ORIGINAL PAPER

Ethnobotanical Survey of Plants used in the Management of Hypertension in Ibadan North Local Government Area of Oyo State, Nigeria

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation; D – writing the article; E – critical revision of the article; F – final approval of article.

Abstract

Background: Among diseases that affect humans, the non-communicable diseases (NCDs) are quite a number of which hypertension is a leading member of the group and a leading contributory cause of death worldwide.

Objective: To identify and document medicinal plants used in ethno-medical management of hypertension in selected communities within Ibadan metropolis. This is with the aim of contributing to a database of plants for future systematic biological and chemical evaluation for possible templates of anti-hypertensive agents and drug leads.

Materials and methods: An inventory of plant species/natural remedies used in folk medicine to manage hypertension in Ibadan North Local Government Area of Oyo State was undertaken. Interviews using semi-structured questionnaires and open-ended conversations were conducted among one hundred and seventy-six (176) respondents aged 30 years and above to obtain relevant information.

Results: A total of one hundred and one (101) plants belonging to fifty-four (54) families were identified of which the highest number of plants mentioned belong to family Compositae. The usage profiles of the plants were quantified by the quotation frequency/ mention index.

Conclusion: It was observed that Ibadan is a rich source of plants indicated in management of hypertension. More scientific work especially biological studies are needed to ascertain the efficacy, toxicity, safety and appropriate dosage regimen of these ethno-medicinal remedies.

Keywords: Hypertension, *Kigelia africana*, Non-communicable diseases, ethnobotanical survey

INTRODUCTION

Non-communicable diseases are medical conditions or diseases which are non-infectious (Alexander, 1995) of which hypertension is a leading member and cause of death (WHO, 2010). They are diseases of long duration and slow progression and include heart disease, stroke, cancer, diabetes, chronic kidney diseases, osteoporosis, Alzheimer's disease, cataracts (Alexander, 1995).

Hypertension is the most common cardiovascular disease and is a major public health issue in developed as well as developing countries (Weiss, 2011). The "Seventh Report of the Joint National Committee on Detection, Evaluations and Treatment of High Blood Pressure" (JNC-7) defines hypertension as a systolic blood pressure greater than 140 mmHg or a diastolic blood pressure greater than 90 mmHg. The (JNC-7)

added a "prehypertension" category that includes individuals with systolic blood pressure readings of 120 to 138 mm Hg or diastolic blood pressure readings of 80 to 89 mmHg. This category is now included in contemporary management strategies. There are many potential causes of hypertension, but sometimes the disease is asymptomatic. It is regarded as the silent killer because 30% of its sufferers do not realize it. It is the number one modifiable cause of stroke because lowering blood pressure reduces the chance of stroke by 35 to 40% while other conditions including heart attack and heart failure can be reduced by 25 and 50% respectively (Weiss, 2011).

Hypertension is a heterogeneous disorder that may result either from a specific cause (secondary hypertension) or from an underlying pathophysiologic mechanism of unknown aetiology (primary or essential hypertension) (Wells *et al*, 2009). Secondary

hypertension accounts for fewer than 10% of cases, and most of these are caused by chronic kidney disease or renovascular disease. Other causes of secondary hypertension include pheochromocytoma, Cushing's syndrome, hyperthyroidism, hyperparathyroidism, primary aldosteronism, pregnancy, obstructive sleep apnea, and coarctation of the aorta. Some drugs that may increase blood pressure (BP) include corticosteroids, estrogens, nonsteroidal antiinflammatory drugs (NSAIDs), amphetamines, sibutramine, cyclosporine, tacrolimus, erythropoietin, and venlafaxine (Wells *et al,* 2009).

