



Ethnomedicinal Study and Screening of Plants Used for Memory Enhancement and Antiaging in Sagamu, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. ETO and SAA designed the study, ETO, ATO, CMC, JMA and SAA performed the data collection. ATO and CMC performed statistical analysis. ETO, CMC and JMA wrote the protocol and screening. ATO wrote the first draft of the manuscript, while ATO and SAA managed the literature search. All authors read and approved the final manuscript.

Research Article

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ABSTRACT

Background: The objective of this study was to carry out a comprehensive ethnomedicinal survey of plants used as memory enhancer and antiaging in Sagamu Local Government area of Ogun State in south west Nigeria.

Methodology: Semi-structured questionnaires were used to conduct interviews with traditional healers, herb sellers and other knowledgeable individuals on use of medicinal plants as memory enhancers and anti-aging. Nine communities were selected randomly for data collection across the rural and urban centers with a total of 110 informants.

Results: The informants consist of 92% males and 8% females, 60% were traditional healers, 13% herb sellers while the others were knowledgeable individuals on medicinal plants utilization. Findings revealed 41 plant genera belonging to 31 families of which 46.3%, 26.8%, 17.1% and 12.2% are trees, herbs, climbers and shrubs respectively. Leaves (58.5%) and stem bark (26.8%) are prevalent in plant parts used. Screening of

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commonly used plants revealed presence of alkaloids, tannins, saponins, anthraquinones, cyanogenetic and cardiac glycosides.

Conclusion: Potentials of plants commonly used by indigenous people in the study area as memory enhancer and antiaging are recommended for further pharmacological research and conservation.

Keywords: Memory enhancement; antiaging; medicinal plants; herbal medicine; Sagamu; Nigeria.

1. INTRODUCTION

Man has used plant drugs for health care delivery over centuries; diseases remedies from plants sources for mankind are as old as human history and still in use till date. It is estimated that about 75% of useful bioactive plant derive pharmaceuticals used globally are discovered by systemic investigation of leads from traditional medicines (Tomoko et al., 2002).

Medicinal plants are used in treatment and prevention of various health problems from simple to complex disease situations among rural populations globally, thereby improving the quality of life. The inaccessibility and affordability of modern drugs among the rural populations of tropical Africa have made a large proportion of rural people to depend on traditional herbal drugs, (Oladele et al., 2011). In sub Saharan Africa, modern health care delivery is beyond the reach of people living in rural areas, hence they greatly rely on readily available medicinal plants in their neighbourhoods. It is estimated that over 70% of people in developing countries of Africa are peasant farmers, live in rural areas and use medicinal plants for their health care needs, (Birhan et al., 2011). However, in most developing countries, the knowledge on the use of these plant resources for medicine is vast disappearing due to lack or scanty documentation of this invaluable biological resource. In Nigeria, the documentation of indigenous knowledge on the use of plants for medicinal purposes exist but, inadequate and almost lacking in some parts of the country. Plant use for medicine varies among different ethnic and cultural groups, (Mussema, 2006). The use of medicinal plants for memory enhancing and anti-aging is popular among the Yoruba folk of western Nigeria, (local remedies for memory loss and aging are popularly referred to as "Ogun isoye and Ajidewe" respectively).

Alzheimer's disease (AD) is a progressive neurodegenerative brain disorder that occurs gradually and results in memory loss, unusual behavior, personality changes and ultimately death, (Jewart et al., 2005; Adewusi et al., 2010). It is a chronic, progressive disabling brain disorder characterized by disturbance of multiple cortical functions, including memory, judgment, comprehension, learning capacity and language, (Robert and Claudia, 1998). Adewusi et al. (2010) reported that AD is the major cause of morbidity in developed world where life expectancy is long, this situation have put severe strains on the local welfare systems of such societies. Considerable financial, social and emotional burdens are associated with the caring for patients with this disease (Akhondzadeh and Noroozian, 2002). In USA alone about 5 million people are affected by AD, (Houghton and Howes, 2005). However, the resulting adverse effects associated with nootropic agents, such as piracetam, pramiracetam, aniracetam, and donepezil have restricted their use for improving

memory, mood and behavior, (Cumin et al., 1982; Rogers et al., 1998; Schever et al., 1999; Joshi and Parle, 2006).

