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THE USE OF ETHNOBOTANICALS IN THE MANAGEMENT OF INFLAMMATION IN NIGERIA: A REVIEW

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Abstract

Inflammation, one of the leading health issues in recent times call for concern. Many plants used in the management and treatment of inflammation in various parts of Nigeria have not been properly harnessed hence this review. The result of this review revealed that plants commonly used for the treatment of inflammation include: *Zingiber officinale, Alstonia boonei, Plumbago zeylanica, Ocimum basilicum, Parquetina nigrescens, Peperomia pellucida, Abrus precatorius, Tetrapleura tetraptera, Alchornea cordifolia, Terminalia ivorensis, Aspilia africana, Ageratum conyzoides* and *Hymenocardia acida*. Altogether 74 plant species are ethnobotanicals used in the management and treatment of inflammation. The plants were enumerated with their family names, common and local names, possible chemical constituents, part(s) used, route of administration and subsequent references where available.

Key words: Ethnomedicinal plants, Inflammation, Arthritis, Nigeria

Introduction

The use of medicinal plants constitutes an important part of traditional medicine which is a part of African heritage. Though modern or orthodox medicine has improved the lots of many people worldwide, it is noteworthy that in many cultures, modern medicine complements traditional practices as is obtainable in industrialized societies *e.g.* China and India (Odugbemi, 2006). It is estimated that there are about 500,000 species of plants on earth (Borris, 1996), of which a relatively small percentage (<10%) are used for food by humans and animals. It is possible that more serve as medicine (Moerman, 1996). Medicinal plants contain numerous biologically active compounds, such as alkaloids, quinines, terpenoids, flavonoids, carotenoids, sterols, simple phenolic glycosides, tannins, saponins and polyphenols.

Medicinal plant is defined as any substance with one or more of its organ containing substances that can be used for therapeutic purposes or which can be used as precursors for the synthesis of drugs (Sofowora, 1982, 1984). According to World Health Organization (WHO), as many as 80% of the world's people depend on traditional medicine for their primary health care needs. Thus, they defined traditional medicine as health practice, knowledge and belief incorporating plants, animals and mineral based medicines, spiritual therapies, manual techniques and exercises applied singularly or in combination to treat, diagnose and prevent illnesses or maintain well being (WHO, 2005).

Inflammatory diseases such as arthritis and rheumatism are longstanding medical problems and major cause of morbidity throughout the world (Sofidiya *et al.,* 2007). Inflammation is a reaction of the body that causes swelling, redness, pain and loss of motion in an affected area. It is a major physical problem in the most serious form of arthritis. Normally, inflammation is the way the body responds to an injury or the presence of disease agents. During this reaction, many cells of the body's immune system rush to the injured area to wipe out the cause of the problem, clean up damaged cells and repair tissues that have been hurt. Once the "battle" is won, the inflammation normally goes away and the area becomes healthy again. In many forms of arthritis, the inflammation does not go away as it should; instead it becomes part of the problem, damaging healthy tissues of the body as this may result in more inflammation and more damage. The damage that occurs can change the bones and other tissues of the joints, sometimes affecting their shape and making movement hard and painful. Diseases in which the immune system malfunction and attacks healthy parts of the body are called autoimmune diseases. Inflammation

is characterized by four physical signs: warmth, redness, swelling and pain. Warmth and redness result from dilation of the small blood vessel in the injured area and increases local blood flow.

Inflammatory responses are associated with many pathological disorders and many Nigerian traditional medicine practitioners enjoy huge patronage and success in this area (Akah and Nwambie, 1994). Although a good number of plant species are used for this purpose, scientific and pharmacological information on them is scarce and not well harnessed (Akah and Njike, 1990). The plant kingdom is abundant in species that act as anti-inflammatory to human tissues. It should therefore be remembered that the steroidal anti-inflammatory drugs were developed from plant materials and are still largely synthesized from saponins such as diosgenin from Yam (*Dioscorea floribunda*). Although, the natural plants may not be as powerful as the steroid drugs, but are less dangerous. This work is a review of some ethnobotanicals used in the treatment of inflammation in Nigeria.

Materials and methods

This study reviewed both the published and unpublished articles which have been used in the treatment and management of arthritis. It revealed the plant species and families, common name, local names in Yoruba, Ibo and Hausa, plant part or parts used, mode of usage and chemical constituents where known.