As per the World Health Statistics 2012, of the estimated 57 million global deaths in 2008, 36 million (63%) were due to non-communicable diseases (NCDs). The World Health Organization (WHO, 2010) reported that NCDs are to be by far the leading cause of mortality in the world, representing 60% of all deaths. Risk factors such as a person's background, lifestyle and environment are known to increase the likelihood of certain NCDs. About 7.5 million people die because of high blood pressure and by 2030 deaths due to chronic NCDs are expected to increase to 52 million per year while deaths caused by infectious diseases, maternal and pre-natal conditions and nutritional deficiencies are expected to decline by 7 million per year during the same period (Alexander, 1995). There was an estimate of about 20.8 million cases of hypertension in Nigeria among people aged at least 20 years in 2010, with a prevalence of 28.0% (24.6, 31.9) in both sexes – 30.7% (24.9, 33.7) among men and 25.2% (22.7, 31.9) among women. And by 2030, a projected increase to 39.1 million cases of hypertension among people aged at least 20 years with a prevalence of 30.8% (24.5, 33.7) in both sexes – 32.6% (27.3, 38.2) among men and 29.0% (21.9–32.2) among women (Adeloye *et al*., 2015) Hence, the urgent need to find a sustainable solution. The largest proportion of NCD deaths is caused by cardiovascular diseases (48%). In terms of attributable deaths, raised blood pressure is one of the leading behavioural and physiological risk factor to which 13% of global deaths are attributed. Hypertension is reported to be the fourth contributor to premature death in developed countries and the seventh in developing countries. Recent reports indicate that nearly 1 billion adults (more than a quarter of the world's population) had hypertension in 2000, and this is predicted to increase to 1.56 billion by 2025 (Sharma and Minolin, 2017). Earlier reports also suggest that the prevalence of hypertension is rapidly increasing in developing countries and is one of the leading causes of death and disability. While mean blood pressure has decreased in nearly all high-income countries, it has been stable or increasing in most African countries. Today, mean blood pressure remains very high in many African and some European countries. The prevalence of raised blood pressure in 2008 was highest in the WHO African Region at 36.8% (34.0–39.7) (World Health Statistics, 2012).

Treatment of hypertension involves both pharmacologic and non-pharmacologic approaches. Pharmacologic treatment is the use of anti-hypertensive agents for lowering blood pressure while non-pharmacologic interventions apply lifestyle modifications in the management of high blood pressure. Lifestyle modification, appropriate drug combinations, adequate antihypertensive drug doses are necessary to achieve adequate blood pressure control (Chobanian *et al*, 2003).

Many synthetic drugs have been developed for the treatment of hypertension because of the severity and prevalence of the disease (Susanta *et al*, 2010). Most of these drugs have demonstrated better efficacy but possess a number of side effects especially the recent recall of some antihypertensive for the cause of cancer by United States Food and Drug Administration (USFDA, 2018). Scientific studies therefore, suggest an alternative in the management of hypertension by lifestyle changes and use of appropriate phytomedicine (Ghorbani, 2014; Singh *et al*., 2015).

Herbal medicines have been regaining importance because of their ease of availability, cultural acceptability, safety, potency, less side effects and cost effectiveness. Recent attention has been focused on the herbal preparations as alternative agents for the treatment and prevention of cardiovascular problems (Benzie and Wachtel-Galor, 2011). Despite the large number of modern antihypertensive drugs, people largely depend on complementary and alternative medicine for treatment while some have the idea that combining it with conventional treatment works better (Abubakar *et al*., 2015).

Previous researchers reported plant species with varying applications against the disease and these includes *Kigelia africana* (Bignoniaceae), *Ficus capensis* (Moraceae), *Crossopteryx febrifuga* (Rubiaceae), *Phyllanthus amarus* (Euphorbiaceae) and *Paullinia pinnata* (Sapindaceae). Others are *Rauwolfia vomitoria* (Apocynaceae), *Calotropis procera* (Aslepiadaceae), *Persea americana* (Lauraceae), *Anacardium occidentale* (Anacardiaceae) and *Newbouldia laevis* (Bignoniaceae) (Atawodi *et al*., 2014). Several other herbal medicines have also been studied as potential therapeutic agents in the management of hypertension. These herbal medicines are shown in Table 1

Table 1: Herbs as antihypertensive (https://wildfoodism.com/2014/01/02/49-plants-that-treat-high-blood pressure)