Aging is closely associated with AD; it is one of the factors leading to the dysfunction of the normal cellular regulation, affecting both central nervous and immune systems, it is reported to cause more than 50% cases of AD (Yu et al., 2005; Holliday, 1996). Caloric restriction and hormonal supplementation are used for anti-aging purpose, (Chiba et al., 2002). Studies suggest that development of anti-aging drugs from herbs may be a possible solution to aging issues, (Lei et al., 2003). Several medicinal plants have been used for decades in different cultures to improve memory and ameliorate aging effects such as; *Lycium barbarum* L (China), *Corydalis* spp (Denmark), *Melissa officinalis* (Iran) among many others, (Akhondzadeh et al., 2003; Yu et al., 2005; Adersen et al., 2006).

In this work, we aimed at documenting ethno-medical information on plants used as memory enhancer and anti-aging among the Remo people of the Yoruba stock in Nigeria, and also screen selected commonly used plants for their chemical compounds for possible leads to development of memory loss drugs.

2. MATERIALS AND METHODS

2.1 Study Area

Sagamu is part of Yoruba cultural region of southwestern Nigeria and the people speak Remo ethnic dialect; it is located in the present Ogun state and serves as the headquarters of Sagamu Local Government Area. The town lies on Latitude 6°49'N/Longitude 3°40'E and covers an area of 614 km² with a population of 253,412 at 2006 census, (NBS, 2006). The people dwell in rural villages around the town (Sagamu), major occupation of the people is farming which they practice at subsistence level due to lack of facilities and fragmented farmlands resulting from land tenure systems. Agricultural products of the region include cocoa, kola nuts and arable crops. The vegetation of the area is rich tropical rain forest. The region is underlain by major deposits of limestone, which is used in the production of cement by local and foreign investors.

2.2 Data Collection

The ethno medical survey was conducted with the aid of a pre tested semi structured questionnaire administered among traditional healers, herb sellers and other knowledgeable individuals on use of medicinal plants as memory enhancers and anti-aging. The semi structured questionnaire was prepared in English language and discussion with the respondents conducted in Yoruba language. Purpose of the interview was explained to the respondents and their consent to publish the findings obtained before questioning, token sum were paid to some respondents for their time and knowledge shared. Both rural and urban communities were visited between April and December 2010 to capture varying degrees of information on local remedies for memory loss and aging. Nine communities were selected randomly for data collection viz: Ofiri, KolawoleSode, IjokuEleja, Makun, Ijagba, Jebe, Epe, Idera and Sotubo. Interactions with the respondents took the form of interview in the premises of the traditional healers and herb sellers, the questionnaire featured the following questions among others – socio economic status, knowledge of memory enhancing and antiaging plants, plant parts used, mode of preparation and administration, sources of plant materials and efficacy of herbal drugs. Specimens of

medicinal plants mentioned were collected with the assistance of traditional healers on the field, collected plants were authenticated at the Forestry Research Institute (FRIN) herbarium, Ibadan, Nigeria where voucher specimens were deposited after proper identification for reference. Specimens collected for screening were air dried, powdered and stored at room temperature (25°C) in the Pharmacognosy laboratory, University of Ibadan pending usage. Powdered plants were macerated with 100% methanol for 48 hours, filtered and concentrated with rotary evaporator. Basic phytochemical screening was performed on the methanolic extracts of the selected plants.

2.3 Data Analysis

Information obtained from the questionnaires was extracted and presented in percentages and tables. Based on the frequency of mention, five (5) plants mentioned by minimum of 20% of the respondents were considered for phytochemical screening of compounds such as alkaloids, tannins, saponins, anthraquinones, cyanogenetic and cardiac glycosides.

