



Extraction and Phytochemical Screening of Rhizomes of *Curcuma longa*

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ABSTRACT

In this present work preliminary phytochemical screening of extract was done to determine the presence of phytoconstituents in extract. The aim of study was to optimize extraction parameter viz., solid:solvent ratio. It was observed that parameters like solid:solvent ratio affects the yield of curcuminoids. The preliminary phytochemical analysis of ethanolic extract showed the presence of alkaloids, carbohydrates, glycosides, proteins, tannins, flavonoids & saponins etc. From this work it was concluded that the optimal condition of solid:solvent ratio for extraction of curcuminoids is 1:5 solid:solvent ratio. The data reported here is useful for further development of extraction of curcuminoids from *Curcuma longa* rhizomes.

Keywords: Solid:solvent ratio, *Curcuma longa*, Phytochemical screening.

INTRODUCTION

The importance of medicinal plants to the mankind is very well proven from ancient time. It is found that majority of the people worldwide depend chiefly on the herbal medicines for their health, due to their better adaptability, better compatibility with the human system and minimum side or untoward effects. Natural products are a source of new chemical diversity and are the choice of today's world. The sources of natural product are plants, animals and microorganisms. Among them plant and its products are more reliable for its renewability and therefore, considered as catalyst for human welfare. Still, they are the primarily required materials for health care system in some parts of the world.^{1,2,3}

Optimization^{3,4}

A common pitfall associated with herbal based phytochemical industry is that the production of the phytochemicals is mainly carried out through various traditional methods leading to high losses and low yield. To make phytochemical industries a viable and profitable, various transformations like suitable process that includes planting and harvesting, raw material preparation and value added production is needed. For successful modernization of phytochemical processing, process technology needs to be optimized for extraction and product formulation.

Optimization of the extraction process includes:

- Yield enhancement
- Reduction in volumes of solvents used for the extraction
- Reduction in process time.

Therefore, extraction is the main step for the recovery and isolation of bioactive phytochemicals from plant materials,

before analysis. It is influenced by their chemical nature, the extraction method employed, sample particle size, as well as the presence of the interfering substances.

Plant Profile^{1,5-7}

Turmeric is an ancient spice derived from the rhizomes of *Curcuma longa*, which is a member of the ginger family (*Zingiberaceae*). It is also known as 'Golden Spice of India'. Turmeric has been used in India for medicinal purposes for centuries. It has been used in traditional medicine as a household remedy for various diseases, including biliary disorders, anorexia, cough, diabetic wounds, hepatic disorders, rheumatism and sinusitis. In addition to its use as a spice and pigment, turmeric and its constituents mainly curcumin and essential oils shows a wide spectrum of biological actions. These include its anti-inflammatory, antioxidant, anti-carcinogenic, anti-mutagenic, anticoagulant, antifertility, anti-diabetic, anti-immunomodulatory, antibacterial, antifungal, antiprotozoal, antiviral, anti-fibrotic, anti-venom, antimicrobial, antiulcer, hypotensive and hypocholesteremic activities.

MATERIALS AND METHODS

Collection and processing of plant material

The rhizomes of *Curcuma longa* were collected from local area of Pune (Maharashtra) in July 2018. The collected rhizomes were washed with water and dried under sunlight. The dried rhizomes were grinded for size reduction & shifted through mesh having fine size. All the chemicals which were used in present work were collected from the Pharmacognosy Lab of Amrutvahini College of pharmacy, Sangamner.



Preparation of alcoholic extract of *Curcuma longa*

Extraction is carried out by varying the solid:solvent ratio. The solid:solvent ratio used for extraction is 1:3, 1:4, 1:5 and 1:6. The extraction is carried out using 2mm particle size powder and temperature used is 60°C and is kept constant throughout all the cycles. About 100 gm of 2 mm particle size powder is weighed accurately and transferred in a three-neck round-bottom flask. Extraction is carried out separately by using 300 ml, 400 ml, 500 ml and 600 ml of ethanol. Then stirred for 3 hours at 60°C. This is carried out twice for individual extraction. At last, the mixture is filtered through 2µ filter cloth by using Buchner. The filtrate obtained from these trials is dried separately by using rotary evaporator. The percentage yield of the extract was calculated using following formula.

$$\text{Percentage yield} = \frac{\text{Final weight of dried extract}}{\text{Initial weight of the powder}} \times 100$$

Phytochemical Analysis⁸⁻¹⁰

The phytochemical analysis was done to find out the presence of phytochemical constituents like alkaloids, carbohydrates, glycosides, proteins, tannins, flavonoids, saponins etc.