Diversity of plants used in the treatment of inflammation in Nigeria

Since the discovery of aspirin from Willow's bark (*Salix alba*), more than 100 years ago, many steroidal as well as non-steroidal anti-inflammatory drugs have been introduced. However, the prolonged use of most of these medications reportedly causes renal problems, gastro intestinal initiation and other adverse side effects (Bertolini *et al.,* 2001). The global interest has been aroused to discover plants which are traditionally used for aches, fever and rheumatic pain (Basu and Hazra, 2006).

The continuous search for natural plant products for use as medicines is encouraged by ethnobotanical surveys (Ogbole *et al.,* 2010). Igoli *et al.,* (2005) recognized ethnobotanical survey as one of the major approaches for selecting plants for pharmacological screening. Several workers have conducted ethnobotanical surveys among various tribes of the African continent and other parts of the world (Khan and Rashid, 2006; Sofidiya *et al.*, 2007; Ogbole *et al.,* 2010). The table below shows a diversity of plants used in the treatment of inflammation in Nigeria.

Table 1: Plants of Nigeria used in the treatment of inflammation

(H=Hausa; I=Igbo, Y=Yoruba)

Plant species with Family	Common Name	Local names	Chemical Constituents	Part(s) Used	Preparation and Administration	References
1. *Abrus precatorius* L. Fabaceae	Crabs eye	*Oju-Ologbo Omisinmisin* (Y) *idonzakara* (H) *anya-nnunu Oto biribiri* (I)	Alkaloids, glycyrrhizin, Abrin.	Leaves, Stems	Decoction/infusion drunk as desired	Sofidiya *et al.,* (2007) Odugbemi, (2008) Olowokudejo *et al., (*2008).
2. *Acanthospermum hispidum DC* Asteraceae	Starbur	*Dagunro* (Y) *Kashinyaawo*(H)	Sesquiterpene Lactones, Saponins, Polyphenols.	Leaves, whole plant	Decoction	Olowokudejo *et al.,* (2008) Adepiti *et al*., (2014).
3. *Acanthus montanus* (Nees) T. Anderson Acanthaceae	False Thistle, Leopard's tongue	*ahon-ekun, ekun-arugbo*,(Y) *agameebu,aga* (I)	Mucillage, Tannins, Glucose, Pectic substances, Alkaloids.	Leaves	Infusion taken thrice daily	NNMDA, (2005) Sofidiya *et al.,* (2007) NNMDA, (2008).
4. *Achyranthes aspera* L. Amaranthaceae	Rough-chaff herb	*Aboro, Ehimagbo*(Y) *Ute* (I)	Saponins, Oleanic acid, Saponins A & B, Saponins C & D.	Whole plant	Boiled in water and used as a drink	Sofidiya *et al.,* (2007)
5. *Adansonia digitata* L Bombacaceae	Baobab tree	*Ose* (Y), *Kukaa, Kuulambi*	Tannins, Flavonnoids, Saponins, Carbohydrates and Cardiac glycosides	Leaves	Leaf infusion	Odugbemi, (2008)
6. *Aframomum melegueta* K.Schum Zingiberaceae	Alligator pepper	*Ata-ire* (Y) *Ose-Oji* (I) *gyandamaryaji* (H)	Essential oils	Seeds, Leaves	Decoction with limewater	Olowokudejo *et al.,* (2008) Ogbole *et al.,* (2010)
7. *Agerantum conyzoides* L. Asteraceae	Goat weed floss flower	*Imi-esu*(Y) *Ogadi Nwanyi, Isi awo* (I)	Phenolic esters, Alkaloids, Limonene, Coumarin, Saponin, Tannin, Hyodrocyanic acid.	Leaves, Flowers	Infusion drunk twice daily; chopped fresh leaves applied on inflamed sores	Sofidya *et al.,* (2007)
8. *Alchornea Cordifolia (*Schmach and Thonns) Mull Euphorbiaceae	Christmas bush	*Ewe-ifa, usin-in* (Y) *Ububo* (I) *Sambami* (H)	Alkaloids, Tannins, Alchornin.	Leaves	Ground leaves applied to the aching places and wounds	Sofidiya *et al.,* (2007) NNMDA, (2008) Odugbemi, (2008) Olowokudejo *et al., (*2008)
9. *Allamanda cathartica* L. Apocynaceae	Yellow allamanda, golden trumpet.	*Allamonda* (Y)	9,12,15-octadecatrienoic acid	Leaves	Leaves mixed with *Piper nigrum*	