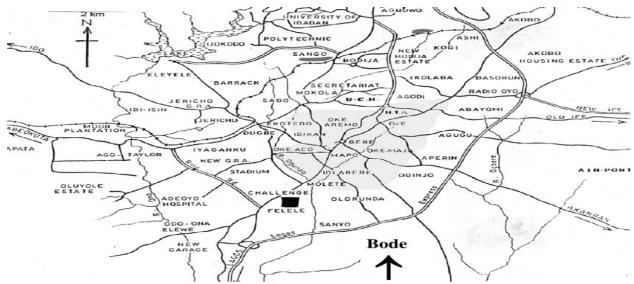| S/N	Common names	Botanical names	Families
1	Round leaf buchu	*Agathosma betulina*	Rutaceae
2	Garlic	*Allium sativum*	Liliaceae
3	Prickly custard apple	*Annona muricata*	Annonaceae
4	Celery	*Apium graveolens*	Apiaceae
5	Manchurian pipevine	*Aristolochia manshuriensis*	Aristolochiaceae
6	Aristolochia manshuriensis	*Artocarpus altilis*	Moraceae
7	Oats	*Avena sativa*	Poaceae
8	Psyllium	*Plantago ovata*	Plantaginaceae
9	Tea	*Camellia sinensis*	Theaceae
10	Lasaf	*Capparis cartilaginea*	Capparaceae
11	Ajwain	*Trachyspermum ammi*	Apiaceae
12	Chaksu	*Cassia absus*	Fabaceae
13	Coffee weed	*Senna occidentalis*	Leguminosae
14	Moreton Bay chestnut	*Castanospermum austral*	Fabaceae
15	Coleus forskohlii	*Plectranthus barbatus*	Lamiaceae
16	Virginia dayflower	*Commelina virginica*	Commelinaceae
17	Chinese hawthorn	*Crataegus pinnatifida*	Rosaceae
18	River lily	*Crinum glaucum*	Amaryllidaceae
19	Giant dodder	*Cuscuta reflexa*	Convolvulaceae
20	Wild carrot	*Daucus carota*	Apiaceae
21	Coin-leaf desmodium	*Desmodium styracifolium*	Fabaceae
22	Hardy fuchsia	*Fuchsia magellanica*	Onagraceae
23	Soybean	*Glycine max*	Fabaceae
24	Pima cotton	*Gossypium barbadense*	Malvaceae
25	Roselle	*Hibiscus sabdariffa*	Malvaceae
26	French lavender	*Lavandula stoechas*	Lamiaceae
27	Broad leaved pepper weed	*Lepidium latifolium*	Brassicaceae
28	Flax	*Linum usitatissimum*	Linaceae
29	Black mangrove	*Lumnitzera racemose*	Combreatceae
30	Tomato	*Solanum lycopersicum*	Solanaceae
31	Moringa	*Moringa oleifera*	Anacardiaceae
32	African corkwood tree	*Musanga cecropioides*	Urticaceae
33	Basil	*Ocimum basilicum*	Lamiaceae
34	Harmal	*Peganum harmala*	Zygophyllaceae
35	Kudzu	*Pueraria lobate*	Leguminoceae
36	Nela nelli	*Phyllanthus amarus*	Phyllanthaceae
37	Maritime pine	*Pinus pinaster*	Pinaceae
38	Pomegranate	*Punica granatum*	Punicaceae
39	Radish	*Raphanus sativus*	Brassicaceae
40	Snakeroot	*Rauvolfia serpentina*	Apocynaceae
41	Rhaptopetalum coriaceum	*Rhaptopetalum coriaceum*	Scytopetalaceae
42	Sesame	*Sesamum indicum*	Pedaliaceae
43	Sticky nightshade	*Solanum sisymbriifolium*	Solanaceae
44	Cacao	*Theobroma cacao*	Malvaceae
45	Wheatbran	*Triticum aestivum*	Poaceae
46	Cat's claw herb	*Uncaria rhynchophylla*	Rubiaceae
47	Mistletoe	*Viscum album*	Santalaceae
48	Wild African black plum	*Vitex doniana*	Lamiaceae
49	Ginger	*Zingiber officinale*	Zingiberaceae

Figure 1: Map of Ibadan North Local Government Area

METHODOLOGY
MATERIALS AND METHODS

Study setting

The study was carried out in the University College Hospital (UCH), University of Ibadan, NARL Specialist Clinic (Centre for Research & Development of Phyto-medicine), Bodija, Sango, Sabongari, Mokola, Ijokodo/Gbaremu markets all in Ibadan North Local Government Area as shown in Figure 1. The Ibadan North Local Government was founded by the Federal Military Government of Nigeria on 27th September 1991. The Local Government is bounded in the North by Akinyele, in the West by Ido Local Governments.

