



THE VERSATILE ‘GOLDEN SPICE’ :-A REVIEW OF TURMERIC (CURCUMA LONGA) IN MODERN MEDICINE

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• ABSTRACT:-

Turmeric is a member of the herbaceous evergreen Zingiberaceae family of plants. Turmeric (*Curcuma longa*) is a common spice, food preservative, and coloring agent in China, India, and South East Asia. Turmeric powder is most commonly used as a main component of curry spices, which also give ballpark mustard its striking yellow color. In addition to its culinary applications, turmeric has been widely used in traditional medicine around the world. Curcumin (diferuloylmethane), the main yellow bioactive component of turmeric, has been shown to have a number of biological effects. These include anti-inflammatory, anti-carcinogenic, antimutagenic, anticoagulant, antifertility, antidiabetic, antibacterial, antifungal, antiprotozoal, antiviral, antifibrotic, antivenom, antiulcer, hypotensive, and hypocholesteremic qualities.

• Keywords :-

Curcuma longa, phytochemical, pharmacological uses, taxonomical classification, and description

• Introduction:-

The umber powdery mildew is caused by *Podosphaera xanthii* and is one of the most devas tating diseases that limits cucumbCucer production worldwide (Fukino et al., 2013). Currently, synthetic chemical fungicides are the main methods usedto control this disease, but it is difficult to apply these fungicides at the time of disease outbreak since cucumber fruits are har vested daily (Fukino et al., 2013). However, the widespread use of synthetic fungicides has caused significant problems, including resistance, resurgence and residue (3R). Pesticides are toxic to humans not

only at high doses but even in low doses. Long-term exposure may lead to an array of health effects including cancer and neurodegenerative diseases (Bassil et al., 2007; Kanavouras et al., 2011; Parrón et al., 2011), reproductive and developmental toxicity (Hanke and Jurewicz, 2004) and respiratory effects (Hernández et al., 2011). It is now well established that exposure to pesticides during critical periods of development can present lasting adverse effects in early development and later in life: in particular, the developing brain and the endocrine system are both very sensitive targets (London et al., 2012). These problems affect human health and environment substantially. At the same time, pathogens are becoming more resistant to currently available pesticides due to the increasing use of synthetic chemicals. This makes it difficult to control plant diseases using synthetic fungicides leading to increased dose rates and a number of applications which makes the 3R problem worse. Thus, a vicious circle arises.



Fig.1:-Turmeric plant

- **DESCRIPTION:-**

Stemless herb with root stock. Leaves broadly lanceolate or oblong, with a deep ferruginous purple. Petiole and sheath as long as the blade. Spike appearing rather before the leaves. Flowering bract green with ferruginous tinge, flower pale yellow, reddish at outer boarder.

- **Plant Profile:-**

Turmeric (*curcuma longa*):-

- **Synonyms:-**

Saffron haldi

- **Biological Source:-**

The dried rhizome of the plant *curcuma longa* also known as *curcuma domestica* valetton

- **MEDICINAL USES:-**

Rhizome:-

Purifies blood, used as tonic to brain and heart, used to treat leucoderma, piles, bronchitis, asthma, tumours, tuberculous glands on the neck, enlargement of spleen, to check leucorrhoeal and gonorrhoeal discharge.

