

Qualitative and Quantitative Phytochemical Composition of *Brachystegia Eurycoma* Root, Leaf and Stem Bark

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Abstract

This study assesses the phytochemical screening of Brachystegia eurycoma root, leaf and bark using aqueous solvent. Phytochemical screening was conducted to determine the presence of natural products (alkaloids, tannins, steroid, saponin, phenol, carbohydrate, flavonoid, terpenoid, triterpenoids, quinone and cardiac glycoside) using standard procedure. The qualitative phytochemical constituents of Brachystegia eurycoma leaf, root and stem bark revealed the presence Alkaloid, Flavonoid, quinone, tannin, saponin and Terpenoids while Phenol, carbohydrate, steroids and triterpenoids are absent in the leaf, stem bark and root extracts of the plant. Cardiac glycoside was only present in root extracts. The quantitative phytochemical screening of the extracts showed that they had high concentrations of alkaloids and tannins and they were relatively low in Terpenoids. The results evidently specifies aqueous extract of leaf, bark and root of Brachystegia eurycoma contains various bioactive compounds which have various medicinal properties that can be used for the treatment of many diseases. However, isolation of individual phytochemical constituents and subjecting it to the biological activity will definitely provide more fruitful results. Therefore, it is recommended as a plant of phytopharmaceutical importance.

Keywords: Brachystegia eurycoma, Phytochemicals, Quantitative, Qualitative

Introduction

Plants plays crucial role in sustaining humanity, plants have not only provided humankind with food, clothing, flavours, cosmetics, ornamental, fumigants, insect deterrents and fragrance, but also served humanity in the treatment of ailment [1]. The importance of plants cannot be overemphasized. Many chemical substances are responsible for the usefulness of plants. For instance reported that the medicinal value of plants lies in the chemical (bioactive) substances present in the plants [2]. Plants contain a number of chemicals that are very important to many industries. Two major industries that have benefitted from the chemicals found in plants are the food processing and pharmaceutical industries. Progress in the study of plant chemistry has led to diverse research in the development of novel products that are useful to man. Reported that the search for biologically active agents is a part of a wider renaissance of scientific significance to bring in new chemotherapeutics [3]. Their usage as traditional health remedies is the most popular for about 80% of the world population in Asia, Latin America and Africa and it is reported to have minimal side effects [4, 5]. Some of these chemical substances found in plants also have protective roles. For instance, stated that plants protect themselves through a chemical defensive system [6]. Plants also contain a number of specialized chemical substances that serves as the major internal constituents controlling growth and development. Houghton noted that plants

synthesize very complex molecules with specific stereochemistry and can show biological activity with new modes of action [7].

Brachystegia eurycoma is an economic tree crop that grows in the tropical rainforest of West Africa [8]. In some parts of Nigeria *Brachystegia eurycoma* is known as “achi” in Igbo land, “akalada” in Yoruba, “Akpakpa or apaupan” in Ijaw, “dewen” in Benin, “okwe” in Edo, “okung” in Efiki [9]. The plant has been found to have potential medicinal and domestic uses, and is a traditional food plant in Africa. This little known seed help improve nutrition, boost food security, foster rural development and support sustainable land scare [9]. The seed gum from *Brachystegia eurycoma* compared favorably with commercial gums used in the food industry and can be used as a binding agent in tablet formulation [10]. In some cultures, the seed flour is used as soup thickening and stabilizing agent and as emulsifying agent in food systems [11, 12]. Unegbu reported that in Nigeria, the main culinary use of gum from *Brachystegia eurycoma* is in thickening soups [9].

Phytochemical screening determines the presence of biologically active ingredients that the plants contains. These compounds such as alkaloids, tannins, cardiac glycosides, terpenoids, saponins, anthraquinones, flavonoids, saponins and so on are the major basis of pharmacological activities of medicinal plants. Harish reported that global demand for alkaloids and their derivatives as well as other bioactive compounds has grown substantially [13]. The presence of many secondary metabolites in plants and plant products have

been shown to display potent activity against infectious organisms and potency in treating diseases [14]. Therefore this study aim to determine the phytochemicals composition of *Brachystegia eurycoma* leaf, root and bark.

Methodology

Healthy *Brachystegia eurycoma* root, leaf and stem bark were collected from the Old Oyo National Park, Nigeria and was identified and authenticated at the herbarium of the Department of Botany, Ahmadu Bello University and Zaria, Nigeria. The plant was washed under running tap water to eliminate dust and other foreign particles. The root, leaves and stem bark were dried under shade at room temperature. The dried root, leaves and stem bark were crushed to powder with in an electric mill. Two gram each of *B. eurycoma* root, leaf and stem bark powder was cold macerated in 20ml of distilled water for 24 hours with constant shaking and filtered using Whitman's filter paper No. 1. It was then concentrated to dryness on water bath at 40°C and the crude extract was kept in refrigerator. Qualitative and quantitative phytochemical test involved the simple chemical test to detect the secondary metabolites using standard method of Trease and Evans [15].

