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# ETHNOBOTANICAL SURVEY OF PLANTS USED AS MEMORY ENHANCER AND ANTIAGING IN ONDO STATE, NIGERIA

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**ABSTRACT**
In traditional medicine, numerous plants have been used for cognitive disorders, including memory loss and antiaging. We document the medicinal plants used by people in Ondo State of Nigeria to alleviate memory loss and aging. Three hundred and twenty six persons (326) were randomly selected and interviewed on their knowledge of medicinal plants used in treating aging and memory loss. Respondents were recruited across the three vegetation types in the state, Okitipupa in swamp rain forest (113), Akoko in southern guinea savannah (110) and Ifedore in tropical rain forest (103). Occupations of the respondents were 30.4% herbalist, 19.9% herb sellers and others 49.7%. Results obtained from the ethnobotanical survey revealed 14 plants species commonly used as memory enhancer and 20 species as antiaging. Trees (61.8%) are used more than other plant forms, Herbs (17.7%), Shrubs (11.8%) and Climbers (5.9%). Further pharmacological work is recommended for the identified plant species for possible development of affordable anticholinesterate and neuro-protective drugs especially in a depressed economy like Nigeria.

**Keywords**: Medicinal plants, Memory loss, Antiaging, Ondo state and Ethnobotany

## INTRODUCTION

Utilization of plants in disease remedy dates back to man's creation. Forest based rural populations have relied on medicinal plants for centuries to meet their health care needs. The non-availability of modern healthcare delivery system in most rural communities of sub Saharan Africa has propelled the people to depend on plants to solve various health challenges from simple to complex situations. In Nigeria, about 80% of the population live in rural areas and rely on herbal and traditional medicine for their health care needs[1].

The efficacies of some of these plants have been validated by scientific findings[2] though the toxicity of many is yet to be determined. There are numerous bioactive compounds used in Western medicine that have been directly isolated from plants, or are derivatives of compounds from plant sources[3]. Vinca alkaloids used in cancer treatment (Vimblastine and Vincristine) are isolated from *Catharanthus roseus*, Vinpocetine and Huperzine A are chemicals derived from *Vinca minor* and *Huperzia serrata*. Like caffeine and cocaine, huperzine A is a medicinally active plant derived chemical that belongs to the class known as alkaloids. Vinpocetine and Huperzine A are sold over the counter as dietary supplement, treatment for memory loss and mental impairment[4-5].

Memory is the ability of an individual to record sensory stimuli, events and information; retain them over short or long periods of time and recall the same at a later date when needed[6]. Cognitive disorders like Alzheimer's disease, amnesia, depression and schizophrenia are associated with impairments in learning and memory[7]. Poor memory, lower retention, and slow recall are common problems in

today's stressful and competitive world, especially with associated ageing process. Alzheimer's disease (AD) is frequent in elderly people, as a result of malfunctioning of different biochemical pathways[8], aging represents the most important risk factor for (AD)[9]. Age , stress, emotions are conditions that may lead to memory loss, amnesia, anxiety, high blood pressure, dementia, or to more omnious threats like schizophrenia and Alzheimer's disease[6].

The National Institute of Health predicts, if the current trend continues, there will be more than 8.5 million AD patients by the year 2030 in USA alone[10]. The drugs currently available in market for the treatment of various learning and memory disorders are associated with several side effects indicating need of substitute medication from alternative system of medicine[11]. In traditional practices of medicine, numerous plants have been used to treat cognitive disorders, including neurodegenerative diseases such as Alzheimer's disease (AD) and other memory related disorders. The use of complementary medicines such as plant extracts in dementia therapy varies according to the different cultural traditions[12].

Medicinal plants such as *Bacopa monniera, Acrorus calamus, Cellastrus paniculata, Convolvulus microphyllus, Azadirachta indica, Albizia lebbeck, Occimum sanctum* and *Evolvulous alsinoides*[13-16] have been used for centuries in India to alleviate memory loss. Acetone fraction of petroleum ether extract of *Lawsonia inermis* leaves has shown nootropic activities[17].

