

The Characteristics and Roles of Medicinal Plants: Some Important Medicinal Plants in Nigeria

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Abstract

Natural products derived from plants for the treatment of diseases have proved that nature stands a golden mark to show the relationship between the interrelationship between man and his environment. The researches and utilization of herbal medicine in the treatment of diseases increases every day. Before the development and civilization by the British in Nigeria, medicinal plants are believed traditionally to be a therapeutic agent for the treatment of diseases such as typhoid, cholera, measles, gonorrhoea. However, the knowledge of herbal medicines for treatment of diseases is confined to mostly the practicing herbalists or plant scientists with the belief that herbal medicines will lose their potency if revealed to other people. Although some herbs may have medicinal values, sometimes the medicinal preparation inflicts certain side effects. In view of this, the present study focuses on the knowledge on medicinal uses of plants and the scientific investigation to confirm their medicinal values.

Keywords: *Natural products; Medicinal plants; Medicinal values; Diseases; Potency*

Introduction

Plant is an important source of medicine and plays a key role in world health [1]. Medicinal herbs or plants have been known to be an important potential source of therapeutics or curative aids. The use of medicinal plants has attained a commanding role in health system all over the world. This involves the use of medicinal plants not only for the treatment of diseases but also as potential material for maintaining good health and conditions. Many countries in the world, that is, two-third of the world's population depends on herbal medicine for primary health care. The reasons for this is because of their better cultural acceptability, better compatibility and adaptability with the human body and pose lesser side effects. From records, most of the used drugs contain plant extracts. Some contain active ingredients (bioactive components or substances) obtained from plants. Through recent researches, plant-derived drugs were discovered from the study of curative, therapeutic, traditional cures and most especially the folk knowledge of indigenous people and some of these claims and believe of people are irreplaceable despite the recent advancement in science and technology. Some of the drugs believed to be obtained from plants are aspirin, atropine, artemesinin, colchicine, digoxin, ephedrine, morphine, physostigmine, pilocarpine, quinine, quinidine, reserpine, taxol, tubocurarine, vincristine and vinblastine. The importance of medicinal plants cannot be taken lightly in Nigeria; therefore, it will be of significance to examine the characteristics and roles of phytochemicals in some of the medicinal plants commonly used in Nigeria.

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Brief Description of Medicinal Plants

Medicinal plants may be defined as those plants that are commonly used in treating and preventing specific ailments and diseases and that are generally considered to be harmful to humans [2]. These plants are either “wild plant species” those growing spontaneously in self-maintaining populations in natural or semi-natural ecosystems and could exist independently of direct human actions or the contrasting “Domesticated plants species” those that have arisen through human actions such as selection or breeding and depend on management for their existence [3].

Herbal medicines proved to be the major remedy in traditional system of medicine. They have been used extensively in medical practices since ancient times. This prompts the development in the practices of medicinal plants. The reasons are because of their biomedical benefits as well as place in cultural beliefs in many parts of world in the development of potent therapeutic agents. During 1950-1970, approximately 100 plants based new drugs were introduced in the USA drug market including deserpidine, reseinnamine and vincristine which are derived from higher plants.

Medicinal plants have provided mankind a large variety of potent drugs to alleviate or eradicate infections and suffering from diseases in spite of advancement in synthetic drugs, some of the plant-derived drugs still retained their importance and relevance. The use of plant-based drugs all over world is increasing [4]. There have been records of advances made in the modern (synthetic) medicine there are still a large number of ailments or infection (diseases) for which suitable drugs are yet to be found. This have brought an urgent need to develop safer drugs (both for man and his environment) for the treatment of inflammatory disorders, diabetes, liver diseases, and gastrointestinal disorder. Through recent researches on herbal plants or medicine, there have been great developments in the pharmacological evaluation of various plants used in traditional systems of medicine. Consequently, plants can be described as a major source of medicines, not only as isolated active principles to be dispensed in standardized dosage form but also as crude drugs for the population. Modern medicines and herbal medicines are complimentarily being used in areas for health care program in several developing countries such as countries in Africa, Asia and some part of Europe. Due to different outcomes on herbal plants, plant products surfaces all over the world due to the belief that many herbal medicines are known to be free from health and environmental effects. The fear of the masses in the utility of synthetic drug or modern drugs is always accompanied with its single or multiple adverse or health effects [5,6].

Important properties of phytochemicals

The use of plants for treating diseases is as old as the human species. Popular observations on the use and efficacy of medicinal plants significantly contribute to the disclosure of their therapeutic properties, so that they are frequently prescribed, even if their chemical constituents are not always completely known. For example, *Senna alata* is used traditionally in Nigeria to treat bacterial and fungal infections [6,7]. They also showed varying degrees of antibacterial and antifungal activities against pathogens.

