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Phytochemical Screening and Ethnomedicinal Importance of Curcuma longa L.

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Abstract: Present review gives the information about phytochemical research and ethno-medicinal uses of turmeric. Turmeric is used against in more than thirty diseases. Turmeric applied in acidity, asthma, back pain, beauty care, body pain, bone fracture, bone dislocation, muscle pain, contraceptive, cough, skin disease, cut and wounds, diabetes, Face shadow, darkness and pimples, Fever, Stomach, Jaundice & cold, Impetigo, Inflated joints, Insect bite, Inflammation and wounds, Jaundice and diabetes, Leucoderma, Malaria & Yellow fever, piles, round worm, strength and vigour, swelling, throat infection, urinary tract infection, burns and as blood purifier and for liver tonic etc.

Key words: Ethnomedicine, Phytochemical screening, Curcuma longa L.

INTRODUCTION

Curcuma longa L. belonging to family Zingiberaceae. It is the main ingredient of Indian kitchen. We cannot think preparation of any recipe without adding of turmeric powder. In India, turmeric is cultivated in large scale. Rhizomes are harvested and processed and then powdered it. The present review provides the data on phytochemical screening and ethnomedicinal uses of turmeric.

TAXONOMIC POSITION

Kingdom: Plantae
Division: Magnoliophyta
Order: Zingiberales
Family: Zingiberaceae
Genus: Curcuma
Species: longa

MATERIALS AND METHODS

The published research literature was searched from Google source. The related research papers were screened and used for present study. Total 40 references are used to write present review.

RESULTS AND DISCUSSION

The details of the phytochemical investigation and ethnomedicinal uses of turmeric are given in the following paragraphs.

PHYTOCHEMICAL SCREENING

Chemical Constituents in turmeric

The turmeric rhizomes contained mainly Curcumin, demethoxycurcumin andbisdemethoxycurcumin (3-6%). Group of these three polyphenolic compounds were collectively knownascurcuminoids.[1]1,7-bis(4-hydroxyphenyl)-1,4,6-heptatrien-3-one;1-(4-hydroxy-3-methoxyphenyl)-7-(3,4-dihydroxyphenyl)-1,6-heptadiene-3, 5-dione; 1-hydroxy-1, 7-bis (4-hydroxy-3-methoxyphenyl)-(6E)-6-heptene-3,5-dione;1, 5-bis (4-hydroxy-3-methoxyphenyl)-penta-(1E, 4E)-1, 4-dien-3-one;1-(4- hydroxy-3, 5-dimethoxyphenyl)-7-(4-hydroxy-3-methoxyphenyl)-(1E, 6E)-1, 6-heptadiene-3, 4-dione and 1-(4-hydroxy-3-methoxyphenyl-5-(4-hydroxyphenyl)-penta-(1E, 4E)-1, 4-dien-3-one are some other phenolic compounds also present in the turmeric rhizomes.

The turmeric oil was volatile in nature and had pale yellow to orange yellow colour due to presence of number of mono- and sesquiterpene. The main sesquiterpenes present in turmeric oil were 4-methoxy-5-hydroxybisabola-2, 10-diene-9-one; 2,5-dihydroxybisabola-3, 10-diene;dehydrocurdione; curcumenol; bisacurone; (4 S, 5S)-germacrone 4,5-epoxide; zedoaronediol; bisabola 3, 10-diene 2-one;4-hydroxybisabola-2,10-diene-9-one;bisacumol;procurcumenol; procurcumadiol[3];isoprocurcumenol;4,5-dihydrobisabola-2,10-diene;germacrone-13-al;arturmerone[2] andepiprocurcumenol.

Turmeric leaves enriched with carotenoids[4]. Maximum contain of carotenoids were present in middle of the leaves followed by the lower and upper part of the leaves. On a column of DEAE Sephadex A-25four polysaccharides were isolate. These Four polysaccharides were name as Ukon A, B, C and D. Three polysaccharides Ukon A, B and C were made up of L-arabinose, D xylose, D-galactose, D-glucose, L-rhamnose, D-galacturonic acid. Ukon D is composed of L-arabinose, D-galactose, D-glucose and D-mannose.The following table shows different molar composition of polysaccharides.

Sr. No	Name of polysaccharides	Name of constituents	Molar ratio composition
1.	Ukon A	L-arabinose, D xylose, D-galactose, D-glucose, L-rhamnose, D-galacturonic acid	12:4:12:1:4:10
2.	Ukon B	L-arabinose, D xylose, D-galactose, D-glucose, L-rhamnose, D-galacturonic acid	12:4:12:1:2:4
3.	Ukon C	L-arabinose, D xylose, D-galactose, D-glucose, L-rhamnose, D-galacturonic acid	8:3:614:2:3
4.	Ukon D	L-arabinose, Dgalactose, D-glucose andD-mannose	1:1:12:2

Preliminary phytochemicals screening

Various research groups confirm that Curcuma longa rhizomes extracts consists of carbohydrates, alkaloids, glycosides, steroids, tannins, saponins and proteins[5-7].From standard published literatures various chemical test were compiled and describe in the following tables.

