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RESEARCH ARTICLE

ETHNOTHERAPEUTIC EVALUATION AND ANTI-NUTRIENT CONTENT OF COMMON PLANTS USED FOR MANAGEMENT OF KIDNEY AND LIVER DISORDERS IN ODEDA COMMUNITIES, OGUN STATE, NIGERIA

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ABSTRACT

A survey study was carried out on plants used to manage kidney and liver diseases in Odeda Local Government Area, Ogun State, Nigeria. A total of hundred (100) questionnaire were administered using stratified sampling method on traditional herbal practitioners. Ethnobotanical data such as, plants and plant parts and methods of extraction used were sought. Anti-nutrients of the frequently mentioned plants were also evaluated. Data were subjected to Analysis of variance (ANOVA) with probability set at $p<0.05$ and descriptive statistics. Results revealed that 55.5% of the respondents were females while 45.5% were males. Largest percentage (47.9%) were between the ages 41-60years. Twenty six 26(26.0%) of the respondents were herbalists, 34(34.0%) were herb sellers, 21(21.0%) were Traditional practitioners while 19 (19.0%) were Traditional practitioners and herb sellers. Twenty three (23) of the respondents had 1-5years, 35 had 6-10 years while 42 of them had being in the herbal profession for more than 10 years. Seventy four percent (74%) of plants collated during this study were available both in home garden and markets. Fifty 50 plants species belonging to 37 families were reported being used to manage kidney and liver diseases. Malvaceae and meliaceae were the most frequently mentioned families. Largest number of plants 20(40%) collated were trees, followed by herbs 19(38%) while vegetable 1(2%) was vegetable. The most commonly used plants part were Leaves, barks roots, fruits, seeds bulbs and combination of any of these parts. Decoction, soaking, infusion, grinding, strong heating paste and combination(s) of any of these methods were employed for preparing herbal remedies of these diseases. No significant difference ($P>0.05$) was recorded in the phytate content of *Khaya ivorensis* and *Kigelia africana* leaves. Similar observation was recorded in the oxalate and cyanide content of *Chasmantheran dependens* and *Kigelia africana* leaves.. Polyphenol and tannins were significantly different across the leaves of plants under this investigation. No significantly different ($P>0.05$) was recorded in the quantity of phytate present in *Chasmantheran dependens* and *Kigelia africana*, oxalate of *Chasmantheran dependens*, *Kigelia africana* and *Azadirachta indica*, and *cyanide* in root of the plants. Highest phytate (13.00) was recorded in *Azadirachta indica*, oxalate (12.33), Polyphenol (9.00) and cyanide (4.33) in *Ficus exasperate* while tannins (16.00) were recorded in the leaves of *Chasmantheran dependens.*

Keywords: Ethnobotanical data , Anti-nutrient content, Kidney and Liver disorders

INTRODUCTION

The advent of modernization and technological development has given rise to increased risk of kidney and liver diseases among humans. The need to control or cure the diseases resulted to proliferation of synthetic drugs (Swati and Kanungo, 2013). Despite diverse advances in modern medicine, there is till significant revitalization of interest with respect to medicine and traditional pharmacopoeia. Plants are important sources of therapeutic drugs and play beneficial roles in the survival of the local communities including Odeda. Plants characterized several therapeutic potentials useful for manufacture of natural and affordable herbal drugs (Al-Adhroey *et al.*, 2010) with less side effects compare to allopathic medicines Irum *et al.*, 2014.

The use of synthetic drugs leads to the problems of side effects, ill effects, and complications of organs such as lungs and kidneys. Liver and kidney disorders are some of the common health problems which affect both old. It is a common and important cause of illness and death.

Therefore, documentation flora of any community for conservation and sustainable use is important not only for food but also for management of diseases.

Despite the array of medicinal flora of Odeda, no research has been conducted on the survey of plants having medicinal potential of managing kidney and liver diseases in the communities.

Therefore, the aim of this study was to systematically collect information about the usage of plants in human

therapy In the light of this, this study aimed to identify, collate and characterize plants commonly used to manage liver and kidney problems among people of Odeda and its environs.

MATERIALS AND METHODS

STUDY AREA

The study was carried out in Odeda Local Government. Odeda Local Government Area is located on Latitude 70 N and Longitude 30 E. It occupies an area of 1,658km2 with an estimated population of 109,449 (National Population Commission, 2006). The economy of the town is based on agriculture, informal services and small scale (cottage) industries. **Odeda is characterized by tropical climate marked with dry and wet seasons distinguished by moist south westerly monsoon winds which always result into heavy** rainfall between March and October.

