

Comparative Evaluation of Antimitotic Activity of Zingiber Officinale and Curcuma Longa

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Abstract:

Humans have been using natural products for medicinal use for ages. Natural products of therapeutic importance are compounds derived from plants, animals, or any microorganism. Ginger and Turmeric are also used as most commonly used condiments and Natural drugs vogue. These are traditional medicine, having some active ingredients used for the treatment of many diseases and Killing of gram negative bacteria as well as gram positive i.e. *E. coli*. Turmeric (*Curcuma longa*) and ginger (*Zingiber officinale*) has been used in cooking, and in herbal remedies. Its possible mechanism of action was examined in terms of antioxidant availability during actual cooking conditions and in therapeutic applications using standardized extracts. The assays involve different extract of ginger and turmeric show Antibacterial activity killing of bacteria. The Aim of this **Comparative Evaluation Of Antimitotic Activity Of Zingiber Officinale And Curcumalonga** in their result of mortality in enterobacteriaceae. Azithromycin, Amoxicillin, Water, Acetone, Alcohol, test extracts of *Zingiber officinale* and *Curcuma longa* were prepared. Antimitotic tests were employed. According Allium cepa bio assay we found that acetone ginger extraction(20%),alcohol ginger extraction(20%),water ginger extraction(20%),acetone turmeric extraction(20%),alcohol turmeric extraction(17.24%),water turmeric extraction(20%).

Keywords: Curcumin, Turmeric, Antioxidant, Anti - Inflammatory, Polyphenol, Ginger -bacterial Inhibition zone, Antimitotic activity, Allium cepa, Pharmacognostics study.

INTRODUCTION

Turmeric

turmeric has also been used for centuries in ayurvedic medicine, which integrates the medicinal properties of herbs with food the extraordinary herbs has found its into the spotlight in the west and rest of globe ,because of its wide range of medicinal benefits . uses of turmeric dates back nearly 4000 years to the vedic culture in india it is extensively. Used ayurveda, unani and siddha medicine as home remedy for various diseases . turmeric derived from rhizomes *curcuma longa* (family *zingiberaceae*) is a perennials plant having short stem with large oblong leaves, and bears ovate, pyriform or oblong rhizomes, which are often branched and brownish- yellow in colouring. turmeric a native of south-east asia, is used as a food additive (spice), preservative and colouring agent in asian countries including china, Bangladesh, Burma, Nigeria, Australia, West Indies, Peru, Jamaica and some other Caribbean and Latin American Countries.



Fig 1.1. Turmeric rhizomes

Ginger:

Ginger is a herbal drug used in medication as well a culinary spice and its medicinal use dates as back as to ancient China and India. The Chinese pharmacopoeias, the Susruta scriptures of Ayurvedic medicine as well as Sanskrit writings give references to the use of Ginger. It is commonly also known as ginger root, zingiberis Rhizoma or black ginger. Ginger is in the official pharmacopoeias of several countries including Austria, China, Egypt, India, Great Britain, Japan, Switzerland and the Netherland



Fig 1.2. Ginger Rhizome

Cancer is one of the most concerning and alarming diseases, nowadays, resulting the death of humans despite the modernization of lifestyle and medical and pharmaceutical sciences. It involves abnormal cell division resulting in malignancy. The prime goal for the treatment and management of cancer is to suppress the abnormal cell divisions. For this purpose, cytotoxic drugs are employed in which natural products namely paclitaxel, vincristine, and combretastatin hold the utmost importance by inhibiting the cancerous cell division (antimitotic action).