Preparation of the 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[6-7], the Curcuma longa extracts could be prepared in water, methanol, ethanol, chloroform and acetonewhich was ready for use.

Test for Carbohydrates

Sr. No	Test	Observation	Inference
1.	**Molish Test:** Firstly 5 ml water extract of Curcuma longa was placed in a test tube then 1 drop of Molish Reagent was added. 2 ml of conc. H_2SO_4 was added from the sides of the test tube	Violet ring at the junction of two liquids	Presence of carbohydrate[7-8].

2.	**Iodine Test:** 5 drops of Iodine solution were treated with 5 ml of extract.	blue colour	Presence of carbohydrate[7].
3.	**Fehling Test:** 2 ml of extract with alkali and heated with Fehling's solution A and B.	formation of red precipitate	presence of reducing sugar[7,9].
4.	**Benedict's Test:** The filtrate was treated with Benedict's reagent and heated gently.	orange red precipitate	presence of reducing sugar[9].

Test for proteins and amino acids.

Sr. No	Test	Observation	Inference
1.	**Ninhydrin Test:** To 5 ml extract 1ml ninhydrin solution was added and boiled.	blue colour	presence of amino acid and protein[7,9].
2.	**Millon's Test:** 2 ml extract is addedwith Millon's reagent.	white precipitate which on heating changes to red	presence of amino acid and protein[6,8,9,10].

Test for Alkaloid

Sr. No	Test	Observation	Inference
1.	**Dragendroff's Test:** To a few ml of extract, 1–2 ml of Dragendorff's reagent wasadded.	yellow precipitate	presence of alkaloids[6,8].
2.	**Mayer's Test:** To a 1 ml or 2 ml of extract,few drops of Mayer's reagent are added by theside of the test tube.	white or creamy precipitate	presence of alkaloids[6,8,9,10].
3.	**Wagner Test:** 2 ml of the extract was treated with Wagner's reagent.	brown reddish precipitate	presence of alkaloids[6,8,9].

Test for Glycosides

Sr. No	Test	Observation	Inference
1.	**Keller-Killani Test:** To 2 ml glacial aceticacid containing a drop of $FeCl_3$ treated withextract.	brown colour ring	presence of glycoside[7,9].
2.	**Legal's Test:** To 2 ml extract,pyridine and alkaline sodium nitroprussidewas added	blood red or pink colour	presence of glycoside[5,6,7].
3.	To 2 ml extract, added withequalquantity of Fehling's solution A and B andsolution was heated.	brick red precipitate	presence of glycoside[6].
4.	**Borntrager's Test:**Firstly, extract wasboiled with dilute sulphuric acid, filtered andto the filtrate chloroform was added andshaken well. The organic layer was separatedto which ammonia is added slowly.	pink to red colour in the ammonical layer	presence of glycoside[8].

Test for Fats and Fixed Oils

Sr. No	Test	Observation	Inference
1.	**Saponification Test:** Small quantity to theextract solution with a drop of phenolphthaleinwas treated with few drops of 0.5 N alcoholic potassium hydroxide and heated on a water bathfor 1–2 h.	formation of soap	presence of fats and fixed oils[6].
2.	**Stain Test:** Between the two filter paperssmall amount of the extract was pressed.	stain on the filter paper	the presence of fixed oils[6].

Test for Triterpenoids

Sr. No	Test	Observation	Inference
	Salkowski Test: The test solution was addedwith 2 ml chloroform and few drops of conc.H_2SO_4 and shaken well.	1. Formation of reddish brown colour at lowerlayer 2.Formation yellowcolourat upper layer	presence of steroids[6]. presence of triterpenoids[6].

Test for Saponins

Sr. No	Test	Observation	Inference
1.	5 ml extract was shaken with 20 ml distilledwater and then heated to boil.	Frothing	presence of saponins [6,9].

Test for Flavonoids

Sr. No	Test	Observation	Inference
1.	**Zn Test:** 2 ml extract were mixed with Zndust and conc. HCl and boil for few minutes.	Redcolour	presence of flavonoid[6,9].
2.	**Shinoda Test:**5 ml extract addedwith few fragments of Magnesium ribbon,dropwise conc. H2SO4 was added.	pink scarlet or crimson red colour	presence of flavonoid [6,9].
3.	**Alkaline Reagent Test:** The extractwas treated with sodium hydroxide solution.	yellow or red colour	presence of flavonoid [6,9].

Test for Phenol

Sr. No	Test	Observation	Inference
1.	4 drops of Alcoholic$FeCl_3$ solution were added in the test extract.	bluish black colour	presence of phenol[7,10].

ETHNOMEDICINAL USES

Acidity: Aasamese, Bodo, Mishing and Santhal tribes of Gohpur, Sonitpur district of Assam mixed 50 ml juice with 5 gm sugar and given early morning for a fortnight to cure acidity[11].