There are about 25-30 semi-urban areas, 860 villages and hamlets in the local government area. Government establishments such as Federal University of Agriculture, Abeokuta, Federal college of Education, Osiele, Ogun- Oshun River Basin Development Authority and State Headquarters of Nigeria Police Eleweran are located in Odeda Local Government Area. Olodo, Olugbo, Kila, Alabata and Osiele are the major markets located in the study areas. Politically, Odeda Local Government Area is divided into ten (10) Electoral Wards, viz-Odeda, Itesi, Olodo, Alagbagba, Ilugun, Osiele, Obantoko, Alabata, Obete, Opeji. Eba, Fufu, Lafun (White Amala), Pounded yam, Plantain are food items associated with people in the area.

Determination of Anti-nutrient content of the most frequently mentioned plants

The anti-nutrient contents of the most frequently mentioned plants were conducted according to the method described by Sowofora *et al.*, 1993.

Questionnaire administration and data collection

Informed consent

The purpose of the study was explained to the local traditional practitioners, herb sellers, community leaders, market-head leaders and herbal shop owners in the town. Consent to was given by the head of traditional herb practitioners and community leaders. Informed consent was obtained from all the respondents. An approval for the study was obtained from market leaders and traditional heads of the communities in which the markets were located.

Questionnaire administration

One hundred(100) structured and validated questionnaire were administered randomly to traditional herbal practitioners and herb sellers, to obtain information on commonly used herbs, names of plants, parts used, methods of herbal preparation, route of administration, mode of administration, dosage measurement and duration of usage. The questionnaires were administered by purposeful sampling method.

Table 2

Reliability Statistics	
Cronbach's Alpha[a]	Number of Items
0.86	20

Quantitative phytochemical screening of leaves and roots of most frequently mentioned plants

Phytochemical contents such as phytate, oxalate, Polyphenol, Cyanide mg/kg and Tannins

of leaves and roots of the most frequently mentioned plant were carried out according Sofowora *et al.*, 1993

Statistical Analysis

Data were subjected to Analysis of variance (ANOVA) and means were by Duncan's multiple ranges Test (DMRT) at $P<0.05$.

RESULTS

A total of 100 randomly selected respondents were interviewed out of which 55.5% were females while 45.5% were males. Majority of the respondents (47.9%) were between the ages 41-60years, followed by people who were more than 60years (28.1%) while least (2.1%) of the respondents were recorded at age group 1-20years.

Thirty two percent (32.0%) of the respondents were Christians, 30.0% were Muslim while 38.0% practiced traditional religion. Majority of the respondents were educated as indicated by 84percent. 26(26.0%) of the respondents were herbalists, 34(34.0%) were herb sellers, 21(21.0%) were Traditional practitioners while 19 (19.0%) were Traditional practitioners and herb sellers (Figure 1).Years (s) of herbal practice played significant roles in the acquisition of herbal knowledge. 23 out of the respondents had 1-5years, 35 had 6-10 years while 42 of them had being in the herbal profession for more than 10 years (Figure 2). **Fifty 50 plants species belonging to 37 families were reported being used to manage kidney and liver diseases. Malvaceae and meliaceae were the most frequently mentioned families (Table 2).**

Seventy four (74%) of plants collated during this study were reported to be available mostly at home garden and markets (Figure 3). Largest number of plants 20(40%) collated during this study were trees, followed by herbs 19(38%) while vegetable 1(2%) was vegetable (Figure 4).

This study provides baseline ethnobotanical information on the use of plants by Odeda community herbal healers to treat liver and kidney diseases.

The most commonly used plants part reported being used were leaves, barks, roots, fruits, seeds bulbs and combination of any of these parts (Figure 5). Different methods of preparations such as decoction, soaking, infusion, grinding, strong heating paste and combination(s) of any of these methods were employed for preparing herbal remedies of these

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diseases. Decoction (45%) was the most preferred (Figure 6) usually with water as indicated by (Figure 7).