Ibadan is the capital city of Oyo State, located in South-Western Nigeria. It is about 128 km inland northeast of Lagos and 530 km southwest of Abuja, the federal capital. Oyo State is bounded in the south by Ogun State and in the north by Kwara State. It is bounded partly by Ogun State and partly by the Republic of Benin in the west while it is bounded by Osun State in the east. At independence, Ibadan was the largest and most populous city in the country with about two and a half million people and the second in Africa after Cairo and Johannesburg. The most predominant ethnic group in this area is the Yoruba (Ajayi and Moody, 2015).

DATA COLLECTION

Information was collected between August and September 2016 from the respondents who were mostly females and males of 30 years and above, comprising of hypertensive patients, traditional medical practitioners and herb sellers. The use of semi-structured questionnaire and oral interview were adopted to obtain relevant ethno medicinal data.

A total of 200 questionnaires were administered to the respondents. Basic information about locality, scientific and vernacular names, parts(s) used, method of preparation of herbal medicine and record of their similar use in ethno medicine were collected. Most respondents including the herb sellers and traditional medical practitioners as well as the patients were interviewed through the help of an intermediary in the local language for clarity. However, some refused to provide helpful information and no further attempt was made to influence such subjects. Informed consent was obtained orally from all participants before the administration of the questionnaires and commencement of the interview. There were two categories of questionnaires administered. One category was for the hypertensive patients and the other category was for the herb sellers and traditional medical practitioner.

The questionnaire was divided into three sections. Section 1 deals with demographic information such as age, sex, occupation (patients), religion and years of experience (herb sellers and traditional medical practitioners). Section 2 deals knowledge of hypertension and medicinal plants for management of hypertension through the local name. Section 3 deals with knowledge of edible food plants and spices that could be used in the management of hypertension.

In terms of educational background, majority of the respondent were not literate. The questionnaire was translated and interpreted to them orally in the local language and responses filled into the questionnaire after each interview.

RESULTS AND DISCUSSION
Ethnobotanical survey
The survey showed a total of 176 respondents, interviewed through the use of semi-structure questionnaire. The respondents were mainly Hypertensive Patients (43%), Herb Sellers (51%) and Traditional Medical Practitioners (TMPs) (5%). The demographic survey of respondents was represented in Table 2.

Table 2: Demographic structure of the respondents on the knowledge of plants used in the treatment hypertension

Parameter	Specifications	N (%)
Category	Patients	76(43.18)
	Herb sellers	90(51.14)
	Traditional medical practitioners	10(5.68)
Sex	Male	33
	Female	143
Years of practise/experience	5-10	13
	11-20	15
	21-30	17
	31-40	19
	41-50	30
	>50	2
Age	<30	3
	31-40	29
	41-50	32
	51-60	35
	61-70	30
	>70	12
Religion	Christian	6(8)
	Muslim	61(91)
	Sango worshiper	1 (1)