3. RESULTS AND DISCUSSION

A total of 110 informants were interviewed on their knowledge of memory improvement and anti-aging plants. The informants consists of 92% males and 8% females (Table 1), among the Yoruba ethnic group of Nigeria, traditional medicine practice is dominated by males due to secrecy in transmitting the knowledge from generation to generation, (Oyelakin, 2009; Kudngaongarm, 2011). Males are culturally seeing as the heirs of family heritage for preservation and continuity with the belief that females leave the family after marriage. Also apprentices of traditional medicine practice are mostly males due to rigours of medicinal plants collection and preparation. However, females are especially knowledgeable in paediatric herbal medicine obtained in the course of raising children, (Jinadu et al., 1997; Voeks, 2007). 56% of the informants were above 50 years and 44% aged between 20-50 years; they mostly live in rural areas (85%, Table 1). Poor rural populations depend on herbal medicine for their health care needs due to lack of modern health care centers in rural areas, (WHO, 2008). Where modern health centers are available, the purchasing powers of rural population are usually low hence; they turn to herbal therapies that are readily available and within reach. Both literate (58%) and non-literate (42%) persons were interviewed randomly. Occupation of informants influences the knowledge of individual on use of plants for medicinal purposes. Traditional healers (TH) make up 60% of the informants, TH are majorly the custodian of knowledge in herbal remedies and serve as the first port of call during health emergencies in rural areas, they are well respected, popular and acceptable to the people in their neighbourhood. TH preserves the indigenous knowledge in herbal therapy through generations by training their family members and accepting apprentices (Sofowora, 1984). Services offered by TH are usually affordable by the rural poor and sometimes free, contrary to non-affordability of modern health care system. About 13% of the informants comprised of herb sellers or herb vendors, the interaction between herb sellers and TH over years help them to acquire some degree of knowledge in traditional health care delivery and utilization of plants for therapeutic purposes. Also, some other knowledgeable individuals (27%) were selected randomly for interview. These include students and parents that usually use herbal preparations with the hope of improving academic performances in school by enhancing memory.

Table 1. Demographic features of informants on Memory enhancer and Anti-aging plants

Informant's gender	Frequency	%
Male	101	92
Female	09	8
Total	110	100
Age		
Above 50 years	61	56
20 – 50 years	49	44
Total	110	100
Residency		
Urban	16	15
Rural	94	85
Total	110	100
Education		
Literate	64	58
Non-Literate	46	42
Total	110	100
Occupation		
Traditional healers	66	60.0
Herb sellers	14	13
Others	30	27
Total	110	100

Results from the survey of medicinal plants used for memory improvement and antiaging in the study area revealed 41 plant species belonging to 31 families of which 46.3%, 26.8%, 17.1% and 12.2% are trees, herbs, climbers and shrubs respectively (Fig. 1). Trees dominated antiaging herbal recipes (46.3%); this could be attributed to their natural signatures of longevity and robustness in the wild such as *Milicia excelsa* and *Carapa procera* of the Meliaceae family. Annual and perennial herbs of Poaceae and Asteraceae families are also frequently used as memory enhancers. Leaves (58.5%) and stem bark (26.8%) are prevalent in plant parts used as memory enhancer and antiaging by Sagamu people, (Fig. 2). Similar trends were observed in Ethiopia and Uganda, (Bekalo et al., 2009; Agea et al., 2011). Sustainable utilization of plants parts such as leaves and stem bark in herbal medicine poses no threat on continuous supply from the wild. Locally, plant harvesting for medicine is done without severing the plant. Memory loss is closely related to aging, our findings showed that some plants are used solely as memory enhancer (46.3%) or antiaging (39.0%) while others (14.6%) are associated with the two conditions, (Fig. 3). Families, local names, uses, parts used and preparation modes of surveyed plants in the study area are presented in (Table 2).

Studies in other cultures reveal that plant species in some of the genera recorded in this work are also used as memory enhancer and antiaging elsewhere, such as *Musa sapientum*, *Piper nigrum*, *Bacopa monniera*, *Senecio abyssinicus*, *Ocimum sanctum*, *Dioscorea bulbifera*, *Ficus religiosa*, (Mukherjee et al., 2007; Vimutha et al., 2007; Sancheti et al., 2009; Deval, et al., 2011; Cyril-Olutayo et al., 2012).

Potentials of medicinal plants in managing Alzheimer's disease (AD) and aging have been reported for *Gingko biloba*, *Bacopa monniera*, *Canscora decussata*, *Evolvulus alsinoides*, *Lycium barbarum*, (Yu et al., 2005; Nag and Bratati, 2008; Deval et al., 2011; Kastenholz 2011). Yu et al., (2005) emphasize the potential of using anti-aging drugs from herbal medicine to treat AD based on existing facts that various medicinal plants have been used as antiaging for decades in many cultures globally.