No significant different (P>0.05) was recorded in the phytate contentment of *Khaya ivorensis* and *Kigelia africana* leaves. Similar observation was recorded in the oxalate and cyanide content of *Chasmantheran dependens* and *Kigelia africana* leaves. This effect varied significantly (P<0.05) compared with oxalate determined in the leaves of *Azadirachta indica* and *Ficus exasperate.* Polyphenol and tannins contents were significantly different (p<0.05) across the leaves of plants under this investigation. Also, in the roots of the plants, no significantly different (P>0.05) was recorded in the quantity of phytate present in *Chasmantheran dependens* and *Kigelia africana*, oxalate of *Chasmantheran dependens, Kigelia Africana* and *Azadirachta indica,* and *cyanide* in root of the plants except *Kigelia Africana.* Similar amount of tannin was recorded in *Khaya ivorensis* and *Kigelia africana* as also observed in *Azadirachta indica* and *Ficus exasperate.* Highest phytate 13.00) was recorded in *Azadirachta indica* , oxalate (12.33) , Polyphenol (9.00) and cyanide (4.33) were recorded in *Ficus exasperate* while tannins (16.00) were recorded in the leaves of *Chasmantheran dependens* (Table 4). This study indicates that the quantity of anti nutrient was higher in the leaves of the plants under consideration roots.

Table 1: Socio- Economic Characteristics of Respondents of Odeda local Government Area

Variables	Frequency	% Frequency	Mode
SEX			
Male	45	45.5	
Female	55	55.5	Female
Age			
1-20years	2	2.1	
21-40years	21	21.9	
41-60years	46	47.9	41-60years
More than 60years and above	27	28.1	
RELIGIONS			
Christianity	32	32.0	
Islam	30	30.0	
Traditional	38	38.0	Traditional
Educational status			
Primary	50	50.0	Primary
Secondary	30	30.0	
Tertiary	4	4.0	
Non formal	16	16.0	

Table 2: Plants commonly used for managing kidney and liver diseases

BOTANICAL NAMES	FAMILY	LOCAL NAMES	COMMON NAMES	HABIT	PART USED
Adansonia digitata	Bombacaceae	Ose	Baobab	Tree	Leaves, barks
Aframomum melegueta	Zingeberaceae	Atare	Alligator pepper	Herb	Fruits
Allium ascalonicum	Liliaceae	Alubosa elewe	Onion	Herb	Bulbs
Allium cepa	Liliaceae	Alubosa onisu	Onion	Herb	Bulbs
Anacadium occidentale	Anacadiace	Chasu	Cashew	Tree	Leaves, Barks
Annanas comosus	Bromeliaceae	Ope oyinbo	Pineapple	Herb	Whole plant
Arachis hypogaea	Leguminose	Epa	Groundnut	Shrub	Leaves
Azadirachta indica	Meliaceae	Dongoyaro	Neem tree	Tree	Leaves
Bidens Pilosa	Compositae	Abere	Black jar	Herb	Whole plant
Carica papaya	Caricaceae	Ibepe	Pawpaw	Tree	Leaves
Chasmantheran dependens	Menispermaceae	Ato	Chasmanthera	Tree	Leaves, roots, barks
Citrulus lanatus	Cucurbitaceae	Egusi bara	Water melon	Herb	Fruits, leaves
Citrus aurentifolia	Rutaceae	Osan wewe	Lime	Tree	Fruits, leaves