N = number of respondents; % = percentage of respondents

Table 3: Plants used to manage hypertension in Ibadan North Local Government

S/N	Botanical Name	Family	Common/Yoruba Name	Part used	Quotation Frequency	Use Mention Index(UMI)	% UMI
1	*Allium sativum*	Liliaceae	Ayuu	Rhizome	53	0.432	43
2	*Zingiber officinale*	Zingiberaceae	Ataale	Rhizome	38	0.301	30
3	*Moringa oleifera*	Moringaceae	Moringa	Fruit	8	0.063	6.3
4	*Aframonum melegueta*	Zingiberaceae	Ataare	Seed	3	0.024	2.4
5	*Kigelia africana*	Bignoniaceae	Pandoro	Leaf\fruit	30	0.238	24
6	*Syzygium aromaticum*	Myrtaceae	Kanafuru	Flower buds	1	0.008	0.8
7	*Viscum album*	Lorantaceae	Afomo	Leaf	20	0.159	16
8	*Dalbergia saxatilis*	Leguminosae	Paran	Leaf	1	0.008	0.8
9	*Moringa lucida*	Rubiaceae	Oruwo	Leaf	1	0.008	0.8
10	*Xylopia aethiopica*	Annonaceae	Eeru/erunje	Seed	2	0.016	1.6
11	*Aloe vera L.*	Xanthorrhoeaceae	Aloe vera	Juice	2	0.016	1.6
12	*Cactus sp.*	Cactaceae	Epo oro	Stem, whole plant	1	0.008	0.8
13	*Irvinga gabonensis*	Irvingacaceae	Epo apon	Stem	2	0.016	1.6
14	*Khaya ivorensis*	Maliaceae	Eruku oganwo	Stem, bark, root	4	0.032	3.2
15	*Newbouldia laevis*	Bignoniaceae	Epo akoko	Bark	1	0.008	0.8
16	*Croton lobatus*	Euphorbiaceae	Eru Alamo	Seed	4	0.032	
17	*Bixa orellana*	Bixaceae	Osunbuke	Fruit, seed	1	0.008	0.8
18	*Ola subscorpioidea*	Olacaceae	Ifon	Stem	1	0.008	0.8
19	*Ficus thonningii*	Moraceae	Opoto	Stem	1	0.008	0.8
20	*Caspicum frutescens*	Solanaceae	Ata ijosi	Fruit	2	0.016	1.6
21	*Citrus aurantium*	Rutaceae	Lime	Juice, root	4	0.032	3.2
22	*Allium scallion*	Liliaceae	Alubosa elewe	Bulb, leaf	3	0.024	2.4
23	*Brysocarpus coccineus*	Connaraceae	Amuje	Root	2	0.016	1.6
24	*Rauwolfia vomitoria*	Apocynaceae	Asofeyeje	Leaf	5	0.040	4
25	*Terminalia glaucescens*	Combretaceae	Idi stem	Stem	1	0.008	0.8
26	*Anogeissus leiocarpus*	Combretaceae	Ayin	Stem	1	0.008	0.8
27	*Plumbago zeylanica L.*	Plumbaginaceae	Inabiri	Leaf	2	0.016	1.6
28	*Nauclea latifolia*	Rubiaceae	Egbesi	Stem	2	0.016	1.6
29	*Hunteria umbellata*	Apocynaceae	Abeere	Seed	4	0.032	3.2
30	*Tetrapleura tetraptera*	Mimosaceae	Aidan	Fruit/seed	1	0.008	0.8
31	*Allium ascalonicum*	Amaryllidaceae	Alubosa onisu	Leaf	1	0.008	0.8
32	*Opuntia dillenii*	Cactaceae	Oro agogo	Fruit	1	0.008	0.8
33	*Euphorbia unispinia*	Euphorbia	Oro adete	Root	1	0.008	0.8
34	*Ficus asperifolia*	Moraceae	Ipin	Leaf	1	0.008	0.8
35	*Piper guineense*	Piperaceae	Iyere	Fruit	2	0.016	1.6
36	*Nicotiana tabacum*	Solanaceae	Taba	Leaf	1	0.008	0.8
37	*Mucuna pruriens*	Leguminosae	Esise	Leaf	1	0.008	0.8
38	*Bambusa vulgaris*	Poaceae	Bamboro	Leaf	1	0.008	0.8
39	*Hibiscus sabdariffa L.*	Malvaceae	Isapa,zobo	Fruit	2	0.016	1.6

40	*Ageratum conyzoides*	Asteraceae	Imi esu	Leaf	1	0.008	0.8
41	*Phaseolus lunatus*	Fabaceae	Poponla	Leaf	1	0.008	0.8
42	*Boscia angustifolia*	Capparaceae	Laoro	Stem	1	0.008	0.8
43	*Securidaca longipedunculata*	Polygalaceae	Ipeta	Stem	3	0.024	2.4
44	*Cassia alata*	Fabaceae	Cassia	Leaf	1	0.008	0.8
45	*Ficus capensis*	Moraceae	Opoto	Leaf	1	0.008	0.8
46	*Curculigo pilosa*	Hypoxidaceae	Epakun	Root	2	0.016	1.6
47	*Opilia celtidifolia*	Opiliaceae	Koyinsolorun	Leaf	1	0.008	0.8
48	*Bidens pilosa*	Asteraceae	Molaganran	Leaf	1	0.008	0.8
49	*Entandrophragma utile*	Meliaceae	Jebo	Leaf	1	0.008	0.8
50	*Reissantia indica*	Celastraceae	Ponjuowiwi	Root	1	0.008	0.8
51	*Synedrella nodiflora*	Compositae	Akoyun	Bark	1	0.008	0.8
52	*Uvaria chamae*	Annonaceae	Eruju	Root	1	0.008	0.8
53	*Raphia mambillensis*	Arecaceae	Ogooro	Leaf	1	0.008	0.8
54	*Gambeya africana*	Sapotaceae	Baka	Fruit		0.008	0.8
55	*Anthocleista nobilis*	Loganiaceae	Sapo	Stem	1	0.008	0.8
56	*Hibiscus Physaloides*	Malvaceae	Ako-igun	Leaf	1	0.008	0.8
57	*Chysophyllum albidum*	Sapotaceae	Baaka	Juice	1	0.008	0.8
58	*Adenopus breviflorus*	Cucurbitaceae	Tangiri	Fruit	1	0.008	0.8
59	*Citrullus mucosospemus*	Cucurbitaceae	Baara	Leaf	1	0.008	0.8
60	*Senna sp.*	Fabaceae	Asun	Leaf	1	0.008	0.8
61	*Chasmanthera dependens*	Menispermaceae	Atoo	Fruit	1	0.008	0.8
62	*Vitex doniana*	Lamiaceae	Orunila	Leaf	1	0.008	0.8
63	*Ficus exasperata*	Moraceae	Ewe epin	Bulb	3	0.024	2.4

