



A REVIEW ON THE PHYTOCHEMISTRY AND MEDICINAL VALUES OF TEN COMMON HERBS USED IN NIGERIA

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ABSTRACT

Herbs are indispensable category of plants with a long history of use in remedying several health related challenges in many countries of the world including Nigeria. Their utilization dates as far back as the primitive age when there was no orthodox medicine. They are repositories of countless number of important bioactive molecules with therapeutic potentials such as anti-inflammatory, anti-tumor, anti-viral, analgesic and anti-malarial functions in living systems. Through advancement in science and technology, the quest for safe alternative medicine has unraveled via several laboratory investigations, various phytochemicals with great healing potentials in various medicinal herbs. This review took a critical review of the phytochemistry and medicinal values of ten (10) herbs used against various ailments and health problems in Nigeria.

Keywords: Herbs, Orthodox, Medicinal, Health, Phytochemicals

INTRODUCTION

Herbs have a long history of use as remedies against wide range of infections affecting mankind especially in Africa (Abd El-Ghani, 2016). They are an indispensable source of therapeutic agents used in orthodox and modern medicine. It has been estimated that more than 70% of drugs are formulated from herbs and not less than 80% of rural population depends on them for primary health care (Akinyemi, 2000). In highly developed countries such as United States, at least 25% of total drugs produced are formulated either directly or indirectly from plants, while in the third world countries such as China and India, the contribution is much more, reaching as high as 80% and contributing substantially to their economy (Abd El-Ghani, 2016). For centuries, herbs such as garlic, ginger, licorice and alligator pepper have been used to treat various respiratory infections such as the flu and pneumonia. As an example, Artesunate and other related anti-malaria drugs are produced from artemisinin, a phytochemical extracted from *Artemisia annua* (Brisibe, et al., 2008). They are believed to be more available, affordable, safe and natural; with fewer side effects compared to drugs.

However, one of the problems associated with herbs in many countries of the world is that, more often than not, herbal and natural remedies are usually prepared under unhygienic conditions.

Herbs like other medicinal plants are a rich source of phytochemicals that function as therapeutics against wide range of infections and ailments. They are regarded as repository of many bioactive molecules which are secondary metabolites with biological properties such as anti-inflammatory, antitumor, antiviral, analgesic and antimalarial effects (Saxena et al., 2013; Aye et al., 2019). These phytochemicals are found in various parts of the plants, such as the leaves, stems, roots, flowers, fruits and seeds (Costa et al., 1999). Most of these compounds especially the pigments usually accumulate in the epidermal layers plant tissues and they exhibit variation in quantity and quality depending on myriads of factors such as plant species, environmental and edaphic factors (Saxena et al., 2013). Research has shown that apart from their roles in plant defensive mechanisms they offer protections against various infections (Rao, 2003).

Nigeria as a country is blessed with a lot of herbal resources due to the presence favourable environmental conditions that support their growth and survival. Despite the immense benefits with this category of plants, a great number of them is currently facing the risk of extinction as a result of indiscriminate exploitation and lack of conservation strategy. Thus, this paper reviews the phytochemistry and medicinal importance of ten selected herbs commonly used in treating various infections and ailments in Nigeria with a view to creating more awareness about their constituent bioactive compounds and medicinal benefits they render.

Common herbs used in Nigeria: Botanical information, phytochemistry, anti-microbial properties, and previously associated infections

1. *Allium sativum* (Garlic)

Garlic, *Allium sativum* (family Liliaceae) is a species of the genus, *Allium* popularly regarded world wide as food supplement (Block, 2010). It is native to Central Asia but now cultivated worldwide mainly because of its associated numerous medicinal benefits. The early men of medicine such as Hippocrates, Aristotle and Ebers Codex ascribed a lot of medicinal importance to this plant (Murray, 2005). Nowadays, it is used as condiment and traditional medicine to treat a lot of diseases. The world production of garlic ultimately comes from South Korea, Spain, India, China and United States (Bongiorno *et al.*, 2008). Garlic is one of those plants that have been widely investigated over several years and used for centuries to fight infectious diseases (Onyeagba *et al.*, 2004). Most of the documented medicinal importance of garlic is associated with some of its constituent phytochemicals such as high trace mineral content, and enzymes. Allicin, S-allylcysteine sulfoxide is the dominant sulfur compound present in garlic at 10mg/g in fresh garlic or 30mg/g dry (Lawson, 1998).