Cocos nucifera	Palmea	Agbon	Coconut	Tree	Fruits, leaves, barks
Cola nitida	Steculiaceae	Obi	Kola	Tree	Fruits, barks, leaves
Corchorus olitorius	Malvaceae	Ewedu	Jute	Herb	Whole plant
Daucus carota	Aplaceae	Caroti	Carrot	Vegetable	Fruits
Entandrophragma cylindrium	Meliaceae	Ijebo	Stave wood	Tree	Barks
Euphorbia hirta	Euphorbiaceae	Emile	Asthma plant	Herb	Whole plant
Ficus capensis	Moraceae	Opoto	African mustard tree	Tree	Leaves, Roots
Ficus exasperate	Moraceae	Epin	Sand paper	Herb	Leaves
Garcina cola	Guttiferaceae	Orogbo	Bitter cola	Tree	Fruits, Barks
Gongronema latifolia	Asclepiadaceae	Madunmaro	Amaranth globe	Herb	Roots
Gossypium barbadense	Malvaceae	Kere wu	Cotton seed	Shrub	Seeds
Hibiscus sabbdariffa	Malvaceae	Sapa	Zobo	Shrub	Leaves
Ipomoea batatas	Convolvulaceae	Odunkun	Sweet potato	Herb	Leaves
Jatropha curcas	Euphorbiaceae	Lapalapa	Physic nut	Shrub	Leaves, Roots
Khaya ivorensis	Meliaceae	Oganwo	African mahogany	Tree	Barks, Roots
Kigelia Africana	Bignoniaceae	Pandoro	Sausage tree	Tree	Leaves
Lantana camara	Verbanaceae	Ewo agogo	Bush lantana	Herb	Whole plant
Mangifera indica	Anacadiace	Mongoro	Mango	Tree	Leaves, barks
Mimosa prudica	Mimosaceae	Patonmo	Sensitive leaf	Herb	Whole plant
Momordica charanta	Cucurbitaceae	Ejirin wewe	Bitter gourd	Climber	Leaves
Morinda lucida	Rubiaceae	Oruwo	Brimstone tree	Tree	leaves, barks
Musa specie	Musaceae	Ogede	Plantain	Shrub	Fruits
Nicotiana tabacum	Solanaceae	Taba tutu	Tobacco	Shrub	Leaves
Ocimum gratissimum	Lamiaceae	Efirin	Scent leaf	Herb	Leaves
Parkia biglobosa	Leguminosaceae	Igba	Locust bean	Tree	Leaves
Petveria alliaeae	Phytolaccaceae	Awogba	Guinea hen weed	Herb	Leaves, Roots
Solanum melongena	Solanaceae	Igba	Garden gg	Herb	Leaves, Roots
Talinum triangulae	Talinaceae	Gbure	Water leaf	Herb	Whole plant
Tamarindus indica	Fabaceae	Ajagbon	Tamarind	Tree	leaves, Roots
Terminalia catapa	Combretaceae	Frutu	Indian almond	Tree	Leaves, Barks
Theobroma cacao	Malvaceae	Coco	Cocoa	Shrub	Seeds, Leaves
Vernonia amygadalina	Asteraceae	Ewuro	Bitter leaf	Shrub	Leaves
Vitex doniana	Labiatae	Eru/Ori	West african plum	Tree	Seeds, Leaves, Fruits
Xylopia aethopica	Annonaceae	Eeru	Ethiopian pepper	Tree	Fruits
Zea mays	Poaceae	Agbado	Maize	Shrub	Seeds, Fruits
Zingiber officinale	Zingiberaceae	Atale	Ginger	Herb	Rhizomes

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Table 3: plant forms, method of application, Duration and Taste of the herbal preparation

Variables	Frequency	Percentage frequency	Mode
Plants forms			
Dry plant	13	13.7	
Freshly collected plant	21	22.1	
Both dry and freshly collected plant	61	64.2	64.2
Method of application			
Oral application	81	93.1	93.1
Cold bathing	3	3.4	
Inhalation	1	1.1	
Steam covering	2	2.3	
Duration of administration of herbal preparation			
Once daily	58	62.4	62.4
2-3 times daily	27	29.0	
Uncountable	8	8.6	
Taste of the herbal preparation			
Bitter	72	72.0	72.0
Sour	23	23.0	
Sweet	5	5.0	
Symptoms			
Edema	4	6.3	
Excessive sweating (fever)	14	21.9	
Fatigue and loss of appetite	1	1.6	
Excessive urination	1	1.6	
Constant coughing	44	68.8	68.8

