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Herbal Formulations in Nigeria: A Survey of Three Major Tribes

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ABSTRACT

Herbal formulations (HFs) have been employed all over the world due to its diagnostic and therapeutic applications. It is particularly common in developing countries like Nigeria. Herbal formulations are mixtures consisting of one or more herbs in specified quantities to provide specific nutritional, cosmetic and therapeutic benefits in an attempt to diagnose and treat diseases. Herbal formulations are obtained from plant parts by extraction, distillation, expression, or fermentation or powdered form. Different herbal formulations are tinctures, extracts, essential oils, expressed juices and processed exudates This article enlists some HFs all around the world particularly those common to the three major tribes in Nigeria and their pharmacological activities. Data on awareness, consequences, and practice of their use, particularly among Nigerians, is scarce. In summary, this research analyses previously published publications on medicinal plants in Nigeria, reports information gathered directly from local traditional healers and describes the usage of some of these plants. It also discusses the advantages and disadvantages of recognizing common HFs in Nigeria's major tribes, comparing HFs to single herbs, and highlights the health effects that may accrue from this. This will help consumers and herbal medicine practitioners understand the strengths and weaknesses of herbal medications across Nigeria.

Keywords: Herbal formulation; medicinal plants; herb; pharmacological activities

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1. BACKGROUND TO THE STUDY

Human's reliance on plants can be traced back to the dawn of time when medicine was originally obtained from plants (Ekor, 2014). In ancient literature, approximately 500 medicinal plants were listed and even presently, over 80% of people in the developing world embrace the use of medicinal plants in disease treatment (Abraham and Paridhavi, 2013; Ekor, 2014). The World Health Organization (WHO) applauds inventions from all around the world, including traditional medicines, drug repurposing, and innovative therapeutics, in the pursuit of potentially curing numerous diseases and infections (WHO, 2001, Oloyede et al., 2010). Herbal medicine is the use of plants or plants material in the raw or processed state to cure injury or disease (Phua *et al*., 2009). It is the oldest and most frequently practiced medical system in the world today. Herbal medicines are herbal materials that contain whole plants, plant parts (leaves, bark, bulbs, fruits, seeds, tubers, flowers, and roots) and/or their extracts in specified quantities as active components intended to provide specific nutritional, cosmetic and therapeutic benefits in an attempt to diagnose and treat diseases (WHO, 2001; Veerareddy, 2013).

Methods of preparation of Herbal medicine used in maximizing efficacy and reduce toxicity vary by culture and location (Hussain *et al*., 2015). Extraction (solvent by weight); Infusions (maceration of crude medication for a brief duration over cold or hot water); Decoctions (boiling herbs for a certain time and filtering the contents); and Tinctures (alcoholic infusions) are some of the different ways of production (Parmer, 2005; Okafor, 2013). Liniments for external use as liquid, semi-liquid, or greasy forms containing active ingredients for skin application are another category. Poultices are made from macerated fresh plant parts, retaining the plant's juice and applied to the skin. Snuffs (powdered form) are dried plant powders inhaled through the nose (Oreagba *et al*., 2011; Veerareddy, 2013).

There are also several administration approaches (Hussain *et al*., 2015) like smoking a crudely constructed cigar containing dried plant materials or passive inhalation, in addition to the typical routes of oral, rectal, topical, and nasal administration. Others are heating the plant matter and inhaling the volatile oils that are released. These can help with congestion, headaches, and pulmonary issues. For piles, Sitz baths are employed (Okafor 2013; Iwu, 2014). Distillation and fermentation have also been used. Different herbal formulations are tinctures, extracts, essential oils, expressed juices and processed exudates (Veerareddy, 2013).

