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Research Article

QUALITATIVE ANALYSIS OF VARIOUS PLANT EXTRACTS OF *ALPINIA OFFICINARUM*

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ABSTRACT

The medicinal plants have been well accepted to provide a diverse source for health care moieties in order to prevent different pathological states. The present study aimed to carry out a qualitative analysis of *Alpinia officinarum.* The preliminary phytochemical screening of different parts of *Alpinia officinarum,* i.e., leaves and roots, was performed in order to identify various bioactive compounds. The ethanolic extract of different parts of the plant revealed the presence of a range of important bioactive compounds like alkaloids, carbohydrates, glycosides, phenolic compounds, sterols, and acidic compounds.

Keywords: *Alpinia officinarum*, Qualitative.

INTRODUCTION

It has been widely accepted that plants possess the inherent ability to synthesize an extensive variety of chemical compounds which can be used to perform various biological functions in the human body. These important phytochemicals have been noted to possess various beneficial effects on long-term health, and thus, can be used effectively in order to treat human diseases.[1-2] *Alpinia officinarum* is a perennial herb, belonging to family zingiberaceae, originated in China and mainly cultivated in Southeast Asia.[3-4] The rhizomes of the plantare thin and tough with orange flesh inside, possess an aromatic odor and a pungent flavor, which are valued for their spicy flavor and aromatic scent.[5-7] A number of phytochemicals have been found to be associated with *Alpinia officinarum* which includes quercetin, kaemferol, isorhamnetin, galangin, alpinol, and galangol.[8-9] Various pharmacological properties have been found to be associated with *Alpinia officinarum* which include anti-inflammatory, antibacterial, antifungal, antiviral, diuretic, and anticancer properties.[10-11] A narrow degree of work on qualitative analysis of *Alpinia officinarum* has been performed. Hence, the present study attempts to exploit different phytoconstituents prepared from different plant parts of *Alpinia officinarum* for phytochemical screening.

MATERIALS AND METHODS

1. Collection of Plant Material

The plant material was gifted from AIMIL Pharmaceuticals (I) Ltd., New Delhi. It was authenticated as *Alpinia officinrum hance* at Department of Botany, Jamia Hamdard, New Delhi and a voucher specimen is preserved in the herbarium section of Department of Pharmacognosy, R.I.T., Greater Noida, Uttar Pradesh.

2. Preparation of plant materials

The freshly collected samples were washed and air-dried under shade at room temperature for 7-10 days. After drying, the samples were reduced to small piece, and the material was grounded in to fine powder using pestle mortar, followed by sieving using a muslin cloth. Powdered samples

were then stored in air tight containers for further use.

3. Extraction of Plant Material

The plant material which was already air dried, was crushed to smaller pieces, redried, coarsely powdered and was then exhaustively extracted with ethanol (95%) in a Soxhlet Appratus for 72 hours. The extract was filtered and the clear supernatant was collected, covered, labeled and used for the qualitative phytochemical screening.

4. Preliminary Phytochemical Screening

The ethanolic extract was subjected to preliminary phytochemical investigation for the detection of the following metabolites:

I. Alkaloids
II. Carbohydrates
III. Glycosides
IV. Phenolic compounds
V. Flavonoids
VI. Protein and free amino acids
VII. Saponins
VIII. Sterols.
IX. Acidic Compounds

5. Tests performed for the presence of qualitative phytochemical analysis

5.1. Test for alkaloids

5 ml of ethanolic extract was evaporated to dryness. The ethanolic residues were taken in 5 ml of 2% hydrochloric acid, saturated with sodium chloride and filtered. The filtrate was tested with alkaloidal reagents:

- **Mayer's Reagent** (KI + Hg_2Cl_2 solutions) produced cream coloured precipitate.
- **Dragondorff's reagent** (excess of KI + $BiNO_3$ solutions) produced reddish brown coloured precipitate.
- **Wagner's reagent** (I_2 + KI solutions) produced reddish brown coloured precipitate.
- **Hager's reagent** (Picric acid) produced yellow coloured precipitate.

These indicated the presence of alkaloids.

5.2. Test for carbohydrates

- **Molisch Test:** To 2 ml of ethanolic extract 3 drops of α-naphthol (20% in ethanol) was added. Then 1ml of concentrated sulphuric acid was added along the side of the test tube. Reddish-violet ring at the junction of the two layers indicated the presence of carbohydrates.
- **Reduction of Fehling's Solution:** 1 ml of Fehling's Solution (Copper Sulfate in alkaline condition) was added to the concentrated extract and heated on a steam bath. Brick red precipitate indicated the presence of carbohydrates.

5.3. Test for Glycosides

2 ml of extract was subjected to the following tests:

- **Keller–Killiani Test:** 1 ml of glacial acetic acid containing traces of ferric chloride and 1 ml of concentrated sulphuric acid were added to the extract carefully. A reddish brown colour formed at the junction of the 2 layers and the upper layer turned bluish green indicating the presence of glycosides.
- **Borntrager's Test:** 1 ml of benzene and 0.5 ml of dilute ammonia solution were added to the extract. A reddish pink colour indicated presence of glycosides.
- **Legal's Test:** Concentrated ethanolic extract was made alkaline with drops of 10% sodium hydroxide and then freshly prepared sodium nitroprusside solution was added. The presence of blue colouration indicated the presence of glycoside.