			(Z,Z,Z), n-hexadecanoic acid, 3-O-methyl-d-glucose and 9,12,15-octadecatrienoic acid ethyl ester (Z,Z,Z).			
10. *Allium cepa* L. Liliaceae	Onions	*Alubosa* (Y) *Yabase* (I) *Albasa gudaji* (H)	Allicin, Allistatin.	Bulb	Decoction or concoction with water or soda water	Odugbemi, (2008) Ogbole *et al.,* (2010)
11. *Allium sativum* L. Liliaceae		*Ayu* (Y)	Vitamin C, Allicin, Allin, Saponins, Proteins, Minerals, Flavonoids., Phytoalexine.	Fruit	Decoction or concoction with water or soda water	Ogbole *et al.,* (2010)
12. *Allophylus africanus* P. Beauv Sapindaceae	African false currant	*Akanro, Akaraesu* (Y)	Terpenes, saponosides, cyanogenetic glucosides	Bark, Root, Leaves	Boiled in water and used as a drink	Sofidiya *et al.,(* 2007)
13. *Alstonia boonei* De wild. Apocynaceae	Stool wood, pattern wood.	*Ahun,Awun* (Y) *Eghu, Akp* (I)	Alkaloids, Saponins, Tannins, Echitamine, Echitamidine.	Leaves, Sap, Stem barks	Topical application of the latex on the swollen part and leaf infusion drunk as desired. Decoction or concoction with *Citrus paradisi fruits Zingiber officinale Allium Sativum* and *Allium cepa* for *Rheumatoid arthritis*	Sofidiya *et al.,* (2007) Obute, (2007) Ogbole *et al., (* 2010)
14. *Alternanthera repens* (L) Kuntze Amaranthaceae	Joy weed	*Dagunro* (Y)	Triterpene, Saponins	Leaves	Decoction used as tea	Sofidiya *et al.,* (2007) Odugbemi, (2008)
15. *Aspilia Africana (*Pers*)*C.D. Adams Asteraceae	Hemorrhage plant, Wild sunflower	*Akoyunyun Yirin- yinrin* (Y) *Oranjila, Oramaejula* (I) *Kalankuwa* (H)	Tannins, Saponins.	Leaves	Chopped fresh leaves applied on inflamed sores	Sofidiya *et al.,* (2007)
16. *Butyrospermum parkii* Kotschy Sapotaceae	Shea butter	*Ori* (Y)	Fatty acids, (oleic, Stearic, Linoleic, Palmitic and Linolenic acids)	Wax	For external use mixture	Ogbole *et al.,* (2010)
17. *Byrsocarpus coccineus* Schum. & Thonn. Connaraceae	Crimson thyme	*Amuje wewe, Oka abole* (Y) *mgba apepea* (I) *kimbar maharbaa* (H)	Alkaloids	Roots, Leaves	Used topically	Akindele and Adeyemi, (2007)
18. *Cardiospermum*	Heart seed /	*Ako-ejirin* (Y)	Protoanthocyanidin,	Whole plant	Leaves mixed with castor oil is	Sofidiya *et al.,* (2007)