64	*Senecio biafrae*	Compositae	Worowo	Leaf	1	0.008	0.8
65	*Momordica charantia*	Cucurbitaceae	Ewe ejinri	Leaf	2	0.016	1.6
66	*Butyrospermum paradoxum*	Sapotaceae	Ori/shea butter	Leaf	2	0.016	1.6
67	*Apium graveolens*	Apiaceae	Celery	Rhizome	1	0.008	0.8
68	*Beta vulgaris*	Chenopodiaceae	Beet root	Root	1	0.008	0.8
69	*Curcuma longa*	Zingiberaceae	Tumeric	Rhizome	1	0.008	0.8
70	*Persea americana*	Lauraceae	Avocado	Fruit	33	0.262	26
71	*Solanum melongena*	Solanaceae	Garden egg	Fruit	1	0.008	0.8
72	*Camellia sinensis*	Theaceae	Lipton tea	Leaf	5	0.040	4
73	*Cnidoscolus aconitifolius*	Euphorbiaceae	Iyanaipaja leaf	Leaf	1	0.008	0.8
74	*Musa paradisiaca*	Musaceae	Ogede leaf	Leaf	1	0.008	0.8
75	*Buchholzia coriacea*	Capparaceae	Wonderful cola	Seed	1	0.008	0.8
76	*Tricuticum aestium*	Poacea	Wheat	Seed	7	0.056	5.6
77	*Parkia biglobosa*	Fabaceae	Locust beans	Seed	10	0.079	7.9
78	*Solanum biafrae*	Compositae	Worowo leaf	Leaf	2	0.016	1.6
79	*Solanum nigrum*	Solanaceae	Odu leaf	Leaf	1	0.008	0.8
80	*Vernonia amygdalina*	Compositae	Bitter leaf	Leaf	9	0.071	7.1
81	*Zea mays*	Poaceae	Omi ogi(pap water)	Juice	8	0.063	6.3
82	*Dioscorea rotundata*	Dioscoreaceae	Yam flour	Tuber	8	0.063	6.3
83	*Saccharomyces cerevisiae*	Saccharomycetaceae	Yeast	Seed	1	0.008	0.8
84	*Allium cepa*	Liliaceae	Onion	Bulb	1	0.008	0.8
85	*Telfairia occidentalis*	Cucurbitaceae	Fluted pumpkin (ugwu)	Leaf	4	0.032	3.2
86	*Juglans regia*	Juglandaceae	Walnut	Fruit	2	0.016	1.6

87	*Cola acuminata*	Malvaceae	(obi ata) Kola nut	Seed	1	0.008	0.8
88	*Celosia argentea*	Amaranthaceae	Soko leaf	Leaf	1	0.008	0.8
89	*Talinum triangulare*	Portulaceae	Gbure	Rhizome	1	0.008	0.8
90	*Sorghum bicolor*	Poaceae	Guinea corn	Seed	1	0.008	0.8
91	*Cocos nucifera*	Arecaceae	Coconut water	Juice	1	0.008	0.8
92	*Abelmoschus esculentus*	Malvaceae	Dried okro	Fruit	3	0.024	2.4
93	*Carica papaya*	Caricaceae	Unripe pawpaw	Fruit	1	0.008	0.8
94	*Musa acuminata*	Musaceae	Banana flour	Fruit	2	0.016	1.6
95	*Ocimum gratissimum*	Labiatae	Effirin	Leaf	3	0.024	2.4
96	*Crassocephalum rubens*	Compositae	Ebolo	Leaf	2	0.016	1.6
97	*Plumbago zeylanica*	Plumbaginaceae	Inabiri leaf	Leaf	1	0.008	0.8
98	*Mangifera indica*	Anacardiaceae	Mango	Fruit	1	0.008	0.8
99	*Citrus aurantium*	Rutaceae	Lime/orange	Fruit	4	0.032	3.2
100	*Psidium guajava*	Myrtaceae	Guava	Fruit	1	0.008	0.8
101	*Musa paradisiaca*	Musaceae	Plantain flour	Fruit	17	0.135	13