Asthma: Rhizomes are chewed for the treatment of Asthma by Khamptis tribe of Arunachal Pradesh[12]. Seed powder of *Balanites aegyptiaca* mixed with Haldi in hot water and taken for the treatment of Asthma by tribals of Nimar region of Madhya Pradesh[13].

Back pain: Indigenous people of Mornaula reserve forest in West Himalaya, they mixed turmeric powder with a glass of milk and given daily to cure back pain and also used for wound healing and paste to glow the skin[14].

Beauty care: Dried Rhizome powder is used in beauty care by people of Nanded district of Maharashtra in their routine life[15].

Blood purifier and liver tonic: Turmeric powder is taken for blood purification and for as liver tonic by tribals of Dantewada of Chhattisgarh State[16].

Body pain: Rhizome is used as spice and for the treatment of body pain by tribals living in Dehang- Debang biosphere reserve of Arunachal Pradesh[17].

Bone dislocation: Tribals of Aravali Hills in Nortth Gujrat boiled Leaves of Cassia auriculata and powder of turmeric powder in water and paste is bandaged on swelling for the treatment of dislocation of bone[18].

Bone fracture: Fresh rhizome paste with leaves of *Schefflera elliptica*, fruit of Banana, egg and honey applied on fractured region for two weeks[19].

Bone fracture or muscle pain: Leaves paste of *Litsea glutinosa* and rhizome of Curcuma longa tighten with banana leaf and applied on bone fracture or muscle pain by tribal and non tribal medicine men of Tripura State[20].

Contraceptive/Anti-fertility: Turmeric is taken with one glass of water for two times as contraceptive by Bhilla tribe of Maharashtra[21].

Cough, Skin disease, Diabetes: Used in cough, skin disease, diabetes by people of Sonebhadra district of Uttar Pradesh[22].

Cut and wounds: Rhizome paste is applied on cut and wounds by tribal of Coochbehar district of West Bengal[23]. Tribals of Darekasa Hill range of Gondia district used rhizome powder with lime and applied on cut wound[24].

Face shadow, darkness and pimples: For the treatment of face shadow, darkness an pimples Curcuma longa used as traditional medicine in Rajastan[25].

Fever, Stomach, Jaundice & cold: Turmeric powder is mixed with hot cow milk, used by people of sacred groves of Panruti taluk, Cuddalore district of Tamil Nadu for the treatment of cold, fever, stomach pain and jaundice[26].

Impetigo: Rhizome of turmeric and seeds of *Terminalia chebula* prepared paste and applied on affected part till the recovery to cure impetigo (a type of skin disease) by tribals of Rewa district of Madhya Pradesh[27].

Inflated joints: Rhizome powder with lime is used for the treatment of inflated joints by people of Fatehpur district of Uttar Pradesh[28].

Insect bite, Inflammation and wounds: Rhizome paste is applied for insect bite, inflammation and wound treatment. Mustard oil and rhizome powder applied on skin diseases by Tharu and Buxa tribes of Uttrakhand[29].

Jaundice and diabetes: Adi tribe of Arunachal Pradesh, rhizome paste taken two times for the treatment of Jaundice and diabetes[30].

Leucoderma: Root paste of *Abrus precatorius* and rhizome of turmeric powder taken for the treatment of Leucoderma by Paliyars aboriginals of Virudhuagar district of Tamil Nadu[31].

Malaria & Yellow fever: From Madagascar, it reported to cure Malaria and Yellow fever[32].

Piles: Paste of rhizome with equal amount of sugar candy used in empty stomach with cold water for 21 days to cure blood setting piles[33].

Round worm: Paste of turmeric and neem given orally to children to cure round worm by people of Semiliguda of Koraput district of Odisha[34].

Skin disease: Paniya tribe of Mundakunnu village of Nilgiri Hills, South India used as antiseptic and applied to sprains and wounds[35].

Strength and vigour: Haldi powder and ginger taken for two weeks for to recover strength and vigor after childbirth in Chhattisgarh state[36].

Swelling and wounds: Rhizome paste is applied to reduce swelling and wound healing by villagers of southern districts of Tamil Nadu[37].

Throat infection: Rhizome powder boiled with milk and taken two times for the treatment of throat infection by people of Ahmednagar district of Maharashtra[38].

Urinary tract infection and piles: Half cup of rhizome juice is taken regularly to cure urinary tract infection and piles by the Chiru tribe of Lakhimpur, Assam[39].

Wounds and burns: Mixure of Rhizome powder of Curcuma longa, Leaf paste of Ipomoea obscura and rice paste applied by ethnic group of Thottianaickans of Semmalai hills (reserved forest), Tiruchirapalli district of Tamil Nadu, for severe wounds and burns[40].

CONCLUSION

Turmeric has important role in human life. The present data shows that Indian people have tremendous knowledge concern turmeric and its usage in their life. Present data will be helpful to research communities as well as for pharmaceutical industries.

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