1.1 Statement Of Problem

Herbal formulations are freely distributed in Nigeria markets without sufficient identification, safety or toxicological testing. Many therapeutic plants are employed in herbal compositions by the three major tribes, though most of their medical effects have yet to be studied (Oladeji, 2016). The absence of well-documented safety profiles of herbal medicine, as well as the paucity of clinical trials on traditional medicines and medications, is a key hindrance to its continued usage globally (Ekor, 2014; Kaur *et al*., 2013). Several studies have identified potential negative effects of herbal medication when taken infrequently, in large amounts, or as a formula (Teschke and Eickhoff, 2015). Many researchers especially publications of Oloyede G. K. and Onocha P.A. have put in so much effort in justifying use of herbs or plants use in traditional medicine as well as isolating and characterising the chemical constituent responsible for the bioactivity (Onocha, et al., 2016; Oloyede et al., 2020)

1.2. Objective

This research will be extremely useful in identifying common herbal formulations in Nigeria's major tribes, comparing herbal formulations to single herbs, and highlighting health consequences. This will help customers and herbal medicine providers understand the strengths and weaknesses of herbal medications across Nigeria's three major tribes.

2. HERBAL FORMULATIONS (HFS)

Herbal formulations (HFs) are herb-herb combinations that have been used in medicine for thousands of years, although empirical evidence of their medicinal advantages is limited (Che *et al*., 2013). HFs are made up of botanicals, which contain a variety of chemical components that, when combined, can produce the desired effect. When compared to a single medicine, drug combinations often have a promising effect in the treatment of disorders. In Nigerian medicine, the concept of drug combination has been well established for decades, with amazing success. Drug combination therapy in cancer and infectious disorders has given patients new hope in recent years (Ramaiah *et al*., 2013).

Naturally occurring herbs and herbal ingredients organized into certain formulas have been shown to have potential synergetic effects (Edorh *et al*., 2015; Kajaria *et al*., 2010). The increasing interest in the use of plant-based formulations is leading to a fast-growing market for traditional medicine (Bhope *et al*., 2011) and making researchers to explore different areas in Natural product chemistry by isolating and characterising secondary metabolites from plants as well as justifying their applications (Oloyede et al., 2010 and 2021). Many of the herbal formulations have been packaged as tablets, syrup, amongst others.

2.1 Some HFs and their pharmacological activities.

HFs are used for the treatment of various ailments. Daouri HFs is a mixture of *Khaya senegalensis*, *Odina acida*, *Lophira lanceolata*, *Paullinia pinnata* L. and *Pteleopsis suberosa* used in Nigeria/Ghana as an anti-diarrhea and anti-malarial agent (Edorh *et al*., 2015). Yoyo Bitters which acts as purgative, blood cleansing, weight reduction and dissolution of hardened tissues is a coded HFs produced and marketed in Nigeria by Abllat Company Limited. According to the producers, the dark brownish herbal liquid is an aqueous preparation from a blend of five different medicinal plants; Aloe, *Acinos arvensis*, *Citrus aurantifolla*, *Chenopodium murale* and *Cinnamomum* (Adeyemi *et al*., 2012). Another formulated herbal drug, Okudiabet is a mixture of *Stachytarpheta angustifolia*, *Alstonia congensis* bark and *Xylopia aethiopica* fruits extract. It is used in the treatment of diabetes (Ogbonnia *et al*., 2010).

A successful attempt has been made using *Cissus rotundifolia* leaf extracts, Cassia abbreviate bark extract, *Zanthoxylum chalybeum* bark extract and *Zanthoxylem chalybeum* leaf extract from the HFs and further evaluated for in-vitro studies (Ogbonnia *et al*., 2010). Zylamend, an HFs common in The United State of America; contains *Ocimum sanctum*, *Curcuma longa*, *Zingiber oficinale*, *Camellia sinensis*, *Rosmarinus oficinalis*, *Polygonum cuspidatum*, *Berberis vulgaris*, *Origanum vulgar*, *Scutellaria baicalensis* and *Coptis chinensis*. Zylamend is used for the treatment of prostate cancer (Huang *et al*., 2011). Nefang is an HFs that consists of *Mangifera indica*, *Psidium guajava*, *Carica papaya* L, *Cymbopogon citratus*, *Citrus sinensis*, *Ocimum gratissimum* used in Cameroonian system of medicine for the treatment of Malaria (Arrey *et al*., 2014). The HFs "RIPARE" contains ingredients such as *Boswellia serrata*, *Commiphora mukul*, *Cissus quadrangularis*, *Vitex negundo*, *Centella asiatica*, *Tinospora cordifolia*, *Curcuma longa*, *Euphorbia hirta* and *Piper nigrum*.