grandiflorum Swart Sapindaceae	Balloon vine		apigenin		administered externally	
19. *Carica papaya* L. Caricaceae	Pawpaw	*Ibepe* (Y) *Ojo, gwanda* (H)	Alkaloids, Papain.	Leaves, Unripe fruits	Concoction taken twice daily	Ogbole *et al.*,(2010)
20. *Carpolobia lutea* G. Don Polygalaceae	Cattle stick	*Otupe, Osunsun* (Y) *uziza* (I) *Aghba-awa*	Alkaloids, Saponins, Tannins, Anthraquinones, Cardiac glycosides, Flavonoids.	Stem bark, Leaves, Roots	Boiled in water and used as a drink. Root powdered and drunk with pap.	Sofidiya *et al.,* (2007) Olowokudejo *et al.,* (2008)
21. *Chasmanthera dependens* Hochet Menispermaceae	Chasmanthera	*Ato-oloriraun* (Y)	Quaternary and Non-phenoilc Alkaloids, Berberine.	Leaves, Sap	Decoction of leaves taken thrice daily for 2 weeks	Sofidiya *et al., (* 2007) NNMDA, (2005)
22. *Chassalia kolly* (Schumach) Heppner Rubiaceae		*Isepe agbe* (Y) *Tutugbo, Okunadie* (I)	Glycosides, Alkaloids, Flavonoids.	Leaves	Extract of bark taken as tea	Sofidiya *et al.,* (2007)
23. *Citrus aurantifolia* L. Rutaceae	Lime	*Osan-wewe* (Y) *Dankabuya* (H) *Afotanta, Epe nkirisi* (I)	Flavonoids, Essential oils	Leaves	Decoction with water or soda water	Ogbole *et al.,* (2010).
24. *Cocos nucifera* L. Arecaceae	Coconut tree	*Agbon* (Y) *kwakwar* (H), *Akebabe* (I)	Medium chain fatty acids	Fruit	Decoction for external use	Ogbole *et al.,* (2010)
25. *Combretum racemosum* P. Beauv Combretaceae	Bush willow	*Ogan, ogan pupa, Okan* (Y)		Leaves	Leaf infusion administered orally.	Sofidiya *et al.,* (2007)
26. *Costus afer* Ker Zingiberaceae	Ginger lily	*Ireke-Omode* (Y) *Opate* (I) *Kakizuwa* (H)	Steroidal Saponin (Aferoside A), Essential oils.	Stems, Roots, Fruit juice	Decoction drunk as desired	Iwu and Anyanwu, (1982) Odugbemi, (2008) Anyasor *et al*., (2014)
27 *Cythula prostrata* (L) Blume Amaranthaceae	Pasture weed	*Areyin-Kosun, sawerepepe* (Y)	Steroids (β-ecdysterone), Saponins.	Leaves	Crushed with alchohol and used as a poultice	Sofidiya *et al.,* (2007) Odugbemi, (2008)
28. *Dalbergia Saxatilis* Hook. F. Fabaceae	Flat bean	*Ogundu, Paran Obunzizi* (I) *runrun Zaki (*H)	Saponins, fatty acid Esters, Sterols and Phenols	Leaves	Decoction used as tea	Sofidiya *et al.,* (2007)
29. *Desmodium triflorum DC.* Fabaceae	Bush groundnut	*Atiponna* (Y)	Polyphenols, Flavonoids, Sterols, Triterpenes.	Whole plant	Powder is made and taken with pap	Sofidiya *et al.,* (2007)

30. *Eclipta alba* (Linn) Hass. K Asteraceae	Ink plant, False daisy	*Abikolo, Arojoku* (Y)	Coumestan derivatives, Ecliptal, β-amyrin, Luteolin-7-0-glucoside, Stigmasterol.	Leaves	Leaves are boiled; drunk as desired.	Sofidiya *et al.,* (2007)
31. *Ekebergia senegalensis* A.Juss Meliaceae	Stave wood	*Orumu, Ayape* (Y), *Madachin dutsi* (H)	Limonoids	Leaves	Infusion drunk as tea	Sofidiya *et al.,* (2007)
32. *Eleusine indica*(Linn) Gaertn Poaceae	Goosegrass,wire grass	*Ichite* (I)	Cyanogenetic glycosides, Triglochinin, Ochratoxin A, α-amylase inhibitiors, Phenolic compounds, Flavonoids, Saponarin, Tricin, lucenin-1.	Whole plant	Decoction drunk as desired	Obute, (2007)
33. *Entadrophragma cylindiricum* Sprague Meliaceae	Cedar mahogany	*Ijebo* (Y), *Papala Olu* (I) *Gedunohor* (H)	Triterpenoids	Stem bark	Macerated in alcohol and used as a drink	Sofidiya *et al.,* (2007)
34. *Ficus elastica* Roxb Moraceae	Sand paper tree	*Ipin* (Y)	Emodin, Sucrose, Morin and Rutin	Leaves, Stem bark	Decoction drunk as desired	Sackeyfio and Lugeleka, (1986)
35. *Funtumia africana* (Benth) Stapf. Apocynaceae	West African Rubber Tree ,Male Funtum	*Ako-ire* (Y) *mba, ekpaffia* (I)	Alkaloids, Tannins.	Leaves	Decoction taken as tea	Sofidiya *et al.,* (2007)
36. *Garcinia cola* Heckle Clusiaceae	Bitter cola	*Orogbo* (Y) *Adi* (H), *Akuilu* (I)	Lipids	Roots, Stem bark	Decoction	Ogbole *et al.,(* 2010)
37. *Harpagophytum procumbens* DC Pedaliaceae	Devil's claw, Grapple plant, Wood spider, or Harpago		Three iridoid glycosides viz. harpagoside, harpagide and procumbide	Roots	Prepared in the form of infusions, decoctions, tinctures, powders	Mahomed and Oyewole, (2004 (2010)
38. *Hippocratea indica* Willd Celastraceae		*Mawoolule* (Y)	Tannins, Saponins, Flavonoids and Alkaloids	Root bark	Decoction, poultice, infusion and ointment	Ogbole *et al.,* (2007)
39. *Hunteria umbellate*	Demouian	*Abere* (Y)	Alkaloids (acetyl	Leaves, Roots,	Decoction drunk as desired	Adeneye *et al.,* (2011)

