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Historical Significance and Modern Applications of Turmeric (Curcuma longa) in Traditional Medicine and Beyond

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ABSTRACT:

Ayurveda and ancient Chinese medicine have used turmeric rhizome of ginger family Zingiberaceae specie *Curcuma longa*, in the past to treat chronic illnesses like cardiovascular and metabolic disorders. Although turmeric's chemical makeup is complicated, two main groups that exhibit bioactive qualities are known as curcuminoids and lavender oil. Turmeric used in anti-inflammatory, anti-cancer, wound healing and in cosmetics etc. In cure of different biological activities turmeric used in foodstuff. Clinical trial evidence is also provided to highlight potential treatment and protective effectiveness. To fully evaluate the long-term protective effects of turmeric, clinical studies with longer intervention durations and defined endpoints for assessing health outcomes are required.

Key words: ***Curcuma longa;*** Antidiabetics; Antidepressant; Anti fibrinogen; Turmeric;

INTRODUCTION

The never ending plant *Curcuma longa* Linn. also called as Curcuma domestica Valeton, is a specie of the ginger family Zingiberaceae and comes from the region of India(Kocaadam et al ., 2017) The epithet "longa" alludes to the long shape of plant's rhizome, from which turmeric is made. it also possessing a distinctive orange-yellow tint. The name varies depending on the language, turmeric typically refers to Bright colour or the "yellow colour"Prasad S, Aggarwal BB (2011). Curcuma is a latin word derived from Arabia root called kurkum mean “saffron” also called Indian saffron. Mostly grows in tropics and subtropics regions including Pakistan. The turmeric primary roots are egg and pear like while lateral roots are tubers. Ebrahim et al 2020. The tubers contain curcumin pigment main component of turmeric which act as bioactive and polyphenolic conmpounds which has used to cure of different ailments (Tapal and Tiku 2012, Gilani et al). curcumin in turmeric has antioxidant property and used in food materials (Mohammadian et al 2019, Rafiee et al 2019). The chemically curcumin consists of 2 hydroxyl, methoxy and two aromatic rings with diarylheptanoid. The unsaturated aliphatic carbon chain with carbonyl groups

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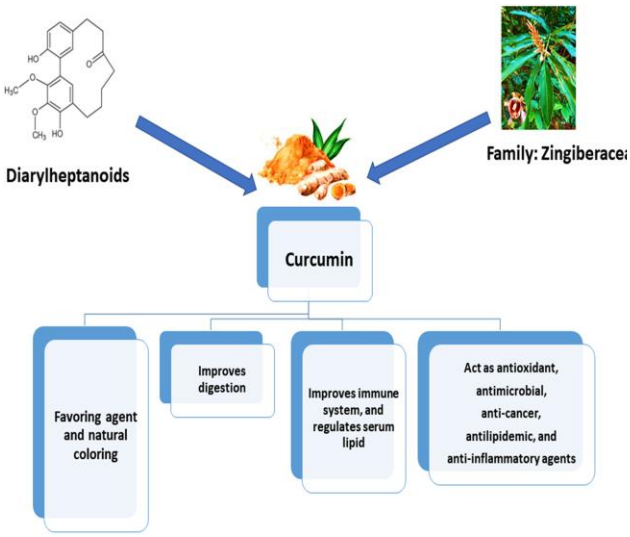
attached with phenolic rings (Rafiee et al 2019, Pan et al 2014)



HISTORY OF TURMERIC

According to doctrine turmeric as a fundamental plant Rafiee et al 2019, Liu et al 2016Turmeric is called as 'Indian saffron' and has been used for 4000 years as Ayurveda in Indian medicines. Turmeric is used for flavoring with different digestive properties and highly used in India as Prasad (Nasir *et al*., 2013). Europeans in 14th century took turmeric to western side. About 4000 years ago crushed rhizome of turmeric mostly used in different purposes like cooking, medicines and fabrics. Turmeric with 40 species have Indian origin (Nasir et al., 2013). Around about 70 to 110 species of turmeric have recorded in Asia, India, and Thailand. However, approximately 70–110 species have recorded in tropical Asia, and India other are found in Myanmar, and Thailand and some other tropical regions like china, Africa and Southern sides. Nair 2013

SCIENTIFIC CLASSIFICATION OF TURMERIC (*Curcuma longa* L.)