The nucleolus, a rounded structure, shrinks and disappears. The end of prophase is marked by the beginning of the organization of a group of fibres to form a spindle and the disintegration of the nuclear membrane. The chromosomes, each of which is a double structure consisting of duplicate chromatids, line up along the midline of the cell at metaphase. In anaphase each chromatid pair separates into two

identical chromosomes that are pulled to opposite ends of the cell by the spindle fibres. During telophase, the chromosomes begin to decondense, the spindle breaks down, and the nuclear membranes and nucleoli re-form. The cytoplasm of the mother cell divides to form two daughter cells, each containing the same number and kind of chromosomes as the mother cell. The stage, or phase, after the completion of mitosis is called interphase. Mitosis is absolutely essential to life because it provides new cells for growth and for replacement of worn-out cells. Mitosis may take minutes or hours, depending upon the kind of cells and species of organisms. It is influenced by time of day, temperature, and chemicals.

MATERIALS AND METHODS

Chemicals and Reagents

All the solvent and chemicals /reagent purchased (acetone, ethanol) from Prasad scientific work durg rani Lakshmi bai chouk , India. methylene blue and petroleum ether purchased from Sai kripa enterprises Durg. Throughout the experimental process, double distilled water (purchased in the laboratory) was used.

Phytochemical Evaluation of crude drug turmeric

Firstly wash and dry all glassware. Take 5gm of tubes sample ginger & turmeric in a conical flask. Add 100ml of different solvent chloroform, alcohol, water, acetone to the sample. Follow the optimum condition and macerate the crude drug for 24 hrs and filter it. For every test, small amount of sample is taken with suitable reagent and chemicals.

Table No. 3.2 - Chemical Evaluation

S.NO.	Category	Test Name	Procedure
1.	Carbohydrates	Molish test	2-3 ml sample + few drops of molish reagent shake it + conc. H ₂ SO ₄ from sides of tube violet ring
		Fehling test	1ml sample + equal amount of fehling's solution A + fehling solution B + heat Brick red ppt
		Iodine test	3ml sample + few drops of iodine solution Blue color (Disappear on boiling)
		Benedict test	1ml sample + 5ml benedict solution shake + heat it for 3 mint (in waterbath) Red or Yellow color
2.	Alkaloids	Dragandraff's test	2-3 ml sample + few drops of dragandraff's reagent (potassium bismuth iodide) Orange Brown ppt
		Mayer's test	3ml of sample + few drops of mayer's reagent Cream color ppt
		Wagner's test	3ml sample + few drops of wagner's reagent Reddish brown color ppt
3.	Tannins	Ferric	1ml sample + ferric chloride solution Dark

		chloride test	blue\ green\ black color
		Potassium permanganant test (KMNO4)	1ml sample + KMNO4 Solution

Antimitotic Study

50 grammes of *Allium cepa* bulbs were purchased from Durg, the state capital of Chhattisgarh, India's spice and condiment market. Only healthy onions were taken for the *Allium cepa* Bioassay was carried out using the methodology described by Fiskesjo, with some adjustments made by us. Specifically, the onion bulbs were left to germinate in a dark room over a few beakers filled with drinkable water until roots began to grow uniformly, about 5 cm in length. Water was then regularly replaced every 24 hours. Additionally, the chosen onions (roots to be dipped) were immersed for the 24 hours in distilled water (control), vinblastine sulphate (100 µg/ml; standard), and extracts (50 mg/ml; testing). The roots were cleaned with distilled water after 24 hours. The sharpe blade was used to cut a tiny piece of root close to the root tip, which was then placed on the slide and squeezed under the two cover slip. Water was added after ethanol to further treat the crushed tissue to remove unwanted fibers. Methylene blue (Indicator) was used to stain the tissue one more time. Excess stain was washed off with water, and the tissue was examined under a trinocular microscope at different magnifications. HD camera pictures were then captured. Counting both dividing and non-dividing cells in the tissue allowed for the calculation of the mitotic index using the following formulas

$$\text{Mitotic index} = \frac{\text{Total number of dividing cells}}{\text{Total number of cells}} \times 100$$

RESULTS AND DISCUSSIONS

Extraction of dried rhizomes of *Curcuma longa* using different solvents

For the preparation of extracts, the Soxhlet and decoction extraction method was used. Firstly, the collected dried rhizomes of *curcuma longa*. Further it was subjected to pulverization to coarse powder and successively extracted with solvents acetone, ethanol and water). The liquid extracts were filtered through Whatman filter paper no. 1. The extracts were further concentrated and dried using water bath and subjected to phytochemical evaluation, antimitoticactivity.