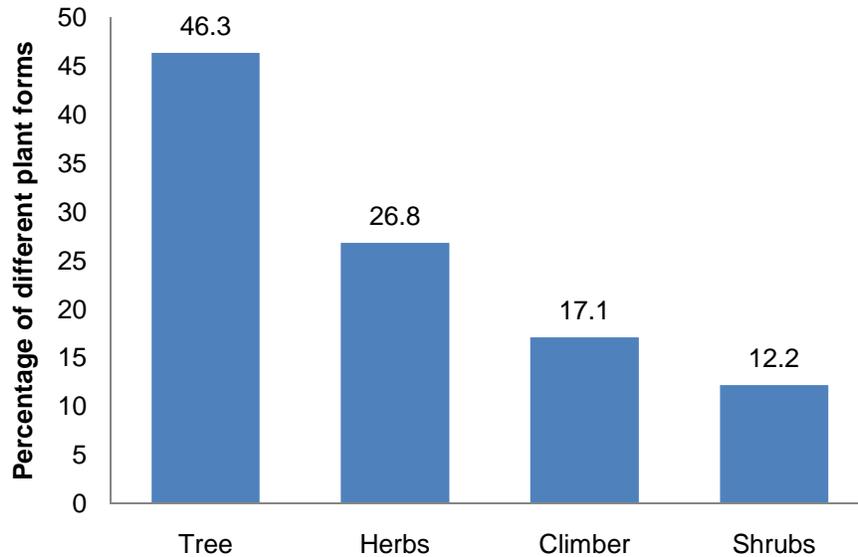


Fig. 1. Life forms of plants used as memory enhancer and antiaging in Sagamu

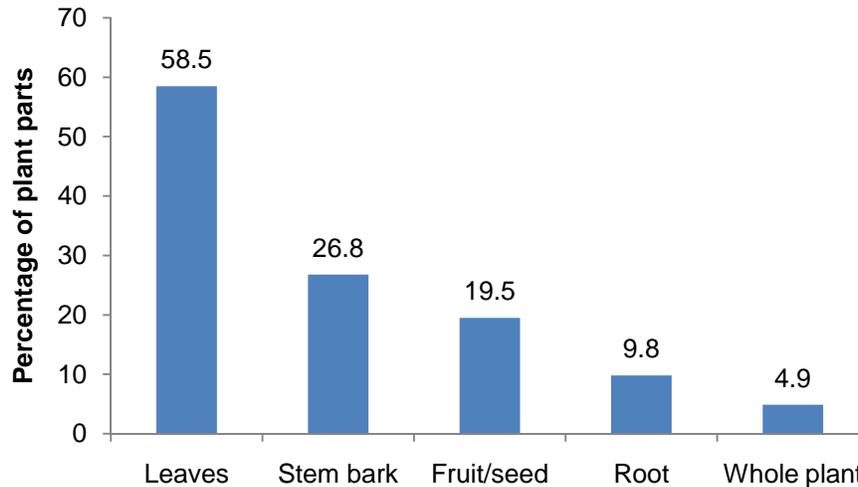


Fig. 2. Parts of plants used as memory enhancer and antiaging in Sagamu

Table 2. Plants used as Memory enhancer (ME) and Antiaging (AA) in Sagamu, Nigeria

