



Turmeric and its health benefits

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Abstract

The yellow principle of the Indian Turmeric, ‘Haldi’ has recently attracted renewed interest in the field of experimental medicine with multiple activities. Turmeric is a popular gastronomic spice and herbal remedy, and there is a growing body of research relating to its therapeutic use. However, it is not clear which preparations of turmeric are most effective and for which disorders. Turmeric (*Curcuma longa*) is a popular and widely used Indian rhizomatous medicinal plant from the family Zingiberaceae. Curcumin, Demethoxycurcumin (DMC), and Bisdemethoxycurcumin (BDMC) are the constituents of the turmeric and are collectively known as curcuminoids. Turmeric is well-known for its different biological activities such as Anti-inflammatory, Anti-viral, Anti-oxidant, Anticancer, Anti-bacterial, Anti-asthmatic, Anti-arthritis, Anti-diabetic, Anti-venom, Antiobesity, Wound-healing, in depression and anxiety and other activities. Various clinical trials and their observations regarding these activities have been discussed here. Curcumin is existing in enolic form in organic solvents and as a keto form in water.

Key-words: Turmeric, Anticancer, Anti-venom

Introduction

Spices are the essential components in the preparation of household and commercial food products. A combination of spices such as turmeric, ginger, cumin, cardamom, caraway, pepper, etc. enhances the flavor, fragrance, color as well palatability, and digestibility of foods [1]. Spices are derived from different parts of plants, such as rhizomes, bulbs, leaves, seeds, fruits, barks, flower buds, and stigmata. Among them, turmeric is an essential component used as a food supplement, preservative, and colouring agent [2]. Turmeric has been used for centuries to add flavour and colour to food, and features in traditional healing practices from India and China to treat wounds, skin diseases, eye infections, respiratory ailments, dental and digestive disorders [3]. In 2018, turmeric dietary supplements attracted some of the highest sales in the United States [4]. It has been explored clinically for a wide variety of conditions from cancer, to obesity and cardiovascular disease [5], and its mechanisms of action suggest anti-inflammatory, anti-tumour and anti-microbial affects [6]. Curcumin is the most abundant of the curcuminoids group [7] and this group constitutes around 5% of the total component of *Curcuma longa*. According to their structure, concluded that the methoxy groups on the phenyl rings in curcumin are important to have health effects [8]. Moreover, it has been described that these curcuminoids have synergistic action for example to have



nematocidal activity [9]. The aim of this paper is to improve the knowledge of curcumin's effects on health.

Function of Turmeric in Health

- 1. Antioxidant Properties**- Antioxidant properties are the two primary mechanisms that explain the majority of the effects of curcumin on the various conditions [10]. Curcumin has been shown to improve systemic markers of oxidative stress [11]. There is evidence that it can increase serum activities of antioxidants such as superoxide dismutase (SOD). A recent study related to the efficacy of supplementation with purified curcuminoids on oxidative stress parameters—indicated a significant effect of curcuminoids supplementation on all investigated parameters of oxidative stress including plasma activities of SOD and catalase, as well as serum concentrations of glutathione peroxidase (GSH) and lipid peroxides [11].
- 2. Anti-Inflammatory Properties** - Inflammation has been identified in the development of many chronic diseases and conditions [10]. These diseases include Alzheimer's disease (AD), Parkinson's disease, multiple sclerosis, epilepsy, cerebral injury, cardiovascular disease, metabolic syndrome, cancer, allergy, asthma, bronchitis, colitis, arthritis, renal ischemia, psoriasis, diabetes, obesity, depression, fatigue, and acquired immune deficiency syndrome/AIDS [10]. Tumor necrosis factor α (TNF- α) is a major mediator of inflammation in most diseases, and this effect is regulated by the activation of a transcription factor, nuclear factor (NF)- κ B. Whereas TNF- α is said to be the most potent NF- κ B activator, the expression of TNF- α is also regulated by NF- κ B. In addition to TNF- α , NF- κ B is also activated by most inflammatory cytokines; gram-negative bacteria; various disease-causing viruses; environmental pollutants; chemical, physical, mechanical, and psychological stress; high glucose; fatty acids; ultraviolet radiation; cigarette smoke; and other disease-causing factors. Therefore, agents that downregulate NF- κ B and NF- κ B-regulated gene products have potential efficacy against several of these diseases. Curcumin has been shown to block NF- κ B activation increased by several different inflammatory stimuli [10]. Curcumin has also been shown to suppress inflammation through many different mechanisms beyond the scope of this review, thereby supporting its mechanism of action as a potential anti-inflammatory agent [10].
- 3. Arthritis Properties**- One such disease associated with inflammation, both chronic and acute, is osteoarthritis (OA), a chronic joint condition. It affects over 250 million people worldwide, leading to increased healthcare costs, impairment in activities of daily living (ADL), and ultimately decreased quality of life [12]. Although OA was once considered primarily a degenerative and non-inflammatory condition, it is now recognized as



