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Comparative Phytochemical and Proximate Analysis of Two Medicinal Plants Used in Folkloric Treatment of Skin Diseases in South Western Nigeria

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Abstract

This study evaluates the phytochemical constitution and proximate analyses of the solvent extracts of the stem bark of two important local herbs (*Cleistopholia patens (*Apako*),* and *Chlorodendroncapitatum (*Lasangba*))* used in the traditional treatment of skin diseases Qualitative analysis of phytochemical constituents' *viz.* tannins, phlobatannins, saponins, flavonoids, steroids, terpenoids and cardiac glycosides; and quantitative analyses of total phenolics, saponins and flavonoids were performed using standard methods. The qualitative phytochemical screening revealed the extracts' richness in tannins, steroids, phenol, saponin, glycosides and flavonoids. The quantitative analyses showed the plants to be rich in tanin, phenol, phylate, oxalate, saponin, flavonoids and alkaloids. However, phylate, saponin and flavonoids were found in high concentrations in most of the plants. The plants were also found to contain minerals such as Na, k, Ca, Zn, Fe, Pb, Cu, Mg and P in relatively high levels.

Key Words: Phytochemical, proximate analyses, skin diseases, plants, herbs, *Cleistopholiapatens, Chlorodendroncapitatum.*

INTRODUCTION

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. All over the globe, especially in South American countries, the use of medicinal plants has significantly supported primary health care (Maciel *et al*., 2002). Nature has provided many things for humankind over the years, including the tools for the first attempts at therapeutic

intervention. Ancient civilization depended on plant extracts for the treatment of various ailments. Today, plant materials remain an important resource for combating illnesses, including infectious diseases and many of these plants have been investigated for novel drugs or used as templates for the development of new therapeutic agents, food additives, agrochemicals and industrial chemicals (Habila *et al*., 2011). Plant based natural constituents can be derived from different parts of the plant like bark, leaves, flowers, roots, fruits, seeds, *etc*. The phytochemical agent is a natural bioactive compound found in plants, such as vegetables, fruits, medicinal plants, flowers, leaves and roots that work with nutrients and fibers to act as an defense system against disease or more accurately, to protect against disease.

Medicinal plants are of great importance to the health of individual and communities. Phytochemicals are chemical compounds that are naturally found in plant. They are responsible for the colour and organoleptic properties of the plant. Phytochemicals could be available as dietary supplements, but its potential health benefits are derived from consumption of the whole plant (Rao and Rao, 2007). Besides being therapeutic agents, medicinal plants are also a big source of information for a wide variety of chemical constituents which could be developed as drugs with precise selectivity. These are the reservoirs of potentially useful chemical compounds which could serve as newer leads and clues for modern drug design (Vijyalakshmi and Ravindran, 2012). The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids and phenolic compounds (Doss, 2009). Correlation between the phytoconstituents and the bioactivity of plant is desirable to know for the synthesis of compounds with specific activities to treat various health ailments and chronic diseases as well (Pandey *et al*., 2013).

Owing to the significance in the above context, such preliminary phytochemical screening of plants is useful in order to discover and develop novel therapeutic agents with improved efficacy. Numerous research groups have also reported such studies throughout the world (Rapheal, 2012, Kumari *et al*., 2012, Kharat *et al*., 2013, .Kavita, 2013,and Dasgupta *et al.,* 2013). Phytochemicals are present in a variety of plants utilized as important components of both human and animal diets. These include fruits, seeds, herbs and vegetables (Okwu *et al*, 2009). Diets containing an abundance of fruits and vegetables are protective against variety of diseases, particularly cardiovascular diseases (Okigbo *et al*., 2005). Herbs and spices are accessible sources for obtaining natural antioxidants (Okwu *et al*., 2004).

Many medicinal plants exert their beneficial effects through the additive and synergistic actions of several chemical compound acting as single or multiple target sites associated with a physiological process. These synergistic pharmacological effects can be beneficial by eliminating the problematic side effect associated with the predominance of the single xenobotic compound in the body (Tyler, 1999).The synergistic interactions that underlie the effectiveness of a number of phytomedicines has been extensively documented (Kaufman *et al*., 1999). *Cleistopholiapatens (Apako), (Benth)* is a tree 20-30m tall, with a trunk up to 10m tall and 20-90cm wide, its back is grayish-white, smooth fibrous or furrowed . It is a fast growing, commonly seen in forests and rapidly colonizing abandoned areas. The body is slender, cylindrical and straight and its timber is straight grained. The tree is sun-loving, common in distributed forest and rapidly colonizing abandoned areas. It is used in traditional medical practices in many parts of Africa where it has several applications. Hu *et al*., (2006) isolated oligorhamnosides anti–bacteria from *Cleistopholis patens Benth.* In addition, alkaloids, (eupolauridine) and 3-methoxy champangine, from the ethanolic extract of *Cleistopholis patens Benth* are potent anti-fungal agents. Liu *et al*.,(1990) reported that the steroidal, glycoside and alkaloidal fractions of *Cleistopholis patens Benth* are effective against *klebsiella* pneumonia. The leaf extracts of *Cleistopholis patens Benth* also revealed the presence of glycosides, steroids, terpenoids, alkaloids, saponins, flavonoids, fats and oils and carbohydrates (Adonu *et al*., 2013).

