



**Review**

**THE USE OF MEDICINAL PLANTS IN HERBAL MEDICINE AND ITS IMPLICATIONS TO HUMAN HEALTH (A REVIEW)**

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**ABSTRACT**

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The roles of plants in maintaining human health is well documented. In Nigeria and other parts of the world, many of these indigenous plants are used as spices, food, ornamentals or medicinal plants. Many of these plants possess bioactive compounds that exhibit physiological activities against bacteria and other microorganisms. However, these plants are used in treatment of many diseases such as rheumatism, dysentery, cough, diabetes, tuberculosis, malaria and other ailments. Herbal medicine however include: herbs, herbal materials, herbal preparations and finished herbal products that contain parts of plants or other plant materials as active ingredients. The term 'medicinal' as applied to a plant indicates that it contains a substance or substances which modulate beneficially the physiology of sick mammals and that it has been used by man for that purpose. The use of herbs to treat diseases is almost universal among non-industrialized societies. There are many forms in which herbs can be administered, the most common of which is in the form of a liquid that is drunk by patient either a tisane or a diluted plant extract. Whole herb consumption is also practiced either fresh or in dried form. In general, the safety and effectiveness of herbal medicine as an alternative medicine have not been scientifically proven and remain largely unknown. However, beyond adverse effects from the herb itself, adulteration, inappropriate formulation or lack of understanding of plant and drug interactions have led to adverse reaction that are sometimes life threatening or lethal. The importance of medicinal plants becomes more patent at the present time in developing countries. In Pakistan it is estimated that 80% of the people depend on plants to cure themselves, a 40% in China and in Nigeria 60-70%. In technologically advanced country as the United States, it is estimated that 60% of the population use medicinal plants habitually to fight certain ailment, while in Japan there is more demand of medicinal plants than of "Official" medicines. Modern medicine, through clinical tests, has been able to validate those plants that the tradition had used with the method of test and error. Many turned out to be worth it, others demonstrated to be innocuous and some potentially dangerous. Perhaps, biochemical tests have been the ones that determined the main components of the medicinal plants and then the active principles.

**Keywords:** Medicinal plant, Herbal medicine, Herbs, Treatment

## INTRODUCTION

Medicinal plants, since times immemorial have been used in virtually all cultures as a source of medicine (Bruneton, 1995). The widespread use of herbal remedies and health care preparations as those described in ancient texts such as the bible and the Vedas, and obtained from commonly used traditional herbs and medicinal plants has been traced to the occurrence of natural products with medicinal properties (Dahlberg and Trygger, 2009).

The use of traditional medicine and medicinal plant in most developing countries as a normative basis for the maintenance of good health has been widely observed (UNESCO, 1996). Furthermore, an increasing reliance on the use of medicinal plants in the industrialized societies has been traced to the extraction and development of several drugs and chemotherapeutics from these plants as well as from traditionally used rural herbal remedies (UNESCO, 1998). Moreover, in those societies, herbal remedies have become more popular in the treatment of minor ailments and also on account of increasing costs of personal health maintenance (UNESCO, 1996). Medicine in several developing countries, using local traditions and beliefs is still the mainstay of health care (WHO, 1978a). As defined by WHO (1978a) health is the state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.

Herbal medicine however include: herbs, herbal materials, herbal preparations and finished herbal products that contain parts of plants or other plant materials as active ingredients (Enwonwu, 2003). The use of herbs to treat diseases is almost universal among non-industrialized societies, UNESCO (1996); many of the pharmaceuticals currently available to physicians have a long history of use of herbal remedies, including; *opium*, *aspirin*, *digitalis* and *quinine*. The World Health Organization (WHO) estimates that 80 percent of the population of some Asian and African countries presently uses herbal medicine for some aspect of primary health care (Akerlele, 1988).

