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Research Article

EVALUATION OF *ZINGIBER OFFICINALE* AND *CURCUMA LONGA* RHIZOME AS A CRUDE DRUG FROM THEIR ETHANOLIC EXTRACT

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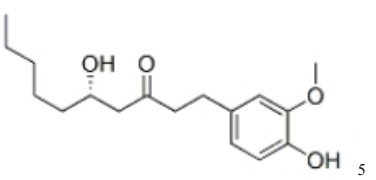
ABSTRACT
Zingiber officinale and *Curcuma longa* has a lot of potential in terms of medicinal properties. Both crude drug rhizomes comprises of the same family, Zingiberaceae. Plants based medicaments are the sources for modern pharmaceuticals as they contain phytochemical constituents. Phytochemicals differ from traditional indigenous herbal medicines by employing industrialized extraction and manufacturing methods and by be cosmopolitan in scope. Hence phytomedicines made from *Zingiber officinale* and *Curcuma longa* crude drug rhizomes are available in most industrialized countries around the globe. The present work aimed at phytochemical analysis and quantitative as well as qualitative investigations, characterized by TLC and UV-Vis spectroscopy. The determined R_f values for gingerol and curcumin are 0.85 and 0.52 respectively, where as the spectrophotometric detection for gingerol and curcumin is carried out at the absorption maxima of 282.8 nm and 425.6 nm.
Keywords: *Zingiber officinale*, *Curcuma longa*, Gingerol, Curcumin, Ethanolic extracts, TLC, UV-Vis spectroscopy.

INTRODUCTION

A Crude drug is an unrefined state of pharmacologically active ingredients and requires no additional processing for use. According to the Morphological Classification of natural products, the dried parts of the plants such as barks, rhizomes, stems, leaves and fruits have been used for crude drug from ancient time. A rhizome is a modified subterranean stem of a plant that is usually found underground. Rhizomes may also called as creeping rootstalks[1]. *Zingiber officinale* is an underground stem or rhizome. It has been used as traditional medicine in China, India, Malaysia and Arabic countries since ancient times. *Zingiber officinale* has been used to treat stomach upset, nausea, diarrhea, colic, arthritis, heart conditions and flu-like symptoms[2]. *Curcuma longa* (Family- Zingiberaceae), a perennial herb is another rhizome, cultivated extensively in South and South-East tropical Asia. The characteristic yellow color is due to the curcuminoids, first isolated by Vogel in 1842[3]. It was used as an anti inflammatory agent to treat gas, toothaches and chest pains in Indian medicines. Curcumin is the phytochemical that is now recognized as being responsible for most of the therapeutic effects[4].



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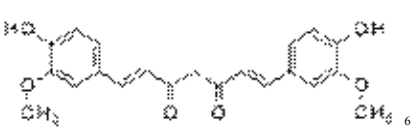
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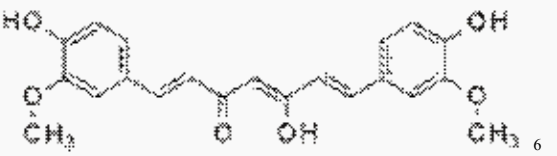
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CURCUMIN ENOL

MATERIALS AND METHODS

Materials

Zingiber officinale (Zingiberaceae)
Curcuma longa (Zingiberaceae)

Methods

Collection and authentication of crude drug rhizomes

Fresh *Zingiber officinale* rhizomes were collected from agricultural fields around Vidisha, M.P., India where as *Curcuma longa* rhizomes were purchased from the local market of Raisen, M.P., India. They were identified by Dr. Jagrati Tripathi, HOD, Department of Botany, Unique College, Bhopal, M.P., India.

Preparation of sample

Zingiber officinale rhizomes were washed thoroughly with de ionized water; peel was removed and cut into slices. Sample is dried under shade (at ambient temperature), and then in oven at 20-40^{0}C[7]. The sample was grind, so that it will pass through a No. 20 standard mesh sieve[8]. *Curcuma longa* rhizomes were dried in shade and ground to fine powder[9].

Extraction of plant material

Crude *Zingiber officinale* extract was prepared by soxhlet extraction. About 100 g of powdered rhizomes were uniformly packed into a thimble and extracted with 600 ml of ethanol. The process of extraction continues for 24 hours or till the solvent in siphon tube of an extractor become colorless. After that the extract was taken in a beaker and

kept on hot plate and heated at 30-40ºC till all the solvent got evaporated. About 100 g of ground *Curcuma longa* rhizomes material were extracted with ethanol using soxhlet apparatus for 18 hours and solvent was evaporated to dryness at constant temperature of 72^0C at reduced pressure[10].

Evaluation of crude drug rhizomes

Zingiber officinale and *Curcuma longa* were analyzed for crude protein determination, crude fiber determination, ash content, moisture content, phosphorus and iron determination[2]. The presence of various phytochemicals i.e. carbohydrates, amino acids, flavinoids, glycosides, steroids, terpenoids, mucilage, alkaloids, proteins, tannins detected by following methods[T1].