Aging is one of the factors leading to the dysfunction of the normal cellular regulation, affecting both central nervous and immune systems[18]. Recently, caloric restriction and hormonal supplementation are used for anti-aging purpose[19]. Recent studies suggest that development of antiaging drugs from medicinal herbs may be one of the possible interventions[20-22]. The purified aqueous extract of the fruit of *Lycium barbarum* popularly used as anti-aging in Chineese traditional medicine possess neuroprotective agents against neuronal degeneration which established its use in folkloric medicine[23].

Extract of *Uttwiler spatlauber* stem cells positively influences viability and resistance against senescence and apoptosis of human stem cells. In this way, the plant stem cell extract promotes regeneration of skin and hair and delays the appearance of skin aging signs[24].

In Nigeria, Yoruba traditional system of medicine offers a number of safe treatments for central nervous system related disorders such as anxiety, aging and memory loss. Scientific reports on plants with antiaging and memory loss activities with particular reference to Nigeria is sparse hence; this work is aimed at documenting plants used in memory loss and antiaging by the people of Ondo state in Nigeria who basically belong the Yoruba stock.

## METHODS

***Study area*:** Ondo state is primarily an agricultural state and has many rural areas largely of subsistence farmers and peasant fishermen. The state lies on latitude $5^0 45^1$ and $7^0\ 52^1$N, longitude $4^0\ 20^1$ and $6^0\ 5^1$E, (Fig.1). People of the state belong to the Yoruba folk and speak same language. The vegetation covers from mangrove to rainforest in the south and savannah in the north. Okitipupa, Ifedore and Akoko south local government areas were selected in each of the vegetation zones (Mangrove, Rainforest and Savannah).

***Data collection:*** Structured questionnaires were administered among the traditional medicine practitioners (TMPs) and knowledgeable people on the utilization of medicinal plants. A total of 326 respondents were randomly selected in the three local governments' areas. Plant specimens were carefully collected and identified at the herbarium of Botany Department of Obafemi Awolowo University, Ile-Ife, where specimens were deposited.

## RESULTS

Knowledge on the use of medicinal plants is not limited to a particular gender, though traditional medicine practice for livelihood is dominated by males in Nigeria, women are versed in the knowledge of plants used in pediatrics problems. In the three local government areas studied, 74.8% of the 326 persons interviewed were males while 25.2% were females, (Table 1). Also the larger number of the respondents was aged between 31 – 70 years who can retrieve their knowledge on plants used as medicine in memory enhancing or antiaging.

It is also a common practice for students in high school and tertiary institutions in Ondo State to use memory improving drugs to enhance their academic performance, hence 41 young adults in school and apprentices were among the randomly selected subjects representing 12.6% of the total respondents. 87.4% of our respondents were married while 12.0% are not. Some parents prepare and administer memory enhancing herbal medicine on their children and wards for improved academic performance,

knowledge of such parents on plants used as memory enhancer was also documented. Herbalist/Traditional healers and herb sellers are known to be repository of knowledge on the use of medicinal plants.

Our assessment on the occupation of the respondents revealed 30.4% herbalist, 19.9% herbsellers and other occupations such as student, farming, artisan and civil servants account for 49.7%.Results obtained from the ethnobotanical survey of plants used in memory enhancing and antiaging in Ondo State, Nigeria was conducted in which 14 plants species were identified as commonly used as memory enhancer and 20 plants species used as antiaging, (Table 2).

The plants were distributed into 24 families and 32genera, Apocynaceae have the highest occurrence among plants used for memory enhancer and antiaging with a value of 8.8%. Tree plant species are used more than other plant forms, diversity of plants showed Trees (61.8%), Herbs (17.7%), Shrubs (11.8%) and Climbers (5.9%),The result corroborate the findings of [25]which found that trees form 51.6% and 44.1% of plants collected from the wild and bought from herb sellers respectively by traditional healers in Osun State (adjacent to the study site). Leaves and aerial parts are frequently used in memory enhancing and antiaging preparations with 67.7%, Flowers, Fruits and Seeds (23.5%), Stem bark (20.6%) and Roots (17.7*%). S. abyssinicus, M. sapientum, C. acuminata and B. floribunda* were the most popular among the memory enhancing plants while *H. madagascariensis, C. nucifera, A. digitata and S. mombin* rated highest among the antiaging plants.

