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Turmeric and Its Pharmacological Properties- A Review

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Abstract: Turmeric is a flowering plant, Curcuma longa of the ginger family, Zingiberaceae, the roots of which are used in cooking. The plant is a perennial, rhizomatous, herbaceous plant local to the Indian subcontinent and Southeast Asia, that calls for temperatures between 20 and 30 °C (68 and 86 °F) and a large amount of annual rainfall to thrive. Plants are gathered each year for their rhizomes, a few for propagation in the following season and some for consumption. This is a review based study on topic turmeric over viral diseases, articles based on turmeric were referred completely which were taken from "pub med", "google scholar", PMC. Around 20-25 articles were referred. Other articles which have done a study on medicinal and pharmacological properties of turmeric are also compared. Hence turmeric has a wide range of biological activities which can be used for preparation of various formulations for the treatment of various conditions.

Keywords: Anti viral; Anti inflammatory; Anticancer; Curcumin; Curcumin longa; Turmeric

INTRODUCTION:

Turmeric is a flowering plant, Curcuma longa of the ginger family, Zingiberaceae, the roots of which are used in cooking. The plant is a perennial, rhizomatous, herbaceous plant local to the Indian subcontinent and Southeast Asia, that calls for temperatures between 20 and 30 °C (68 and 86 °F) and a large amount of annual rainfall to thrive (Balachandran and Stebbing, 2016). Plants are gathered each year for their rhizomes, a few for propagation in the following season and some for consumption (Ammon et al., 1992). The rhizomes are used clean or boiled in water and dried, after which they're ground into a deep orange-yellow powder usually used as a coloring and flavoring agent (Nair, 2019d) in lots of Asian cuisines, particularly for curries, in addition to for dyeing (Nair, 2019a). Turmeric powder has a warm, bitter, black pepper-like taste and earthy, mustard-like aroma (Krishnaswamy, 2009).

Apart from its culinary uses, turmeric has been used widely within the traditional medication in India, Pakistan, and Bangladesh due to its numerous beneficial residences. For conventional Ayurvedics, turmeric plant turned into an excellent natural antiseptic, disinfectant, anti- inflammatory (Aggarwal and Harikumar, 2009; Omosa, Midiwo and Kuete, 2017), antiviral, and analgesic, at the same time as at the identical time the plant has been frequently used to resource digestion, to improve intestinal flora, and to treat skin irritations (Majeed, Badmaev and Murray, 1999). Also, in South Asia it has been used as a readily to be had antiseptic for cuts, burns, and bruises. However, several other beneficial houses are stated in folk medicinal drugs. The rhizome is considerably used in Ayurveda and traditional medication (Nair, 2019c). Curcumin, the yellow shade pigment of turmeric, is produced industrially from turmeric oleoresin. Turmeric is usually used as spice is nicely documented for its medicinal properties in India (Taylor, 2015). Current traditional Indian medicine uses it for various disorders, anorexia, cough, diabetic wounds, hepatic disorders, rheumatism, blood purification and rheumatoid arthritis (Nair, 2019b; Nawab et al., 2020). Previously our team had conducted numerous clinical studies on thyroid gland problems (Fathima and Preetha, 2016) like goitre (Samuel and Devi, 2015), jaundice (Harsha et al., 2015), liver disease (Choudhari and Jothipriya, 2016), spinal problems (Swathy and Gowri Sethu, 2015), myocardial infarction (Renuka and Sethu, 2015) over the past 5 years.Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J et al., 2018; Menon et al., 2018; Prabakar et al., 2018; Rajeshkumar et al., 2018, 2019; Vishnu Prasad et al., 2018; Wahab et al., 2018; Dua et al., 2019; Duraisamy et al., 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma et al., 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi et al., 2020; Samuel, Acharya and Rao, 2020) In this review , we will overview the turmeric properties in treating and overcoming viral diseases with its property or component named curcumin.

MATERIALS AND METHODS:

This is a review based study on topic turmeric over viral diseases, articles based on turmeric were referred completely which were taken from "pub med", "google scholar", PMC. Around 30-35 articles which have reported on study on medicinal and pharmacological properties of turmeric were referred.