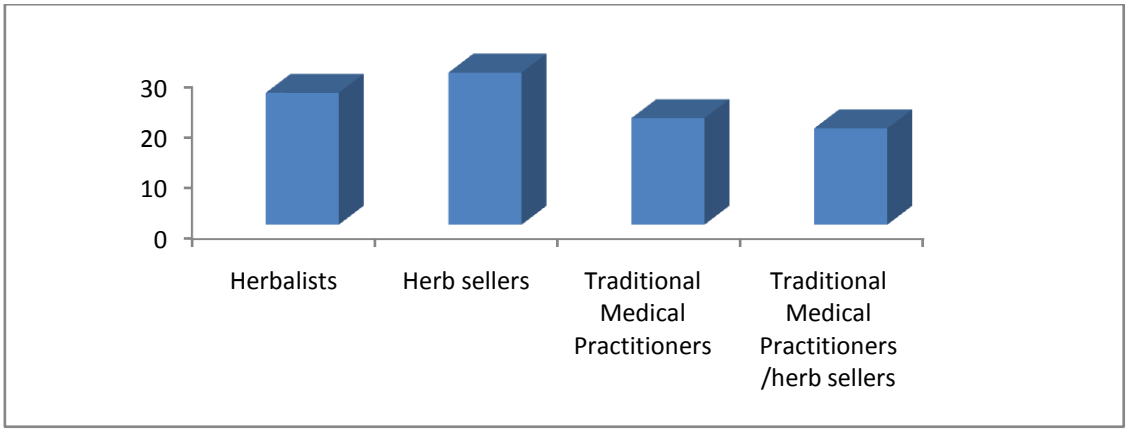

Figure 1: Categories of respondents

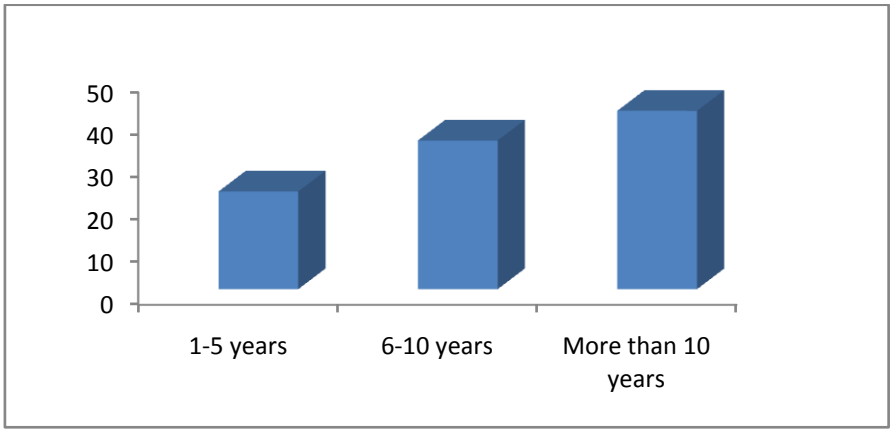

Figure 2: Category of years of herbal experience of the respondents.

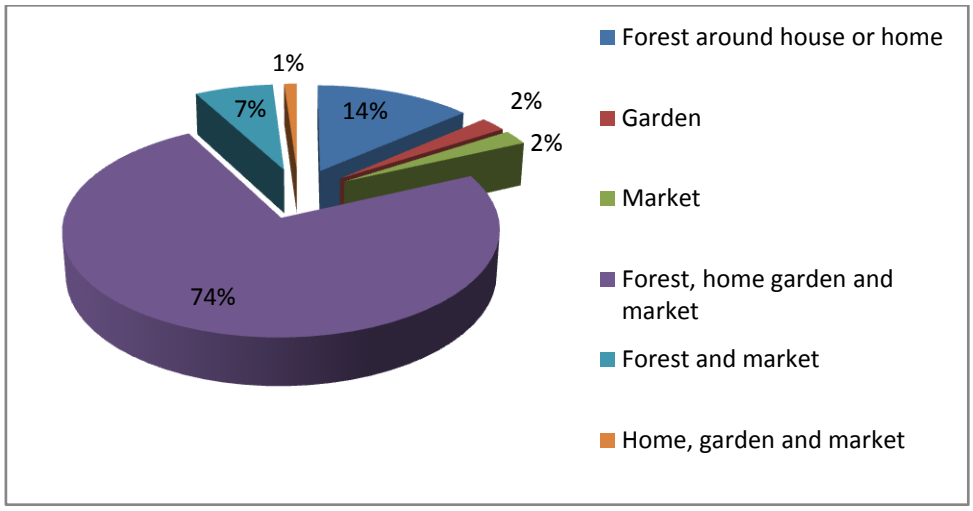

Figure 3: Place of availability of plant collated.