## DISCUSSION

Man has been using herbs and plants products for combating diseases since times immemorial. So far, the outcomes with available Food and Drug Administration-approved medications for Alzheimers Disease (AD) are often unsatisfactory, and there is a place for alternative medicine, in particular herbal medicine[26].As a result of adverse effects of nootropics agents like piracetam and donepezil which limits their usage, [27]suggested the exploration of the utilization of traditional medicines in the treatment of various cognitive disorders.

*Bacopa floribunda* is prominent among the commonly used memory enhancer by the people in the study area, other species from the genus, *Bacopa monniera* has been reported in Ayurvedic medicine and in traditional treatments for a number of disorders, particularly those involving anxiety, intellect, and poor memory[28]. Extracts of *Bacopa monniera* showed improvement in spatial learning performance and enhanced memory retention in rats[29]. Several other works have established the use of *Bacopa species* and other plants as memory enhancers[30-32].

A number of medicinal plant have been used which demonstrate the properties of anti-aging. *H. madagascariensis* was used to help in alleviating poor pancreatic function in Cameroun and blood enrichment plant in Nigeria[33-34]. According to the traditional theory, these herbs can help us to maintain the level of vital energy in our body; and they have multiple neuro-protective mechanisms that enable them to be used in different health stages for disease prevention and even curing[30].

## CONCLUSION

In traditional system of medicines, various plants have been used for treatment of various disorders related to learning and memory. Result from this survey revealed plants with potential anticholinesterase and neuroprotective actions for pharmacological evaluation. Further studies regarding the role of phyto-constituents and compounds responsible for exact mechanism are necessary in order to develop an ideal agent for the treatment of various learning and memory related disorders.

