Phytochemical Profiling and Extraction of *Curcuma* species

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Abstract

Turmeric is a spice made from the rhizomes of the ginger plant *Curcuma (Curcuma longa, Curcuma aromatica, Curcuma amada, Curcuma caesia, and Curcuma angustifolia) (Zingiberaceae).* Rhizomes are horizontal underground stems that produce both roots and shoots. Turmeric's vivid yellow colour is primarily due to fat-soluble polyphenolic pigments known as Curcuminoids. For this study, ethanol was used to extract the rhizomes of five Curcuma species *(Curcuma longa, Curcuma aromatica, Curcuma amada, Curcuma caesia, and Curcuma angustifolia).* Flavonoids, tannin, saponins, and diterpenoids were among the phytochemicals found in the plant species. Plants have therapeutic qualities due to the phytochemical substances they contain. Non-nutritive plant chemicals with disease-preventive characteristics are known as phytochemical components. Curcuma, rhizomes, plant species, phytochemical contents, qualitative phytochemical screening

Keywords:*Curcuma*, rhizomes, phytochemical constituents, qualitative phytochemical screening

Introduction

Medicinal plants, according to the World Health Organization, are the best source of a wide range of medications. Traditional medicine, which contains substances derived from medicinal plants, was utilized by almost 80% of people in developed countries [1]. Herbal medications can be used to treat a variety of infections and ailments. Many herbal preparations and popular supplements start with medicinal plants [2]. Due to their low cost, the usage of herbal medications has increased in recent years. People believe that herbal remedies have no adverse effects and that herbs are harmless because they are natural in nature [3]. Traditional herbal treatments provide an intriguing and largely untapped source for the discovery and development of potentially novel chemotherapeutic drugs that could help address the growing problem of antibiotic resistance as well as the toxicity of currently available commercial antibiotics [4].

Curcuma is a perennial herb with pulpy, orange tuberous roots that grows to about 2 feet in length and is grown in India, China, Bangladesh, and other tropical Asian nations [5, 6]. *Curcuma*is a popular herb in the Ayurvedic, Unani, and Siddha herbal systems. Diabetes, high cholesterol, stomach aches, menstrual irregularities, wounds, eczema, psoriasis, jaundice, inflammation, malignant signs, and as a blood purifier are among conditions for which it is utilised. Antibacterial activity have been discovered in curcuma leaves and rhizomes [7.8].*Curcuma longa, Curcuma aromatica, Curcuma amada, Curcuma caesia, and Curcuma angustifolia*are only a few of the *Curcuma* species that are used medicinally. *Curcuma longa, Curcuma aromatica, Curcuma amada, Curcuma caesia, and Curcuma angustifolia* have been shown to have antifungal, antibacterial, and anti-inflammatory properties [9]. [10,11] looked at the pharmacology of C. longa in great detail.

Methods and materials

Plant-based materials

Curcuma longa, Curcuma aromatica, Curcuma casiea, Curcuma angustifolia, and Curcuma amada rhizomes were taken from Peermade in the Idukki area, cleaned, washed with deionized water, peeled off, sliced, and dried for a week in the sun shade. For this investigation, dried rhizomes were chopped into small pieces and powdered.

Extraction of crude oil

50g coarse powder of dried rhizomes of *C.longa*, *C.aromatica*, *C.amada*, *C.caesia, and C.angustifolia* in 100ml ethanol with periodic shaking for three days The surplus solvent from the whole extract was evaporated to concentrate it. Until they were utilised, the extracts were kept cold in closed conical flasks.

Test for identification

For the existence of some chemical ingredients, the extract was submitted to qualitative phytochemical screening. The phytochemical tests were carried out according to protocol.

Carbohydrates

The extract was dissolved in 10ml distilled water, filtered using Whatmann No.1 filter paper, and Molish's test was performed on the filtrate. A test tube was filled with 2ml of the solution. Molish's reagent (alcoholic -naphthol) was added in one drop. 2 ml concentrated HCl was introduced from the test tube's sides. The presence of carbohydrates was determined by observing the test tube for the creation of a violet ring at the junction of the two liquids.

Proteins

Biuret test: A drop of 2% $CuSO_4$ solution was added to around 2 ml of the filtrate. 1 ml ethanol (95%) was added to this, followed by an excess of potassium hydroxide pellets. The presence of proteins is shown by the pink colour of the ethanol layer.

Phlobatannins

1% aqueous HCl is added to an aqueous extract of the sample. The presence of phlobatannins is determined by the presence of orange red precipitate.