SALIENT FEATURE:

Antioxidant properties:

Turmeric and its substance show amazing antioxidant interest compared to vitamin E and C. One study suggested that curcumin is considered to be 8 times more potent than vitamin E to prevent lipid peroxidation. Curcuminoids inhibit the biosynthesis of leukotrienes via the lipoxygenase pathway and reduce the formation of prostaglandins. A look at ischemia within the cat's coronary heart shows that preoperative treatment with curcumin reduces the adjustments made to help the ischemic heart (Agarwal et al., 2018). Herbal antioxidants protect cells from damage as a result of free radicals. Curcumin has been known to have therapeutic homes in many mammalian cells with irregular radical scavenging habitats to prevent claustrophobia. It has been mentioned that curcumin acts as a pro-oxidant and leads to a large increase in the amount of chromosome disruption formed in Chinese hamster ovarian cells, which is facilitated by the production of hydroxyl radicals (Ara□jo, Antunes and Takahashi, 2001).

Anti-Inflammatory properties:

Turmeric has high anti-inflammatory properties as it contains many natural cyclooxygenase inhibitors. Turmeric extracts, turmeric oil and carcuminoids have been shown to be effective against arthritis due to their high level of anti-Inflammatory properties. Arora et al. Studied anti-inflammatory of turmeric rhizomes in animals using various extracts of petroleum ether. They observed that the extract slows down the development of granulomas and no toxicity has been observed. Turmeric's anti-inflammatory activity is due to its ability to lower histamine levels, but it increases the production of cortisone by the adrenal glands. It helps in both gallbladder and liver functions. It has been shown to be useful in the treatment of rheumatoid arthritis, arthritis, osteoarthritis, trauma, stiffness, and injuries in general activity as well as hyperactivity (Mizushina et al., 2007). Curcumin, feruloyl-(4-hydroxycinnamoyl) - methane] and ethanolic extracts of sodium curcumin and their various derivatives, showed high anti-inflammatory activities against mice induced by carrageenan (Ali, Bagati and Gupta, 2010).

Anti cancer properties:

Cancer is the leading cause of death in many developing countries. Several epidemiological studies have shown that the incidence of cancer is lower in people who depend more on vegetables and fruits. This result is due to the bioactive compounds present in plant foods recognized as flavonoids. While evidence from the Immense body has revealed the chemopreventive power of flavonoids (Kuttan et al., 1985). Curcumin declares its antitumor effect on cancer cells by modifying deregulated cell cycles by cyclin-dependent, p53-dependent, and p53-independent pathways. Curcumin causes apoptosis and cell cycle disorders, both of which are involved in suppressing the growth of cancer cells. Curcumin has shown a chemopreventive effect in cell cultures, studies on humans and animal models. Curcumin acts on a number of biological pathways against cancer due to its action. These effects of curcumin on important cell cycle signal transduction pathways and efficiency in animal model methods have rated curcumin as a multi-edged sword in the fight against cancer (Kuttan et al., 1985; Aggarwal et al., 2013).

Antimicrobial properties:

Gul et al. (Gul and Bakht, 2015) due to phenolic compounds such as curcuminoids contained in turmeric. Turmeric is said to be effective against B. subtilus, S. aureus and E. coli**.** The essential oil, alkaloid, curcumin, termerol and valeric acid are responsible for the antimicrobial activity of turmeric. Odhav et al. (Juglal, Govinden and Odhav, 2002) suggests that the antimicrobial mechanism of action of various spices is due to the hydrophobic interaction of various phenolic compounds with hydrogen binding and membrane proteins, leading to cell membrane disorders, cell wall disorders, and chain damage of electron transport (Schaefer et al., 2020). The antibacterial potential of aqueous extracts is likely due to anionic components such as nitrate, chlorides, sulfates and thiocyanate as well as several other compounds that are naturally present in plants. Ethanolic extracts showed better effects compared to aqueous extracts because the organic solvent dissolves the organic compounds quickly, which leads to the release of a large amount of strong antimicrobial components.

Antibacterial properties:

Bacterial infections are considered an important infectious disease. Therefore, nearly 50 years of extensive research have been carried out to address a variety of bacterial infections, isolating various new antibacterial agents. Despite advances in the development of antibacterial materials, the emergence of various multidrug-resistant bacteria makes it particularly necessary to find new antibacterial materials. Curcumin extracts have been shown to be very effective in preventing the development of pathogenic bacterial strains. Turmeric was investigated for its antimicrobial and antioxidant properties using sensitive chemical and microbiological assays (Oghenejobo, 2017). The mechanism behind the antimicrobial action of different spices includes hydrogen bonding of various phenolic compounds to membrane proteins, membrane damage, disruption of the electron transport chain, and disruption of the cell wall. The studies of Odhav et al.(Juglal, Govinden and Odhav, 2002)

have shown that turmeric and curcumin can be tolerated in high doses without any toxic risk. Both can be used as modern medicine to treat many foodborne illnesses (Mahour et al., 2018).