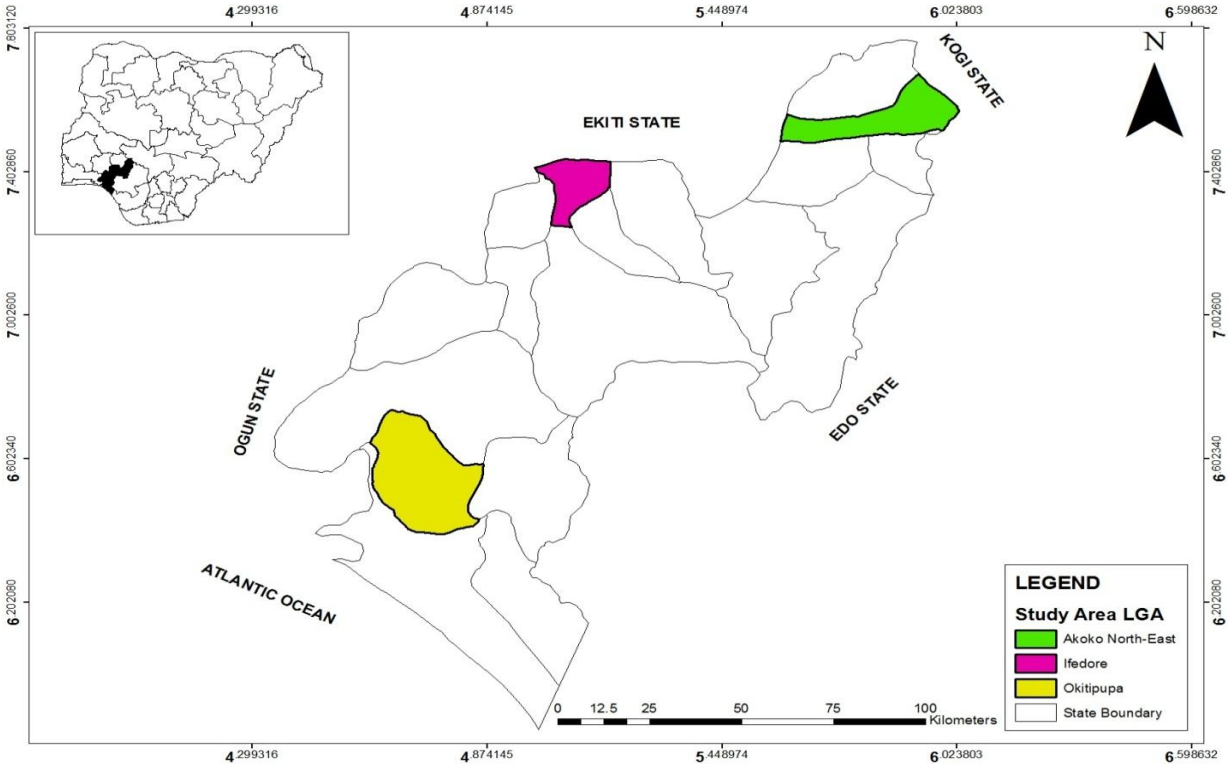


Fig.1: Map of Ondo state of Nigeria showing the study areas.

**Table 1: Demographic factors of the respondents**

| | Okitipupa | | Akoko south | | Ifedore | | Total | |
|---|---|---|---|---|---|---|---|---|
| | **Frequency** | **%** | **Frequency** | **%** | **Frequency** | **%** | **Frequency** | **%** |
| | | | | **Gender** | | | | |
| Male | 73 | 64.6 | 80 | 72.7 | 91 | 88.4 | 244 | 74.8 |
| Female | 40 | 35.4 | 30 | 27.3 | 12 | 11.7 | 82 | 25.2 |
| **Total** | **113** | **100** | **110** | **100** | **103** | **100** | **326** | **100** |
| | | | | **Age (years)** | | | | |
| 10 – 30 | 13 | 11.5 | 9 | 8.2 | 19 | 18.4 | 41 | 12.6 |
| 31 – 50 | 30 | 26.5 | 48 | 43.6 | 47 | 45.6 | 125 | 38.3 |
| 51 – 70 | 59 | 52.2 | 47 | 42.7 | 29 | 28.2 | 135 | 41.4 |
| Above 70 | 11 | 9.7 | 6 | 5.5 | 8 | 7.8 | 25 | 7.7 |
| **Total** | **113** | **100** | **110** | **100** | **103** | **100** | **326** | **100** |
| | | | | **Marital Status** | | | | |
| Married | 98 | 86.7 | 105 | 95.5 | 82 | 79.6 | 285 | 87.4 |
| Single | 14 | 12.4 | 05 | 4.5 | 20 | 19.4 | 39 | 12.0 |
| Others | 01 | 0.9 | - | - | 01 | 1.0 | 02 | 0.6 |
| **Total** | **113** | **100** | **110** | **100** | **103** | **100** | **326** | **100** |
| | | | | **Occupation** | | | | |
| Herbalist | 20 | 17.7 | 48 | 43.6 | 31 | 30.1 | 99 | 30.4 |
| Herb seller | 26 | 23.0 | 26 | 23.6 | 13 | 12.6 | 65 | 19.9 |
| Others | 67 | 59.0 | 36 | 32.7 | 59 | 57.3 | 162 | 49.7 |
| **Total** | **113** | **100** | **110** | **100** | **103** | **100** | **326** | **100** |

