Research Article

Phytochemical Evaluation Curcuma Longa and Curcumin

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ABSTRACT
In the present study, an attempt was made to investigate phytochemical evaluation of Curcuma longa and curcumin. The crude power extract of the leaves of the above plant were taken for the study. The Phytochemical screening was done for the selected plants. Phenolic compounds, tannins, flavonoids, cardiac glycosides, and alkaloids were present in Curcuma sanctum . Alkaloids, flanoids, carbohydrates, glycosides and tannins were present in Curcuma longa gratissimum. Alkaloids, saponins, favanoids, carbohydrates and anthraquinone glycosides were present in Curcumin.

Keywords: Anti-inflammatory, Anti-H.pylori, curcumin.

INTRODUCTION

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 shoots as well as roots. The bright yellow color of turmeric comes mainly from fat-soluble, polyphenolic pigments known as curcuminoids.Curcumin, the principal curcuminoid found in turmeric, is generally considered its most active constituent. Other curcuminoids found in turmeric include demethoxycurcumi and bisdemethoxycurcumin. In addition to its use as a spice and pigment, turmeric has been used in India for medicinal purposes for centuries.More recently, evidence that curcumin may have anti-inflammatory and anticancer activities has renewed scientific interest in its potential to prevent and treat the disease.

Botanical Description of Curcumin

Turmeric is a tall annual herb of South East Asia. It needs lots of rainfall and temperatures between 20 and 30 degrees to grow. The herb develops a large ovoid root stock that bears stalkless cylindrical tubers with distinct orange colour from inside. Turmeric leaves are also large(close to 2 feet!), its blade is slippery, oblong and lance like as it tapers along the base. In fact, The turmeric plant is identifiable by both its characteristic tuberous root and the leaves that extend upward from erect, thick stems arising from the root. The parts of turmeric plants which are used are – rhizomes and tubers. Rhizomes can be considered as underground stems, these have roots below them and leaves growing above.The interior of turmeric root is hard, orange-yellow in colour. When eaten it colours our saliva yellow and has a warm sensation.

Scientific Classification

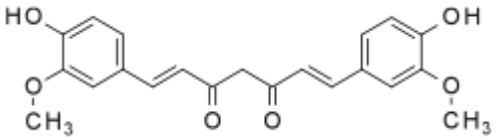
Kingdom :	Plantae
(unranked):	Angiosperms
(unranked):	Monocots
(unranked):	Commelinids
Order:	Zingiberales
Family:	Zingiberaceae
Genus:	Curcuma
Species:	C. longa

Chemical composition of turmeric

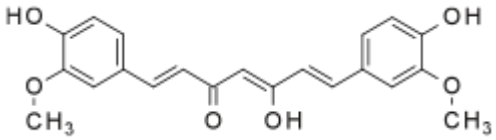
Composition of turmeric can vary slightly based on region it is grown. A typical Indian turmeric has the following composition:

- Moisture – 3.1 %
- Protein – 6.3%
- Fat – 5.1%
- Mineral matter – 3.5%
- Fibre – 2.6%
- Carbohydrates – 69.4%

Biochemical composition



Curcumin keto form



Curcumin enol form

Synonyms

Entry	Language	Name
1	Arabic	Kurkum
2	Armenian	Toormerik,Turmerig
3	Assamese	Halodhi
4	Bengali	Halud
5	Bulgarian	Kurkuma
6	Chinese	Wat gam
7	Dutch	Kurkuma,Tarmeriek
8	English	Indian saffron
9	French	Safran des indes
10	German	Indischer safran
11	Greek	Kourkoumi
12	Guajarati	Halad
13	Hindi	Haldi
14	Urdu	Haldi,Zard chub
15	Indonesian	Kunyit
16	Italian	Curcuma
17	Japanese	Ukon
18	Kannada	Arishina
19	Malayalam	Manjal
20	Marathi	Halad
21	Nepali	Haldi,Hardi
22	Punjabi	Haldi
23	Telugu	Haridra,Pasupu
24	Sanskrit	Ameshta,Haridra

MATERIALS AND METHODS OF CURCUMIN

Curcuma longa (turmeric) collected from Satara dist (Rajapuri). All solvents /chemicals used were of AR/HPLC grade and obtained from SRL. The reference curcumin purchased from HIGHMEDIA Company in India.

METHODS

1. Extraction of curcuminoids

Fresh rhizomes were cleaned, washed with deionsed water, sliced and dried in the sun for one week and again. Dried at 50˚c in a hot air oven for six hours. Dried rhizomes were cut in small pieces, powdered by electronic mill. Six gm of sample were taken into a thimble and placed in a Soxhlet apparatus, were set up with various solvent from non polar to polar. 250 ml of solvent was added and extracted according to their boiling point for seven hours. The solvents used were chloroform (B.P. =61˚c).ethyl acetate (B.P. =77˚c), methanol (B.P. =65˚c) and acetone (B.P.=56.53˚c). After completion of extraction the dark brown extract was then cooled, concentrated using rotary evaporator get a crude dried extract which was black orange in colour. Each raw sample of turmeric was extracted by the same method and yield was calculated.