Chlerodendroncapitatum (lasangba) in Nigeria has been widely used in traditional medicinal application in the treatment of tuberculosis, fever, obesity, diabetes mellitus, diarrhea, asthma, hypertension and erectile dysfunction (Siddig *et al*., 2012). In Sudan, the roots of this plant are used traditionally in the management of male erectile dysfunction (Mahmoud *et al*., 1995). The genus *Clerodendrum*has has been reported to demonstrate versatile biological activities by other researchers, such as; antitumorgenic (Liu *et al.,*2008).hypoglycemic, hypolipidemic (Devi and Sharma, 2004).hepatoprotective activity against CCl4-induced liver injury in rats (Gopal and Sengottuvelu, 2008)., anti-inflammation (Choi *et. al*., 2004), radical-scavenging activity (Chae *et al*., 2006, Vidya *et al*.,2007), antidiarrhoeal (Rani *et al*.,1999), antinociceptive, and antipyretic effects

(Narayanan *et al*., 1999). The phytochemical constituents of the leaf extracts include; Carbohydrate, Glycosides, Tannins, Saponin, Flavonoids, Steroids, Triterpenes, and Alkaloids (Momoh *et al*., 2015).

The purpose of this study is to investigate the phytochemical composition of some medicinal plants that are used in the herbal treatment of skin diseases in parts of southwestern Nigeria.

MATERIALS AND METHODS

Sample Collection and Preparation

Stem bark and roots of plants were sampled from traditional healers at Ibode in Ibadan, Oyo State. The plant materials were washed with distilled water, air dried at room temperature, milled into powder and kept in sterile containers till use. Eight different plants used in folkloric treatment of microbial infections were sampled for phytochemical screening. The plants were identified by Mr. Olatunde of the Department of Biological Sciences, Achievers University, Owo, Ondo State. Voucher specimens were deposited in the herbarium of the University.

A 100gm amount of powered plant samples was suspended in 500mls of each solvent. The solution was allowed to stand for 5 days (120 hrs) after which each solution was filtered using a sterile muslin cloth and a Whatman no.1 filter paper. The collected filtrate was evaporated to dryness under sterile condition at room temperature. The extracts were kept in sterile bottles until ready for use.

Table 1. List of Plants and Their Taxonomy

Plants names)	*Cleistopholia patens*	*Cleorodendroncapitatum*
English name	Salt and oil tree	Hollow stem
Locaal names	Apako	Lasangba
Family	(Anonaceae)	
Parts used traditionally	Leaves, bark	Leaves, roots
Parts used in this work	Stem bark	Stem bark
Traditional uses	Cough, anthelmintics, antipyretic, respiratory diseases, tube	Anthelmintics, dysentery, gonorrhoea

Phytochemical Screening

Active plants were screened quantitatively and qualitatively for phytochemicals using the methods of Trease and Evans (2002) and Odebiyi and Sofowora (1993).

Test for Alkaloids: About 0.2g amount of plant extract was acidified with 1% hydrochloric acid (HCL) for 2 minutes and was then treated with a few drops of Dragendorff's reagent in a test tube. The formation of white precipitate indicates the presence of alkaloids. (Odebiyi and Sofowora, 1978, Banso and Ngbede,2006).

Test for Saponins: Sterile distilled water was used to dissolve 0.2g of plant extract. A 2ml amount of the solution was placed in different test tubes and were shaken vigorously for a few minutes. Frothing which persists on warming was taken as an evidence of the presence of saponin (Odebiyi and Sofowora, 1978).

Test for Tanins (Gelatin test). To the extract, 1% gelatin solution containing sodium chloride was added. Formation of white precipitate indicates the presence of tannins.

Test for Flavonoids (Shinoda's tests); Plant extract was dissolved in 2ml of dilute NaOH. A yellow solution that turns faint or colorless on addition of a few drops of hydrochloric acid and a change in colour while standing indicates the presence of flavonoids.

Test for Cardiac Gycosides (Liberman's test);The Liberman's test was used to test for the presence of cardiac glycosides. A 5g amount of plant was dissolved in 20ml of acetic anhydride and cooled with ice. Concentrated H_2SO_4 was then carefully added. A colour change from violet to blue and then to green indicated the presence of a steroidal nucleus (a glycone portion of the cardiac glycoside).