2. *Garcinia kola* (Bitter kola)

Bitter kola (*Garcinia kola* Heckel) is an indigenous fruit tree of the family Guttiferae found in moist forests of western and central African countries

such as Nigeria, Cameroun, Sierra Leone, Gabon and Congo Brazzavile (Peprah *et al.*, 2009). It is of immense relevance in folkloric medicine and has proven to be effective against many diseases affecting mankind. Several laboratory investigations have documented information on its phytochemistry, pharmacognosy and toxicity (Ekene and Erhirhie, 2014). Virtually all parts of the plant are essential and utilized in various ways. However, the seeds are the most valued. Despite its astringent taste, it is a common snack chewed to remedy poor health conditions such as coughs, high blood pressure, erectile dysfunction and gastric problems. The seed extract has been reported to have the capacity to hinder Ebola virus replications under laboratory conditions (Iwu *et al.*, 1993). The kernel is highly rich in essential phytochemicals such as flavonoids and tannins. One of the most important biflavonoids found in the kernel, kolaviron possesses neuroprotective, antimicrobial, anti-malaria, wound-healing and anti-inflammatory properties, which attests to its indispensability in health care (Usunomena, 2012; Nwaehujor *et al.*, 2015; Tshibangu *et al.*, 2016). The roles of the biflavonoid complex, kolaviron in the management of benign prostatic hyperplasia, acquired immunodeficiency syndrome (AIDS) and neurodegenerative disorders have also been reported (Nworu *et al.*, 2008; Kalu *et al.*, 2016; Omotoso *et al.*, 2018).

3. *Citrus limon* (Lemon)

Lemon, *Citrus limon* (family Rutaceae) is a small evergreen flowering plant species consisting about 1300 species (Kamal *et al.*, 2011). The ripe fruits are ovoid, globose, berry, hesperidium, or yellow (Feizy and Beheshti, 2012). Lemon has a lot of medicinal importance. Research has shown that crude extracts of the various plant parts possess anticancer and antibacterial properties (Maruti *et al.*, 2011). Lemon serves as brain and nerve foods, blood purifier and regulates blood sugar. They are also used for treating asthma, nausea, throat infections, travel sickness, spots, acne, pimples, rheumatism, arthritis and bone-related diseases (Chaturvedi *et al.*, 2016). Lemon equally has varieties of traditional uses, a mixture of lemon juice and honey aids is used in reducing body weight. Lemon juice is rich in vitamin C; it helps to

lighten the skin, stimulate the liver, control nausea and relieve heartburns and irritable bowel syndrome. Also, it is used by people suffering from urinary tract infection problem to flush out high level of uric acid. A mixture of lemon juice and olive oil helps to cure gall bladder and kidney stones.

4. *Cymbopogon citratus* (Lemon grass)

Lemongrass (*Cymbopogon citratus*) belongs to the genus *Cymbopogon* in the African, Asian, Australian, and tropical island grass family (Soenarko, 1977). It is native to tropical Asia, but now found nearly all over the world. Lemon grass is a plant characterized with tall, well striped and unbalanced leaves, popularly known for its smoky, pleasant, herbaceous and lemon-like aroma (Manzoor et al. 2013). Lemongrass is antioxidant, anti-fungal and anti-microbial in nature and thus very useful in traditional medicine as remedy to many health conditions such as oily skin, scabies, acne, headache, body pains, flatulence, inflammation, abnormal perspiration, convulsion, insomnia, blood circulation, kidney and gastrointestinal problems (Santin et al., 2009; Hanaa et al., 2012; Kamkaen et al. 2015). Lemon grass is utilized in poultry and fish feeds production and an important ingredient in soup, teas, curries preparations in many countries (Costa, 2007). Lemon grass oil is very important in aromatherapy for its essential constituents such as citral, limonene, elemol, citronellal, citronellol, 1,8 cineole, linalool, geraniol, β -carophyllene, methylheptenone, geranylformate and geranyl acetic acid derivatives (Ahmad et al. 2008). Also, it is an important additive in cosmetic industries for soap and other body care productions (Wifek et al., 2016).