This formulation is known to possess antiarthritic activity while BHUx, a patented HFs consisting of the aqueous fraction of five medicinal plants of the ayurvedic system, has significant anti-inflammatory properties through inhibition of cyclooxygenase-2 and lipoxygenase-15 (Satheesh *et al*., 2011).

3. COMMON HFs IN MAJOR TRIBES IN NIGERIA

According to Green and Makhubu (1983), 60-85% of the population in every developing country must rely on traditional or indigenous types of medicine. This data was utilized by Erinosho and Ayorinde (1985) stating that Nigeria has a long history in the use of herbal formulations. Nigeria has been dubbed "Africa's Giant" due to its vast population and impressive economic achievements compared to the countries that surround it. Nigeria's population is projected to grow from more than 186 million people in 2016 to 392 million in 2050, becoming the world's fourth most populous country and already Africa's most populous country. There are about 500 ethnic groups and languages spoken in the country, Hausa 30%, Yoruba 15.5%, Igbo (Ibo) 15.2%, Fulani 6%, Tiv 2.4%, Kanuri/Beriberi 2.4%, Ibibio 1.8%, Ijaw/Izon 1.8%, other 24.7%. With this statistics (Figure 1), Hausa, Yoruba, and Igbo are the three main tribes.

The Hausa people with a population estimated to be 67 million are Nigeria's largest ethnic group and account for roughly 30% of Nigeria's population. The Yoruba people that make up roughly 15.5 percent of Nigeria's population make them the country's second-largest ethnic group, while the Igbo people make up approximately 15.2 percent (Statistica, 2022; CIA, 2022). Several African countries, including Nigeria, have relied on traditional medical practitioners' spiritual and practical skills, such as herb sellers, traditional birth attendants, bone setters, and traditional surgeons, whose botanical knowledge of plant species, their ecology, and scarcity, as opined by Cunningham, are invaluable (1993). Table 1 summarises a list of some of the accessible HFs from the three major tribes.