Results and Discussion

The qualitative phytochemical constituents of *B. eurycoma* leaf, stem bark and root were revealed in Table1, it revealed that Alkaloid, Flavonoid, quinone, tannin, saponin and Terpenoids are present in the leaves, stem bark and root of *B. eurycoma*. The table further reveal that Phenol, carbohydrate, steroids and triterpenoids are absent in the leaf, stem bark and root extracts of the plant. Cardiac glycoside was only present in root extracts. Table2 revealed the quantitative phytochemical composition of *B. eurycoma* leaf, stem bark and root, in which alkaloid and tannin recorded the highest composition for both leaf, stem bark and root extracts (8.24±0.09, 6.34±0.05 and 5.47±0.02) (7.08±0.04, 4.36±0.02 and 2.09±0.05) while Terpenoids recorded the least (0.77±0.01, 0.65±0.01 and 0.49±0.02).

Table1: Qualitative Phytochemical screening of *Brachystegia eurycoma* Leaf, Stem Bark and Root

Parameters	Leaf	Stem Bark	Roots
Alkaloid	++	++	++
Flavonoid	++	++	++
Phenol	--	--	--
Quinone	++	++	++
Carbohydrate	--	--	--
Cardial Glycoside	--	--	++
Saponin	++	++	++
Tannin	++	++	++
Steroid	--	--	--
Triterpenoids	--	--	--
Terpenoids	++	++	++

Key:

- ++ means Present
- -- means absent

Table2: Quantitative Phytochemical screening of *Brachystegia eurycoma* Leaf, Stem Bark and Root

Parameters	Leaf	Stem Bark	Roots
Alkaloid	8.24±0.09 ^a	6.34±0.05 ^a	5.47±0.02 ^a
Flavonoid	3.32±0.07 ^b	2.97±0.03 ^c	2.02±0.05 ^b
Quinone	1.46±0.03 ^c	1.04±0.01 ^c	1.23±0.02 ^c
Cardial Glycoside	0.00±0.00 ^e	0.00±0.00 ^e	0.41±0.01 ^d
Saponin	1.82±0.03 ^c	1.51±0.05 ^c	1.22±0.01 ^c
Tannin	7.08±0.04 ^a	4.36±0.02 ^b	2.09±0.05 ^b
Terpenoids	0.77±0.01 ^d	0.65±0.01 ^d	0.49±0.02 ^d

Means followed by the same superscript in each row are not significant (P<0.05).

Discussion

Phytochemical screening have been reported to aid in the assessment of plants chemical constituents and also for the search of plant bioactive ingredients that could be used in the production and formulation of drugs [16]. Phytochemical screening of the leaf, root and bark of *Brachystegia eurycoma* revealed the presence of Alkaloid, Flavonoid, Quinone, Tannin, Saponin and Terpenoids as the major phytochemical components. The presence of these bio-active constituents, alkaloids, saponins, flavonoids, tannis and terpenoid in the extract of *Brachystegia eurycoma* leaf, bark and root clearly indicates the phyto-therapeutic potentials of this plant. The qualitative and quantitative phytochemical evaluation of bioactive chemical compounds of the plants extract is in accordance with the report of [12].

Flavonoids are a group of polyphenols compounds found in fruits and vegetables and in many plant parts have multiple biological activities [17, 18]. Ao reported that Flavonoids has vasodilators, anticarcinogenic, anti-inflammatory and antibacterial activities while Cowan reported the anti-allergic, antiviral, estrogenic and immune system stimulating effects of flavonoids [19, 20]. Alkaloids are reported as a plant bases that exhibit certain physiological properties when used in herbal medicine [20]. Most of them have anti-malarial, antifungal and antimicrobial activities [21]. Tannins in plants are known to improve healing of ulcers and burns, and also known for their antioxidant and antimicrobial properties. It possesses astringent properties and is thought to act as inhibitors of oxidative phosphorylation and electron transport (by depletion of iron); thus depriving bacteria of iron [21]. Saponin are group of glycosides that is widely distributed in higher plants. They are characterized by forming colloidal solution in water, which froth upon shaking. They have bitter taste and drugs containing them are usually irritating to the mucous membranes. Thus, these compounds give a permanent froth when shaken with water. Saponins destroy the red blood cells by hemolysis and are toxic especially to cold blooded animals. Many have been used as fish poisons and are toxic to aquatic life. Tannins are astringent, bitter plant polyphenols that either bind and precipitate or shrink proteins. The astringency from the tannins is what causes the dry and puckery feeling in the mouth following the consumption of red wine or an unripened fruit. Their main function in nature seems to be one of protection; animals are deterred from eating plants high in tannins because of the bitter, astringent. Tannins have traditionally been considered antinutritional but it is now known that their beneficial or antinutritional properties depend

upon their chemical structure and dosage [22]. Recent studies have demonstrated that products containing chestnut tannins included at low dosages (0.15-0.2 %) in the diet can improve wellbeing [14].

Conclusion and Recommendation

The findings revealed that aqueous leaf, bark and root extract of *Brachystegia eurycoma* contains various bioactive compounds which have various medicinal properties that can be used for the treatment of many diseases. However, isolation of individual phytochemical constituents and subjecting it to the biological activity will definitely give fruitful results. Therefore, it is recommended as a plant of phytopharmaceutical importance [23, 24].

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