- **Kingdom**: Plantae
- **Subkingdom**: Tracheobionts
- **Super division** :Spermatophyta
- **Division**: Mangoliophyta
- **Order** Zingiberales
- **Family** Zingiberaceae
- **Genus** Curcuma
- **Species** longa
- **Scientific name** *Curcuma longa*

MORPHOLOGY OF TURMERIC PLANT

Indonesia and Malaysia are home to the turmeric plant. it is perennial ,herbaceous and leafy ginger like plant with underground (undifferentiated root) rhizome found in America etc. it require humidity and temperature between 20 to 30 degree for proper growth or require high rain fall for flowering stage. Yellow flowers are gathered as remedies for many ailments. Since ancient times, turmeric has been cultivated in Southeast Asia with a height of 10-15 cm. The turmeric plant's thin, oval, long sheath-like leaf blades were introduced to both Africa and China

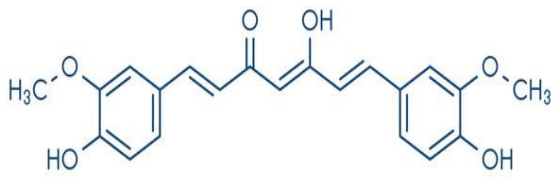
CHEMICAL COMPOSITION OF TURMERIC

Analysis of turmeric shows that is a herb the herb that consists of carbohydrates, amino acids, lipids, minerals, vitamins and water 60 to 70% (RR et al., 2019) Its rhizome is a source of essential oils which

also contains terpenoids, monoterpenoids, demethoxycurcumin and curcuminoids and curcumin etc. its essential oils and cur cumin classified into secondary metabolites (Nelson *et al*., 2017).

STRUCTURE OF CURCUMIN.

Curcumin is a turmeric antioxidant and bioactive part. It has anti-inflammatory, anti-diabetics, anti-depressant, anti-fibrinogen properties. It is beneficial in treating all type of cancer (Luthra et al., 2011) curcumin has potential to stop proliferations of mitogen induced of lymphocytes and blood cells that act as anti-carcinogenic activity (Huang., *et al* 1992). It has also some therapeutically values like wound healing, anti-potent, anti thromic activites. Curcuminoids are separated from different mechanisms but solvent extraction is mostly used.



curcumin

THERAPEUTICAL VALUES…..

INFLAMMATION

Organism's most important and striking defence responses to tissue damage, brought on by an ischemia injury brought on by an insufficient blood supply to a tissue physical injury, vulnerability to toxins, poison, or other types of trauma (Singh, 2019). When the inflammatory response is no longer necessary, it must be vigorously stopped to prevent tissue and cellular degeneration that could result in chronic inflammation. (Eming, Krieg, & Davidson, 2007). The inflammatory responses neutrophils, macrophages, leukocytes, cytokines and amines are included. These factors moderate the inflammatory process to cure healing and tissue damage. (Abdulkhaleq et al., 2018). Different investigations have reported that inflammatory, osteoarthritis, dermatitis and bowel diseases are cured by turmeric containing curcumin (Aggarwal, Gupta, & Sung, 2013; Ahmad et al., 2020; Shimizuet al., 2019)

WOUND HEALING PROCESS

Wound healing are complex procedure that include reshaping of tissue and inflammation Sidhu et al (1998). In wounds treated with curcumin as opposed to untreated wounds, it was noticed that the transforming beta growth factor and fibronectin localization are crucial factors in wound healing, increased. Phan et al (2001) in an effort to understand the process of curcumin's wound healing researchers examined the effects of curcumin on damage caused by hydrogen peroxide on cultured human keratinocytes and fibroblasts. It was found that exposing human keratinocytes to curcumin (10 g/ml)

significantly reduced the damage caused by hydrogen peroxide. But there were no safeguards against harm to the oxidase of hypoxanthine- xanthine. The researchers came to the conclusion that curcumin is a powerful inhibitor of keratinocyte and fibroblast that cause damage in humans. Thangapazham et al (2007).Revealed that curcumin acts proangiogenic agent to aid in the healing of wounds by generating factor of beta growth which promotes angiogenesis during the remodelling stage of the wound healing. Panchatcharam et al (2006) found that wounds treated with curcumin healed more quickly than control wounds, as evidenced by improved rates of wound contraction and higher tensile strength.

ANTIFIBRINOGEN ACTIVITY

It was reported that Curcumin show to be a useful antifibrinogenic agent that contain collagen mRNA that prevent in Vivo and Vitro DNA synthesis. Kang et al (2002).

ANTIDIABETIC ACTIVITY

When curcumin effect were tested in rats it showed that blood sugar level decreases ad standard test revealed that lessen the oxidative stress. The result showed that curcumin reduce the level of glucose in polyol that enhanced NADPH ratio and antioxidant enzyme called glutathione peroxidase. (Arun and Nalini 2002, Hussain 2002, Murugan and Pari 2007).

RADIO PROTECTIVE ACTIVITY

A possible chemo preventive agent, curcumin reduces the effect of protein kinase that are reduced by radiations. Therefore, it may be able to reduce the emergence of radio resistance after radiation by suppressing PKC. It inhibits the effect against toxic radiations and organo chlorine pesticides.it is beneficial for lowering cancer risk.. (Cheng et al 2001). Varadkar et al (2001) reported curcumin is mostly used in different radio resistant therapy techiques. Inano and Onada (2002) it also oticed the effect of curcuma in pregnant rats that play role in reducing the risk of mammary and different cancers Khafif et al (2005) explained that curcumin stopped the senitizing effect in different carcinoma cells. Kunwar et al (2007) it also play role as shielding cells in different enzymes like catalase, dismutase against dangerous radiations.