The entire survey revealed that a total of 101 medicinal plant species from 54 families were used by the various practitioners. Botanical names, local names/common names, family, use mention index and plant part used presented in Table 3 while figure 2 represents the species distribution according to their families. Graphical representations showing the percentage occurrence of the plant families and the plant parts used in the management of hypertension is shown in Figure 2.
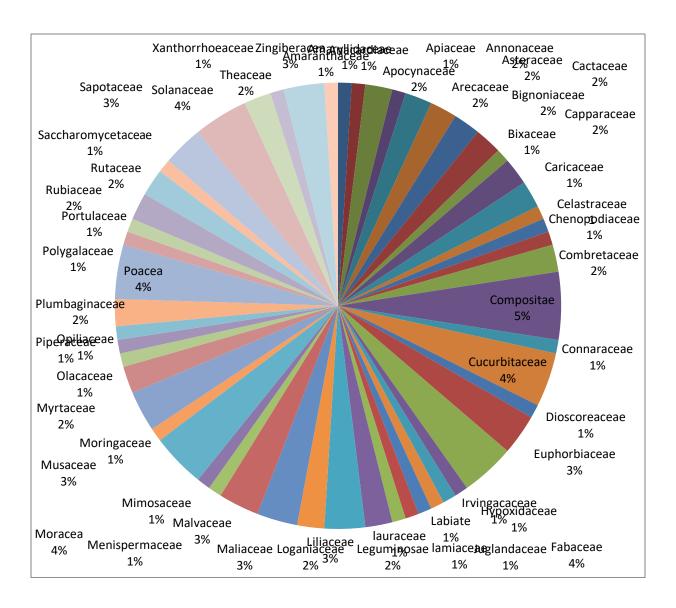
Figure 2: Graphical representation of species distribution according to families of the plants used to manage hypertension

Herbs are generally valued for their virtues as food as well as medicine (Oliver, 1960). Herbs may be prepared in different ways for use in the treatment of ailment, diseases and infections. They could be prepared as infusion, decoction, tincture, maceration, poultices and bathing remedies. Herbal remedies were either prepared from dry or freshly collected plants while the traditional solvents of choice include water, pure honey and lime. Survey revealed that leaves form the major part of plant for herbal preparations. Other parts are fruits, stems and roots (Oliver, 1960).

Plants have been a major source of medicine for human kind. The demand for traditional herbs is increasing very rapidly, mainly because of

accompanying toxicities in synthetic chemical drugs. The global clamour for more herbal ingredients creates possibilities for the local cultivation of medicinal and aromatic crops as well as for the regulated and sustainable harvest of wild plants (Anita, 2004). Nigeria is endowed with an enormous diversity of animals and plants, both domesticated and wild, and an impressive variety of habitats and ecosystems. This heritage sustains the food, medicinal, clothing, shelter, spiritual, recreational, and other needs of her population (Odugbemi and Akinsulire, 2006).

The respondents in this study gave local names of plants in recipes used in the management of hypertension in their locality. This was in consonance

with Singh who reported that plants are generally known by their local names in every part of the world (Singh, 2008).

The local names play a vital role in ethnobotanical study of a specific tribe or region. Although local names are not recommended directly for scientific accounts as they lack uniformity and consistency, yet they may certainly be considered as a useful tool for search of new useful plants or new uses of known plants (Erinos and Aworinde, 2012). Local names render a useful service as a means of reference by local people in a particular area.

The Use of Mention Index (UMI) was calculated by dividing the number of use of each mentioned plant by the number of respondents for all the plants both in single and multi-species remedies.