1. Alkaloids

About 50 mg of extract was stirred with 3 ml of dilute hydrochloric acid and then filtered. The filtrate was tested with different alkaloid reagents.

a. Dragendorff's test

To 1 ml of filtrate, 2 ml of Dragendorff's reagent was added. The formation of yellow precipitate indicated the presence of alkaloids.

b. Mayer's test

To a 1 ml of filtrate, few drops of Mayer's reagent were added by the side of the test tube. The creamy precipitate indicated the presence of alkaloids.

2. Carbohydrates

The extract was dissolved in 10 ml of distilled water and filtered. The filtrate was subjected to test for carbohydrates.

a. Molish test

In 2 ml of solution, 1 drop of Molish reagent was added. 2 ml of conc. HCl was added from the sides of the test tube. Formation of a violet ring indicated the presence of carbohydrates.

3. Glycosides

a. Legal's test

1 ml of pyridine and 1 ml of sodium nitroprusside solution was added to the extract. The pink or red colour indicated the presence of glycosides.

4. Proteins

The extract was dissolved in 10 ml of distilled water and filtered. The filtrate was subjected to test for proteins.

a. Millon's test

To 2 ml of filtrate, few drops of Millon's reagent was added. A white precipitate indicated the presence of proteins.

5. Tannins

a. Ferric chloride test

To 50 mg of extract, 1 ml of water and 1-2 drops of Ferric chloride solution was added. No formation of greenish-black colour. It indicates absence of tannins.

6. Flavonoids

a. Ferric chloride test

20 mg of extract was dissolved in 1 ml of distilled water. 0.5 ml dilute ammonia solution was added to it. Conc. Sulphuric acid was added later. A yellow colour indicated the presence of flavonoids.

7. Saponins

About 0.2 g of extract was shaken with 5 ml of distilled water and heated to boil. Frothing showed the presence of saponins.

RESULTS AND DISCUSSION

The *Curcuma longa* rhizomes powder was extracted with ethanol. Ethanol extract obtained was dark yellow in colour, semisolid in appearance. The percent (%) content (table 1) of ethanol extracts of solid:solvent ratio (1:5) was found to be 9.53% for cycle 1 & 4.48% for cycle 2. The % content of solid:solvent ratio 1:5 was found to be better than all other ratios which are studied.

From preliminary phytochemical analysis (table 2) it was found that ethanolic extract of *Curcuma longa* showed presence of some phytochemicals like alkaloids, carbohydrates, glycosides, proteins, flavonoids, saponins etc.

Percent Content of Extracts

Table 1: Percent (%) content of extracts

Solid:Solvent Ratio	% content
1:3- Cycle 1	5.61%
Cycle 2	2.21%
1:4- Cycle 1	6.93%
Cycle 2	2.64%
1:5- Cycle 1	9.53%
Cycle 2	4.48%
1:6- Cycle 1	6.45%
Cycle 2	3.17%

Preliminary phytochemical evaluation of alcoholic extract

Table 2: Preliminary Phytochemical Screening of Extracts

Sr. No.	Test	Observation
1.	Alkaloid	+
2.	Carbohydrate	+
3.	Glycosides	+
4.	Proteins	+
5.	Tannins	-
6.	Flavonoids	+
7.	Saponins	+

CONCLUSION

The extraction parameter like solid to solvent ratio was affected the curcuminoids yield from turmeric. Powdered rhizomes of plant were extracted by using conventional extraction method using ethanol as a solvent for extraction. From this work it is concluded that the optimal condition for extraction of curcuminoids is 1:5 solid to solvent ratio. The extraction at above mentioned optimized condition is applicable commercially for the extraction of curcuminoids from turmeric rhizomes. The data reported herein is useful for further developments of turmeric phytopharmaceuticals products with optimized parameters.

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