The use of and search for drugs and dietary supplements derived from plant have accelerated in recent years, pharmacologists, microbiologists, botanists and natural-product chemists are combing the earth for phytochemicals and leads that could be developed for treatment of various diseases (Baba *et al.*, 1992). In fact according to World Health

Organization, approximately 25% of modern drugs used in the world have been derived from plants (WHO, 1978a). Among the 120 active compounds currently isolated from the higher plants and widely used in modern medicine today, 80 percent show a positive correlation between their modern therapeutic use and the traditional use of the plants from which they are derived (UNESCO, 1996). Also, more than two third of the world's plant species at least 35, 000 of which are estimated to have medicinal value, come from the developing countries, WHO (1978b) and at least 7000 medicinal compounds in the modern pharmacopoeia are derived from plants.

## MATERIALS AND METHOD

Relevant research publications were looked up from a number of different scientific journals on [www.google.com](http://www.google.com). About 10 different text books relevant to the subject were also consulted from the Prof Kenneth Aghagbo central library, Nnamdi Azikiwe University, Awka Anambra State.

## RESULTS AND DISCUSSION

Various researchers have made several contributions which have been very helpful in understanding this topic, but there is need to further carry out research in other to make more improvements in the use of herbal medicine. El-Said, 1971; Garcia, 1974; Akpata, 1977; Odebiyi and Sofowora, 1979; Kocry, 1983; Ogunbodele, 1991; Baba *et al.*, 1992; Pittler *et al.*, 2000; Sodipo and Akiniyi, 2000; Eric *et al.*, 2002; Hollist, 2004; Elujoba, 2005; Srinivasan 2005; Acharya and Anshu, 2008; Ramawat and Merillon, 2008; Crawtto *et al.*, 2010 and many others have made relevant contributions to this subject.

### Herbal Preparations

There are many forms in which herbs can be administered, the most common of which is in the form of a liquid that is drunk by patient either a tisane or a (possible diluted) plant extract. Whole herb consumption is also practiced either fresh or in dried form (Eric *et al.*, 2002). Several methods of standardization may be determining the amount of herbs used; one is the ratio of raw materials to solvent, Crawtto *et al.* (2010), although different specimens of

the same plant species may vary in chemical content. For this reason, layer chromatography is sometimes used by growers to access the content of their products before use (Ramawat and Merillon, 2008). Another method is standardization on signal chemical, tisanes or herbal teas are the resultant liquid of extracting herbs into water, Pitter *et al.* (2000); though they are made in a few different ways. Infusions are hot water extracts of herb such as chamomile or mint, through sleeping (Pittler *et al.*, 2000). Decoctions are the long-term boiled extracts, usually for harder substances with roots or barks (Pittler *et al.*, 2000). Maceration is the old infusion of plants with high mucilage content, such as sage, thyme, etc, Pittler *et al.* (2000); He also maintained that to make macerates, plants are cropped and added to cold water. They are then left to stand for 7 to 12 hours (depending on herbs used). For most macerates 10 hours is used.

Nevertheless, tinctures are alcoholic extracts of herbs which are generally stronger than tisanes (Pittler *et al.*, 2000). Usually obtained by combining 100% pure ethanol (or a mixture of 100% ethanol with water) with an herb (Sodipo and Akiniyi, 2000; Acharya and Anshu, 2008). A complete tincture has an ethanol percentage of at least 25% (Sometimes up to 90%) (Sodipo and Akiniyi, 2000). Herbal wine and elixirs are alcoholic extract of herbs; usually with an ethanol percentage of 12-38%, Sodipo and Akiniyi(2000) more so; herbal wine is a maceration of herbs in wine, while an elixir is a maceration of herbs in spirit e.g. Vodka grappa etc. Extracts include liquid extracts, dry extracts and nebulisates; liquid extracts are liquids with a lower ethanol percentage than tinctures (Acharya and Anshu, 2008). They can (and are usually) made by vacuum distilling tinctures. On the other hand, dry extracts are extracts of plant materials which are evaporated into a dry mass, Srinivasan (2005); Cawtto *et al.* (2000) they can then be further refined to a capsule or tablet. A nebulisate is a dry extract created by freeze-drying. Vinegars are prepared at the same ways as tincture except using a solution of acetic acid as the solvent (Pittler *et al.*, 2000). Syrups are extracts of herbs made with syrup or honey. Sixty-five parts of sugar are mixed with thirty-five parts of water and herb, the whole is then boiled and macerated for three weeks (Pittler *et al.*, 2000).