(K.Shum) Apocynaceae			Corymine, Corylmine and Isocorymine, and Abereamines), Flavonoids, Tannins and Glycosides	Stem bark, Seeds		
40. *Hymenocardia acida* (Tul) Euphorbiaceae	Hymenocardia	*Orunpa, Aboopa* (Y)	Amphiphile tritepenoids, tannins, flavonoids, saponins, cardiac-glycosides, Tapenenes, alkaloids, resins, steroids.	Leaves	Infusion taken twice daily	Sofidiya *et al.,* (2007)
41. *Icacina tricantha* Oliv Icacinaceae	Icacina	*Gbegbe* (Y)		Leaves. seeds	Infusion with *Lecaniodiscus cupanoides* drunk as desired	Sofiidya *et al.,* (2007) Odugbemi (2008) Ogbole *et al.,*(2010)
42. *Jateorhiza macrantha* (Hook. F.) Excell Mendonca Menispermaceae	Jateorhiza, calumba	*Namunamu Atutu* (Y)		Leaves	Topical application of leaf poultice	Ogbole *et al.,* (2010)
43. *Khaya grandifolia* C.DC Meliaceae	African Mahogany	*Oganwo* (Y)	Meliacin	Stems, Roots, Bark	Decoction drunk as desired	Olowokudejo *et al.,* (2008)
44. *Khaya ivoriensis* A. Chev Meliaceae	African mahogany	*Oganwo* (Y)	Scopoletin, scoparone	Stems, Roots, Bark	Decoction drunk as desired	Olowokudejo *et al.,* (2008)
45. *Lecaniodiscus cupanoides* (Planch) Sapindaceae	Lecaniodiscus	*Akika, Akaisin* (Y*) Kekera Kuchi* (H) *Okpu* (I)	Triterpenoid saponins.	Roots, Leaves	Two teaspoon extract prepared from the root bark is taken daily orally early in the morning for 15 days and up to 3 months to cure arthritis and rheumatism	NNMDA, (2005) Sofidya *et al.,* (2007)
46. *Lonchocarpus cyanescens (*Schum. and Thonn.) Benth Fabaceae	West African Indigo, Indigo vine	*Elu*. (Y) *Talaki* (H) *nji, anunu* (I)	Glycyrhetinic acid (enoxotone), Triterpenes.	Roots, Stems	Macerated in alcohol and used as a drink	Iwu and Ayanwu, (1982) NNMDA, (2005) Sofiodiya *et al.,* (2007) Odugbemi, (2008)
47. *Microdesmis puberula* Hook.F. Pandaceae	Microdesmis	*Esunsin, Osusin* (Y)		Fruits, Leaves	Boiled in water and used as a drink	Sofiidya *et al.,* (2007)
48. *Monodora myristica* (Gaertn) Durnal. Annonaceae	Calabash, nutmeg.	*Dario, Lakose* (Y) *Ehuru* (I)	Essential oils	Leaves, barks	Chopped fresh leaves applied on inflamed sores	Sofidiya *et al.,* (2007) Odugbemi (2008)