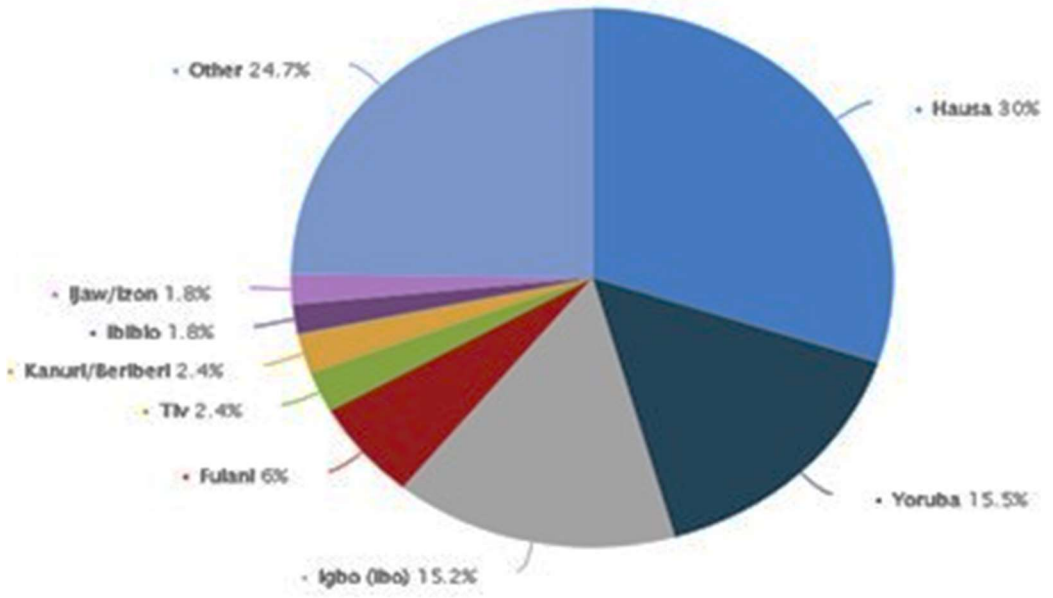

Figure 1: Adapted from Statistica (https://www.statista.com/statistics/1203438/distribution-of-ethnic-groups-in-nigeria/)

Table 1: List of some available HFs in Nigeria*

Commercial name	Local name	Formulation with Scientific names	Tribe	Therapeutic claims	References
Jedi-Jedi	(*Egbogi jedi, Agbo Jedi-Jedi*) Yoruba; (*Dankaloma*) Hausa	*Pelargonium zonale* L., *Citrus paradisi* M., *Vernonia amygdalina* D., *Sorghum bicolour* M., Allium sativum L., and naphthalene tablets	Yoruba, Hausa	Anti-dysentery, anti-diarrhea and anti-hemorrhoid	(Ibrahim *et al*., 2011)
St John's wort	Atun eje se (Yoruba)	*Hypericum perforatum L.*	Yoruba Hausa Igbo	Decrease anxiety and improves mood	Oluwa et al., 2013
–	*Agbo Iba*	*Ananas comosus* L., *Carica papaya* L., *Azadirachta indica* A. Juss., *Cymbopogon citrates* Stapf., *Psidium guajava* L. and *Pelargonium zonale* L.	Yoruba	Anti-malarial, anti-biotics	(Ibrahim *et al*., 2011)
Dauori	*Diuri*	*Khaya senegalensis*, *Odina acida*, *Lophira lanceolata*, *Paullinia pinnata* L. and *Pteleopsis suberosa*	Hausa	Anti-diarrhea, Anti-malarial and anti-anemic	(Edorh *et al*., 2015)
Wound Healer	–	*A. conyzoids*, *C. scandens* and *M. villosus*	Igbo	Anti-microbial and wound healing	Ilodigwe *et al*., 2012
Alomo bitter®	*Ogun ale*	*Treculia Africana* Decne. Ex Trécul and *Khaya ivorensis* A. Chev.	Yoruba	Erectile dysfunction, Man Power and Anti-dysentery	(Ibrahim *et al*., 2011)
Ciklavit	*Ogun romolapa romolese*	*Cajanus cajan* (L.) Millsp.	All tribes (sold in Pharmacies)	For management of pain crisis in sickle cell disease	
Black Soap	Sabilum-Salo (Hausa), Ose-dudu (Yoruba) and Ncha-Nkota (Igbo)	*Elaeis guineensis* A. Chev. Oil, *Theobroma cacao* and Honey	Hausa, Yoruba and Igbo	Anti-septic, Anti-fungal, Anti-bacterial and Moisturizer	(Ibrahim *et al*., 2011)
Ajase poki-poki®	*Ogun Jedi*	*Nicotiana L., Cocos nucifera* L. and *Aframomum melegueta* K.Schum	Yoruba	Anti-dysentery and Anti biotics	(Ibrahim *et al*., 2011)
Okudiabet	–	*Stachytarpheta angustifolia*, *Alstonia congensis* bark and *Xylopia aethiopica* fruits	Igbo	Anti-diabetic and Anti-bacterial	(Ogbonnia *et al*., 2010)
–	*ogwu obara*	*Hibiscus sabdariffa, Sorghum bicolor* and *Gongronema latifolium*	Igbo	Immune booster, Energizer, Blood normalizer	(Okunola *et al*., 2007)
Herbal tooth paste	–	*Aloe barbadensis* Mill.	Igbo	Teeth whitening, Anti-septic and Anti-mouth ulcer	(Ibrahim *et al*., 2011)