Phenols

Boiling alcohol is used to extract the plant material. Add 1% aqueous or alcoholic ferric chloride to a few cc of the alcoholic extract in an analytical tube. The presence of phenolic chemicals is indicated by an intense green/purple/blue/ or black colour.

Flavonoids

Test with alkaline reagent: extract was treated with a 10% NaOH solution, and the appearance of a yellow colour shows the presence of flavonoid.

Coumarins

To the aqueous extract, 3ml of 10% NaOH was added. Coumarins are identified by the formation of a yellow colour.

Emodins

The extract was treated with 2ml of NH_4OH and 3ml of benzene. The presence of emodins is indicated by the presence of red colour.

Groups of syringyl

Plant material is treated with 1% aqueous $KMnO_4$, 2M HCl, and 2m NH_4OH solutions at room temperature. A rose red colour arises when syringyl groups are present.

Terpenoids

5 ml extract, 2 ml chloroform, and con. H_2SO_4 are gently mixed together to form a layer. The presence of terpenoids is indicated by a reddish brown coloring of the interface.

Diterpenes

Copper acetate test

After dissolving the extract in water, 10 drops of copper acetate solution were added. The presence of diterpenes is indicated by the formation of emerald green colour.

Glycosides

Keller-Killani test is a method of determining whether or not a5 ml extract is treated with 2 ml glacial acetic acid and 1 drop ferric chloride solution. 1ml of concentrated H_2SO_4 is used as a foundation. The presence of deoxy sugar, which is characteristic of carotenoids, is

indicated by a brown ring around the interface. Below the brown ring, a violet ring may emerge.

Tannins

In a beaker, around 0.5 g of dried sample is heated with 20 ml water and then filtered. A few drops of ferric chloride (0.1%) are added. The presence of tannins is indicated by a brownish green or blue black colour that turns to olive green when more ferric chloride is applied.

Carotenoids

Con.HCl and one or two drops of phenol are used to treat the sample. The presence of carotenoids is indicated by a dark blue coloration.

Alkaloids

About 50mg of solvent-free extract was filtered after being agitated with weak HCl.By adding a few drops of Wagner's reagent (0.2g of iodine dissolved in 0.6g of potassium iodide) to the side of the test tube, the filtrate was carefully examined. The presence of brown precipitate indicates that the test is positive.

Saponins

The extract was heated after being mixed with 5 cc of distilled water. Saponins can be detected by frothing.