49. *Ocimum basilicum* L. Lamiaceae	Sweet basil, Hairy basil	*Efinrin-wewe* (Y) *dandoriya* (H) *nchu-anwu* (I)	Eugenol, Linalool, Thymol, Xanthomicrol, methylchaylcol.	Whole plant	Infusion drunk once daily	Sofidiya *et al.*, (2007) Singh *et al.*, (2010)
50. *Palisota hirsuta* (Thumb.)K. Schum Commelinaceae	Palisota	*Ikpere aturu*(I) *Jagborokun, rogboaguntan* (Y)	Flavonoids Antioxidants, Alkaloids, Tannins Terpenoids.	Leaves	Leaves and stem are used in treating rheumatism arthritis if taken as infusion	Obute, (2007)
51. *Parquentina nigrescens* (Afzel). Bullock Periplocaceae	African perquentina	*Ogbo* (Y)	Cardenoides, Glycosides. Alkaloids	Sap, Leaves	Mixed with coconut oil and applied to inflamed joint	Sofidiya *et al.*, (2007)
52. *Paullina pinnata* L. Sapindaceae	Hippo cola, five fingers, water cola	*Kakasenla Ogbe-Okuje* (Y)	Triterpenoids, Paullinomide A, β-sitosterol	Leaves	Boil leaves and drink as desired	Sofidiya *et al.*, (2007)
53. *Peperomia pellucida* (Linn) HBK Piperaceae	Silver bush	*Rinrin* (Y)	Alkaloids, Cardenolides, Saponins, Tannins, Secolignans, Tetrahydro-furan lignans.	Aerial parts	Squeezed juice used for eye inflammation and headache	Sofidiya *et al.*, (2007)
54. *Piper guineensis* Schum et Thonn Piperaceae	Climbing black pepper	*Iyere* (Y)	Essential oils	Leaves, Fruits	Powder	Ogbole *et al.*, (2010)
55. *Plumbago zeylanica* L. Plumbaginaceae	Ceylon Leadwort	*Inabiri* (Y)	Plumbagin, Plumbagic acid, Beta-sitosterol, Vallic acid.	Roots, Leaves	Decoction with *Hymenocardia acida*	Sofidiya *et al.*, (2007) Odugbemi, (2008)
56. *Poga oleosa* Pierre Rhizophoraceae	Inoi		Tannins, Saponins, Flavonoids and Alkaloids	Fruits	Decoction, poultice, infusion and ointment	Ogbole *et al.*, (2007)
57. *Ritchiea capparoides* (Andr) Britten. Capparidaceae		*Logbokiya, Ologbe-Kuyan* (Y) *Aka-ito* (F)		Leaves	Boiled in water and used as a drink	Sofidiya *et al.*, (2007)
58. *Salacia pallescens* Oliv. Celastraceae		*Elewekan* (Y)		Leaves	Crushed with alcohol and used as poultice	Sofidiya *et al.*, (2007)
59. *Schwenkia americana*	Schwenkia	*Igbale odan, Oju-isin* (Y)		Whole plant	Crushed and used as a poultice	Sofidya *et al.*, (2007)

L. Solanaceae						Odugbemi (2008)
60. *Sclerocarya birrea* (A. Rich.) Hochst. Anacardiaceae	Jelly plum, cat thorn, morula, cider tree, marula, maroola nut/plum		Phenolic compounds, flavonoids, tannins, Alkaloids.	Stem bark	Topical application of extract	Ojewole, (2004)
61. *Securidaca longipedunculata* Fres. Polygalaceae	Violet tree	*Ipeta* (Y)	Saponins, Volatile compounds (methyl salicylate), Xanthones	Leaves, Roots	Paste of root bark and leaf is applied externally to cure rheumatism and sores.	Sofidiya *et al.,* (2007) Odugbemi (2008).
62. *Stereospermum kunthianum* Cham. Bignonaceae	Cham Sandrine petit	*Sansami* (H)	Iridoid, Phenyl propanoid glycoside, Naphthoquinone, Anthraquinones.	Stem bark	Decoction drunk as desired	Ching *et al.,* (2009).
63. *Strophanthus hispidus* Oliv Apocynaceae	Arrow poison plant	*Isagere* (Y)	Resin, Mucilage, Trigonelline, choline, Fixed oil, Glycosides-K-strophantin.	Leaves	Decoction taken as tea	Sofidiya *et al.,* (2007) Odugbemi, (2008)
64. *Terminalia ivoriensis* A. chev Combretaceae	Black Afara	*Epepe, Afara-dudu Ipepe* (Y)	Triterpenoid saponins, Ivorenoside A and B, Saponins.	Stem bark	Extract of Bark taken as tea	Iwu and Ayanwu, (1982) Sofidiya *et al.,* (2007) Odugbemi (2008)
65. *Tetrapleura tetrapteura* (Taub) Fabaceae	Aridan	Aridan, Aidan(Y) Uziza (I) Kalangon Daji (H)	Triterpenoid glycoside (aridanin), coumarins, flavonoids.	Fruits	Decoction and infusion drunk twice daily	Sofidya *et al.,* (2007) Olowokudejo *et al.,* (2008)
66. *Tithonia diversifolia* (Helmsl) A. Gray Asteraceae	Tree marigold, Mexican sunflower	*Agbale, jogbo* (Y)	β-sitosterol, 2, 2-dimethy-6-acetyl-8-hydroxy-2H-chromen,6-methoxyl-Apigenin, Tagitinin A, Daucosterol, Tithonian 1,6-methoxyl-luteolin, 5, 6, 9-trihy droxyl-10-(E)-octadecenoic acid, Tithoniamide B. saponins.	Whole plant, Leaves, Roots		Owoyele *et al.,* (2004)
67. *Triclisia subcordata* Oliv Menispermaceae	Triclisia	*Alugbonron, Alugbinrin, Osanaparo* (Y)	Phaeanthine, tricordatine, fancholine	Leaves	Used as infusion with leaves of *Hymenocardia acida*	Sofidiya *et al.,* (2007).

