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Qualitative phytochemical screening of *Acalypha indica* Linn

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Abstract

The phytochemical analysis of Aerial part extracts in petroleum ether, chloroform, ethanol and aqueous extracts indigenous medicinally important plants of *Acalypha indica* were investigated. The phytochemical analysis reveals the presence of alkaloids, Glycosides, flavonoid, saponins, phenol and tannin. The results showed that the ethanol was more efficient than other extracts.

Keywords: Phytochemical, ethanol, chloroform, *Acalypha indica*

Introduction

Phytochemicals are responsible for medicinal activity of plants ^[1] these are non-nutritive chemicals that have protected human from various diseases ^[2]. The major constituent consists of alkaloid, flavonoids, saponins, phenolic compounds, phytosterols, proteins and amino acids, gums and mucilage and lignin ^[3]. Phytochemical constituents are the basic source for the establishment of several pharmaceutical industries the constituents are playing a significant role in the identification of these plants lies in some chemical substances that produces a define physiological action on the human body. The most important property of these bioactive constituents of plants is that they are more effective with little or no side effects when compared to the commonly used synthetic chemotherapeutic agents.

Medicinal plants have vital role in life of human beings on the globe. The medicinal value of any plant is due to presence of some chemicals that can interact with the enzymes working in human physiology. Plants produce a wide range of natural products belonging to different molecular families with different physiological function. These molecules possess different biological activities, which Fascinated several researchers that eventually lead to the development of marketable products ^[4]. Naturally occurring compounds can be isolated from animals, minerals and plants but mostly their main sources are plants. These organic molecules can be obtained from both secondary and primary metabolic process. The plants are widely used in the world's pharmaceuticals. The well-studied bioactive constituents of plant kingdom include alkaloid, tannins, steroids, terpenoids, flavonoids, carotenoid and glycosides ^[5].

Materials and Methods

Phytochemical screening of petroleum ether, chloroform, ethanol and aqueous extracts were carried out by following the methods of Harborne, Korte *et al.*, and Prabhakaran ^[6, 7, 8]. Carbohydrates, proteins, amino acids, alkaloids, flavonoids, glycosides, phenols, tannins, saponins, steroids and sterols, triterpenoids and volatile oil were qualitatively analyzed.

Test for Carbohydrates

Fehling's Test: 5 ml of Fehling's solution was added to 2 ml of extract and boiled in a water bath. The formation of yellow or red precipitate indicates the presence of reducing sugars.

Test for Proteins and Aminoacids

Biuret Test: To 1ml of extract, equal volume of 40% sodium hydroxide solution and 2 drops of 1% copper sulphate solution were added. The appearance of violet colour indicates the presence of proteins.

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Test for Alkaloids**Dragendorff's Test**

To 1 ml of the extract, 1 ml of Dragendorff's reagent was added. The appearance of orange-red precipitate indicate the presence of alkaloids.

Test for Flavonoids**Shinoda's Test**

To 1ml of the extract, magnesium turnings and 1-2 drops of concentrated hydrochloric acid were added. Formation of pink colour indicate the presence of flavonoids.

Test for Glycosides**Legal's Test**

The extract was dissolved in pyridine and freshly prepared sodium nitroprusside solution was added. The formation of pink or red colour indicates the presence of glycosides.

Test for Tannins and Phenolic Compounds

- To 1 ml of the extract, 2 ml of 5% neutral ferric chloride solution was added. The development of a dark bluish-black colour indicates the presence of tannins.
- To 1 ml of the extract, 2 ml of gelatin solution was added. The formation of white precipitate indicate the presence of tannins and phenolic compounds.

Test for Saponin**Foam Test**

About 1ml of the extract was dilute with 20 ml of distilled water and was shaken in a graduated cylinder for 15 min.

The formation of 1cm layer of foam indicates the presence of saponins.

Test for Steroids and Sterols**Salkowski's Test**

The extract was dissolved in 2 ml of chloroform and equal volume of concentrated sulphuric acid was added along the sides of the test tube. The upper layer turns red and lower layer turns yellow with green fluorescence, indicating the presence of steroids and sterol compounds in the extract.

Test for Terpenoids**Liebermann-Burchard's Test**

The extract was dissolved in 2ml of chloroform and added 10 drops of acetic anhydride and 5 drops of concentrated sulphuric acid. Appearance of red to violet colour indicates the presence of terpenoids.

Test for Volative Oil

2ml of the extract was evaporated on a porcelain crucible. If the residue has an aromatic smell, it indicates the presence of volatile oil.

Results and Discussion

The preliminary phytochemical screening presented in table revealed the presence of alkaloids, glycosides, flavonoids, saponins, phenols and tannins in ethanol extract. The results showed that the ethanol extract was more efficient than other extracts.

Table 1: Qualitative phytochemical screening to aerial parts of *Acalypha indica*

Plant constituents	Petroleum ether extract	Chloroform extract	Ethanol extract	Aqueous extract
Alkaloids	-	+	+	-
Glycosides	-	+	+	-
Carbohydrates	-	-	-	+
Phytosterols	+	-	-	-
Steroids	-	-	-	-
Flavonoids	-	+	+	-
Saponins	-	+	+	-
Phenols	-	-	+	-
Tannins	-	-	+	+
Protein and Amino acids	-	-	-	+
Terpenoids	+	-	-	-
Foxed oil and Fats	-	-	-	-

+ = Indicates the presence of the constituents

- = Indicates the absence of the constituents

Medicinal plant based drugs have shown the added advantage of being simple, effective, free from side effects and offer a broad spectrum of activity with great emphasis on preventive action of chronic and degenerative diseases [9]. Medicinal plants are the richest bio-resource of drugs of traditional medicines, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs [10, 11, 12]. The medicinal plants have chemical substances called phytochemicals that produce various physiological action on the human body. Phytochemical screening is an essential step towards the discovery of new drugs as it provides the information regarding the presence of particular primary and secondary metabolites in the plant extract of clinical significance. Phytochemicals derived from the plant sources are used for prevention and treatment of diabetes, mellitus, cancer, heart diseases and high blood pressure [13]. The

therapeutic effect of several medicinal plants have been attributed to the presence of phenolic compounds such as flavonoids, phenolic acid, proanthocyanidins, diterpenes and tannins [14].

In the present study, the qualitative phytochemical analysis of ethanolic extract of *Acalypha indica* revealed the presence of alkaloids, glycosides, flavonoids, saponins, phenols and tannins (Table 1). The positive response of the above mentioned compounds in the ethanolic extract may be due to the dissolution capacity of phytochemicals in the organic solvent. Earlier similar studies were carried out *Strumpfia maritima* [15], *Uncaria* species [16], *Mitracarpus scaber* [17], and *Teucrium stoksonianum* [18].

Conclusion

The preliminary phytochemical screening of the ethanol extract from *Acalypha indica* demonstrated the presence of

alkaloids, glycosides, flavonoids, saponins, phenols, and tannins, highlighting its potential as a valuable source of bioactive compounds. Compared to other extracts tested (petroleum ether, chloroform, and aqueous), the ethanol extract showed superior efficiency in extracting these phytoconstituents. These findings underscore the importance of solvent selection in phytochemical studies, as ethanol proved more effective in extracting a diverse range of compounds with potential medicinal benefits. Further research into the biological activities and therapeutic potentials of these phytochemicals could lead to the development of new drugs or therapeutic agents for various health conditions.

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