Result

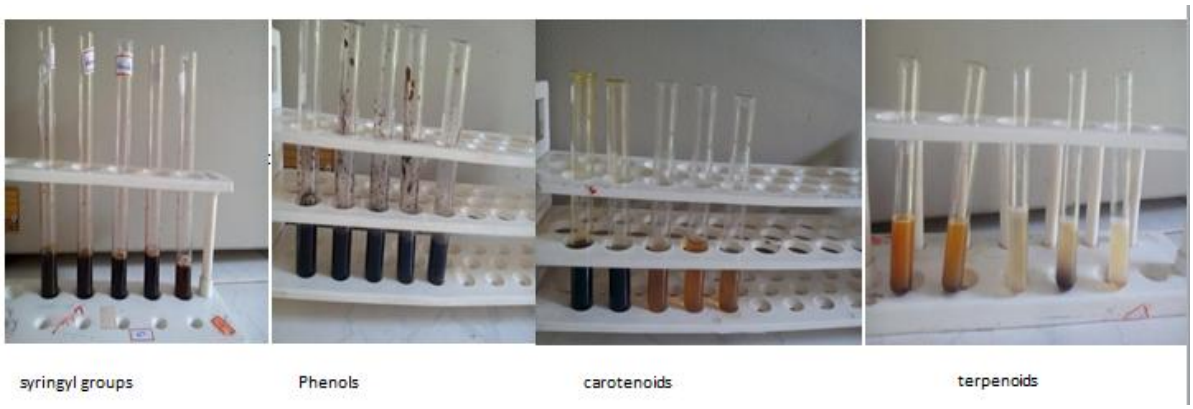
Plant-based materials

Fig1: Five genus species of *Curcuma*

Sample extraction

Fig 2: Solvent extraction of five genus species of *Curcuma*

Phytochemical screening



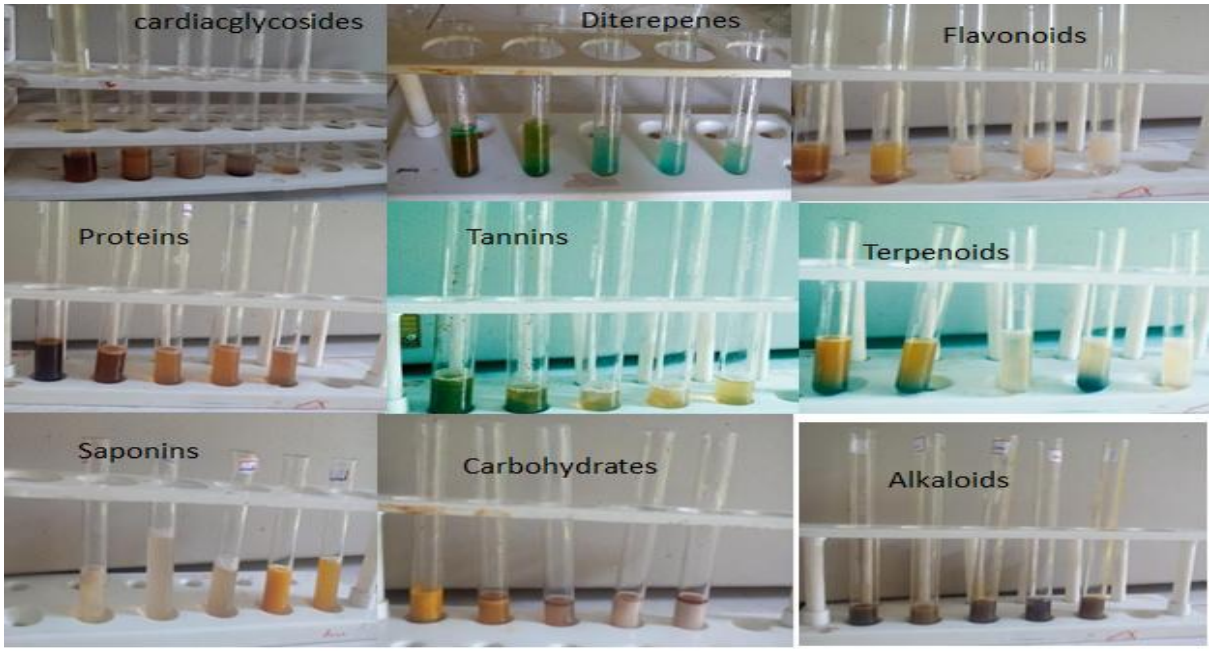


Fig 3: Phytochemical analysis of *C.longa, C.aromatica, C.amada, C.caesia*and *C.angustifolia*

Table 1: Phytochemical Analysis of Rhizomes of *Curcuma* species

SI. No.	Species Name	Carbohydrate	Protein	Alkaloids*	Terpenoids	Flavonoids*	Phenol*	Phlobatannins	Tannins	Diterpenes	Carotenoids	Glycosides	Saponins	Emodins	SyringylGropus	Coumarins
1.	*Curcuma longa*	+	+	+	+	+	+	+	+	+	+	-	+	+	+	-
2.	*Curcuma aromatica*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
3.	*Curcuma amada*	+	+	+	-	+	+	-	+	+	-	+	+	-	+	-
4.	*Curcuma caesia*	+	+	+	+	+	+	-	+	-	-	+	+	-	+	-
5.	*Curcumaa ngustifolia*	+	+	+	-	+	+	-	+	-	-	+	+	-	+	-

\+ Presenceofphytochemical, –Absenceofphytochemical, * Sampleinethanolextract

Discussion

Turmeric samples *(C.longa, C.aromatica, C.amada, C.caesia, and C.angustifolia)* were collected and extracted using ethanol and other solvents. The solvent of choice for recovering a wide spectrum of curcuminoids from C.longa rhizome has been reported to be ethanol. A

phytochemical investigation was performed to see if the rhizome contained any pharmacologically active compounds. Phytochemical analysis was performed on ethanol extracts of *C.longa, C.aromatica, C.amada, C.caesia, and C.angustifolia* rhizomes. A phytochemical examination was performed to see if the rhizomes contained any pharmaceutically active compounds. The plant species contained major phytochemicals such as flavonoids, tannin, saponins, and diterpenoids, among others.

Conclusion

Turmeric, and the pigment curcumin derived from it, is one of the few potential natural items that has been well studied from both a biological and chemical standpoint. *Curcuma longa, Curcuma aromatica, Curcuma amada, Curcuma caesia, and Curcuma angustifolia*, all members of the Curcuma genus, were evaluated for the presence of important secondary metabolites in this study.

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