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An overview on anti-carcinogenic properties of curcumin

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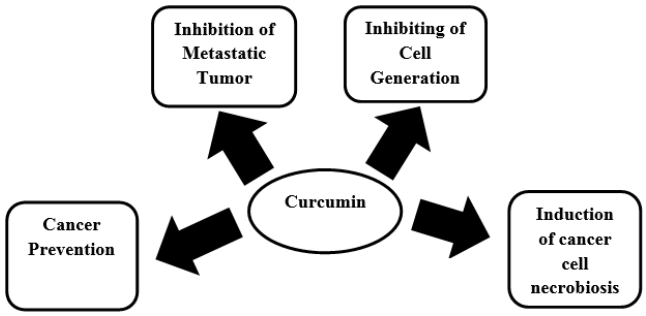
Abstract
Turmeric (*Curcuma longa*) is a type of herb that belongs to the ginger family. Turmeric is a spice that has been used widely in a variety of food items in India as a flavoring and coloring agent. Curcumin is present in the form of 1, 7-bis (4-hydroxy-3methoxy phenyl) -1, 6-heptadiene-3, 5-dione) it also works as a compounds of phenol and is the main ingredient in the rhizome of the herb naming, *Curcuma longa*, which is extracted as a yellow pigment from the powdered form which is called as turmeric, the rhizome from 2000 BC which also is known as anti-inflammatory agent. Researches have been done over the last 50 years which reported that curcumin can treat and prevent cancer. Pharmacologically, curcumin has been found to be safe. It has been directed at doses up to 10g/day. Many of the researches have suggested that curcumin has a huge prospective in the anticipation & chemotherapy of cancer. Despite excessive progress in beneficial practices over the last ten years, neither the frequency nor the mortality from cancer has changed from the last 30 years. Existing anticancer drugs have less efficacy, various complications, and highly expensive. Hence, recognizing therapeutic agents lacking these drawbacks is required. Curcumin is believed to interfere in all the stages of cancer development, invasion of cancer cells and during the metastasis process. It also hinders the tumor imitation and promotion as well as various phases of multiplication of cell, invasion, and ontogenesis.

Keywords: anti-carcinogenic, curcumin, *Curcuma longa*

1. Introduction
Curcumin is one of the best known biologically active compounds extracted from turmeric (*Curcuma longa*). It has many biological activities that have the potential to treat cancer. It also has been demonstrated to raise the efficiency of additional cytotoxic agents and to decrease their poisonous properties that are the foremost problem of many of the cytotoxic agents. It is very well identified for its anti-inflammatory action (Amanda and Robert, 2008) [2]. Curcumin can be a well-proved agent for curing cancer as it is a disease that can also be developed under prolonged inflammatory conditions. Additionally, most of the cytotoxic agents that act on particular process of development of cancer that is apoptosis and growth of cell, it also has its influence on the several stages of development of cancer that is carcinogenesis activation (Singh and Singh, 2009), cancer cell generation (Simon *et al*., 1998) [17], necrobiosis evasion (Han *et al*., 1999), induced opposition (Pongrakhananon *et al*., 2010) [15], and cell growth (Chen *et al*., 2008) [4]. Hence, it has the efficiency to overwhelmed chemo-resistance that is the main difficulty in the chemotherapy process of cancer.
Today, cancer is considered as one of the common reason of death in humans. In 2012, the World Health Organization (WHO) reported 4 million new cases of cancer and 8.2 million mortality rate. The current studies showed that in 2020 cancer will be one of the most common reasons for human death. (Dikshit *et al.*, 2015) [10]. The use of natural or synthetic chemical compounds for the prevention and progression of cancer means chemoprevention. These are the compounds containing less poisonous side effects, while Curcumin, that is composed of polyphenols, belongs mutually in both the groups (Delhalle *et al.*, 2005) [8]. For thousands of years, curcumin has been used in traditional Chinese as well as Iranian medicine. Traditional treatments done with turmeric hindmost to around 5000 years ago, which was used to overcome certain diseases like inflammation, infectious diseases and autoimmunity (Singh *et al.*, 2006, Sharma *et al.*, 2005) [16]? It has a marvelous ability for curing human diseases like metabolism related disease and infection causing disorder, obesity, psoriasis, neurodegenerative diseases, Parkinson's disease, Alzheimer's disease, rheumatoid arthritis, heart disease, digestive disorders such as indigestion, flatulence, duodenal ulcer, gastric ulcer and cancer (Alizadeh *et al.*, 2014) [11].