68. *Uvaria chamae* Beauv Annonaceae	Finger Root, Cluster pear	*Eruju* (Y), *Mmimiohia* (I)	Glycosides, Flavonoids, Tannina, Alkaloids, Cis-bullatencin, Saponins, Phenols.	Roots	Powder	Ogbole *et al.,* (2010)
69. *Vernonia amygdalina* Del Asteraceae.	Bitter leaf	*Ewuro* (Y), *Onugbu* (I), *Shiwaka* (H)	Flavonoids, Flavones, Antioxidants.	Roots, Leaves	Decoction drunk as desired	Ogbole *et al.*,(2010)
70. *Vigna unguiculata* (L) Walp Fabaceae	White beans, cowpea	*Ewa fifun* (Y)	Protein, Fat, Crude fibre.	Seeds		Ogbole *et al.,* (2010)
71. *Vitex doniana* Sweet Hort. Verbanaceae	Black plum	*Oori-nla* (Y), *Dinyan* (H), *Uchakoro* (I)	Saponins, Tannins, Anthraquinones, Terpenoids, Flavonoids, Alkaloids.	Leaves, Roots, Stem bark		Olowokudejo *et al.,* (2008)
72. *Zanha golungensis* Hiern Sapindaceae		*Nago goriraya* (H)	Saponins.	Leaves	Chopped fresh leaves applied on inflamed sores	Sofidiya *et al.,(* 2007)
73. *Zanthoxylum zanthoxyloides* (Lam.) Watermann Rutaceae	Fagara	*Orin-ata* (Y)	Essential oils, Hydrocarbons and Terpenoids, Piperonyl-4-acrylic isobutyl amide.	Stem bark, Roots		Oriowo *et al.,* (1982) Olowokudejo *et al.,* (2008)
74. *Zingiber officinale* Roscoe Zingiberaceae	Ginger	*Ginija* (Y)	Zingiberine, Gingerol, Cineol, Citral, Phellandine, Borneol	Tubers	Decoction with *Garcinia cola* and *Allium sativum*	Odugbemi, (2008) Olowokudejo *et al.,* (2008) Ogbole *et al.,* (2010)

Prescriptions regarding the use of the plants listed in Table 1 could be based on a single plant part or combination of several plant parts. However, most herb sellers believe that combination of several plant parts cure disease rapidly and takes care of all signs and symptoms of the disease (Sofidiya *et al.,* 2007). Methods of preparation as well as medical administration vary from decoctions to infusions which were mostly orally administered while poultice to paste were topically applied. It should however be noted that most of these plants are gathered from the wild.

Many African countries are taking advantage of the links to the ancient cumulative wisdom of the traditional practitioners. Ethnobotanical knowledge of the past as well as present folk is of immense value to the development of newer drugs with virtually little or no adverse effects. A few studies have contributed much in the understanding of the compound(s) responsible for the anti-inflammatory and analgesic action, their mechanism of action and therapeutic values.