Flavonoids have been found to exhibit a greater antifungal and antibacterial activity against some human pathogenic fungi and bacteria [8]. The therapeutic potency of a medicinal plant is due to the presence of some bioactive components. These bioactive components are ascertained using phytochemical screening such as phytochemical tests and thin layer chromatography [9].

Medicinal plants contain a wide variety of secondary metabolites or compounds such as tannins terpernoids, alkaloids, flavonoids; that dictates the therapeutic potency of the plants most especially the antimicrobial activities [10]. Similar phytochemical constituents such as flavonoids and tannins were also revealed to be active against pathogenic bacteria such as

Bacillus cereus, *Staphylococcus aureus* amongst others [11]. The tannins present in medicinal plants make it useful in production of antiseptic soap which are commonly used in bathing or cleansing of skin surfaces. It was documented in literature that phytochemicals can be toxic to filamentous fungi, yeasts and bacteria [12], and also, inhibitory to viral reverse transcriptase [13]. Saponins were reported as a major components acting as antifungal secondary metabolite. A wide range of physiological activity of saponins, steroids, phenols and tannins are found to be more predominant and therefore may be responsible for the antimicrobial action [14].

Tannins have astringent properties which hasten the healing of wounds and inflamed mucous membrane due to their physiological activities such as anti-oxidant, antimicrobial and anti-inflammatory properties. The healing properties of medicinal plants could be due to the presence of tannins. They are known to possess' astringent, anti-inflammatory, anti-diarrheal, antioxidant and antimicrobial properties [14]. Saponins have been traditionally used in detergents, pesticides and molluscides in addition to their industrial applications such as foaming and surface active agents. They help in controlling cardiovascular diseases and in controlling cholesterol in humans [13].

Characteristics of medicinal plants in Nigeria

In West Africa, mostly in Nigeria, medicinal plants have shown distinctive features in area of herbal therapy. There are about 1000 medicinal plants in Nigeria and most of their medical activities have not investigated yet. Their medical activities could be decisive in treatment of present or future health problems. Some medicinal plants can complement or damage or neutralize their possible negative effects in the body, and they are known as synergic medicinal plants; some are used in the treatment of complex cases like cancer diseases, they are known as official medicinal plants; some have ability to prevent the appearance of some diseases by reducing the side effect of synthetic treatment, these are known as preventive herbal medicinal plants.

Problems or issues facing the use of medicinal plants in Nigeria

Despite the recent advancement in herbal medicine, one of the most difficult issues to contend with in translating traditional herbal practices into conventional 'western' medicine is the individualization of prescriptions containing multiple herbal and other ingredients. Also, industries in developing countries face challenges in the development of the medicinal plant.

One of these problems is lack of information on the social, biochemical and economic benefits that could be derived from the industrial utilization of medicinal plants. In addition, there are little incentives for standardization of products, little information on the market potential and trading possibilities of these medicinal plants. This result in under use or less exploitation in the real potential of these plants.

The Role of Medicinal Plants in Traditional Healing in Nigeria

The pharmacological treatment of disease began long ago with the use of herbs [2]. Methods of folk healing throughout the world commonly used herbs as part of their tradition. Some of these traditions are briefly described below, providing some examples of the array of important healing practices around the world that used herbs for this purpose. It is also a function of the traditionally-held belief that the synergistic combination of several active principles in some herbal preparations is responsible for their beneficial effects [15].

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The introduction of plant derived drugs in modern medicine has been linked to the uses of plant derived materials as an indigenous cure in traditional system of medicine [16]. Some of the plants have been found to possess significant antibacterial, antifungal, anticancer, antidiuretic, anti-inflammatory and anti-diabetic properties [14,17-20]. Some other uses of herbal medicines are in venom neutralization by lupeol acetate isolated from the root extract of *Hemidesmus indicus* [21], treatment of hypertension and lowering of blood sugar by serpentine isolated from the root of *Rauwolfia serpentine*, treatment of Hodgkin's, choriocarcinoma, non-Hodgkin lymphomas, leukemia in children, testicular and neck cancer from vinblastine isolated from the *Catharanthus rosesus* [22], treatment of acute lymphocytic leukemia in childhood advanced stages of Hodgkin's, lymphosarcoma, cervical and breast cancer amongst others. Plant derived drugs are used to cure mental illness, skin diseases, tuberculosis, diabetes, jaundice, hypertension and cancer.