5. *Zingiber officinale* (Ginger) and *Curcuma longa* (Turmeric)

Ginger, *Zingiber officinale* Rosc., and turmeric, *Curcuma longa* L., are subtropical and tropical perennial herbs of Asia origin with an age-long history of use as cuisines and medicinal spices in many regions of the world (Gang and Ma, 2008; Ernst and Durbin, 2019). Several medicinal importance have been attributed to these plants and these include their therapeutic properties against wide range of infections and health conditions such

as cancer, cold, fever, coughs, nausea, arthritis, Alzheimer's disease, inflammations, rheumatism (Gang and Ma, 2008). Ginger and turmeric efficacies as remedies are believed to be conferred by several important phytochemicals which include the terpenoids (such as turmerones) and phenylpropanoid-polyketides (such as curcuminoids and gingerol-related compounds) compounds (Koo et al. 2013). Among these chemical compounds, curcumins and gingerols have received more attention and this is due to the fact that, they have been more associated with the cures for ailments affecting the world. For example, curcumin has been reported as a potent cure for cancer, diabetes and cardiovascular diseases while gingerol has found use in treating inflammatory diseases such as arthritis and asthma (Gang and Ma, 2006; Jiang et al. 2006). Over the years, ginger and turmeric have been highly regarded in the health and wellness product market as economically important herbs and their demands have continued to rise in many parts of the world (Ernst and Durbin, 2019).

6. *Nigella sativa* (Black seed)

Black seed (*Nigella sativa*) is also known as black caraway. It is an annual flowering plant species in the family of Ranunculaceae, native to the eastern Mediterranean, Indian Subcontinent, Northern Africa, and West Asia. The fruit capsule is large and inflated and bears 3-7 united follicles, each containing numerous seeds which are used as spice (Gayle and Josef, 2017). In traditional medicine, black seed is used in treating various ailments and these include, nasal congestion, conjunctivitis, headache, abscesses and toothache. Phytochemical profiling of *Nigella sativa* has revealed that, the seed contains 32- 40% oil, which is highly antioxidant in nature (Sultana et al., 2015). The oil is an effective remedy against internal and external inflammations, skin cancers, high blood sugar, arthritis, high cholesterol, asthma and stomach ache.

7. *Vernonia amygdalina* (Bitter leaf)

Bitter leaf (*Vernonia amygdalina*) belongs to the popular daisy family and is a small shrub of tropical Africa origin. It has characteristic rough bark, reaches a height of 2-5 m and bears elliptical leaves which usually grow up to 20 cm in length

(Ijeh and Ejike, 2011). Although, bitter leaf is commonly found in the wild but its numerous economic importance has greatly encouraged its domestication. Bitter leaf is well valued in orthodox medicine as it offers effective treatments against myriads of ailments such as stomach ache, prostate cancer, measles, chicken pox, pneumonia and high blood pressure. In many African countries including Nigeria, it is an essential ingredient that renders a unique and delicious taste in traditional dishes and possesses immense nutritional benefits.