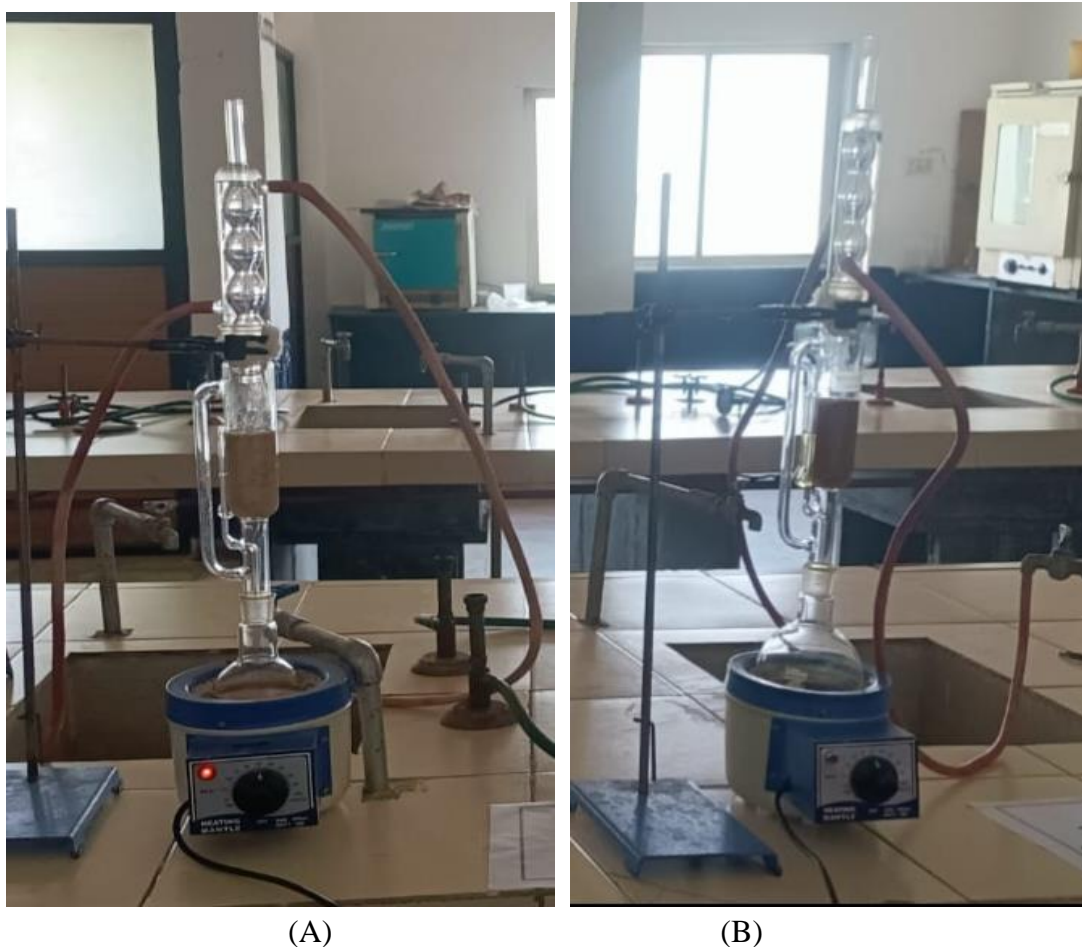


Figure No.4.1 - Crude Drug Extraction (A. Ginger & B. Turmeric) By Soxhlet Method



Figure No.4.2 Before volume makeup Acetone, Alcohol And Aqueous Extract of *Zingiber officinale* And *Curcuma longa*



