae (5 each) which is indicative of their importance in the treatment of *Diabetes mellitus* (Table 2). However, Bromeliaceae, Burseraceae, Capparaceae, Caricaceae, Combretaceae, Hypoxidaceae, Loranthaceae among others have the least number of species (1), this call for urgent attention on these families before they go into extinction. The frequent occurrence of other families also suggests their importance as repository of useful plants which may be explored for diabetes and other diseases treating drugs. Results also revealed that quite a number of plants parts especially the fruits, seeds, leaves, bulbs and the roots have been found efficient in the treatment of the disease. The most prominent in the recipes are *Senna alata*, *Curculigo pilosa*, *Cucurmeropsis mannii*, *Anthocleist spp*, *Vernonia amygdalina* and *Allium s pp* showing that they possess important anti-diabetic properties as reported by (22) and (23).

Some traditional remedies for *Diabetes mellitus* may create feeling of improved conditions without necessarily reducing hyperglycaemia (high sugar content in the body) because of claims that certain plants can ameliorate the complication of diabetes. According to (24), the *Allium* family, particularly Garlic is traditionally considered to give strength, reduce polydipsia (excessive thirst) and dehydration as demonstrated in severely streptozotocin induced diabetic mice without improving glycemic control. The use of traditional medicine with synthetic drugs must be approached with caution to avoid severe hypoglycaemia and coma. This is because studies on the interaction of traditional medicine with conventional drugs are not common but a case study by (25), indicated that hypoglycaemic effect of *Momordica charantia* Schum & Thonn. was additive to that of chlorpropamide (Diabinese) which apparently reduce insulin requirement.

Today, ethnobotany is in the midst of renaissance. This revival reflects increasing concern about the disappearance of the rain forests and the tribal cultures inhabiting them. According to (26), medicinal plants should be focused for regeneration and propagation as (27) earlier reported that only about 39% of Rural Communities in Nigeria have access to modern health care services.

The usage of herbal remedies in treating *Diabetes mellitus* is useful because of long cultural history of utilization and the current renewed interest in natural products to sustain global health. As a way of recognizing the values and roles of traditional medical knowledge in health care provision, further research into the efficacy and safety of herbal remedies employed in the treatment of diabetes is very important in Nigeria and Africa as a whole. There is therefore the need for rejuvenation of these medicinal plants to preserve their genetic diversity. (28), concluded that conservationists in Nigeria must begin to address this area of genetic erosion at the genetic level which is the most neglected area of biological Diversity.

Since the overall aim of health care delivery is to better the health of people, the orthodox medical practitioners should tolerate, abjure antagonism and co-operate with traditional practitioners in order to create a conducive atmosphere for much needed research into traditional medicine. In this way, we can mate the two practices to produce a hybrid (29).

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