Survey revealed that quite a number of plant parts from the 101 species especially the leaves, stem, fruit and seeds have been found efficient in the management of hypertension in Ibadan North Local Government Area of South Western Nigeria. However, the prominent plant species are food plants and the recipes are; *Zingiber officinale, Allium sativum, Kigelia africana, Persea americana, Viscum album and Musa paradisica* (Table 3), which are indicative of their importance in the management of the disease.

This was illustrated by their use mention index (UMI) calculated by dividing the number of use of each mentioned plant (quotation frequency) by the number of respondents for all the plants (i.e. 176 respondents) and the percentage calculated by multiplying each UMI by 100. *Allium sativum* (43%) was observed to have the highest %UMI followed by *Zingiber officinale* (30%) and *Kigelia africana* (24%) amongst others (Table 3). Similarly, plants belonging to the families Compositae, Cucurbitaceae, Fabaceae, Poaceae, Solanaceae and Zingiberaceae occurred more frequently in the list of plants identified which suggest that those families are repository of prospective chemical compounds which may be templates for drug development in the management of hypertension.

The various plants parts used in preparations mentioned include bulb, fruit, leaves, rhizome, root, seed, stem, bark, tuber and whole plants. The leaves are important ingredient in traditional treatment of various diseases as it features as a component in many herbal preparations possibly because they represent the site of most photosynthetic activity in plants and they also contain very high concentrations of secondary metabolites (Boadu and Asase, 2017). It was observed that the leaves are the most frequently used (36%), followed by fruits (19%), seed (11%) and

stem (10%) and the methods of preparation varies, decoctions and infusions are the most frequently used methods. This is supported by previous researchers who reported that the leaf (43%) represents the dominant morphological part often included in recipes (Adebayo, 2012).

This finding agrees with other studies where prominent plant species included in recipes are *Cajanus cajan*, *Allium sativum*, *Carica papaya*, *Momordica charantia*, *Vernonia amygdalina* and *Aframomum melegueta* (Oladunmoye and kehinde, 2011). Some of the plants revealed in the survey have also been cited in the ethnobotanical survey of some African countries, for example in the treatment of measles, jaundice, poliomyelitis, yellow fever, chicken pox, (Oladunmoye and kehinde, 2011), antimalarial (Clarkson *et al* 2004).

Another study that supports the findings in this survey, reported the same plants as those frequently found to be included in antihypertensive recipes. The plant species are *Allium* species, *Persea americana, Zingiber officinale, Hunteria umbellata, Rauwolfia vomitoria* and *Aframomum melegueta* although with different Use of Mention Index (Adebayo, 2012).

Regular foods low in cholesterol and high in unsaturated fat has been indicated in the management of hypertension (Olapade, 2002). These include; dried fish, mackerel and herring, snail, lean red meat (preferably grilled), olive oil, corn oil, sunflower oil, oats, corn, skimmed milk, or yeast, beans, vegetable, plantain, bread, tea, coffee, fruits like walnut, bananas, green pawpaw, pineapple, grapes, garden eggs, carrots, boiled rice, potatoes, pears, soybeans, (Olapade, 2002). This supports the results from the survey revealing regular food plants such as *Allium sativum* (43%), *Zingiber officinale* (30%) and *Kigelia africana* (24%) with the highest use of mention index. However, foods to avoid are cream, coconut, butter, whole milk, all fatty meats and poultry and duck, eggs (yolk), shrimps, prawn and crabs, cashew nuts, ice cream, animal tongue, kidney and brain (Olapade, 2002).

The secrecy of the informants about the name of herbs shows their fear toward losing their source of income as this may have the aftermath of shifting patients focus from them to others. The respondents also demonstrated their fears about the newer generation losing the grips of the knowledge or practice of traditional medicine. Efforts need to be made by government to integrate herbal practice and protect the intellectual knowledge of practitioners. The government should demonstrate appropriate political will by not only formally recognizing the practice of traditional medicine, but also to establish traditional medical institutions and provide scholarships for interested persons (Raji *et al.,* 2013).

CONCLUSION

This study revealed that there exists the knowledge of the use of plants for the management of hypertension has added more to the existing discoveries of the relevance of plants and its usefulness in the management of hypertension in Ibadan North Local Government Area of South Western Nigeria. However, there is need for a more scientific backing for the use of these plants such as expanding its pharmacological basis such as pharmacokinetic, pharmacodynamics and toxicological properties. It is also important to validate the therapeutic claims through phytochemical, pharmacological investigation and the isolation, characterisation and identification of the bioactive compounds.

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