

QUALITATIVE PHYTOCHEMICAL SCREENING OF RHIZOMES OF *CURCUMA LONGA* LINN

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Abstract: Turmeric is a spice derived from the rhizomes of *Curcuma longa* which is a member of the ginger family (Zingiberaceae). Rhizomes are horizontal underground stems that send out shoot as well as roots. The bright yellow colour of the turmeric comes mainly from fat soluble; polyphenolic pigments known as Curcuminoids. Plants shows medicinal properties as it contain phytochemical constituents. Phytochemical constituents are non nutritive plant chemical that have disease preventive properties. The rhizomes of *Curcuma longa* was extracted in Acetone, Methanol, Ethanol and Chloroform solvents giving 16.10, 15.42, 25.75 and 15.50% yields.

Keywords: *Curcuma longa*, Phytochemicals, Acetone, Methanol, Ethanol and Chloroform Extracts.

Introduction

According to World Health Organization medicinal plants would be the best source to obtain a variety of drugs. About 80% of individuals from developed countries used traditional medicine, which has compounds derived from medicinal plants (Aggarwal BB et.al 2007). Herbal products are suitable for treating a wide range of infections and diseases (Chattopadhyay et.al 2004). Medicinal plants are the raw material for many herbal formulations and popular supplements. The use of herbal medicines has been on the rise in recent years due to their low prices. There is a common concept among people that herbal medicines have no side effects and that being natural in origin, herbs are safe. Herbal remedies used in the traditional medicine provide an interesting and still largely unexplored source for the creation and development of potentially new drugs for chemotherapy which might help to overcome the growing problem of resistance and also the toxicity of the currently available commercial antibiotics.

Curcuma longa Linn (Family-Zingiberaceae, Marathi-Halad) is a perennial herb with pulpy, orange, tuberous roots that grows to about 2 feet in length and is cultivated in India,

China, Bangladesh and other Asian countries with a tropical climate. *Curcuma longa* is widely used in Ayurvedic, Unani and Siddhha Herbal System. It is also recommended for treating diabetes, high cholesterol, abdominal pains, menstrual disorder, Wounds, eczema, psoriasis, Jaundice, Inflammations, Cancerous Symptoms and as a blood purifying activity.

R. Arutselvi et.al 2012 has reported antimicrobial activity from leaves and rhizomes of *Curcuma longa*. Many species of *Curcuma* are traditionally used for their medicinal properties, Antifungal, Antibacterial and Anti inflammatory activity has been reported for species such as *C. long*, *C. zedoria*, *C. aromatica* and *C. amada* (Manimegalai V. et.al 2011). The Pharmacology of *C. longa* was studied by Ammon et.al (1991) in details.

Experimental

Material and Methods:

Plant Material: Rhizomes of *Curcuma longa* were purchased from Gadhinglaj Market, Kolhapur district in Mar 2013. They were cut into small pieces, shade dried and ground to fine powder.

Crude Extraction:

200 gm of Coarse powder of rhizomes of *Curcuma longa* was soaked in 500 ml of each Acetone, Methanol, Ethanol and Chloroform solvents in the cold for 3 days with occasional shaking. The solvent from the total extract was filtered and then dried under shade. Percentage yield was calculated for each extract (Table No. 1). It was used for the qualitative analysis of secondary metabolites.

Identification Test:

The individual extract was subjected to the qualitative phytochemical screening for the presence of some chemical constituents. Phytochemical test were carried out adopting standards procedure (Trease et.al 1983, Kokate et.al 1997, Hegde et.al 2010).

Alkaloids:

A quantity (3 ml) of concentrated extract was taken into a test tube and 1 ml HCl was added the mixture was heated gently for 20 min cooled and filter, the filtrate was used for following test.

- a) Wagner test: 1ml of the extract was treated with Wagner's reagent; formation of brown reddish precipitate indicates presence of alkaloids.
- b) Dragen droff's test:- 2 drops of Dragen droff's reagent were added to 1ml of the extract. The development of a creamy ppt was indicative of the presence of alkaloids.

- c) Hager's test: 1ml of the extract was treated with Hager's reagent, presence of alkaloids confirmed by the yellow colored precipitate.

Saponin:

5 ml extract was mixed with 20 ml of distilled water then agitated in graduated cylinder

For 15 min formation of foam indicates Saponin.

Steroid:

1ml extract was dissolved in 10 ml of chloroform & equal volume of concentrated H_2SO_4 acid was added from the side of test tube .The upper layer turns red and H_2SO_4 layer showed yellow with green fluorescence .This indicates the presence of steroid.

Tannin:

4ml extract was treated with 4 ml $FeCl_3$ formation of green colour indicates that presence of condensed tannin.

Anthocyanin:

2 ml of aqueous extract is added to 2 ml of 2N HCl & NH_3 , the appearance of pink red turns blue violet indicates presence of Anthocyanin.

Coumarin:

3 ml of 10% NaOH was added to 2 ml of aqueous extract formation of yellow colour indicates coumarins.

Emodins:

2 ml of NH_4OH and 3 ml of benzene was added to extract appearance of red colour indicates presence of emodins.

Proteins:

Xanthoproteic test: Extract was treated with few drops of concentrated HNO_3 formation of yellow indicates the presence of proteins.

Amino acids:

Ninhydrin test: To the 2 ml extract 2 ml on ninhydrin reagent was added & boil for few minutes, formation of blue colour indicates the presence of amino acid.

Flavonoid:

- a) Alkaline reagent test: Extract was treated with 10 % NaOH solution, formation of intense yellow colour indicates presence of Flavonoid.