8. *Anacardium occidentale* (Cashew leaf)

Cashew, *Anacardium occidentale*, is a tropical evergreen flowering tree species usually found in tropical countries including Nigeria. The leaves are oval with thick veins and midribs and are usually 10-12 centimetres in length and 7-12 centimetres in width. Research has shown that cashew leaves are rich in antioxidants and have antifungal, antiparasitic, antibacterial, antiseptic, and anti-inflammatory properties. They contain vitamin B and vitamin C, also, they are a fair source of iron and calcium, and also contain zinc, magnesium, phosphorus, manganese, sodium and potassium. Cashew leaves are very important in traditional medicine and used for treating various ailments in many parts of the world. In Africa, they are used in oral hygiene to solve tooth and gum problems. They are used to treat diabetes and malaria.

9. *Aframomum melegueta* (Alligator pepper)

Alligator pepper (*Aframomum melegueta*) also known as grains of paradise, is a tropical perennial herb of genus *Aframomum* and family, Zingiberaceae also known as the ginger family (Bamidele, 2019). Alligator pepper is greatly utilized by many countries including Nigeria for diverse puposes. For instance, it is a common item used for traditional sacrifices and other religious rites. Also, several uses of alligator pepper have been reported in the literature and this includes its efficacy in controlling larvae of *Spodoptera littoralis* and Egyptian cotton leaf worm and also important crop pests such as the diamond back moth *Plutella xylostella* L. (Ntonifor *et al.*, 2006; 2010). Alligator pepper has immense medicinal importance. The seed extract heals wounds and invigorates the

immune system against diseases (Ntonifor *et al.*, 2010). Studies have shown that seeds contain important phytochemicals namely, alkaloids, glycosides, tannins, flavonoids, sterols, triterpenes, and oils; some of which are responsible for its pestical and antimicrobial properties (Edeoga *et al.*, 2005; Doherty *et al.*, 2010). Alligator pepper is often included in anti-allergy, anti-flammation, anti-toxin and anti-ulcer herbal remedies for liver problems and tumours and its potency can be attributed also to some of the phytochemicals such as flavonoids (Iwu, 1993).

10. *Azadirachta indica* (Neem)

Neem, *Azadirachta indica* A. (family Meliaceae) is a tropical evergreen tree of Asia origin that shares some characteristics with mahogany species (Roshan and Verma, 2015). It is widely cultivated in many regions of the world especially in Southeast Asia and West Africa including Nigeria. In India, various parts of the plant are used in so many ways. The twigs are used for teeth whitening, the leaves eaten as salads and are effective remedies against smeared skin disorders and bugs repellent while the juice are used for making blood tonic (Roshan and Verma, 2015). The neem tree is more popular as a preventative and curative to various ailments (which includes malaria, fever, anaemia and skin infections) than being an exploitable tree for timber production in Nigeria. Research has shown that various chemical compounds of important biological functions have been isolated from various parts of the tree. These include liminoid, flavonoid and nimbosterol compounds. Quercetin, a flavonoid compound found in the leaves posses antiseptic, antifungal and antibacterial properties and thus could account for the potency of the leaf extracts in treating sore and scabies. Also the leaves are associated with antiviral properties and could confer its widely propagated virucidal potential against COVID-19.

Conclusions and Recommendations

This review encompassed vital botanical, phytochemical and ethno-medicinal information on ten herbs used in Nigeria as healing agents against various diseases. Not only do they possess the potentials for treating the mentioned health issues,

there are myriads of other unassociated health challenges they can equally render solutions to. The information provided therein could also help in unlocking other hidden potentials of the plants, thereby enriching the ethno-botanical resources available for the management of ailments and health challenges affecting mankind. Extensive research is required however into some of these medicinal herbs and especially regarding their combinations in herbal preparations as the quest to combat various health problems continues. In many cases, combining herbs exploits the natural synergy among

their constituent phytochemicals, but there are situations whereby it results in anti-synergy and production of deleterious effects. Also, the challenge of possible extinction can however not be overlooked, as many years of continued exploitation without any recourse for regeneration predisposes the continued existence of these wonderful herbs to threat. It is therefore necessary to raise awareness on the medicinal potentials of these herbs in order to encourage further research, conservation and sustainable utilization.

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