- **Morphology:-**

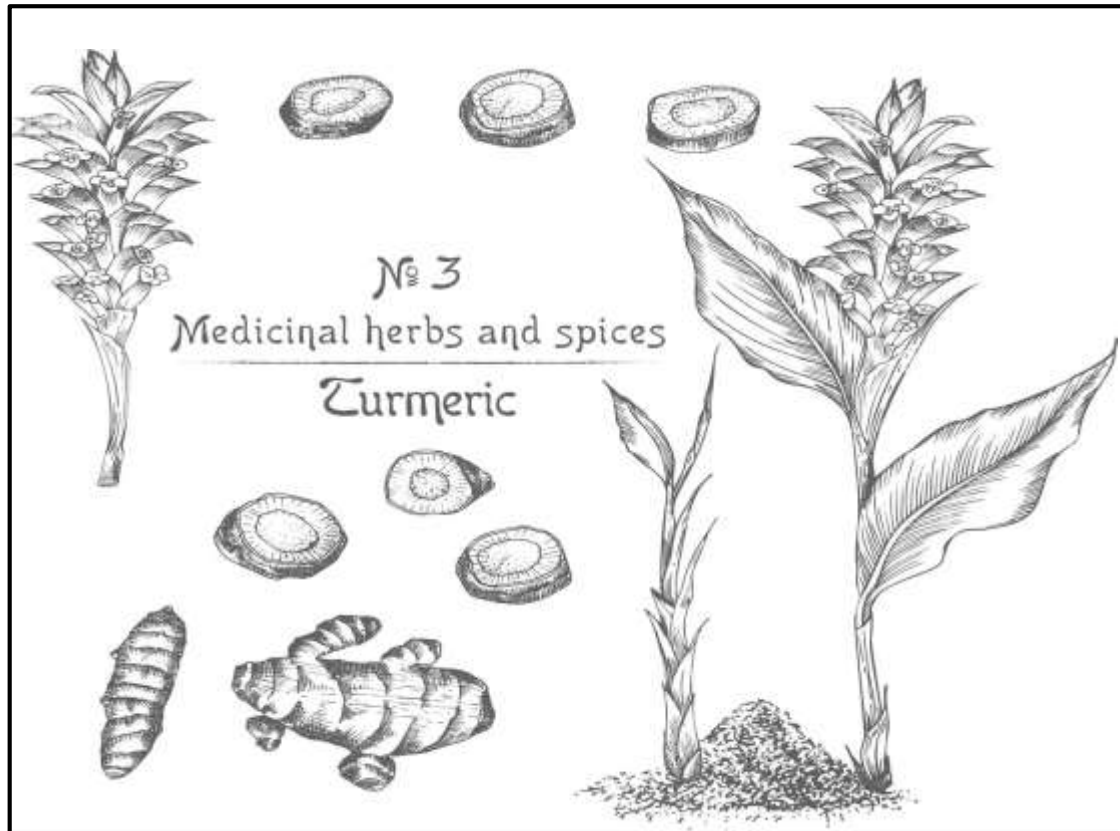


Fig.2:-Morphological Characters of Turmeric Curcuma Longa

- **TAXONOMICAL CLASSIFICATION:-**

Plantae Subkingdom: Tracheobionta

Superdivision: Spermatophyt

Division: Magnoliophyta

Subclass: Zingiberidae

Order: Zingiberales

Family: Zingiberaceae

Genus: Curcuma

Species: longa

Scientific name: Curcuma longa

• PHYTOCONSTITUENTS:-

(a)1,8-cineole, 2-bornanol, 2-hydroxy methyl-anthraquinone, 4-hydroxybisabola-2.

(b)10-diene-9-one; 4-methoxy-5 hydroxybiosabola; 4-hydroxy-cinnamoyl (Feruloyl)-methane, Alpha-atlantone, Alpha pinene, Alphaterpineol, Ar-turmerone, Arabinose.

(c)Ascorbic-acid, Ash, Azulene, Beta carotene, Beta-pinene, Beta sesquiphellandrene, Bis-(Para-hydroxy cinnamoyl)-methane.

(d)Bis-desmethoxycurcumin, Bisabolene, Bixin, Borneol, Boron, Caffeic-acid, Calcium, Caprylic-acid, Caryophyllene, Chromium, Cineole, Cinnamic-acid, Cuminyalcohol, Curcumene, Curcumenol, Curcumin, Curdione, Cobalt, Copper.

(e)Eugenol, Epiprocurcumenol; Eucalyptol; Eugenol; Feruloyl-p-coumaroyl-methane, Gamma-atlantone, Germacrone, Germacrone 13-al;Guaiacol, Isoborneol, L-alpha curcumene.

(f)L-beta-curcumene, Limonene, Manganese, Monodesmethoxycurcumin, Niacin, Nickel, norbixin; O-coumaric-acid, P-coumaric-acid, P-methoxycinnamic-acid, Pcymene, P tolylmethylcarbinol, Phosphorus, Protocatechuic-acid, Procurcumadiol.