5.4. Test for Phenolic Compounds

- **Ferric chloride Test:** 3 ml of ethanolic extract was evaporated to dryness, extracted with 5 ml of distilled water, ferric chloride solution (5%) was then added in the extract, blue green colour indicated the presence of phenolic compounds.
- **Lead Acetate Test:** Yellow precipitates were obtained by the addition of 3 drops of lead acetate solution (5%) indicated the phenolic compounds.
- **Gelatin Test:** 3 ml of 0.1% of gelatin solution was added to 5ml of ethanolic extract. Precipitation indicated the presence of phenolic compounds.

5.5. Test for Flavonoids

- **Ammonia Test:** Filter Paper strips were dipped in the alcoholic solution of the extract and ammoniated. The filter strips turned yellow indicating the presence of flavonoids.

- **Shinoda / Pew Test:** To 1 ml of the extract, a piece of metallic magnesium was added, followed by the addition of 2 drops of hydrochloric acid. Presence of deep red colouration indicated the presence of flavonoids in the extract.

5.6. Test for Proteins and Free amino acids

- **Millon's Test:** To a few ml of alcoholic extract, 5 ml distilled water were added and filtered. To 2 ml of filtrate, 5 drops of Millon's Reagent (solution of mercury nitrate and nitrous acid) were added. A red precipitate was not formed, indicating the absence of proteins and amino acids.
- **Xanthoprotein Test:** To 2 ml of extract, 3 drops of nitric acid were added by the side of the test tube. Absence of yellow colouration indicated the absence of proteins and free amino acids.
- **Biuret Test:** To the ammoniated alkaline filtrate of the extract, 2 drops of 0.02% copper sulphate solution was added. Absence of red or violet colouration indicated the absence of proteins and free amino acids.

5.7. Test for Saponins

A few ml of the alcoholic extract was tested for the saponins in the following manner:

- The alcoholic extract was evaporated to dryness, residues extracted with petroleum ether and acetone. To the insoluble residue after extraction, 5 ml of water was added and shaken well; the residue did not produce any foam indicating the absence of saponins.
- To the alcoholic extract, 3 drops of sodium bicarbonate was added and shaken well. There was no honeycomb like frothing indicating the absence of saponins.

5.8. Test for Sterols

The alcoholic extract was evaporated to dryness and the residue was extracted with petroleum ether. The insoluble residue was tested for sterols:

- **Salkowski Reaction:** To the extract, 2 ml of concentrated sulphuric acid was added. The presence of a yellow ring at the junction which would finally turned red after one minute, indicated the presence of sterols.
- **Hersche's Son's reaction:** To the residue, 2 ml of trichloroacetic acid was added. Presence of red to violet colour on heating indicated the presence of sterols.

5.9. Test for Acidic Compounds

- To the 2ml of alcoholic extract, 1ml sodium bicarbonate solution was added. The effervescence produced indicated the presence of acidic compounds.
- 2ml of alcoholic extract was taken in warm water and filtered. The filtrate was then tested with litmus paper and methyl orange. The appearance of blue colour indicated the presence of acidic compounds.

RESULTS AND DISCUSSION

The preliminary phytochemical screening of different parts of *Alpinia officinarum* was performed in order to identify various bioactive compounds. In these screening processes, alkaloids, carbohydrates, glycosides, phenolic compounds, flavonoids, protein and free amino acids, saponins, sterols, and acidic compounds showed different types of results in ethanolic solvent. The results of the phytochemical screening of leaf and root of *Alpinia officinarum* have been presented in Table 1-2. The leaves extract showed positive results for alkaloids, carbohydrates and glycosides in the ethanolic solvents. Also, the leaf extract showed positive results for the presence of flavanoids and phenolic compounds. While saponin and sterols showed negative results in the ethanolic extract. On the other hand, protein and free amonio acids alongwith acidic compounds were found to be present in the leaf extract.

Similar reports were obtained in the root extract of *Alpinia officinarum*. apart from glycosides and flavanoids, which were found to be present in the leaves. The root extract gave positive results for the presence of bioactive compounds like alkaloids, carbohydrates and glycosides in the ethanolic solvents. In addition, the root extract showed positive results for the presence of phenolic compounds, but flavanoids were found to be absent in the root extract, which differed from that of the leaf extract. However, saponins showed positive results for their presence but sterols were found to be absent in the ethanolic extract of roots. Moreover, proteins and free amonio acids alongwith acidic compounds showed positive results for their presence in the root extracts of *Alpinia officinarum*.

Table 1: Observations of Preliminary Phytochemical Screening in Leaves

S. No.	Phytoconstituents	Presence / Absence
1.	Alkaloids	+
2.	Carbohydrates	+
3.	Glycosides	+
4.	Phenolic Compounds	+
5.	Flavanoids	+
6.	Proteins and Free Amino Acids	+
7.	Saponins	_
8.	Sterols	_
9.	Acidic Compounds	+

Table 2: Observations of Preliminary Phytochemical Screening in Roots

S. No.	Phytoconstituents	Presence / Absence
1.	Alkaloids	+
2.	Carbohydrates	+
3.	Glycosides	+
4.	Phenolic Compounds	+
5.	Flavanoids	_
6.	Proteins and Free Amino Acids	+
7.	Saponins	+
8.	Sterols	_
9.	Acidic Compounds	+

CONCLUSION

The present research revealed that the ethanolic extract of leaves and root of *Alpinia officinarum* possess different bioactive compounds like alkaloids, carbohydrates, glycosides, phenolic compounds, flavonoids, protein and free amino acids, saponins, sterols, and acidic compounds. Although sufficient phytochemical investigation of the plant material has been conducted in the present study, but further qualitative and quantitative research is warranted in order to isolate various bioactive compounds from different parts of *Alpinia officinarum* for its potent pharamcological properties.

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