- b) NH_4OH test: 3 ml of extract were 10 % NH_4OH solution development of yellow fluorescence indicates positive test.
- c) Mg turning test: Extract were treated with Mg turning and add conc. HCl to this solution add 5ml of 95 % ethanol, formation of crimson red colour indicates Flavonoid.
- d) Zn test: 2 ml extract were treated with Zn dust and conc. HCl development of red colour indicates presence of Flavonoid.

Diterpenes:

Copper acetate test: Extract were dissolved in water and treated with 10 drops of copper acetate solution, formation of emerald green colour indicates presence of diterpenes.

Phytosterol:

Salkowski's test: Extract was treated with chloroform and filtered. The filtrate was treated with few drops of concentrated H_2SO_4 and shakes, allow standing, appearance of golden red indicates the positive test.

Phenol:

Ferric Chloride test: Test extract were treated with 4 drops of Alcoholic FeCl_3 solution. Formation of bluish black colour indicate the presence of Phenol

Phlobatannins:

Deposition of red ppt when aqueous extract of each plant sample is boiled with 1% Aqueous HCl was taken as evidence for presence of Phlobatannins.

Leucoanthocyanin:

5 ml of isoamyl alcohol added to 5 ml of aqueous extract, upper layer appear red in colour indicates the presence of Leuanthocyanin.

Anthraquinone:

5ml of Extract was hydrolyzed with dilute H_2SO_4 , then add 1ml of benzene and 1ml of NH_3 , formation of Rose Pink coloration suggest Anthraquinone.

Chalcones:

2ml of NH_4OH was added to 0.5 gm ethanolic extract, appearance of red colour showed presence of chalcones.

Cardial Glycosides:

Legal's Test: To the extract 1ml of pyridine and few drops of freshly prepared sodium nitroprusside solution were added, appearance of pink to red colour indicates presence of glycosides.

Keller-Killani Test: Plant extract treated with 2 ml glacial acetic acid containing a drop of FeCl_3 . A brown colour ring indicates the presence of positive test.

Carbohydrate:

Extract were dissolved individually in 5ml of distilled water and filtered. The filtrate was used for the following test.

- a) Molisch's Test: Filtrate were treated with 2 drops of alcoholic α -naphthol solution, formation of violet ring at the junction indicates the presence of carbohydrate.
- b) Barfoed's Test: Take 1ml of test solution add 1ml of Barfoed's reagent in a test tube, then keep this test tube in boiling water bath, brick red colored ppt is formed at the bottom indicating carbohydrate
- c) Iodine Test: 2ml of extract were treated with 5 drops of Iodine solution, gives blue color indicates the positive test
- d) Fehling Test: 2ml of extract were hydrolyzed with dilute HCl and neutralized with alkali & heated with Fehling's solution A and B, formation of red ppt indicates the presence of reducing sugar.
- e) Benedict's test: Filtrate were treated with Benedict's reagent and heated gently, orange red ppt indicates the presence of reducing sugar.

Result and Discussion

Saxena Jyoti et.al (2012) isolated ten phytochemicals (Carbohydrate, Proteins, Starch, Amino acids, Steroid, Glycoside, Flavonoid, Alkaloid, Tannin and Saponin) from Methanolic extracts of rhizomes of *Curcuma longa*. Rajesh et.al (2013) has reported ten phytochemicals from Methanolic extract of *curcuma longa*. Swadhini S.P. et.al (2011) determined six phytochemicals viz Alkaloids, Flavonoids, Tannin, Saponins, Cardiac Glycosides and phenol from aqueous extract of Turmeric.

According to the percentage of Yield, Ethanolic extract gives more percentage (25 %) whereas Methanolic extract gives less percentage. In the present investigation Acetone extract shows the presence of 15 Phytochemicals, Methanolic extracts contains 16, Ethanolic

Extract having 13 phytochemicals whereas Chloroform extract contain 12 secondary metabolites from the rhizomes of *curcuma longa* Linn. From above studies Methanolic extract contains more number of Phytochemicals whereas Chloroform extract shows less number of phytochemicals.

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Table No. 1: Phytochemical Analysis of Rhizomes of *Curcuma longa* Linn.

| Phytochemical | Acetone | Methanol | Ethanol | Chloroform |
|------------------------|---------|----------|---------|------------|
| Alkaloids | | | | |
| Wagner's | + | + | + | - |
| Dragen droff's | + | + | + | + |
| Hager's | + | + | + | + |
| Saponin | + | + | + | + |
| Steroid | - | + | - | + |
| Tannin | + | + | + | - |
| Anthocyanin | + | + | + | + |
| Coumarin | - | - | - | - |
| Emodins | + | + | + | + |
| Protein | - | - | - | - |
| Amino Acid | - | - | - | - |
| Flavonoids | | | | |
| 10% NaOH | + | - | - | - |
| 10% NH ₄ OH | + | + | - | - |
| Mg test | + | + | + | + |
| Zn test | - | - | - | - |
| Diterpenes | + | + | + | - |
| Phytosterol | + | + | - | - |
| Phenol | + | + | - | - |
| Phlobatannin | + | + | + | + |

| | | | | |
|----------------------|---|---|---|---|
| Leucoanthocyanin | + | + | + | + |
| Anthroquinone | + | + | + | + |
| Chalcones | + | + | + | + |
| Cardiac Glycosides | | | | |
| Legal's test | + | + | + | + |
| Kellar-Killiani test | + | + | + | + |
| Carbohydrate | | | | |
| Molisch's | + | + | + | + |
| Barfoed | + | + | + | + |
| Iodine | + | - | + | + |
| Fehling | + | + | + | + |
| Benedict | - | - | - | - |

Note: + = Present; - = Absent

Table No 2:- Percentage Yield of Various Solvents.

| Solvent | % yield |
|----------------|----------------|
| Acetone | 16.10 |
| Methanol | 15.42 |
| Ethanol | 25.75 |
| Chloroform | 15.50 |