Figure N0.4.3:- After volume makeup Acetone, Alcohol And Aqueous Extract of *Zingiber officinale* And *Curcuma longa*

Preliminary Phytochemical Screening:-

On phytochemical investigation of various extracts; carbohydrates, proteins were found present in ethanol and aqueous extract; alkaloids, saponins glycosides and terpenoids in all extracts except ethanol; flavonoids in petroleum ether and aqueous extract; tannins were reported in all extracts and steroidal compounds in petroleum ether and chloroform extracts. Amino acids and anthraquinone glycosides were found absent in all tested extracts (Table No. 4.2).

Table No.4.2- Phytochemical analysis

S.NO.	Category	Test Name	Ginger	Turmeric
1.	Carbohydrates	Molish test	present	present
		Fehling test	absent	present
		Iodine test	present	absent
		Benedict test	absent	present
2.	Alkaloids	Dragandraff's test	present	present
		Mayer's test	present	present
3.	Tannins	Wagner's test	Present	Present
		Ferric chloride test	Absent	Absent
		Potassium permanganant test (KMNO4)	Absent	Absent



Figure No.4.4- Chemical Test

***In vitro* study**

Antimitotic study

The results of antimitotic assay of different *Zingiber officinale* and *curcuma longa* extracts using *Allium cepa* bioassay are summarized in (Table No. 4.3) It is observed that acetone-turmeric extract shown the significant antimitotic action ($p < 0.05$) with mitotic index 20% in addition to the reduction in root length and numbers, as compared to chloroform extract (44.3 ± 0.03), acetone extract (49.02 ± 0.01) and ethanol extract (62.2 ± 0.03) while it was 63 ± 0.02 for distilled water (control) and 1.6 ± 0.02 for vinblastine sulphate (standard) (Fig. 4.23 – 4.25).

Table No. 4.3: Mitotic index (MI) % values obtained in antimitotic assay	
Treatments	Mitotic index(MI)%
Distilled water	23.25%
Vinblastine sulphate	13.33%
Acetone-turmeric extract	20%
Acetone ginger extract	20%
Alcohol-turmeric extract	17.24%
Alcohol-ginger extract	20%
Water-turmeric extract	20%
Water-ginger extract	20%

Values are expressed as Mean \pm SD($n = 5$)



Fig No. 4.5 :- Growing Root of *Allium Cepa*



Figure no. 4.6:- Antimutagenic Assay Using *Allium Cepa*- Distilled Water, Vinblastine Sulphate, Ginger-Water, Ginger-Acetone, Ginger-Alcohol, Turmeric- water, Turmeric-Alcohol, Turmeric-Acetone.

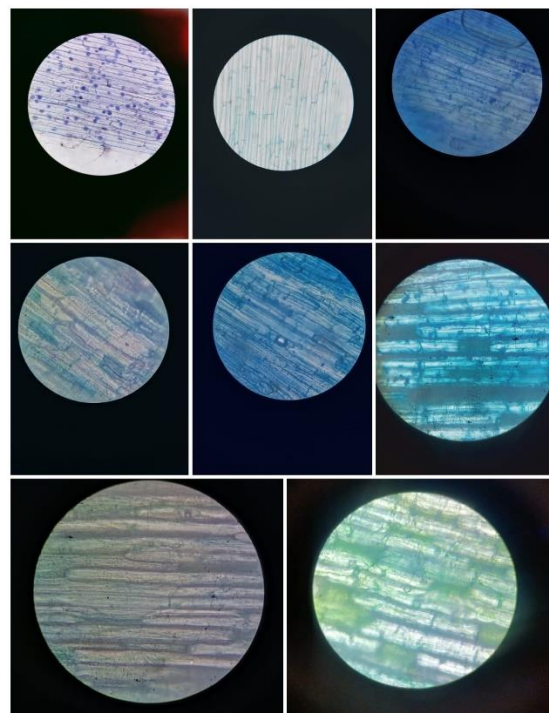


Figure No.4.7 :- Microscopic Observation Of *A. Cepa* Meristematic Cells Treated With: (A)- Distilled Water/Control; (B)- Vinblastine Sulphate/Standard; (C) Ginger-Water Extract;

(D)Ginger-Acetone Extract; (E) Ginger-Alcohol Extract; (F)Turmeric-Water Extract; (G) Turmeric-Alcohol Extract; (H) Turmeric-Acetone Extract.