Table 2: Plants used as Memory enhancer (ME) and Antiaging (AA) in Ondo State, Nigeria

| No | Name | Family | Local Name (Yoruba) | Plant form | Parts used | Uses |
|---|---|---|---|---|---|---|
| 11 | *Bacopa floribunda* (R.Br)Wettst | Scrophuliaceae | Ewe Oniyemuye | Herb | Aerial parts | ME |
| 4 | *Carica papaya* Linn | Caricaceae | Ibepe | Tree | Leaves and root | ME |
| 14 | *Cola acuminata* (P. Beav) Schott and End | Sterculiaceae | Obi abata | Tree | Seeds | ME |
| 3 | *Detarium microcarpum* Guill. &Perr. | Caesalpiniaceae | Ariran | Tree | Stem and leaves | ME |
| 5 | *Dichapetlum toxicarium Bail (G.Don)* | Dichapetalaceae | Itakun | WoodyClimber | Leaf and twigs | ME |
| 6 | *Dioscorea mangenotiana* J. Miège | Dioscoreaceae | Esusu | Climber | Leaves | ME |
| 9 | *Musa sapientum Linn* | Musaceae | Ogedewewe | Tree | Stem | ME |
| 1 | *Picralima nitida* Stapf Th. & H. Dur | Apocynaceae | Abeere | Tree | Fruits and seeds | ME |
| 12 | *Quassia undulata* (Guill. &Perr.) D.Dietr. | Simaroubaceae | Oriji | Tree | Leaves | ME |
| 10 | *Scopariadulcis*L | Scrophulariaceae | Olomuyinrin, Omisinminsingogoro | Shrub | Leaves | ME |
| 2 | *Senecio abyssinicus* A.Rich | Asteraceae | Amunimuye | Herb | Aerial parts | ME |
| 13 | *Solanum incanum* L | Solanaceae | Ikan, Igba | Herb | Leaves, fruits and roots | ME |
| 8 | *Tetrapleura tetraptera* (Schumm. &Thonn.) Taub | Mimosaceae | Aridan | Tree | Fruits | ME |
| 7 | *Uraria picta* (Jacq.) DC | Leguminosae-Papilionoideae | Alupayida | Climber | Leaves | ME |
| 18 | *Adansonia digitata* Linn | Bombacaceae | Oshe | Tree | Leaves and stem bark | AA |
| 32 | *Aframomum melegueta* K Schum | Zingiberaceae | Atare | Herb | Seed | AA |
| 17 | *Alstonia boonei* De Wild | Apocynaceae | Ahun | Tree | Leaves | AA |
| 29 | *Bambusa vulgaris* Schrad. ex J.C. Wendl | Poaceae | Oparun | Shrub | Young leaves | AA |
| 28 | *Baphia nitida* Lodd. | Papilinionaceae | Owiwi, Iyereosun | Shrub | Leaves, stem bark, wood and root | AA |
| 27 | *Cocos nucifera* Linn | Palmae | Agbon | Tree | Roots | AA |
| 19 | *Cordia millenii* Bak. | Boraginaceae | Omoh | Tree | Stem bark | AA |
| 26 | *Elaeis guineensis* Jacq. | Palmae | Ope | Tree | Young leaves | AA |
| 24 | *Ficus capensis* Thunb | Moraceae | Opoto, Odan | Tree | Leaves | AA |
| 20 | *Garcinia kola* Heckel | Gutiferae | Orogbo | Tree | Seed | AA |
| 21 | *Harungana madagascariensis* Lam. ex Poir | Harungaceae/ Clusiaceae | Arunje, Asunje | Tree | Leaves | AA |
| 22 | *Khaya ivorensis* A. Chev | Meliaceae | Oganwo | Tree | Stem and root bark | AA |
| 25 | *Lophira alata* Banks ex Gaertn. f | Ochnaceae | Eki | Tree | Seed, root, leaves and stem bark | AA |
| 23 | *Milicia excels* Welw C.C. Berg | Moraceae | Iroko | Tree | Fruits | AA |
| 16 | *Montandra guineensis* L | Apocynaceae | Asifirin | Tree | Roots | AA |
| 15 | *Spondias mombin* L | Anacardiaceae | Iyeye, Okika, Ekikan | Tree | Leaves | AA |
| 31 | *Tectona grandis* L.f | Verbanaceae | Agala | Tree | Young leaves | AA |
| 30 | *Zea mays* Linn | Poaceae | Agbado | Shrub | Leaves | AA |
| 33 | | | Aran | | Leaves | AA |
| 34 | | | Ojusaju, Isaju | | Leaves | AA |

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