Pharmacological activity of some plants used in the treatment of inflammation

Inflammation is a complex and dynamic condition in which many changes take place at the site of inflammation systemically. It involves a complex array of enzymes activation, release of mediators, extravasations of fluid, migration of cells, tissue breakdown and repair (Vane and Botting, 1995). It is known that the acute inflammatory response consists of three main vascular effects viz: vasodilation and increased vascular flow, increased vascular permeability and leucocytes migration to the injured tissues (Di Rosa *et al.,* 1971). It is also known that anti-inflammatory effects can be elicited by a variety of chemical agents and there is no remarkable correlation between their pharmacological activity and chemical structure (Sertie *et al.,* 1990). This coupled with the complexity of the inflammatory process that makes use of several different experimental models necessary when conducting pharmacological trials.

Carrageenan-induced rat paw oedema has been frequently used to screen natural products with anti-inflammatory potentials (Tapas *et al.,* 2008). Inflammation induction with carrageenan involves the activation of platelet activation factor and release of pro-inflammatory mediators such as prostaglandins, kinins, tumor necrosis factor and nitric oxide (Tan-No *et al*., 2006). Carrageenan induces inflammation in three distinct major phases namely: the first phase which involves the release of histamine and serotonin, release of

kinins in the second phase and the activation of cyclooxygenase-2 enzyme and ultimate release of prostaglandins in the third phase (Agbaje *et al*., 2008). Formalin has been reported to induce inflammation via similar mechanism as described for carrageenan (Joseph *et al*., 2009). However, non-steroidal anti-inflammatory drugs such as aspirin, indomethacin and diclofenac are known to mediate their anti-inflammatory action via inhibition of these phases of inflammatory response (Vane and Booting, 1987; Noguchi *et al*., 2005).

The pharmacological anti-inflammatory activities of some plants listed in Table 1 using experimental animals have been reported: *Zanthoxylum zanthoxyloides* (Oriowo *et al.,* 1982); *Lonchocarpus cyanescens, Costus afar* and *Terminalia ivorensis* (Iwu and Anyanwu, 1982); *Ficus elastica* (Sackeyfio and Lugeleka, 1986); *Alstonia boonei* (Olajide *et al.,* 2000); *Chasmanthera dependens* (Morebise *et al.,* 2001); *Acanthus montanus* (Adeyemi *et al.,* 2004); *Bysorcarpus coccineus* (Akindele and Adeyemi, 2007), *Stereospermum kunthianum (*Ching *et al.,* 2009), *Sclerocarya birrea* (Ojewole, 2004), *Harpagophytum procumbens* (Mahomed and Oyewole, 2004;Anilkumar, 2010), *Tithonia diversifolia* (Owoyele *et al.,* 2004), *Palisota hirsuta* **(**Wood *et al.,* 2009; Boakye-Gyasi *et al.,* 2011), *Zingiber officinale* (Ojewole, 2006; Anilkumar, 2010), *Hippocratea indica and Poga oleosa* (Ogbole *et al.,* 2007), *Securidaca longepedunculata* (Ojewole, 2008), *Tetrapleura tetraptera* (Ojewole, 2009), *Parquetina nigrescens* (Owoyele *et al.,* 2008*), Hunteria umbellate* (Adeneye *et al.,* 2011).

The plant genetic resources of Nigeria are great source of pharmaceuticals and therapeutics, though the plants are not adequately documented. Traditional medicine practice has existed in Africa and other cultures for centuries since man came into being. Until recently, this has been neglected or even outlawed in some cases due to undue pressure from the practitioners of modern medical practices and the unscientific background of the method of operation. There is therefore, a great need to harmonize traditional medicine practice with the orthodox practice rather than the disdain with which the later considers the former, in this part of the globe. This is obvious in the face of not only in the interdependence of the two but also for the fact that a greater number of people have it as their only available health care service as the orthodox is far removed from them. Furthermore, the traditional approach often treats some ailments that have defiled modern medical practice. Apart from direct

traditional utility of these genetic resources, allopathic medicine is now taking recourse to traditional medicines because of its cheapness and availability to a greater percent of the world's population. It is hoped that further research will be generated from this effort as is done elsewhere like China and India where modern medicine is viewed as complementary to traditional medicine and the poor are better off in accessing health care.

Scientific investigations of the plants and their medicinal properties on inflammatory diseases like arthritis, rheumatism, gout etc need to be carried out in various pharmaceutical industries and national laboratories. This will give a lead to the development of new natural drugs. The conservation of these plants is also very paramount in order to avoid there over exploitation and eventual extinction through proper education of the populace, establishment of medicinal plant farms, sustainable harvesting approach and setting aside of forest areas in the local communities as special zones.

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