	Plant name/family	Local name (Yoruba)	Plant form	Parts used	Uses	Preparation and administration mode	Freq
1	<i>Bacopa floribunda</i> (R.Br)Wettst Scrophuliaceae FHI- 67261	Oniyemiye	Annual herb	Leaves	ME	-Powdered dry leaves are licked with honey or incised into the body. -It is cooked with cat fish or pot soup	25
2	<i>Angraecum eichlerianum</i> Bory. OrchidaceaeFHI-52202	Ela	Vine/ climber	Leaves	ME	-Macerated or infused fresh leaves are taken orally -Leaves cooked as pot herb	25
3	<i>Parquet inanigrescens</i> Baillon. AsclepiadaceaeFHI-38737	Ogbo	Climber	Root, stem	ME, AA	-Stalks and roots are roasted or dried in clay pots, mix with pap and taken orally	24
4	<i>Senecioabysinicus</i> A.RichAster aceaeFHI-56916	Amunimuye	Herb	All parts	ME	-Decoction from all parts is taken orally or used to bath -Cook dry leaves with <i>P. guineense</i> fruit or cat fish as pot soup - Grind leaves and 7 seeds of <i>A. melegueta</i> , scrubbed on incision in the head	23
5	<i>Cleome gynandra</i> L. CapparidaceaeFHI-56917	Ekuya	Herb	Leaves	ME	-Cook with <i>Capsicum frutescens</i> and taken orally as pot soup	22
6	<i>Dalbergia lactea</i> (Roxb) Vatke. Papilionaceae FHI-85239	Ojiji	Tree	Leaves, stem bark	ME	-Leaves are cooked with <i>Piper guineense</i> fruits as pot soup - Leaves and stem bark are ground with <i>Capsicum frutescens</i> , eat with pap -Leaves cooked with electric fish eaten as pot soup -Ground dry leaves, mix with hair cream and use every morning	18
7	<i>Aframomum melegueta</i> K. Schum. Zingiberaceae FHI-85147	Atare	Herb	Seeds	ME, AA	-A fruit bunch grinded with Cock feather and cook with cat fish as pot soup (AA) -Seeds are powdered with maize grain then mix with honey and lick (ME)	13
8	<i>Digitaria debilis</i> (Desf.) Willd. PoaceaeFHI-93387	Airan	Herb	Leaves	ME	Leaves as pot herb	7

Table 2 continues ...

9	<i>Musa sapientum</i> L. Musaceae FHI-93383	Ogedewewe	Shrub	Stem and leaves	ME	-Cut the stem, place <i>Kola acuminata</i> fruit on the cut growing bud, cut the raised kolanut with the stem and cooked with <i>A melegueta</i> seeds then eat -Raised kolanut cooked with <i>B. vulgaris</i> leaves and eat as pot soup -Raised stem with kolanut macerated with honey to be licked	7
10	<i>Bryophyllum pinnatum</i> (Lam) Kurz. Crassulaceae FHI-31669	Abamoda	Herb	Aerial parts	AA	Leaves cooked with egg of local chicken and eat	6
11	<i>Abrus precatorius</i> L. Fabaceae FHI-70452	Omisinminsi, Ojuologbo	Climber	Leaves	ME	Powdered leaves mixed with honey then lick	6
12	<i>Ficus exasperate</i> Vahl. Moraceae FHI-17743	Eepin, Ipin	Tree	Leaves	ME	Leaves are cooked with <i>A. melegueta</i> seeds as pot soup	6
13	<i>Dioscorea mangelotiana</i> Meige. Dioscoriaceae FHI-66638	Esusu	Climber	Leaves, tuber	ME	Powdered dry tuber plus young leaf of palm tree and honey, lick daily	6
14	<i>Jatropha curcas</i> L. Euphorbiaceae FHI-78157	Botuje, Iyalode	Tree	Leaves	ME	-Leaf decoction with <i>Canna indica</i> plus <i>P. pelucida</i> leaves and <i>X. aethiopica</i> fruits, used to bath daily	5
15	<i>Spondia smombin</i> L. Anacardiaceae FHI-38084	Iyeye, Okika	Tree	Leaves	ME	Chew leaves with <i>Kola acuminata</i> fruit	5
16	<i>Capsicum frutescens</i> L. Solanaceae FHI-79005	Ata ijosin, Atawewe	Shrub	Fruits, leaves	AA ME	-Fruits are cooked as pot soup (AA) -Leaves powdered with cock feather, incise under armpit (ME)	5
17	<i>Cola acuminata</i> Schott&Endl. Malvaceae FHI-105132	Obi abata	Tree	Fruits	ME	-Seeds are placed on freshly cut <i>Musa sapientum</i> stem, chew raw with 7 seeds of <i>A. melegueta</i> early in the morning.	5
18	<i>Mirabilis jalapa</i> L. Nyctaginaceae FHI-86424	Tonaposo	Herb	Leaves	ME	-Pierce egg of local fowl with the leaves, eat the egg NOT leaves	4

Table 2 continues ...