In addition, the exact composition of herbal product is influenced by the method of extraction (Cawtto *et al.*, 2000). A tea will be rich in polar components because

water is a polar solvent. Oil in the other hand is a non-polar solvent and it will absorb non-polar compounds (Edgar *et al.*, 2002). Alcohol lies somewhere in between.

Many herbs are applied topically to the skin in a variety of forms (Srinivasan, 2005). Essential oil extracts can be applied to the skin usually diluted in a carrier oil, many essential oils can burn the skin or are simply too high dose used straight-diluting in olive oil or another food grade oil such as almond oil can allow these to be used safely as a topical; salves, oils, balms, creams and lotion are other forms of topical delivery mechanisms (Srinivasan, 2005). Most topical applications are oil extractions of herbs. Taking a food grade oil and soaked herbs in it for anywhere from weeks to months allows certain phytochemicals to be extracted into the oil (Srinivasan, 2005, Cawtto *et al.*, 2010). This oil can then be made into salve cream lotions, or simply used as oil for topical application, Bruneton (1995) any massage oils, antibacterial salves and round healing compounds are made this way. One can also make a poultice or compress, using whole herb (or the appropriate part of the plant) usually crushed or dried and re-hydrated with a small amount of water and the applied directly in a bandage, cloth or just as it is (Srinivasan, 2005). Inhalation as in aromatherapy can be used as mood changing treatment to fight a sinus infection or cough, or to cleanse the skin on a deeper level (Steam rather than direct inhalation here) (Srinivasan, 2005).

### **Herbs, Treatments and Constituents with known or suspected adverse effects**

Non-inclusion of an herb in the list of harmful herbs does not imply that it is free of adverse effects (WHO, 1998b). In general, the safety and effectiveness of alternative medicine have not been scientifically proven and remain largely unknown (WHO, 1978b). However, beyond adverse effects from the herb itself, adulteration, inappropriate formulation or lack of understanding of plant and drug interactions have led to adverse reaction that are sometimes life threatening or lethal (Eric *et al.*, 2002).

Most of the adverse effects stated in this list are associated with only a small percentage of cases; they should be understood as potential risks rather than as certainties (WHO, 1978b; Akerele, 1998; Sofowora, 1993b).

**Aconite:**

Monkshood, Wolf bane, aconitum; *Aconitum* species: Heart palpitations and arrhythmias, hypotension, nausea, vomiting, abdominal pain, respiratory system, paralysis, death.

***Aloe Vera* Juice 'Medicinal Aloe':**

Abdominal pain, diarrhea, potentially carcinogenic with others can potentiate cardiac glycosides and antiarrhythmic agents.

**Anthroid Laxatives:**

Deterioration of psychosis in patient with pre-existing psychiatric disorders, known carcinogen contributing to cancer of the mouth, pharynx, esophagus and stomach when chewed. Kidney toxicity (associated with kidney failure, associated with development of cancer, particularly of the urinary tract).

**Atractylate (*Atractylis gummitera*):**

Liver damage, nausea, vomiting, epigastric and abdominal pain, diarrhea headache and convulsions, often followed by coma.

***Rhamnus frangula*:**

Abdominal pain, diarrhea, potentially carcinogenic, with others can potentiate cardiac glycosides and antiarrhythmic agents.

***Larrea tridentata*:**

Liver damage, kidney problems, hypotension in cancer patients.

***Ephedra sinica*:**

Agitation and palpitations; hypertension, irregular heart rate, insomnia, nervousness, tremors and seizures; paranoid psychoses, heart attacks, strokes and death.