Commercial name	Local name	Formulation with Scientific names	Tribe	Therapeutic claims	References
Oroki Herbal Mixture	*Agbo Jedi-Jedi*	*Khaya ivorensis* A.Chev., *Alstonia congensis* Engl., *Mangifera indica* L. and *Sorghum bicolour* M.	Yoruba	Anti-oxidant anti-diarrhea and anti-hemorrhoid	(Ibrahim *et al*., 2011)
Ruzu Bitters	*Okpu n'ike*	*Uvarie chamae, Curculigo pilosa* and *Colocythis citrullis*	Igbo	Anti-diabetic, Anti-oxidant and Anti-dysentery	(Kale *et al*., 2018)
Fidson Bitters	(*Ogun Jedi*) Yoruba, (*Dankaloma*) Hausa	*Ginseng, Phyllanthus niruri, Aloe vera, Tephrosia purpurea, Eclipta alba, Swertia chirata* (Buch-Ham.), *Casssia angustifolia, Cinnamomum zeylanicum*	Yoruba, Hausa	Immune booster, anti-diabetic, erectile dysfunction	(Kale *et al*., 2018)
Jobelyn	Blood booster Atun eje se (Yoruba)	*Sorghum bicolour Moench leaves, Parquetina nigrescens, Harungana madagascariensis, Anacardium occidentale, Waltheria indica*	All tribes (sold in Pharmacies)	Treatment and prevention of stroke, improves the general well-being and for treating arthritis	Oluwa et al., 2013
Fajik Bitters	*Egbogi Jedi*	*Cassia alata, Citrus medica var. acida* (Roxb.), *Aloe barbaris, Aloe vera, Cassia angustifolia*	Yoruba	Anti-diabetic and Anti-oxidant	(Kale *et al*., 2018)
Baker Cleanser Bitters	*Okpu n'ike*	*Aloe vera, Acinos ravens, Chenopodium murale, Cinnoamomum aromaticum, Citrus aurantifolia and* purified water	Igbo	Anti-diabetic, Anti-rheumatism, Anti-inflammatory and Anti-haemorrhoids	(Kale *et al*., 2018)
Ginseng	Tamolabiya (Yoruba)	*Panax ginseng*	Yoruba Igbo Hausa	Improves cognitive function, provides energy and prevents fatigue, for treating inflammation, and cancer prevention, and for treating erectile dysfunction	Oluwa et al., 2013

***** Many of the herbal formulations listed here have been approved by National Agency for Food and Drug Administration and Control (NAFDAC) and supplied by community pharmacies.

4. IMPLICATIONS TO HEALTH

Scientists believe that substance that has therapeutic effect can also cause undesirable or harmful side effects. Medicinal plants, like synthetic medications, must be tested for quality, efficacy, and safety. Herbal medicines are not fully safe, despite their extensive use and proven

advantages around the world. While medicinal herbs have been shown to have therapeutic effects, they can also have negative side effects if administered inappropriately or in excess. Because of indiscriminate, irresponsible, or unregulated use, as well as a lack of sufficient standardization, the potential for negative effects increases. Many worldwide forums on medicinal plant research and publications have focused on these issues (Angell and Kassier, 1998).

