



Preliminary Phytochemical Screening on the Leave, Stem and Root of *Acalypha Indica*

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Abstract Preliminary phytochemical screening on the aqueous extract of leave, stem and root of *Acalypha indica* L. was carried out. This plant belongs to the family Euphorbiaceae. It is a popular plant in traditional medicine used for treating various ailments. This analysis was carried out using standard procedures. The result revealed the presence of saponins, flavonoids, steroids, phenols, alkaloids, tannins and cardiac glycosides. The medical significance of various phytochemical constituents identified in this plant supports the notion that medicinal plants have been used for centuries as remedies for human diseases.

Keywords *Acalypha indica*, Phytochemicals, Medicinal.

Introduction

Herbal medicines have been the basis of treatment and cure for various diseases and physiological conditions in traditional African medicine. Medicinal components from plants play an important role in conventional as well as western medicine. Plant derived drugs have been a part of the evolution of human healthcare for thousands of years. Plants produce a diverse range of bioactive molecules, making them a rich source of different types of medicines. The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids and phenolic compounds [1]. These substances are usually found in several parts of plants like root, stem, leaf, shoot and bark. The effects of plants extracts on microbes have been studied by a very large number of researchers in different parts of the world. Their usage in traditional health remedies is the most popular for 80 % of world population. In recent years, multiple drug resistance has developed in many microbes, which has resulted in search for new antibiotic sources. In general, it is assumed that the dietary constituents contributing to those protective effects of these plant materials are plant secondary metabolites in the form of phytochemicals, vitamins and minerals. Medicinal and aromatic plants contain biologically active chemical substances such as saponins, tannins, flavonoids, alkanoids, anthocyanin, steroids, and other chemical compounds [2-3] which have curative properties.

It has been reported that these plants also contain certain other compounds that moderate the effects of the active ingredients [4]. This diet containing an abundance of fruits and vegetables give protection against a variety of diseases, particularly cardiovascular diseases [5]. Many rare and useful herbs occur in Nigeria, from which important drugs could be prepared or agent which may serve as starting materials for the potential synthesis of some useful drugs [3]. The usefulness of these plant materials medicinally is due to the presence of bioactive constituents such as phenols, flavonoid, tannins and alkaloids [1].

Acalypha indica L. commonly known as Indian acalypha belongs to the family Euphorbiaceae. It has been used traditionally for the treatment of throat infections, wound healing, chronic constipation, asthma, pneumonia, bronchitis, intestinal worms, anti-venom and migraine pain relief. There are various clinical constituents namely kaempferol glycoside, mauritianin, clitorin, nicotiflorin and biorodin that have been isolated from the root, stem and leaves of *A. indica* [6]. The presence of these phytochemicals could be responsible for the wide range of



antimicrobial activities. Hence, this study was carried out to analyse qualitatively the presence of various bioactive constituents occurring in the aqueous extracts of the leaves, stem and root of *A. indica*.

Materials and Methods

Collection of Plant Materials

Plant materials were collected from Nnamdi Azikiwe University botanical garden, Awka Anambra state and were identified and authenticated as *A. indica* at the Department of Botany, Nnamdi Azikiwe University, Awka. The freshly collected sample of *A. indica* was shade dried at room temperature (32-37 °C) for 5 days. The dried samples (leave, stem and root) were ground into uniform powder using Thomas-Wiley Miller. The powdered air dried plant materials were extracted with distilled water.

Phytochemical Screening

Preparation of Samples

The plant samples were air-dried and ground into uniform powder using a Thomas-Wiley milling machine. The aqueous extract of each sample was prepared by soaking 100 g of dried powdered samples in 200 ml of distilled water for 12 hours. The extracts were filtered using Whatman filter paper No 42 (125 mm). Chemical tests were carried out on the aqueous extract and on the powdered specimens using standard procedures to identify the constituents as described by [2-3,7].

Tannin Determination

The presence of tannins was determined using the reported method [2]. 2 g of the powdered samples was boiled with 50 ml of water, filtered using Whatman filter paper and the filtrate used to carry out the ferric chloride test. Few drops of ferric chloride were added to 3ml of the filtrate in the test tube. A greenish black precipitate indicates the presence of tannins.

Alkaloid Determination

The presence of alkaloid was determined using the Mayer and Wagner's test as described [2]. 2 g of each portion of the powdered samples were put in a conical flask and 20 ml of dilute sulphuric acid in ethanol was added into it and then placed in water bath to boil for 5 minutes. The mixture was filtered and the filtrates were separated, and treated with 2 drops of Mayer and Wagner's reagents (iodine in potassium solution) in a test tube. Development of a reddish-brown precipitate confirmed the presence of alkaloid.

Saponin Determination

The emulsion test was used to determine the presence of saponins [2]. Exactly 20 ml of water was added to 0.05 g of the powdered sample in 100 ml beaker and boiled, then used for the test.

Emulsion Test

Two drops of olive oil was added to the frothing solution and shaken vigorously. The formation of emulsion indicated the presence of saponins.

Glycosides Determination

To 1 g of powdered sample was mixed with few drops of toluene reagent in a test tube and a sodium picrate paper was suspended inside for about 10-20 minutes and covered with foil. The change of colour from yellow to brick red indicates the presence of cyanogenic glycosides.