having inflammatory aspects, including elevated cytokine levels, as well as potentially being connected with systemic inflammation [13]. While there is no cure, there are several pharmaceutical options for treatment. Therefore, there is increased interest in alternative treatments including dietary supplements and herbal remedies [14]. Several studies have shown the anti-arthritic effects of curcumin in humans with OA and rheumatoid arthritis (RA) [15].

4. Anti-cancer Properties- It impacts of many investigations have clarified that turmeric has potent anti-cancer impacts via suppressions of angiogenesis formation of new blood vessels from the pre existing vessels [16]. There are multiple steps involved in angiogenesis, including activation, proliferation, invasion, and migration of the endothelial cells [17]. Turmeric has been shown to prevent angiogenesis. Moreover, studies showed that curcumin also inhibited lymphangiogenesis, the formation of new lymphatic vessels, which has a serious function in cancer metastasis, in vivo through suppression of VEGF Receptor signaling [18]. Indian diets contain a lot of fried foods, which also contribute to gastrointestinal tract cancers due to the food preparation process, most likely forming carcinogenic or mutagenic heterocyclic amines (HA). However, despite all this, gastric tumor incidence rates are rated as moderate to low in India, in contrast to other countries. High use of natural compounds, like turmeric, may explain why they protect against the cancer-causing bacterium *Helicobacter pylori*, a common cause of stomach tumors [19].

5. Applications of turmeric in food processing- Food preservation has been necessary for the continuity of life since the existence of humanity. Due to the changing eating habits over time and the increased number of employees, the development of ready-to-eat foods has become mandatory. Expanding food products' shelf life and preserving their quality is a mandatory objective [20]. Today, the increase in consumption and processing of food based on the large number of people who work outside the home and do not have time to prepare food has encouraged the production of semi-finished or fully prepared foods commercially, and this situation has necessitated the use of food additives inevitable [21]. Assuring food safety and security is one of the most important issues of today. On condition that food security, improving food production, preventing nutrient losses, preserving their quality during the period between when the food is abundant and less, and extending its shelf life have gained significance. Thus, the usage of food additives has become inevitable in this case [22]. The use of plants by humanity as paint dates back centuries. There are nearly 150 plant species used in natural dye production. These plants are turmeric, elecampane, licorice, common juniper, and sage. Food dyes, a type of food additive, are used in the industry for various purposes, including preserving, elevating, or modifying the existing or typical color, controlling color change and deterioration, standardizing the appearance, adding decorative



features, and creating new products. They are additives used in confectionery, food eaten between meals, soft drinks, pastries, and many foods such as gelatin desserts [23]. Curcumin is a powerful coloring agent widely used in the food industry. Its extraction from the plant *C. longa* is commonly done with aqueous solvent solutions. Turmeric is also used as spices in foods.

Conclusion: Turmeric has a prolonged history of usage in ancient medicine, where it was used in various medical treatments as well as food coloring and spice. The "golden spice" is still used in cooking today. Still, technological advances have made it possible to employ curcumin for various uses in the food and health industries.