2. Estimation of curcuminoids:by sphectrophotometric analysis Procedure

Preparation of standard

1 mg of pure curcumin was dissolved into methanol and water such that concentration was 60µg/ml, got reading at 420 nm.

i) Sphectrophotometric analysis

To find out concentration of extracted sample by using spectrophotometer, 1 mg of sample were mixed with methanol and water same as standard solution, OD was taken at 420 nm. Because all three components of curcuminoids has λmax at 420 nm.

ii) Separation of curcuminoids by TLC

Methanol extracts were tested on TLC for presence different curcuminoids. The TLC pre-coated silica gel. Plate were developed using glass beaker , which was pre-saturated with mobile phase for 20 min and each plate was developed up to a height of about 6.8 cm. chloroform : methanol mobile phase was used with composition 95: 5. After development, plates were removed and dried. Spots were analyzed.

MEDICINAL AND PHARMACOLOGICAL PROPERTIES OF TURMERIC

1. Anti-inflammator

Oral administration of curcumin in instances of acute inflammation was found to be as effective as cortisone or phenylbutazone.Oral administration of Curcuma longa significantly reduced inflammatory swelling. C. longa's anti-inflammatory properties may be attributed to its ability to inhibit both biosynthesis of inflammatory prostaglandins from arachidonic acid, and neutrophil function during inflammatory states. Curcuminoids also inhibit LOX, COX, phospholipases, leukotrienes, prostaglandins, thromboxane, nitric oxide elastase, hyaluronidase, collagenase, monocyte chemoattractant protein-1, interferon inducible protein,TNF and interleukin-12.They also decrease prostaglandin formation and inhibit leukotriene biosynthesis via the lipoxygenase pathway. An RCT investigated the effect of a combination of 480mg curcumin and 20mg quercetin (per capsule) on delayed graft rejection (DGR) in kidney transplant patients. Of participants who completed the study, two of 14 in the control group experienced DGR compared to zero in either treatment group. Early function (significantly decreased serum creatinine 48 hours post-transplant) was achieved in 43% of subjects in the control group, 71% of those in the lowdose treatment group. Since the amount of quercetin in the compound was minimal, the majority of benefit is thought to be due to curcumin's anti-inflammatory and antioxidant activity. Likely mechanisms for improved early function of transplanted kidneys include induction of the hemeoxygenase enzyme, and proinflammatory cytokines, and scavenging of free radicals associated with tissue damage.

2.Antidiabetic properties

A hexane extract (containing ar-turmerone), ethanolic extract (containing containing ar-turmerone, curcumin, demethoxycurcumin and bisdemethoxycurcumin) and ethanolic extract from the residue of the hexane extraction (containing curcumin, demethoxycurcumin and bisdemethoxycurcumin) were found to dose-dependently stimulate adipocyte differentiation. The results indicate that turmeric ethanolic extract containing both curcuminoids and sesqui terpenoids is more strongly hypoglycemic than either curcuminoids or sesquiterpenoids.Wickenberg *et al.* The effects of turmeric on postprandial plasma glucose and insulin in healthy subjects;they found out that the ingestion of 6g *C.longa* had no significant effect on the

glucose response. The change in insulin was significantly higher 30min and 60min after the OGTT including *C. longa*. The insulin AUCs were also significantly higher after the ingestion of *C. longa* after the OGTT .

3.Cardiovascular diseases

Turmeric's protective properties on the cardiovascular system include lowering cholesterol and triglyceride levels, decreasing susceptibility of low density lipoprotein (LDL) to lipid peroxidation and inhibiting platelet aggregation .Turmeric extract demonstrated decreased susceptibility of LDL to lipid peroxidation, in addition to lower plasma cholesterol and triglyceride levels. Turmeric extract's effect on cholesterol levels may be due to decreased cholesterol uptake in the intestines and increased conversion of cholesterol to bile acids in the liver. Inhibition of platelet aggregation by C. longa constituents is thought to be via potentiation of prostacyclin synthesis and inhibition of thromboxane synthesis.

4.**Antimicrobial properties**

Turmeric extract and the essential oil of Curcuma longa inhibit the growth of a variety of bacteria, parasites, and pathogenic fungi. A study of chicks infected with the caecal parasite Eimera maxima demonstrated that diets supplemented with turmeric resulted in a reduction in small intestinal lesion scores and improved weight gain. Another study, in which guinea pigs were infected with eitherdermatophytes, pathogenic molds, or yeast, found that topically applied turmeric oil inhibited dermatophytes and pathogenic fungi. Improvements in lesions were observed in the dermatophyte- and fungi-infected guinea pigs, and at seven days post-turmeric application the lesions disappeared. Curcumin has also been found to have moderate activity. " Khattak et al". studied the antifungal,antibacterial, phytotoxic, cytotoxic and insecticidal activity of an ethanolic extract of turmeric. The extract showed antifungal activity towards Trichophyton longifusus and Microsporum canis and weak antibacterial activity against Staphylococcus aureus. Toxic activity was observed against Lemna minor.Against Plasmodium falciparum and Leishmania major organisms.