(g) Acidic polysaccharides: utonan A, B, C, D.

(h)Volatile Oil(4.2%),its main content is turmerone, arturmerone, curcumene, germacrone, ar-curcumene,

(i)The herbal classics CHMM (Chinese Herbal Materia Medica).

(j)Other chemicals: Turmeric contains protein (6.3%), fat (5.1%), minerals (3.5%), carbohydrates (69.4%) and moisture (13.1%). Phenolic diketone, curcumin (diferuloylmethane) (3-4%) is responsible for the yellow colour, and comprises curcumin I (94%), curcumin II (6%) and curcumin III (0.3%).

• Phytochemical screening :-

Preparation Of Extract:-

The rhizomes of Curcuma longa were collected and sun dried, cut into small pieces The small piece of dried rhizome was then grinded to get a fine powder, which is ready for use] test filtrate w [9

Test for Alkaloid:-

The extract was mixed with 3 ml of dilute hydrochloric acid and then filtered thoroughly. The tested with following as carefully]:

1.Mayer's Test:-

To a 1 ml or 2 ml of filtrate, few drops of Mayer's reagent are added by the side of the test tube. The white or creamy precipitate indicated test as positive (presence of alkaloids) [1, 5, 8, 10]

2. Wagner Test:

1 ml or 2 ml of the filtrate extract was treated with Wagner's reagent; formation of brown reddish precipitate shows positive result of alkaloids

3. Dragendorff's Test:-

To a few ml of filtrate, 1–2 ml of Dragendorff's reagent was added formation of prominent yellow precipitate indicates the presence of alkaloids [5, 8]. Test for Glycosides (a) To 2 ml test solution, added with equal

Test for Glycosides:-

1.To 2 ml test solution, added with equal quantity of Fehling's solution A and B and solution was heated gives the positive result of glycoside. A brick red precipitate was observed [8]

2.Legal's Test:-

To 2 ml or 1 ml test solution, pyridine and alkaline sodium nitroprusside was added ,get a blood red or pink colour indicate presence of glycoside [1, 8, 9].

3.Keller-Killani Test:-

To 2 ml glacial acetic acid containing a drop of FeCl_3 treated with extract .Formation of a brown colour ring indicates the presence of glycoside [1, 9].

4.Borntrager's Test:-

Firstly extract was boiled with dilute sulphuric acid, filtered and to the filtrate chloroform was added and shaken well. The organic layer was separated to which ammonia is added slowly. It also shows positive result, by pink to red colour in the ammonical layer [5].

Test for Flavonoids:-

1.Shinoda Test:-

2 ml test solution added with few fragments of Magnesium ribbon, dropwise conc. H_2SO_4 was added. The results shows pink scarlet or crimson red colour [1, 8].

2.Alkaline Reagent Test:-

The test solution, was treated with sodium hydroxide solution, which gives a yellow or red colour [1, 8]

3. Zn Test:-

2 ml extract were mixed with Zn dust and conc. HCl , after a few minutes red colour observed and it means presence of flavonoid [1, 8].

Test for Tannins:-

1.Ferric Chloride Test:-

The extract solution mixed with drops of ferric chloride solution. Presence of gallic tannins, blue colour was observed and green black for catecholic tannins [1, 5, 8].

2.Gelatin Test:-

A white precipitate is obtained by mixing of 2 ml test solution and 1% Gelatin solution containing 10% sodium chloride [8].

Test for Saponins:-

1.Foam Test:-

Researchers tries to find out the presence of Saponins as follows: 5 ml extract was shaken with 20 ml distilled water and then heated to boil. Frothing shows the presence of saponins [1,5].

Test for Triterpenoids:-

1. Salkowski Test:-

The test solution was added with 2 ml chloroform and few drops of conc. Sulphuric acid (3 ml), and shaken well. Formation of reddish brown colour at lower layer indicates presence of steroids and yellow colour shows the presence of triterpenoids [8]

Test for Phenol:-

1.Ferric Chloride Test:-

4 drops of Alcoholic FeCl_3 solution were added in the test extract. Appearance of bluish black colour indicates the presence of phenol [9, 10].