Antiviral properties:

There is a need to find some new effective antiviral compounds due to the emergence of antiviral resistant drugs and the very high cost of some antiviral drugs. Furthermore, the predominant antiviral agents are unsatisfactory and well tolerated. Therefore, the increasing need for antiviral elements will be emphasized. Several plants as a rapid source of numerous phytochemicals with unique biological activities, such as high antiviral activity, remain in the scientist's field of vision. Curcumin has been found to have high antiviral activity. It inhibits the activity of Epstein-Barr virus in infected DR-LUC cells. Individuals infected with Epstein-Barr virus, such as 12-0-tetradecanoylphorbol-13-acetate, alter the growth factor beta and sodium bicarbonate, increasing the level of BZLF1 in cells by 12-48 hours of treatment, which is achieved by curcumin that effectively block (Anggakusuma et al., 2014). Most importantly, curcumin also exhibits anti-HIV activity, and does not bind to HIV-1, which is essential for replicating the virus. It also complicates the expression of the HIV gene due to ultraviolet radiation. As a result, curcumin and its various analogues could be used as a new anti-HIV drugNovel antiviral agents: a medicinal plant perspective (Jassim and Naji, 2003).

DISCUSSION:

The lack of effective therapeutic agents for most viral diseases, the emergence of resistance to antiviral drugs, and the high cost of some antiviral therapies require the search for new effective antiviral compounds (Tomei et al., 2005; Lemoine, Nayagam and Thursz, 2013). Furthermore, existing antiviral therapies are not always well tolerated or quite effective and successful (Clercq, de Clercq and Herdewijn, 2005). Therefore, the increasing need for antiviral substances is further emphasized. Plants as a rich source of phytochemicals with different biological activities, including antiviral activities, are of interest to scientists (Jassim and Naji, 2003; Moghadamtousi et al., 2013). Curcumin as a plant derivative has been shown to have a broad spectrum of antiviral activity against various viruses. The enzyme inosine monophosphate dehydrogenase (IMPDH) due to the speed limiting activity in de novo guanine nucleotide synthesis is proposed as a therapeutic target for antiviral and anticancer compounds. Among the 15 different polyphenols, curcumin is suggested as an effective antiviral compound through this process by inhibitory activity against the IMPDH effect in a non-competitive or competitive way (Dairaku et al., 2010).

Turmeric has been used in Ayurvedic medicine since ancient times with various biological uses (Kumar et al., 2001). Researchers are keen to treat a variety of ailments with a natural product (Kumar et al., 2016). Curcumin is a non-toxic, highly promising natural antidote compound with extensive biological functions (Sharma, 1976; Thomas-Eapen, 2009). Curcumin is now available in its purest form, showing a wide spectrum of biological activities, a detailed study of its mechanism and its cationic effects, and this combination makes it easier to develop new drugs. It is anticipated that curcumin may find application in the next few days as an innovative drug to control various diseases, disorders and oxidative stress (Parveen et al., 2013).

Previously we have worked on topics like obesity (Baheerati and Gayatri Devi, 2018), asthma (Dave and Preetha, 2016) [persistent airway disease (R and Sethu, 2018) and obstructive airway disease (Timothy, Gayatri Devi and Jothi Priya, 2019)], sleeping disorders (Rj and R, 2016; Shruthi and Preetha, 2018) and some studies like Onychocryptosis, Muscular endurance, Physical fitness (Abigail et al., 2019; David et al., 2019; Iyer, Gayatri Devi and Jothi Priya, 2019). The present study reviewed the antiviral property of turmeric. Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh et al., 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai et al., 2019; Sridharan et al., 2019; Vijayashree Priyadharsini, 2019; Mathew et al., 2020)

CONCLUSION:

It was concluded that Curcuma longa is highly regarded as a universal treatment for herbal medicines with diverse pharmacological and antibacterial activities. It has been shown that Turmeric has strong antibacterial, antiparasitic, antiseptic, antioxidant, anti-inflammatory, antirheumatic, antitumor, and antiviral properties on an overall evaluation. In the future, the novel is expected to find use as an herbal drug to combat many diseases including carcinogenesis, inflammatory disorders, and oxidative stress-induced etiology. Additional evaluation is required to investigate many other Curcuma Longa medical applications

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AUTHOR CONTRIBUTIONS:

Author 1 (Vamshi ram) carried out the study by collecting data from search engines and drafted the manuscript using necessary information. Author 2 (Dr. Preetha. S) aided in conception of the topic, helped in supervising and developing the manuscript. All the authors have thus contributed to the final manuscript.

CONFLICT OF INTEREST:

The authors have none to declare.

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