Uses

Culinary

Turmeric grows wild in the forests of South and Southeast Asia. It is one of the key ingredients in many Asian dishe Indian traditional medicine, called Siddha, has recommended turmeric for medicine. Its use as a coloring agent is not of primary value in South Asian cuisine.Turmeric is mostly used in savory dishes, but is used in some sweet dishes, such as the cake Sfouf. In India, turmeric plant leaf is used to prepare special sweet dishes, patoleo, by layering rice flour and coconut-jaggery mixture on the leaf, and then closing and steaming it in a special copper steamer (goa).In recipes outside South Asia, turmeric is sometimes used as an agent to impart a rich, custard-like yellow color. It is used in canned beverages and baked products, dairy products, ice cream, yogurt, yellow cakes, orange juice, biscuits, popcorn color, cereals, sauces, gelatins, etc. It is a significant ingredient in most commercial curry powders.

Folk medicine and traditional uses

In India, turmeric has been used traditionally for thousands of years as a remedy for stomach and liver ailments, as well as topically to heal sores, basically for its supposed antimicrobial property. In the Siddha system (since c. 1900 BCE) turmeric was a medicine for a range of diseases and conditions, including those of the skin, pulmonary, and gastrointestinal systems, aches, pains, wounds, sprains, and liver disorders. A fresh juice is commonly used in many skin conditions, including eczema, chicken pox, shingles, allergy, and scabies.

Preliminary medical research

According to the National Center for Complementary and Alternative Medicine, "there is little reliable evidence to support the use of turmeric for any health condition because few clinical trials have been conducted. Although trials are ongoing for the use of turmeric to treat cancer, doses needed for any effect are difficult to establish in humans. Some research shows compounds in turmeric to have anti-fungal and antibacterial properties.

Dye

Turmeric makes a poor fabric dye, as it is not very light fast. However, turmeric is commonly used in Indian and Bangladeshi clothing, such as saris and Buddhist monks' robes. Turmeric is used to protect food products from sunlight. The oleoresin is used for oil-containing products. A curcumin and polysorbate solution or curcumin powder dissolved in alcohol is used for water containing products. Over-coloring, such as in pickles, relishes, and mustard, is sometimes used to compensate for fading.

EXPERIMENTAL SECTION

TEST FOR ALKALOIDS

To 250 mg of each extract, 10ml of dilute HCL was added,mixed and filtered.To the filtrate the following reagents were added and tested.

TEST	PROCEDURE
Wagner's Test	2ml of Wagner's reagent was to the above filtrate solution an observed.
Hager's Test	To the 2ml of above filtrate solution, 2ml of picric acid was added and observed.

TEST FOR FLAVANOID

TEST	PROCEDURE
Lead Acetate Test	To the 100mg of each extract, lead acetate (5ml) was added and observed.

TEST FOR STEROIDS

TEST	PROCEDURE
Salkowski Test	To 100mg of each extract,2ml of CHCl3,2ml of conc.H2SO4 were added, mixed thoroughly and both the layers were observed for color
Liberman Burchard Test	To 200mg of each extract, 5ml CHCl3, 5ml acetic anhydride were added. Two drops of H2SO4 was added from the sides of test tube and observed.

TEST FOR CARDIAC GLYCOSIDES

TEST	PROCEDURE
Legal's test	To 50mg of each extract, 1ml of pyridine, 1ml of sodium nitro prusside solution were added and observed.
Keller-Kiliani Test	To 50mg of each extract,2ml of glacial acetic acid,1ml FeCl3 solution were added, heated and then cooled. This was transferred to a test tube containing 2ml conc.H2SO4 and observed.

Phytochemical Evaluation of curcumin

S.NO.	CHEMICAL TESTS	RESULTS
1.	TEST FOR ALKALOIDS A. Hager's Test B. Wagner's Test	 POSITIVE POSITIVE
2.	TEST FOR FLAVANOIDS A. Lead acetate Test	 POSITIVE
3.	TEST FOR STEROIDS A. Salkowski test B. Lieberman	 POSITIVE POSITIVE
4.	TEST FOR CARDIAC GLYCOSIDES A. Legal Test B. Keller-killiani Test	 POSITIVE POSITIVE

CONCLUSION

The screening of phytochemical constituents of plants curcuma longa and curcumin of carbohydrate, flavanoids, alkaloids and steroids in common.The plants contains more metabolites there is need for further investigations using fractionated extracts and purified chemical components . Physicochemical constituents works on these plants are in progress. Curcumin is used to produces in different properties like antioxidant, anti inflammatory, anti-cancer, anti-fertility, antibacterial, antimicrobial, antidepressant activities etc,are believed to account in large measure for its demonstrated ability to help prevent the neurodegenerative changes seen in Alzheimer‟s as well as Parkinson‟s disease. As an anti-inflammatory agent, curcumin inhibits damaging COX-2 enzymes but not beneficial COX-1 enzymesand thus beneficial for inflammatory conditions. The review is focus on application of curcuminin different therapeutic efficacy in treatment of various disorders.

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