Test for Fats and Fixed Oils:-

1.Stain Test:-

Between the two filter papers small amount of the extract was pressed, the stain on the filter paper indicates the presence of fixed oils [8].

2.Saponification Test:-

Small quantity to the extract solution with a drop of phenolphthalein was treated with few drops of 0.5 N alcoholic potassium hydroxide and heated on a water bath for 1–2 h. The results shows formation of soap or partial neutralization for the alkali indicates the presence of fats and fixed oils [8].

Test for proteins and amino acids:-

1.Millo's Test:-

2 ml test solution is added with Millon's reagent gives a white precipitate, which on heating changes to red [1, 5, 8, 10].

2.Ninhydrin Test:-

To 2 ml test solution, ninhydrin solution was treated and then boiled. Formation of blue colour indicates the presence of amino acid. Again 2ml test solution, 0.2% ninhydrin solution was treated with amino acids and proteins, then boiled shows a violet colour [1, 8]

Test for Carbohydrates :-

The extract was dissolved in 5–10 ml of distilled water and filtered through Whatmann No.1 filter paper and the filtrate is used for the following test of carbohydrates.

1.Molish Test:-

Firstly 2 ml solution was placed in a test tube then 1 drop of Molish Reagent was added. 2 ml of conc. HCl was added from the sides of the test tube violet ring at the junction of the two liquids indicates presence of tube. A violet ring was observed in the test tube. Formation of a carbohydrates [5, 9]

2.Fehling Test:-

Dilute HCl was hydrolysed with 2 ml of extract and extract also neutralized with alkali and heated with Fehling's solution A and B, formation of red precipitate it indicates the presence of reducing sugar [1, 9].

3.Benedict's Test:-

The filtrate were treated with Benedict's reagent and heated gently, appearance of orange red precipitate indicates the presence of reducing sugar [1].

4.Iodine Test:-

5 drops of Iodine solution were treated with 2 ml of extract, gives blue colour indicates the positive test [9].

• PHYTOPHARMACOLOGY:-

Turmeric has several therapeutic and pharmacologic activities. The following is the most important phytopharmacology and therapeutic properties of turmeric.

Anti-inflammatory:-

Curcuma longa exhibit potent anti-inflammatory effects due to volatile oils and curcumin. One half of curcumin if taken as oral is effective for Chronic inflammation, was found to be as helpful as cortisone or phenylbutazone in instances of acute inflammation [11]. Turmeric is credited with hot potency and anti-inflammatory action with specific lipoxygenase- and COX-2-inhibiting properties. Rheumatic complaints are often connected with inflammatory changes of joints It cures the etiological factors and pathological changes of inflammation [6, 12].

Anti-inflammatory and antioxidant:-

Turmeric is rich in compounds that fight inflammation and protect against oxidative damage by scavenging free radicals.

Anticancer:-

It has been researched for its potential to inhibit cancer cell growth through various mechanisms, including affecting cell cycle and promoting apoptosis.

Hepatoprotective:-

It can protect the liver from damage.

Gastroprotective:-

It has been traditionally used to treat gastrointestinal issues.

Antimicrobial:-

Turmeric shows activity against various bacteria and fungi.

Wound-healing:-

It can promote the healing of wounds.

Cardiovascular benefits:-

It may help lower cholesterol and triglycerides and prevent platelet aggregation

Antibiotics:-

Turmeric can help lower blood sugar levels, although caution is advised for individuals with diabetes due to the risk of excessive loss.

Wound healing:-

Its anti-inflammatory and antimicrobial properties contribute to its ability to Its anti-inflammatory and antimicrobial properties contribute to its ability to promote healing.

MATERIALS AND METHODS :-

Selected brands of turmeric powder were procured from the local market and analysed. All chemicals and reagents used for this study were of analytical grade. Physical and chemical evaluation method including, ash value, acid insoluble ash value, moisture content and extractive value were carried out as per WHO Recommendation and other authentic procedures.

ORGANOLEPTIC EVALUATION:-

Selected brands of turmeric sample powder showed the following characters. Colour-yellow, Odour-Aromatic odour, Taste-Aromatic taste, Sensation-Coarse. These characters are useful for identification purpose.