19	<i>Elaies guineensis</i> Jacq. ArecaceaeFHI-31537	Ope	Tree	Young leaves	ME	-Young leaves grinded with <i>P. nigrescens</i> leaf, drink with pap (ME) -Young leaves cooked with catfish as potsoup	4
20	<i>Canna indica</i> L. CannaceaeFHI-100060	Ido	Herb	Leaves	AA	Young leaves are cooked as pot herb	3
21	<i>Ipomoea mauritania</i> Jacq. ConvolvulaceaeFHI-64343	Atewogba	Climber	Leaves	AA	Cook young leaves with <i>A. melegueta</i> seeds	3
22	<i>Bambusa vulgaris</i> Schrad.exJ.C.Wendl. Poaceae FHI-86749	Oparun	Tree	Stem	ME	Leaves cooked with cuttings of raised stem cut of <i>M. sapientium</i>	3
23	<i>Cordia millenii</i> Baker. BoraginaceaeFHI-58764	Omo	Tree	Stem bark, root, leaves	AA ME	-Stem bark plus barks of <i>B. sapida</i> and <i>M. excelsa</i> are macerated with black soap and bath daily (AA) -Leaves, root and <i>A melegueta</i> seeds cooked as pot soup (ME)	3
24	<i>Piper guineense</i> Schum. andThonn. PiperaceaeFHI-72306	Iyere	Climber	Fruits	AA ME	Potherb	3
25	<i>Dioclea sarmentosa</i> Kunt. FabaceaeFHI-28766	Dasa	Tree	Leaves	ME	Powdered leaves are incised on the forehead	2
26	<i>Cucumeropsis mannii</i> Naudin. CurcubitaceaeFHI-61841	Egusi	Climber	Leaves, seeds	AA	Pot soup	2
27	<i>Eleusine indica</i> (L.) Gaertn. PoaceaeFHI-92140	Gbegi	Grass/ herb	Leaves	AA	Blend leaves with black soap and bath daily	2
28	<i>Ocimum basilicum</i> L. LamiaceaeFHI-86650	Efinrinwewe	Herb	Leaves	AA	Pot soup	2
29	<i>Khaya ivorensis</i> A.Chev. Meliaceae FHI-25413	Oganwo	Tree	Stem bark	AA	Steam bark with <i>X. aethiopicaf</i> ruits are boiled, drink a cup (25cl) daily	2
30	<i>Carpolobia alba</i> G.Don. PolygalaceaeFHI-70345	Osunsun	Shrub	Root	AA	Grind leaves with sugar and lick	2
31	<i>Carapa procera</i> DC. Meliaceae FHI-104894	Lakasagba, Irere	Tree	Leaves	AA	Decoction of stem bark to bath daily	1

Table 2 continues ...

32	<i>Entandrophragma utile</i> (Dawe & Sprague) Sprague. Meliaceae FHI-86848	Jebo	Tree	Stem bark	ME, AA	Decoction of root and stem bark drunk daily (25cl)	1
33	<i>Xylopiaceae thiopica</i> (Dunal) A.Rich. Annonaceae FHI-27625	Eeru	Tree	Fruit	AA	Cook – Potherb	1
34	<i>Garcinia kola</i> Heckel. Gutiferae/Clusiaceae FHI-68518	Orogbo	Tree	Fruit	AA	Grind stem bark and drink with pap	1
35	<i>Theobroma cacao</i> L. Sterculiaceae FHI-68891	Koko	Tree	Fruit, stem bark	AA	Seeds cooked as pot soup	1
36	<i>Milicia excels</i> (Welw.) C.C. Berg. Moraceae FHI-37625	Iroko	Tree	Stem bark	AA	Stem bark grinded into powder and mix with black soap to bath daily	1
37	<i>Blighia sapida</i> K.D.Koenig. Sapindaceae FHI-90980	Isin	Tree	Stem bark	AA	Flesh of seed mix with black soap to bath daily	1
38	<i>Baphia nitida</i> Lodd. Fabaceae FHI-20236	Iyereosun	Tree	Stem	ME	Stem powder incision on the head	1
39	<i>Peperomia pellucid</i> L. Piperaceae FHI-95484	Rinrin	Herb	Leaves	AA	Pot herb	1
40	<i>Vernonia amygdalina</i> Delile. Asteraceae FHI-106978	Ewuro	Shrub	Leaves	AA	Pot soup	1
41	<i>Zea mays</i> L. Poaceae FHI-91082	Agbado, Oka	Shrub	Seed	ME	Grains put on cut <i>Musa sapientium</i> stem, raised stem and grain to be chew raw.	1