Test for Steroids (Salkowski test); About 0.5g amount of plant extract was dissolved in 2ml of chloroform. 0.2ml of concentrated H_2SO_4 was carefully added to form a layer. A reddish –brown colour ring at the interface between the layers indicated the deoxy-sugar characteristic of cadenolides which indicated the presence of steroids.

RESULTS

This study has revealed the presence of phytochemicals considered as active medicinal chemical constituents in the two plants. Important medicinal phytochemicals such as terpenoids, flavonoids, alkaloids and phlobatannins were present in the samples. The results of the phytochemical analysis shows that the two plants are rich in at least one of alkaloids, flavonoids, terpenoids and phlobatannins.

Table 2: Qualitative Analyses Of Phytochemical Screening Of Medicinal Plant

Sample	Alkaloids	Glycosides.	Steroids	Anthraquinone	Phenol	Tanin	Saponin
Cleistopholia patens	Negative	Positive	Positive	Negative	Positive	Positive	Positive
Cleorodendrumcapitatum	Negative	Positive	Positive	Negative	Positive	Positive	Positive

Table 3; Quantitative Analyses Of Anti-Nutrients Present In Plants (%)

Samples./parameters	Tanin	Phenol	Phylate	Oxalate	Saponin	Flavonoids
Cleistopholia patens	2.20	3.50	17.30	3.69	13.89	8.53
Cleorodendrumcapitatum	2.37	2.47	15.71	6.55	9.75	6.55

Table 4; Quantitative Analyses of Minerals (Chemical Elements) Present in Pants (mg/ml)

Samples	Na	K	Ca	Mg	Zn	Fe	Pb	Cu
Cleistopholia patens	24.03	30.14	31.31	26.09	28.09	6.70	ND	0.03
Cleorodendrumcapitatum	19.00	24.98	23.12	20.31	16.89	22.12	2.56	2.14

DISCUSSION

Phytochemical screening of the two plants revealed the absence of alkaloids and anthroquinones, but both contain steroid, saponin, glycoside, phenol and tannins. They are both high in phylate which is an anti-nutrient. Phylate is known to prevent the absorption of minerals from diets. The presence of glycoside moieties like saponins, anthracene and cardiac glycosides, some of which are known to structurally resemble sex hormones (oestrogens, gestrogens and androgens) are known to protect against gastric infections caused by enteric pathogens thus justifying the use of these plants in traditional medicine practice.

Tannins have been found to form irreversible complexes with proline proteins resulting in inhibition of cell protein synthesis. Tannins are potent antioxidants and also used for treating diarrhea and dysentery (Rajendra *et al*.,2011).Tannins present in the plants have been found to possess stringent properties which hasten the healing of wounds and inflamed mucus membranes (Okwu, 2004; Kozioc,1998). More so, tannins if ingested in excessive quantities inhibit the absorption of minerals leading to anemia (Chavan *et al*.,1995).

Cleistophoilapatens is very rich in saponin, which explains its high foaming ability. More so, saponins have been found to intercalate DNA of microorganism as mechanism of their antimicrobial activity (Jennins and Ridder, 1983) and thus exhibit antifungal activity (Cowan, 1999). Saponin is also useful in medicine and pharmaceutical industry due to its foaming ability that produces frothy effects in the food industry. Saponin is also used in the manufacture of shampoos, insecticides, various drug preparation and synthesis of steroidal hormone. However, some examples of such compounds include cortisone and the estrogenic contraceptive (Dubrovsky, 2005; Okeke and Nwachukwu, 2009).

Plants are potent biochemical agents and have been components of phytomedicine since times immemorial; man is able to obtain from them a wondrous assortment of industrial chemicals. Plant based natural constituents can be derived from any part of the plant like bark, leaves, flowers, roots, fruits, seeds, etc i.e. any part of the plant may contain active components. The systematic screening of plant species with the purpose of discovering new bioactive compounds is a routine activity in many laboratories (Parekh *et al*., 2006). The secondary metabolites present in these plants are linked to anti-microbial activity of the plant material. Drugs contained in medicinal plants are called active principles and these active principles are divided into a number of groups.

These phytoconstituents are known to show medicinal activity as well as exhibiting physiological activity (Edeoga *et al.*, 2005) and exhibit anti-inflammatory, anti-oxidant and membrane-stabilizing property (Perenz *et al*., 1995).The phytochemicals present in the plants are known to inhibit tumor growth, treatment of intestinal disorder like diarrhea and dysentery. Tannin are used in treating wounds, sprains, bruises and arresting bleeding (Nwaeze and Abarikwu, 2006; Akinpelu and Onakoya, 2006). Studies carried out by Ijeh and Agbo (2006) indicated the possibility that the use of plant extract in high doses could lead to toxic injury to kidney which may interfere with renal tubular functioning and could induce acute renal failure.

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