• PHYSICAL EVALUATION:-**Total Ash value:-**

2gm of turmeric powder from each brand weighed accurately and transferred into a crucible separately. The material was spread evenly and ignited by gradually increasing the temperature 500 - 600°C. white mass is not obtained by this method. So the crucibles were cooled and moisten with 2ml of water and dried on a hot plate and ignite to constant weight. The residue was cooled in a desiccator for 30 minutes then weighed without delay.

Acid Insoluble Ash:-

World Journal of Pharmaceutical Research To the crucible containing the total ash, 25 ml of HCL was added, covered with a watch glass and boiled gently for 5 minutes and filtered. Insoluble matter was collected, dried on a hot plate and ignited to constant weight. The residue was allowed to cool in a suitable desiccator for 30 minutes and then weighed without delay.

Moisture Content:-

An oven at 115 °C for 2-3 hours. The crucible was allowed to cool and the samples reweighed to calculate the moisture loss.

Extractive Value:-

2 g of turmeric samples were weighed in a weighing bottle and transferred in a dry conical flask. The conical flasks were filled with 90% alcohol. The flask was corked and set aside for 24 hours, shaking frequently (maceration). The 25 ml of extract was transferred to a thin porcelain dish and evaporated to dryness on a water bath and for complete drying kept in an oven at 105 °C for 6 hours. The crucibles were cooled in desiccators for 30 minutes and weighed immediately.

• By UV/Visible Spectroscopic Assay of Curcumin Method:-

0.1g of dried extract obtained from each sample was dissolved by using 25ml of ethanol individually then filtered and made up to 100ml. Then 10ml of the above solution was taken in 100ml volumetric flask separately and made up to 100ml. The absorbance of individual solution was determined at 425nm in a 1cm cell. The total colouring matter content of each sample calculated using the following equation. % curcumin content = (sample abs/std abs) X (std conc/sample conc) X 100 = (A/1607) X (10/W) X 100 A = Absorbance of sample W = weight of sample 1607 = specific absorbance of the curcumin standard in ethanol at 425nm

CHEMICAL EVALUATION Thin Layer Chromatography Solvent system was prepared (mobile phase) by mixing n-hexane, ethyl acetate in the ratio of 7:3 for the isolation of curcumin, the slurry is prepared by mixing the adsorbent in water in.

• CONCLUSION:-

It has been revealed by wide-range of survey of the literature that *Curcuma longa* with diverse pharmacological characteristics is considered as a Universal panacea among the herbal medicine. This plant considered as a versatile medicinal plant which is responsible for the various usefulness as it possess various types of chemical compounds. So, it is obvious that to combat with the diseases a wide-ranged research is required to find their therapeutic utility. From time immemorial it is observed that crude extracts of different part of plants has its medicinal uses and the process of development of modern drugs now a days usually done by wide-ranged of research towards its bioactivity, manufacturing process, pharmacotherapeutics, toxicity and subsequently require proper standardization and clinical trials. Nowadays non-toxic plant products used as traditional medicine like *Curcuma longa* required extensive research and development work towards utilising its medicinal value and effort should be made to explore the possibilities of practice.

• RESULT AND DISCUSSION:-

different samples of turmeric were selected for the present study. All the samples were subjected to organoleptic, physical, chemical, adulterant evaluation studies. Organoleptic evaluation of sample powder showed the following characters; Colour-yellow, Sensation coarse, odour-aromatic, taste-aromatic, which are useful diagnostic characters. The physical parameters such as ash value (%), acid insoluble ash value, and extractive value were measured. The values of all the four samples lie within the specification given by spices board of India. Ash value is useful in determining authenticity and purity of drug also these values are important quantitative standards. They help to detect low grade products, exhausted product and excess of sandy and earthy matter in drug. Moisture content is used to determine the storability, microbial stability, flow properties and purity. The entire four samples show moisture content Slightly excess from the specification. (Table 1) Turmeric extract from each sample was separated by TLC method using n-hexane and ethyl acetate in the ratio of 7:3 as mobile phase. The R_f value in the ratio of 7:3 as mobile phase.

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