- Test for Alkaloids- To extract, add dilute HCl and filter. Perform Mayer's and Wagner's tests.
- Test for Amino acids- To ethanolic extract add ninhydrin solution (0.1 % in acetone) and heat for few minutes.
- Test for Flavinoids- By alkaline reagent test, addition of increasing amount of NaOH to the extract shows yellow coloration, which decolorizes after addition of acid.
- Test for Glycosides- By Keller-Kilani test, to 2 ml. extract, add glacial acetic acid, one drop 5 % $FeCl_3$ and concentrated H_2SO_4.
- Test for Steroids- By Salkowski's reaction, to 2 ml. of extract add 2 ml. chloroform and 2 ml. concentrated H_2SO_4.
- Test for Terpenoids- 2 ml. chloroform added to extract and evaporate to dryness. To this, 2 ml. concentrated H_2SO_4 added and heated to about 2 minutes.
- Test for Mucilage- Powdered drug swells in water or aqueous KOH.
- Test for Carbohydrates- Add 1 ml. of each Fehling A and B solution, heat for few minutes. Brick red precipitate is observed.
- Test for Proteins- By Xanthoproteic test, extract treated with few drops of conc. HNO_3 for yellow color ppt.
- Test for Tannins- to 2 ml. of alcoholic extract add few drops of 5 % $FeCl_3$ solution for deep blue color.

Qualitative Profile

The qualitative analysis is carried out by TLC (IP 2010)[12] and UV Spectroscopy[3,5,7]. TLC and UV Spectroscopy are the suitable methods to show the qualitative profile of gingerol and curcumin in the ethanolic extracts.

Detection of gingerol and curcumin by UV Spectroscopy

For stock solution, pipette out 2 ml. of filtered *Zingiber officinale* extract and dilute to 25 ml. by methanol. From this stock solution pipette out 1 ml. and dilute to 25 ml. The absorbance of the resultant solution was measured at 282.8 nm against methanol as blank. Similarly, pipette out 2 ml. of filtered *Curcuma longa* extract and dilute to 25 ml. by ethanol. From stock solution pipette out 1 ml. and dilute to 25 ml, further dilute this solution to four times. The absorbance of the resultant solution was measured at 425.6 nm against ethanol as blank.

Table 1: Organoleptic and physical evaluation of *Z. officinale* and *C. longa*

S. No.	Tests	Results	
		Zingiber officinale	***Curcuma longa***
1	Color	Yellowish-brown	Yellow
2	Odor	Pungent	Mustardy smell
3	Taste	Pungent	Bitter
4	Melting Point	-	182.5^0C
5	Moisture	8.18 %	7.84 %
6	Ash Content	7.5 %	6.5 %
7	Acid Insoluble Ash	1.0 %	1.43 %
8	Water Soluble Ash	5.33 %	16.66 %

Table 2: Chemical evaluation of *Z. officinale* and *C. longa*

S. No.	Tests	Results	
		Zingiber officinale	***Curcuma longa***
1	% Starch	56.92 %	59.22 %
2	% Protein	31.5 %	10.5 %
3	% Ca	1.63 %	-
4	% Mg	212 mg/100 g	190 mg/100 g
5	P (mg /100 g powder)	168 mg/100 g	258 mg/100 g
6	Fe (mg /100 g powder)	20 mg /100 g	44 mg/100 g
7	% Crude Fiber	5.0 %	9.0 %

Table 3: Results showing phyto-chemical analysis

S. No	Phyto-chemical Constituents	*Zingiber officinale*	*Curcuma longa*
1	Alkaloids	+	+
2	Amino acids	+	-
3	Flavinoids	-	-
4	Glycosides	+	+
5	Steroids	+	-
6	Terpenoids	+	+
7	Mucilage	+	-
8.	Carbohydrates	+	+
9	Proteins	+	+
10	Tannins	-	+

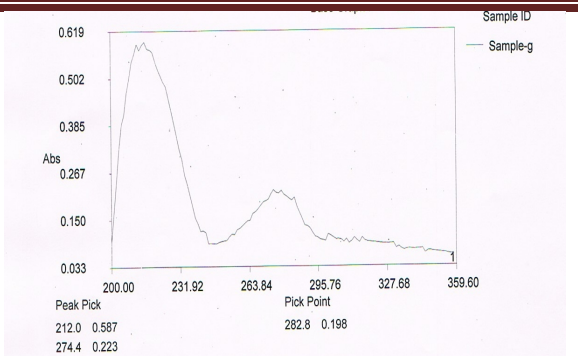

Figure 1: UV scan of *Zingiber officinale* extract

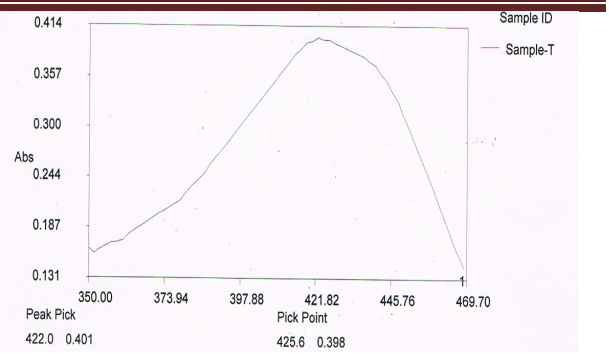

Figure 2: UV scan of *Curcuma longa* extract

RESULTS AND DISCUSSION

The Characterization of the isolated Gingerol and the Curcumin was done by TLC and UV spectroscopy. The R_f values came out were matched with the standards and the results came were found to be within the standard range. The R_f values for gingerol (1:10) and curcumin (1:50) are found to be 0.85 and 0.52 respectively. The UV absorption maxima of isolated compounds, gingerol and curcumin were recorded using methanol and ethanol as a solvent. UV spectra of the isolated compounds show peaks of almost same intensity, gingerol at 282.8 nm and curcumin at 425.6 nm. To determine the presence of various elements quantitative experiments were performed. Thus based on the results of the test carried out and spectral studies, the observed data for gingerol and curcumin was found to match well with that of standard data.

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