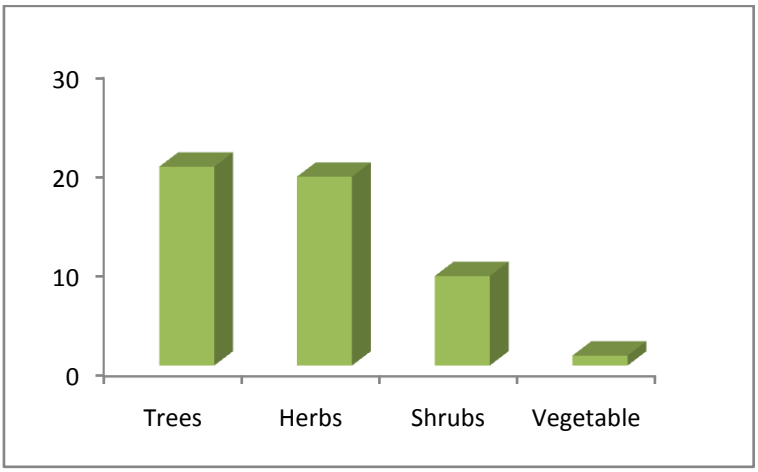

Figure 4: Habit of plants collated

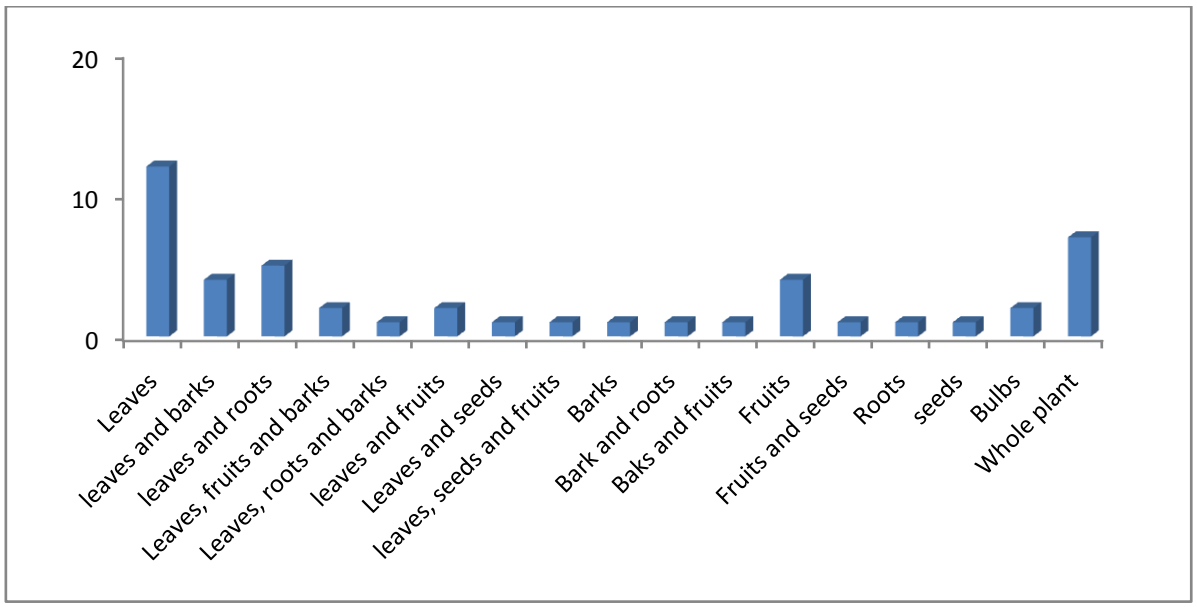

Figure 5: plants parts commonly used.