References

1. Turmeric. In: Chemistry of spices. London: CABI; V.A. Parthasarathy *et al.*, (2008).
2. Turmeric as spice and flavorant. In: Turmeric: The genus *curcuma*. Boca Raton: CRC Press; K.S. Premavalli (2007).
3. The clinical efficacy of curcumin containing nutraceuticals: an overview of systematic reviews E. Pagano *et al.*, *Pharmacol Res* (2018).
4. Systematic review finds overlapping reviews were not mentioned in every other overview D. Pieper *et al.*, *J Clin Epidemiol* (2014).
5. A systematic review and meta-analysis of randomized controlled trials investigating the effects of curcumin on blood lipid levels A. Sahebkar., *Clin Nutr* (2014).
6. A Systematic Review and Meta-analysis of Randomized Controlled Trials on the Effects of Turmeric and Curcuminoids on Blood Lipids in Adults with Metabolic Diseases F. Yuan *et al.*, *Adv Nutr* (2019).
7. Curcumin nanoformulations: A review of pharmaceutical properties and preclinical studies and clinical data related to cancer treatment. O. Naksuriya *et. al.*, *Biomaterials* 2014.
8. Curcumin, demethoxycurcumin, bisdemethoxycurcumin, tetrahydrocurcumin and turmerones differentially regulate anti-inflammatory and anti-proliferative responses through a ROS-independent mechanism. S.K. Sandur *et. al.*, *Carcinogenesis* 2007.
9. Nematocidal activity of turmeric: Synergistic action of curuminoids. F. Kiuchi *et. al.*, *Chem. Pharm. Bull.* 1993.
10. Curcumin and curcumin-like molecules: From spice to drugs. A. Marchiani *et. al.*, *Curr. Med. Chem.* 2014.
11. Effect of curcuminoids on oxidative stress: A systematic review and meta-analysis of randomized controlled trials. A. Sahebkar *et. al.*, *J. Funct. Foods* 2015.
12. The individual and socioeconomic impact of osteoarthritis. D. J. Hunter *et. al.*, *Lancet Nat. Rev. Rheumatol.* 2014.



13. Osteoarthritis and cartilage: The role of cytokines. M.B. Goldring, *Curr. Rheumatol. Rep.* 2000.
14. Molecular mechanisms for curcumin benefits against ischemic injury. A. Sahebkar *Fertil. Steril.* 2010.
15. A randomized, pilot study to assess the efficacy and safety of curcumin in patients with active rheumatoid arthritis. B. Chandran, *Phytother. Res.* 2012.
16. PARP inhibitor Veliparib (ABT-888) enhances the anti-angiogenic potentiality of Curcumin through deregulation of NECTIN-4 in oral cancer: Role of nitric oxide (NO). S. Chatterjee *et. al.*, *Cell Signal.* 2021.
17. Polyphenols and posterior segment eye diseases: effects on angiogenesis, invasion, migration and epithelial-mesenchymal transition. M. Caban *et. al.*, *Food Rev Int.* 2021.
18. Pharmacological, nutritional and antimicrobial uses of *Moringa oleifera* Lam. leaves in poultry nutrition: an updated knowledge. M. E. Abd El-Hack *et. al.*, *Poult Sci.* 2022.
19. Curcumin: a review of anti-cancer properties and therapeutic activity in head and neck squamous cell carcinoma. R. Wilken *et. al.*, *Mol Cancer.* 2011.
20. Application of bio-nanocomposite films and edible coatings for extending the shelf life of fresh fruits and vegetables. S. Jafarzadeh *et. al.*, *Adv Colloid Interface Sci.* 2021.
21. A review on turmeric (*Curcuma longa* L.) and usage in seafood. N. Guneri, *Mar Sci Tech Bull.* 2021.
22. Turmeric: evaluation in terms of health and nutrition. G. A. Delikanl *et. al.*, *Beslenme ve Diyet Dergisi.* 2016.
23. Evaluating the food colors in traditional confectionaries and beverages in Shiraz city. Z. Gholami *et. al.*, *Trends Pharmacol Sci.* 2021.