Medicinal importance of some indigenous medicinal plants in Nigeria

Medicinal plant contains chemical compounds that dictate their therapeutic potency. Researchers have shown that different plants contain different bioactive components at different concentrations. The higher the amount of the important phytochemical in medicinal plants, the greater therapeutic potency or medicinal importance of the plants. There are more than 300 known medicinal plants in Nigeria; though the applications vary from plants to plants, culture and people believe, weather and other factors, many of these plants are not widely distributed; some grows well in rain forest while others in savannah regions. In some part of Nigeria, most especially, pawpaw (*Carica papaya*) is known to be used in treatment of ulcer; other part used it for treatment of constipation, catarrh, abortion and cough. The following examine the common importance of some medicinal plants and the phytochemicals of some selected plants in Nigeria:

Alternanthera nodiflora

- **Botanical name:** *Alternanthera nodiflora*
- **Local name:** Dangunro (Yoruba)
- **Common name:** Joyweeds or Joseph's coat
- **Phytochemical constituents:** Alkaloids, carotenoids, flavonoids, terpenoids, phlobatannins, phenols, saponins [23,24].
- **Medicinal application:** They are mostly used as pain reliever. The leaves are pulverized to fine powder and later smeared with white palm oil and this was then applied on the affected part of the body.

Kalanchoe genata

- **Botanical name:** *Kalanchoe genata*
- **Local name:** Odundun (Yoruba), onwa (Ibo),
- **Common name:** Miracle plant, Hand-life plant
- **Phytochemical constituents:** Alkaloids, flavonoids, phenolic compounds, tannins [25,26].
- **Medicinal application:** They are used for treating concussion. Fresh leaves soften by heating and then squeezed to obtain liquid content. This was then mixed with palm oil and taken orally or massage on the affected part of the body.

Cassia alata/Senna alata

- **Botanical name:** *Cassia alata* or (*Senna alata*)
- **Local name:** Asunwon (Yoruba), ogala (Ibo),
- **Common name:** Candle bush, acapulo
- **Phytochemical constituents:** Flavonoids; anthraquinones; tannins; steroids; saponins; phenolic compounds, glycosides [8,14,27-30].
- **Medicinal application:** Used as a treatment to relieve constipation. The dried leaves are pulverized and fine powdered potassium aluminum sulphate was added and administered orally.

Strophanthus hispidus

- **Botanical name:** *Strophanthus hispidus*
- **Local name:** Isa (Yoruba), kwankwani (Hausa), Sagere, isagere, isagira
- **Common name:** Arrow poison
- **Phytochemical constituents:** Flavonoids, tannins; steroids; saponins, glycosides, phlobatannins, carbohydrate [31-33].
- **Medicinal application:** It is often used as treatment for cough. The leaves sample was pulverized and small quantity of sodium chloride was mixed together. This is taken orally with palm-wine daily.

Pupalia lappacea

- **Botanical name:** *Pupalia lappacea*
- **Local name:** Emi-agbo (Yoruba), ose (Ibo), marin-kusu (Hausa)
- **Phytochemical constituents:** Flavonoids; anthraquinones; saponins; phenols, glycosides [34-37].
- **Medicinal application:** It is often used as treatment for sterility in women. The sample was pulverized and mixed with fruits, dried squirrel and maize grains. About three tea spoon full are taken orally with liquid food.

Nicotiana tabacum

- **Botanical name:** *Nicotiana tabacum*
- **Local name:** Ewe taba (Yoruba), an were (Ibo), taba (Hausa)
- **Common name:** Tobacco
- **Phytochemical constituents:** Alkaloids; flavonoids; anthraquinones; tannins; steroids; saponins; glycosides; terpenes [38-42].
- **Medicinal application:** As a treatment for convulsion. The leaves are crushed to collect the juice and this is added to water for bathing.

Carica papaya

- **Botanical name:** *Carica papaya*
- **Local name:** Ibepe (Yoruba), ojo (Ibo), gwanda (Hausa)
- **Common name:** Pawpaw
- **Phytochemical constituents:** Flavonoids; anthraquinones; tannins; steroids; saponins; phenolic compounds, glycosides [36,37,43-45].
- **Medicinal application:** They are often used as a medicine for the relief of constipation, catarrh, abortion and cough. The leaves are boiled with honey in water for 5 h and allowed to cool; this is taken orally as treatment for catarrh and cough.

Byrsocarpus coccineus

- **Botanical name:** *Byrsocarpus coccineus*
- **Local name:** (Yoruba), (Ibo), (Hausa)
- **Common name:** Schellent
- **Phytochemical constituents:** Flavonoids; anthraquinones; tannins; steroids; saponins, glycosides [32,37].
- **Medicinal application:** They are often used as a treatment of sore throat and tooth-ache. The juice is obtained from the leaves and applied on the affected part with the aid of cotton wool on the affected part of the tooth.

Conclusion

The knowledge of herbal medicines for complicated treatment of diseases is confined to mostly the practicing herbalists or plant scientists with the belief that herbal medicines will lose their potency if revealed to other people. Although some herbs may have medicinal values, sometimes the medicinal preparations inflict certain side effects. The special significance of medicinal plants in treatment of diseases relates to the phytochemical present. The study showed that all the medicinal plants (in Nigeria) contain bioactive components known as phytochemicals. Therefore, the therapeutic or medicinal applications of these plants could be due to the presence of bioactive components.

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