A number of herbs are thought to be likely to cause adverse effects (WHO, 1978b). Furthermore, adulteration, inappropriate formulation or lack of understanding of plant and drug interactions have led to adverse reactions that are sometimes life threatening or lethal (Akerle, 1988; Sofowora, 1993b).

Proper double-blind clinical trials are needed to determine the safety and efficacy of each plant before they can be recommended for medicinal use (Butlet, 2004).

Although many consumers believe that herbal medicines are safer because they are "natural" herbal medicines and synthetic drugs may interact causing toxicity to the patient (Baba *et al.*, 1992). Herbal remedies can also be dangerously contaminated and herbal medicines without established efficacy may unknowingly be used to replace medicines that do have corroborated efficacy (Butlet, 2004). Standardization of purity and dosage is not mandated in Nigeria, but even products made to the same specification may differ as a result of biochemical variation within a species of plant (Sofowora, 1993a).

Plants have chemical defense mechanisms against predators that can have adverse or lethal effects on humans, e.g. of brightly toxic herbs include poison hemlock and nightshade, they are not marketed to the public as herbs because the risks are well known; partly due to a long and colorful history in Europe associated with sorcery, magic and intrigue (Maxwell, 1962). Although not frequent, adverse reactions have been reported for herbs in widespread use (Who, 1978b). A case of major potassium depletion has been attributed to chronic licorice ingestion and consequently professional herbalists avoid the use of licorice where they recognize that this may be a risk (Parfitt, 1978). Black cohosh has been implicated in a case of liver failure, Parfitt, (1978); few studies are available on the safety of herbs for pregnant women and one study found that use of complementary and alternative medicines are associated with 30 percent lower ongoing pregnancy and live birthrate during fertility treatment.

Relatively, examples of herbal treatments with likely cause-effect relationships with adverse events include aconite, which is often a legally restricted herb; ayurvedic remedies, broom, chaparral, Chinese herb mixtures, camfrey, herbs containing certain flavonoids, germander, guar gum, liquorice-root, and pennyroyal (Parfitt, 1978; Bruneton, 1995). There is also concern with respect to the numerous well established interactions of herbs and drugs in consultation with a physician usage of herbal medicine should be clarified, as some herbal remedies have the potential to cause adverse drug interactions when used in combination

with various prescriptions and over the counter (Akerle, 1991). Pharmaceuticals, just as a patient should inform an herbalist of their consumption of orthodox prescription and other medication. For example, dangerously low blood pressure may result from the combination of an herbal remedy that lowers blood pressure together with prescription medicine that has the same effect, Bruneton, (1995) some herbs may amplify the effects of anti-coagulants, certain herbs as well as common fruit interfere with cytochrome P450, an enzyme critical to much drug metabolism.

## CONCLUSION

The roles of plants in maintaining human health is well documented (Moerman, 1996). In Nigeria and

other parts of the world, many of these indigenous plants are used as spices, food, ornamentals or medicinal plants. Okwu and Ekeke (2003) reported that many of these plants possess bioactive compounds that exhibit physiological activities against bacteria and other microorganisms. However, these plants are used in treatment of many diseases such as rheumatism, dysentery, cough, diabetes, tuberculosis, malaria and other ailments, Oliver (1959); Gill (1992); Burkill (1995); Nnimh (1996); Bartam (1998); Lai (2004); Tapsell (2006) and Acharya *et al.* (2008). Medicinal Plants and Aromatic Plants have demonstrated its contribution to the treatment of disease such as HIV/AIDS, Sickel Cell anaemia, mental disorders (Elujoba *et al.*, 2005; Okigbo and Mmekka, 2006) and Microbial infections (Iwu *et al.*, 1999; Okigbo *et al.*, 2009).