Many hazardous plants can be found in Africa's diverse flora, yet they also have interesting medical properties. The toxic constituents in these plants (such as neurotoxins, cytotoxins, and metabolic toxins) can harm the human body's major systems (cardiovascular system, endocrine system, respiratory system, digestive system, urinary system, immune system, muscular system, nervous system, reproductive system, and so on) (Kamsu-Foguem and Foguem, 2014). Toxicity can also result from incorrect plant identification and usage. As a result, presentation of accurate, timely, and integrated risk communication as an important aspect of pharmacovigilance, which could benefit patient health and safety, is important. There is need for more collaboration between traditional medicine practitioners and modern healthcare professionals, as well as researchers and drug-regulatory agencies (Kamsu-Foguem and Foguem, 2014). Having highlighted the implications to health, it is appropriate to mention some of the advantages and disadvantages of herbal medicines and their applications.

4.1 Advantages of use of HFs

Combination of several active components from different plants or herbs generates a potentiating effect that may not be achieved by any single molecule which is an advantage of these botanicals over conventional single-component medications (Benzie and Wachtel-Galor, 2012). Under its related varied active principles, HFs have plant-based pharmacological compounds that may perform synergistic, potentiative, agonistic, and antagonistic activities. These pharmacological principles interact in a dynamic way to provide optimum treatment efficacy with the fewest possible side effects (Oloyede et al., 2010; Benzie and Wachtel-Galor, 2012).

There are two processes through which synergism works (pharmacodynamics and pharmacokinetics), depending on the nature of the interaction (Spinella, 2002). The herbal combination may work on numerous targets at once to deliver complete relief (Chorgade, 2014). Due to synergism, HFs provide some unique effects that single herbs do not. It is clear that a single multi-constituent formulation can achieve a superior therapeutic impact. To achieve desired pharmacological action, a lesser dose of the herbal product would be required, lowering the probability of harmful side effects (Chorgade, 2014). Furthermore, HFs reduce the need to take multiple herbal formulations at once, resulting in enhanced compliance, therapeutic impact and convenience to the user (Sarwar *et al*., 2011). When compared to single herbal formulations, all of these advantages have resulted in the popularity of HFs in the market (Parasuraman *et al*., 2014). HFs also have multiple types of molecules against a disease complication so different molecules cure a disease by different mechanisms to provide a complete therapy against a disease condition (Sarwar *et al*., 2011).

4.2 Disadvantages of use of HFs

Previously stating the advantage of combining many herbs or plants, the combined extract may also have more action than the individual extract thereby causing unwarranted side effects. The existence of numerous ingredients may cause chemical incompatibility, resulting in instability (Kavitha *et al*., 2013). Despite the formation of The National Agency for Food and Drug

Administration and Control (NAFDAC) in Nigeria, the regulation of herbal preparation manufacturing is less stringent. Toxicity studies and clinical trials on HFs are not required for the filing of patents and granting of manufacturing licenses for the manufacture of Herbal Formulations, according to acceptable clinical standards (Sarwar *et al*., 2011). This is worrisome considering the proliferation of herbal medicines in Nigeria markets. More stringent measures should therefore be put in place to curb the excesses of practitioners, manufacturers and exporters of Herbal Formulations.

5. CONCLUDING REMARKS

Herbal formulations are widely used in many nations, Nigeria inclusive, yet scientific data is still missing in even packaged formulations already licensed for consumption. Scientists have tested many herbal remedies in animals and have not yet been subjected them to clinical studies. Furthermore, no safety assessments, such as toxicological tests, have been conducted on many Herbal Formulations. More efforts in examining herbal formulations utilizing scientific approaches such as clinical trials, isolating and characterising the bioactive components, and mechanisms of action should be put in by stakeholders. Herbal Formulations can only have the best impact on human health when they are used appropriately. This review reveals the variety of herbal formulations across the three major tribes in Nigeria, their applications and challenges.

7. CONTRIBUTIONS TO KNOWLEDGE

This study highlight some herbal formulae and medicinal plants used in the three major tribes in Nigeria but most of their medicinal effects and active chemical components are still under investigation. The data on their knowledge, implications, and usage are also limited which offers probable research topics for researchers in this field.

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