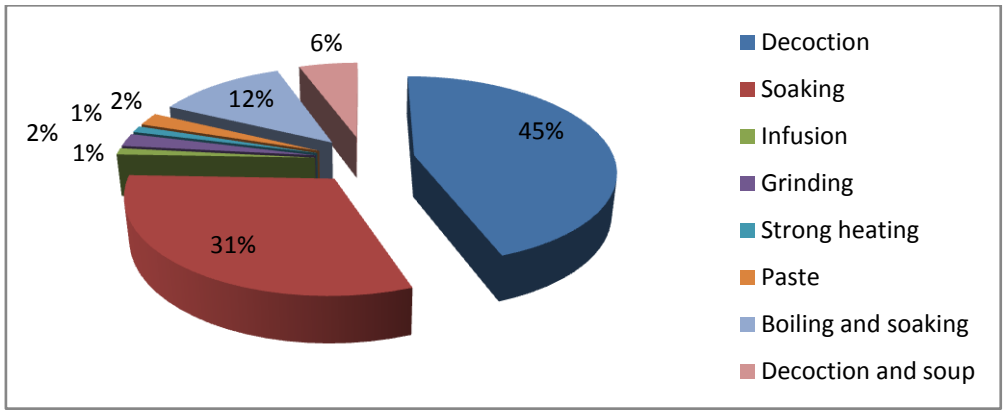

Figure 6: Method of preparation from the plants collated

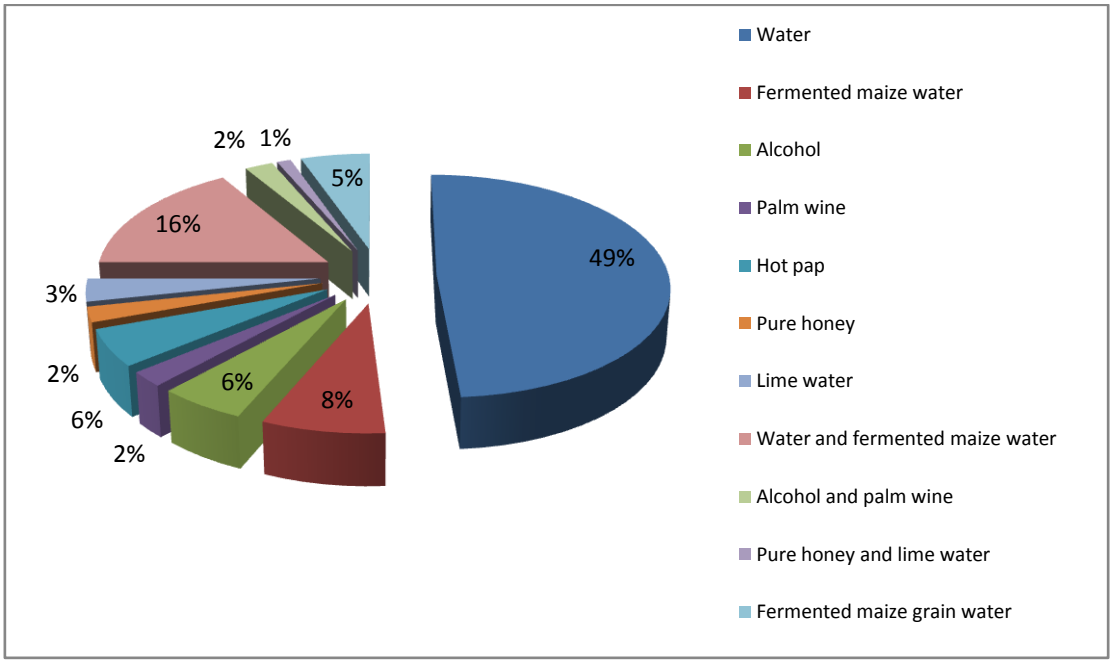

Figure 7: Solvent of choice

Table 4: Anti-nutrient content of leaves and root of plants commonly used for kidney and liver diseases in Odeda communities Abeokuta , Ogun State .

Plants	Anti-nutrient contents of leaves of plants commonly used for kidney and liver diseases				
	Phytate	Oxalate	Polyphenol %	Cyanide	Tannins
Leaf					
Chasmantheran dependens	3.75 ± 1.25^{f}	7.00 ± 2.35^{bc}	6.00 ± 0.10^{c}	2.00 ± 1.10^{bc}	16.00 ± 0.11^{a}
Khaya ivorensis	10.33 ± 0.33^{b}	7.00 ± 1.00^{bc}	7.6667 ± 0.67^{b}	2.00 ± 0.02^{bc}	14.67 ± 0.13^{b}
Kigelia Africana	11.00 ± 0.58^{b}	6.00 ± 0.58^{bcd}	5.00 ± 0.02d	2.67 ± 0.33^{b}	10.6667 ± 0.33^{e}
Azadirachta indica	13.00 ± 0.00^{a}	9.00 ± 0.58^{b}	7.3333±0.33b	2.33 ± 0.33^{b}	13.3333 ± 0.30^{c}
Ficus exasperate	11.33 ± 0.33^{ab}	12.33 ± 0.33^{a}	9.00±0.58a	4.33 ± 0.67^{a}	12.3333 ± 0.13^{d}
Root					
Chasmantheran dependens	7.96 ± 0.01^{c}	2.53 ± 0.01^{e}	3.00 ± 0.01^{f}	1.07 ± 0.01^{d}	2.63 ± 0.08^{f}
Khaya ivorensis	6.15 ± 0.01^{de}	3.17 ± 0.03^{de}	4.00 ± 0.04^{e}	0.83 ± 0.08^{d}	2.12 ± 0.01^{h}
Kigelia Africana	8.07 ± 0.03^{c}	1.59 ± 0.06^{e}	2.00 ± 0.10^{g}	1.37 ± 0.01^{cd}	1.64 ± 0.58^{h}
Azadirachta indica	7.68 ± 0.02^{cd}	2.17 ± 0.00^{e}	1.00 ± 0.05^{h}	1.03 ± 0.01^{d}	2.92 ± 0.01^{f}
Ficus exasperate	5.05 ± 0.03^{ef}	4.57 ± 0.02^{cde}	2.00 ± 0.12^{g}	1.167 ± 0.23^{d}	3.12 ± 0.67^{f}

Means followed by different letters on the same columns are significantly different according to Duncan's Multiple Range Test at $p<0.05$.

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DISCUSSION

Traditional use of flora by local communities reveals the cultural heritage and biodynamic elements that have immense chemotherapeutic values to cure many diseases (Vo Van Minh, 2014). The cultural and biological diversity of Odeda and its environs offers immense opportunities for ethno-botanical studies for the health care delivery of people in the communities.