SAFETY DOSAGE

Different forms of turmeric like extracts, powders, with high quatity has o tee associated with any toxicity. Asians who consumed turmeric per day on average did not experience any harmful side effects. (Eigner and Scholz 1999). Male and female pigs, monkeys etc were given turmeric at greater doses, however the structure and mass of the body did not alter. (Chattopadhyay et al 2004). It also reported that a experiment conducted in which 25 humans received 8000mg of turmeric on daily basis for 3 months but they show no any danger. Five further human studies utilizing daily doses of 1125 to 2500 mg of curcumin also revealed to be healthy. Cur cumin’s anti-inflammatory activity was based on human investigations.

ANTI TUMOR AND ANTI CANCER ACTIVITY

Huang et al., 1992) reported that ornithine decarboxylase protein that causes skin cancer in mouse is also cured by turmeric. According to Lin et al (2000) and Johnson and Mukhtar (2007) turmeric curcumin has capacity to enhance chemotherapeutic cytotoxicity that prevent from colon cancers. When curcumin was coupled with common chemotherapy drugs, synergistic benefits were seen. Due to its free radical action, it successfully inhibits UV radiation producing cells damage and decreased the prevalence cancer of skin. In vitro models, it was discovered that curcumin prevented the multiplication of breast cancer cells. (Zhang et al 2007). Pure turmeric reduced the growth of malignant and premalignant reducing in the glandular stomach and had anti - carcinogenic actions in rats. (Ozaki et al (2000) kappa B nuclear factor and activated protein I transcriptional factors were shown to be strongly reduced by curcumin. These elements were understood to perform crucial functional roles in osteoclast preservation. It has been demonstrated that curcumin induces osteoclast mortality in a dose- or manner of moment. As evidence that it increases osteoclast apoptosis, it displays osteoplastic and osteoclast activity. Wahl et al (2007) revealed that curcumin might overcome the chemo resistant phenotype seen in many cells of by apoptotic ways.

TURMERIC IN COSMETICS

Turmeric is used in different cosmetics used for skin as colorant agent. (Nair, 2013). As a skin beautifier, it is frequently combined with milk and applied externally and internally by Indian. In different Asians countries turmeric extract is used on bride and groom skin before the wedding ceremony in the hopes that it will make the skin sparkle and ward off hazardous bacteria. (Sabale, Modi & Sabale, 2013). Numerous multinational enterprises and worldwide businesses already employ it in the manufacture of several sunscreens and turmeric-based face treatments. (Prasad & Aggarwaal, 2011).Hindu ladies utilise turmeric and turmeric-based products like kumkum and parani in their baths as an inexpensive and all-natural method of improving their appearance. It has been said that applying turmeric paste to the face and limbs before a bath will wash the skin and improve the appearance of the face. Its mending and antibacterial properties are regarded to be a preventive and therapeutic treatment for the terrible adolescent ailment known as pimples. (Sabale, Modi & Sabale, 2013). It is also source of removing unwated hair from female skin (Ratanshi, 2017; Sa & Das, 2008; Sabale, Modi & Sabale, 2013). After giving birth or after pregnancy woman consume turmeric paste including ginger and milk that help in recovery soon, (Nair, 2013; Krishnaswamy. 2008)

ANTI DEPRESSENT

The American Cancer Society (2016) reported curcumin is effective in controlling depression symptoms in animals despite the fact that few clinical trials have been performed Prasad and Aggarwal (2011), turmeric can effective in depression. They postulated that swim stress resulted in a considerable reduction in the ethanolic

extract's serotonin, acid, noradrenaline, and dopamine concentrations as well as serotonin turnover. In a study published Chen (2002) reported that mice administrating turmeric paste aout 140 to 150 mg for 14 days show reduced stiffness in tail dispersion and forced swim tests. 560 mg of turmeric have antidepressant activity while doses reduced brain oxidase activity while large amount have an impact on brain activities while in rats fluoxetine reduced the effect of MAO-A in brain cells. Curcumin is not soluble in water, hence it is uncertain what molecule in turmeric aqueous preparations is responsible for its activity.

CONCLUSION

Since ancient times, the medical systems of Ayurveda, Unani, and Siddha have all utilized turmeric. A review of the literature reveals that turmeric, whether in the various form such as extracts, powder or isolated components, shows a wide range of therapeutically actions with few effects. The phenyl ring with methoxy group the phenolic system, and the 1, 3-diketone system all play significant roles in the pharmacological actions of curcumin. Fortified with curcumin or turmeric, a number of useful varieties have been introduced in national and international markets for a variety of ailments. Even though this plant has been the subject of extensive research, there is still room for improvement in the area of medication development. In comparison to other phyto-antioxidants, curcumin is a safe, non-poisonous and potent natural antioxidant. In the near future, curcuma longa could be used as a cutting-edge herbal medication to treat a variety of illnesses, such as carcinogenesis, diseases caused by inflammation and oxidative stress pathogenesis. Additional assessments must be conducted on Curcuma longa in order to learn about its numerous other uses for medication.

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