Table 1: Some Nigerian Medicinal Plants with Oral Health Implications

Oral Hygiene	Tooth Ache	Sore Throat	Carious Tooth
<i>Antidesma venosum</i> Tul.	<i>Alchornea cordifolia</i> Muell. Arg.	<i>Acacia farnesiana</i> (Linn) Wild	<i>Acaciasie beriana</i> DC.
<i>Casearia bateri</i> mast	<i>Anacardium occidentale</i> Linn.	<i>Amaranthus spinosus</i> Linn.	<i>Alchornea cordifolia</i> muell. Arg.
<i>Citrus aurantifolia</i> Swing	<i>Chlorophora tinctora</i>	<i>Anacardium occidentale</i> Linn.	<i>Capsicum annum</i> Linn.
<i>Diospyros ellioti</i> F. Whit	<i>Caspium annum</i> L.	<i>Casearia barteri</i> mast.	<i>Curcuma domestica</i> L.
<i>Garcinia kola</i> Hackel.	<i>Curcuma domestica</i> Linn.	<i>Citrus onivantium</i> Linn.	<i>Dichrostachys cinerea</i> Wigh & Arm
<i>Jatropha curcas</i> Linn.	<i>Piper guineense</i> Linn	<i>Cocos nucifera</i> Linn.	<i>Diospyros ellioti</i> F. Whit
<i>Lecaniodiscus cupaniodes</i>	<i>Daniella oliverl</i> Hut.	<i>Diospyros ellioti</i> F. Whit	<i>Zanthoxylum rubescens</i> Eng.
<i>Ocimum gratissimum</i> Linn.	<i>Zingiber officinales</i> Rosco.	<i>Grongronema latifolium</i> Benth.	<i>Zanthoxylum zanthoxyloids</i> Waterm.
<i>Vernonia amygdalina</i> Del	<i>Erythrina mildbaedi</i> Har.	<i>Magifera indica</i> Linn	<i>Piper guineanse</i> Linn
<i>Masularia acuminata</i> (G. Don) Bull-Ex Hoyle	<i>Zanthoxylum zanthoxyloids</i> Waterm	<i>Ocimum gratissimum</i> Linn	<i>Syzigium aromaticum</i>
<i>Terminalia glaucenscens</i> Planch	<i>Garcinia kola</i> Heckel	<i>Piper guineense</i> Linn	<i>Zingber officinale</i> Rosco.
	<i>Syzigium aromaticum</i>	<i>Zingiber officinale</i> Rosco	

(El-Said, 1971; Garcia, 1974; Akpata, 1977; Odebiyi and Sofowora, 1979; Kocry, 1983; Ogunbodele, 1991; Hollist, 2004; Elujoba, 2005).

According to the WHO (1978a), 80% of the world's population use medicinal plant in the treatment of diseases and this is more prevalent in African countries. Reports from Iwu *et al.* (1999) holds that the primary benefits of using derived medicine are that they are relatively safer than synthetic alternatives, offering profound therapeutic benefits and more

affordable treatment. The use of medicinal plants in developing countries as a normative basis for the maintenance of good health has been widely observed (UNESCO, 1996). More so, the increasing reliance on the use of medicinal plants in the industrialized societies has been traced to the extraction and development of several drugs and chemotherapeutics

from these plants as well as from traditionally used rural remedies (UNESCO, 1998).

The importance of medicinal plants becomes more patent at the present time in developing countries (Kumar *et al.*, 1997). In Pakistan it is estimated that 80% of the people depend on plants to cure themselves, a 40% in China and in Nigeria 60-70% (Egunjoba, 1978). In technologically advanced country as the United States, it is estimated that 60% of the population use medicinal plants habitually to fight certain ailment, Farnsworth and Soejarto (1991) in Japan there is more demand of medicinal plants than of "Official" medicines.

However, modern medicine, through clinical tests, has been able to validate those plants that the tradition had used with the method of test and error (Butlet, 2004). Many turned out to be worth, other demonstrated to be innocuous, others, potentially dangerous (Butlet, 2004). Perhaps, biochemical tests have been the ones that determined the main components of the medicinal plants, hence, the active principles.

## CONFLICT OF INTEREST

None declared.

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