Majority of the local people are neglected and their basic health requirement is at the expense of nature which is at their proximity. People rely largely on medicinal plants found in their localities for their common ailments by traditional methods. This has made the trend of using medicinal plants common in old inhabitants than young people (Qureshi *et al.*, 2013; Irum *et al.*, 2014). Decrease of ethno-pharmacological practices is due to encroaching industrialization and modern cultural changes in the life style**.** Documentation of indigenous knowledge about the use of plants for kidney and liver herbal remedies in Odeda is of paramount importance before the information is lost.

The observation that malvaceae and meliaceae are the most frequently mentioned families could be a pointer that the families could be scientifically investigated for management of liver and kidney herbal remedies.

Leaves were the most commonly used plants part for the control and management of the ailments. This could be because leaves are sites where many medicinal compounds such as alkaloids, tannins, coumarines, flavonoids, essential oils and inulins which are active components of most herbal preparations in high concentrations are synthesized and stored via photosynthesis. These compounds have been reported to give relief to patients suffering from kidney diseases and other diseases affecting both internal and external organs of man (Okigbo and Igwe, 2007; Ramesh and Okigbo, 2008). These results are clear indications that aerial parts of plants play important roles in herbal medicine preparation. The result of this finding could be a clears indication of wide use of leaves for herbal medicine compared to other plant part in the study area or importance of leaves for survival of the plants and animals (VoVan Minh, 2014). Utilization of the root and bulb highly affects the survival and ecological aspect of the plant because Medicinal plants are mostly harvested from the wild sources either for local use or trade purposes. This observation concurs with the finding of De-la-Cruz *et al.* 2007.

Most of the remedies were made from varying combination of two or more plants and parts.

The use of combination of plants and plant parts to prepare remedy for ailments could be as a result of additive or synergistic effects of all the plants in use (Bussman and Sharon, 2006). Igoli *et al.* (2005) reported that the joint use of multiple medicinal plants in concoctions could be due to synergistic effects of phytocemicals. Although occasionally, the preparations are administered by inhalation application but the most common mode of administration was oral because most preparations are made with water as a solvent. Various plant parts were also mixed with oil, honey, milk or tea for enhancing their acceptability and medicinal properties. This observation is in agreement with report of Kadiri *et al.*, 2014 who claimed that for effective treatment of catarrh and arthritis, small quantities of oil are added to the paste prepared by crushing the plant parts and that addition of oil might be to enhance the efficacy of the herbal remedies. The observation that although the respondents claimed the medicinal potential of the plants but could not explain their mode actions calls for further investigation about these plants.

Some of the anti-nutrients recorded in this study have been reported to have different implications on humans and their diets. Omoyeni and. Adeyeye (2009) reported that tannins posses anti-nutritional effect on the proximate composition by precipitating dietary proteins and digestive proteins and digestive enzymes to form complexes which are not readily digestible.

The anti-anti- nutrient contents of leaves and roots of *Chasmantheran dependens, Khaya ivorensis, Kigelia Africana, Azadirachta indica* and *Ficus exasperate* investigated contains low

level of anti-nutrients. This observation corroborates that reported by Omoyeni *et al.*,2012.

Anti-nutrient content of the leaves are capable of limiting the wide use of many plants as food due to their ubiquitous occurrence and deleterious effect on consumers **.** Some of these anti-nutrients can be reduced by different Heat methods of herbal preparation such as decoction and cooking, for example, boiling can reduce the soluble oxalate content of a food, if the water used for boiling is discarded thus, making the food prepared from these accessions safe for human consumption**.**

Finding of Miller *et al.*(1980) revealed that anti-nutrient content of plants in many cases vary due to variety and/or cultivar, climate condition, location, type of soil and season of the year during which they are grown.

However, consumption of different anti- nutrient such tannin, and saponins have also been encouraged despite their deleterious effect because they have been evaluated to be characterized by beneficial hypocholesterolaemic and hypoglycemic properties (Cheeke *et al.*, 1978 ; Ojewumi and kadiri, 20014). This study therefore recommends that preparation should be taken inform of decoction because of the belief that heating has reduction effect on the anti-nutrient levels of plants

CONCLUSION

This survey shows the flora values of the study area and need for herbal enlightment on the use of herbs as an alternative medicine**.** There is also need for further herbal research to remove some herbal impediments on indigenous methods of treating kidney and liver disease.

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