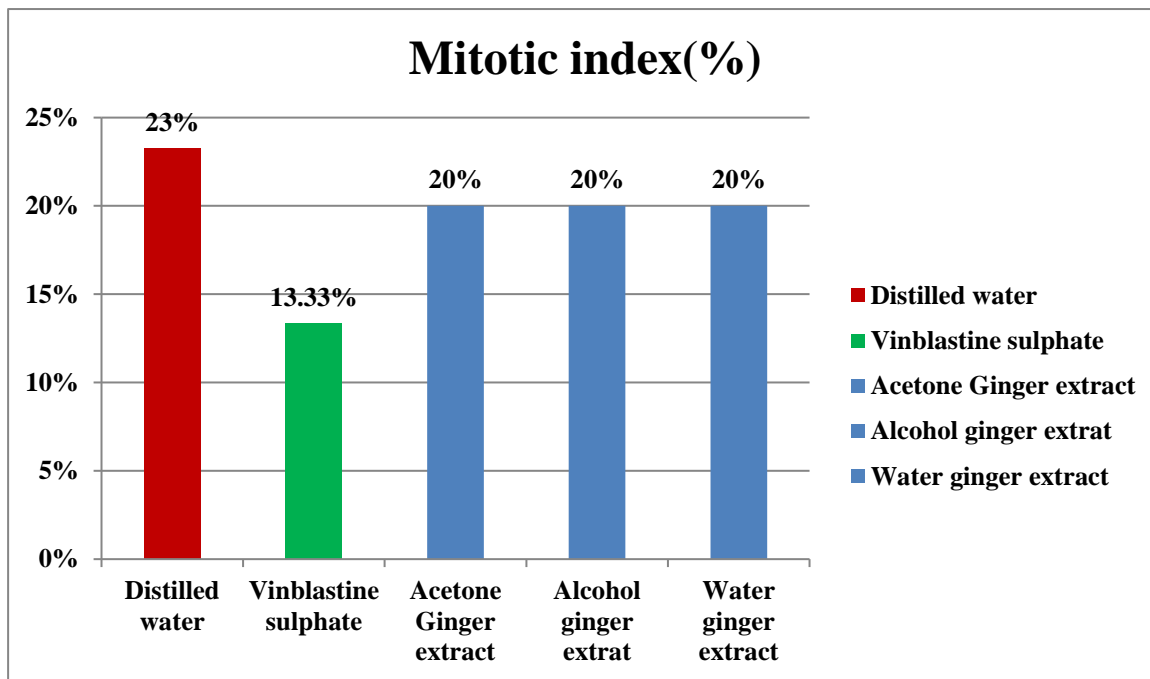


Figure no. 4. 8 :-Antimitotic assay of ginger (Graphical representation of mitotic index)