Steroid Determination

Exactly 1.0 ml of the extract was dissolved in 20 ml of chloroform in a test tube, and then 1.0 ml of concentrated sulphuric acid (H₂SO₄) was carefully added to the side of the test tube. A red or reddish-brown colour at the interface was taken as a positive test for steroids. The above test is known as the Salkowskis test.

Flavonoid Determination

The presence of flavonoids in the samples was determined using the [2], [3] method. To 2 g of the powdered samples, 10 ml of ethyl acetate was added and was heated in a water bath for about 5 minutes. The mixture was cooled, filtered and the filtrates used for the test.



Ammonium Test

Exactly 2 ml of filtrate was shaken with 1 ml of dilute ammonium solution. The layers were allowed to separate and the yellow colour in the ammonical layer indicated the presence of flavonoids.

Ammonium Chloride Test

Just 1 ml of 1 % ammonium chloride solution was added to 20 ml of the filtrate and shaken. A yellow colouration indicated the presence of flavonoid.

Phenol Determination

Dry sample of 2 g was boiled with 50 ml of ether for the extraction of the phenolic compound for 15 minutes. Then 5 ml of the extract was pipette with a 50 ml flask, and then 10 ml of distilled water was added 2 ml of ammonium hydroxide solution and 5 ml of concentrated amyl alcohol were also added to react for 30 minutes for colour development. Also 2 ml of the samples was added in a test tube 1 ml of ferric chloride was added as well into the test tube. The development of greenish-brown precipitate indicated the presence of phenols.

Results and Discussion

Phytochemical screening of the aqueous extracts of *A. indica* showed the presence of various bioactive active constituents (Table 1). The phytochemical constituents present in the leave, stem and root extracts include tannin, saponins, alkanoid, phenols, flavonoids, steroids and cardiac glycosides.

Table 1: Qualitative phytochemical constituents of aqueous extract of *Acalypha indica*

Phytochemical component	Test	Observation	Inference		
			Leave	Stem	Root
Tannin	Ferric chlorides test	Greenish-black	-	+	+
Alkaloid	Mayer's and Wagner's test	Reddish brown precipitate	+	+	+
Saponin	Emulsion test	Presence of emulsion	+	+	+
Steroids	Salkowkis test	Red colour at interface	-	-	+
Flavonoid	Ammonium test	Yellow colour	+	+	+
	Ammonium chloride test	Yellow colour			
Phenols	Ferric-chloride test	Greenish-brown precipitate	+	+	+
Glycosides	Toluene reagent test	Yellow-brick red colour	+	+	+

+ = present - = absent

Plants have since ancient times provided mankind with various medicinal agents and natural products serving as source of food and many drugs [8]. Contrary to synthetic drugs, antimicrobials of plant origin are not associated with many side effects and have an enormous therapeutic potential to heal many infectious diseases. According to the World Health Organisation, medicinal plants would be the best source to obtain a variety of drugs. Though there is large body of information to support the wide ranging applications of *A. indica* in folklore and indigenous medicine for the treatment of eye infection, wounds, joint pain, arthritis and many other diseases [9] the occurrence of phytochemicals and their medicinal role has not been adequately studied over the years. The results of the phytochemical screening of *A. indica* parts showed that they are very rich in tannins, saponins, phenols, steroids, alkaloids, flavonoids and glycosides which are best known for their antimicrobial and antiviral properties [10-11]. Flavonoids are present in all vascular plants and have been reported to exert multiple biological effects in both plants and in animals including anti-inflammatory, antiulcerogenic, antiallergic, antiviral and anticancer activities [2]. Medicinally, tannins are used in antidiarrhoeal, haemostatic and antihaemorrhoidal preparations. Tannins have been reported in the leaves of pomegranate, guava and Euphorbia species [12] and this is in agreement with the present work. Saponins are used in cosmetic industries for the manufacture of soaps and creams while glycosides and steroids are used as precursors in pharmaceutical industries for the production of drugs. Alkaloid found in the plant is useful in lowering cholesterol, as antioxidants and anti-inflammatory agents. Cardiac glycosides are also used in the treatment of congestive heart failure and cardiac arrhythmia and are found as secondary metabolites in several plants [12]. Glycoside found in enormous quantities in the plant is constituent of many animal tissues, [13]



and are important in medicine because of their action on the heart [14]. Again, steroids present in the plant in traces are used in the treatment of some endocrine disorder [15], regulation of blood sugar, salt, imbalance [16], and antimicrobial infections [17]. Phenols, also present in the plant are germicidal and are used in formulating disinfectants [18]. Phenols are also used to make disinfectants and antiseptics that are used in mouthwash [19]. In this study, *A. indica* was chosen because it is widely distributed in many parts of Nigeria and easily adapted to new environmental conditions and has high medicinal value. This study revealed that the aqueous extracts of *A. indica* contained many important bioactive chemical constituents with various medicinal properties. However, taking into consideration the safety aspects, toxicity and isolation of active compounds and phytochemicals, further studies need to be carried out to unravel the search for more bioactive compounds and their safety as precursors for developing drugs.

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