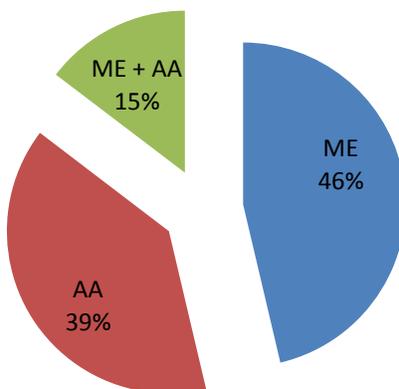


Fig. 3. Distribution of 41 plant taxa used as memory enhancer and antiaging in Sagamu, Nigeria

(Note: ME – Memory enhancer, AA – Antiaging)

Alkaloidal compounds are abundant in all the plants selected for phytochemical screening in (Table 3), alkaloids from *Curcuma longa* (Zingiberaceae), *Salvia officinales* (Lamiaceae) and *Theobroma cacao* (Malvaceae) improved cognitive function in patients and delay the onset of AD, (Gu et al., 1992; Iriti et al., 2010). Similarly, saponins from panax root (Ginseng-*Panax ginseng*) have been used as neuro protective, modulate the immune function, improve memory and learning performance, (Radad et al., 2006; Rausch et al., 2006). Abundant saponin complexes in the screened extracts of memory improving plants, (Table 3) may be investigated for important drugs in the management of AD and associated diseases. Other compounds such as tannins, anthraquinones, cyanogenetic and cardiac glycosides and their derivatives present in the selected screened plants possess the potential of delivering novel drugs in the management of memory loss and aging.

Table 3. Phytochemical screening of selected Memory enhancer and Antiaging plants

	<i>Parquetina nigrescens</i>	<i>Angrae cumeichlerinum</i>	<i>Senecio abyssinicus</i>	<i>Cleome gynandra</i>	<i>Bacopa floribunda</i>
Alkaloids	Dragendoff' (+++)	Wagner (+++)	Dragendoff' (+++)	Dragendoff' (+++)	Dragendoff' (+++)
Tannins	Ferric chloride(+)	Ferric chloride (-)	Ferric chloride(++)	Ferric chloride (-)	Ferric chloride (-)
Saponins	Frothing(+++)	Frothing(+++)	Frothing (+++)	Frothing (+++)	Frothing (+++)
Anthraquinones	Combined (+)	Combined (++)	Combined (-), Free (-)	Combined (+), Free (+)	Combined (+), Free(++)
Cyanogenetic glycosides	Moist picrate(++)	Moist picrate(+)	Moist picrate(-)	Dry picrate (+++)	Moist picrate(-)
Cardiac glycosides	Keller-Killiani (++)	Keller-Killiani (++)	Keller-Killiani (-)	Keller-Killiani (++)	Keller-Killiani (+++)

Legend: Absent (-), Present (+), Abundant (++) , Very abundant (+++)

4. CONCLUSION

Plants, in the form of herbs, spices and foods, constitute an unlimited source of phytochemicals available for improving human health including memory improvement and aging. Knowledge on utilization of plant resources for health care delivery varies with cultural background globally. Ethnobotanical survey of medicinal plants used as memory enhancing and antiaging in Sagamu, Nigeria yielded 41 candidate plants with important compounds that can be researched further in areas of Phytochemistry and Pharmacology for possible leads in the development of novel drugs with little or no side effects.

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CONSENT

Purpose of the interview was explained to the respondent and their consent to publish the findings obtained before questioning, token sum were paid to some respondents for their time and knowledge shared.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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