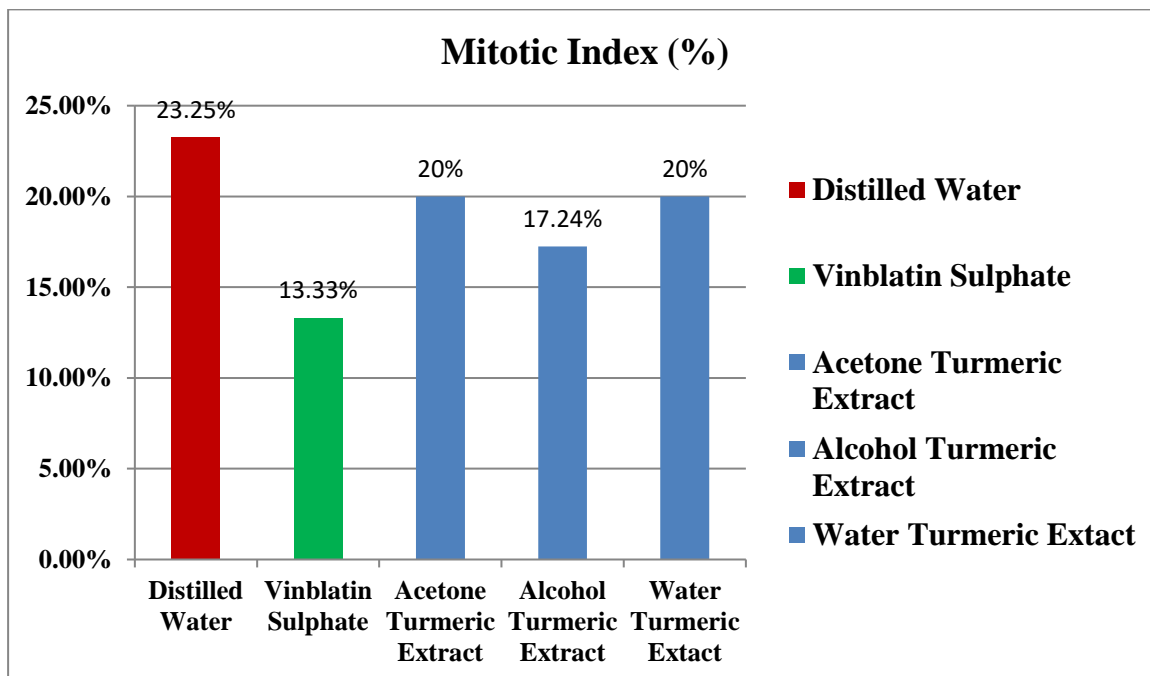


Figure No. 4.9 :-Antimitotic assay of ginger (Graphical representation of mitotic index)

CONCLUSION

Concluding the study, “Pharmacognostic study and phytochemical evaluation of *Zingiber officinale*” and *Curcuma Longa* rhizomes.-

1. Pharmacognostic and Phytochemical investigation of *Zingiber officinale* and *Curcuma Longa*.

2. Investigation of antimitotic potential of *Zingiber officinale* and *Curcuma Longa* rhizomes extracts using *Allium cepa* bio assay and

The first part of pharmacognostic and phytochemical investigation of *Zingiber officinale* and *Curcuma longa* was carried out under different steps- collection and authentication of plant materials, macroscopic evaluation, microscopic evaluation, physical evaluation followed by phytochemical screening of petroleum ether, chloroform, acetone, ethanol and aqueous extracts for the presence of various phytoconstituents groups. Beside general findings, as discussed in Results and Discussion Chapter, some important findings of our study were- presence of phenolic compound (gingerols, shogaols and paradols) and terpene compounds (zingiberene, beta sesquiphellandrene) in *Zingiber officinale* and curcumin, eugenol, turmerone, caprylic acid in *Curcuma Longa*.

In the second part, the antimitotic bio assay revealed that, the alcohol extract of turmeric rhizome showed higher antimitotic activity with mitotic index 17.24 % followed by, acetone and ethanol extracts. The reason for such arrest cell division probably because of presence of saponin glycosides, alkaloids, steroids, flavonoids, terpenoids and tannins compounds in the extract as revealed by the phytochemical screening. Although the concentration of extracts as compared to standard drug is higher but as already known fact that, the extract is a mixture of large number of constituents and if we could process further especially, the fractional separation assisted isolation of particular components of said alcohol extract, the breakthrough molecule for treatment of cancer can open the door of future surely. So the alcohol solvent has been shows effective mitotic index finally we found that

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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