It has protective chemical effects, cytotoxic effects, anti-aging, anti-oxidant, anti-tumor & anti-inflammatory. The anti-chemotherapeutic effects of curcumin are vital because its overdose avoids the rapid multiplication of cells of cancer but secure normal cells (Anand *et al*., 2008) [1].

2. Anti-cancer properties of curcumin



Curcumin has been used from a long time as a nutritional ingredient with well-known fitness. Far searching from the last 10 years has revealed that curcumin contains anticancercenogenic activities & could be cast-off as a protective agent against various cancers, either as a single or in combined therapy with chemotherapeutic agents. It relevates biological actions in different stages of oncogenesis which includes inhibition of oncogene activation, prevention of cancer-related inflammation, inhibiting cancer cell prohibition induction of necrobiosis and anoikis, the anticipation of cell growth, and sensitization of cancer cells to aromatherapy.

2.1 Prevention of cancer

2.1.1 Chemopreventive properties

Oncogenesis contains several steps carried by genome instability. Its continuous revelation to Environmental surrounding & endogenic hemotoxic agents can cause extensive DNA damage. The broken molecules can be imparted during the division of cell producing mutated clones that can give rise to the expansion of premalignant cell population possessing uncontrolled proliferative and invasive properties. Curcumin is well-known for its capability to conquer or hinder the toxicity development pursued by different various biochemical toxins.

2.2 Inhibiting growth of tumor & cell propagation

Extreme propagation is an assurance of malignancy (Hanahan and Weinberg, 2000) [12]. Anomaly division of cell is a significant basis of expansion of cancer cells that allows development as well as expansion growth of the tumor. In healthy cells, production of cell needs the growth indication which is created by the meeting of different cells, neighboring cells & extracellular matrix. Cells of cancer added their own progress, up-regulate receptors of growth, & get insensitive to opposite growth factors. Curcumin has been revealed to control the action as well as expression of factors affecting growth, that includes epidermal growth factor (EGF) as well as an insulin-like growth factor (IGF). When undergoing fast extension overextending epidermal growth factor & its receptor, EGFR (Epidermal growth factor receptor) expression and action, was found in human prostate cells of cancer. (Cai *et al*., 2008) [3]. It has been revealed that curcumin chunks the EGF(Epidermal growth factor) cycle with down-regulation of EGFR (Epidermal growth receptor), inhibition of ligand-induced EGFR(Epidermal growth receptor), action & suppression of intrinsic EGFR (Epidermal growth receptor), tyrosine kinase action both androgen-independent as well as dependent glandular cells of cancer. (Dorai *et al*., 2000) [7].

2.3 Induction of cancerous cells necrobiosis

Necrobiosis shows vital role in different pathological & functional methods (Hengartner, 2000) [12]. Equilibrium of tissue sustains the stability of cell propagation & necrobiosis as a portion of regular development of tissue. Deregulation of this method en route for numerous diseases adding cancer. Many approaches have been established to overwhelm this broken process in cancers & curcumin has revealed hopeful action that controls this activity in the indulgence of cells of cancer necrobiosis.

2.4 Animal researches

Many types of research on animals have been described on the anti-cancer & chemopreventive effects of curcumin in different types of cancer. The anti-cancerous properties of curcumin in glandular cancer was inspected using glandular cancer cells embedded into naked rats (Dorai *et al.,* 2001) [6]. Dietetic curcumin at 2% concentration was specified to the rats, and then after a leap of 6 weeks treatment, the rats were inspected for apoptosis, tumor growth and vascularity. The outcomes revealed that curcumin has the ability to decrease the volume of a tumor, increase cancerous cell necrobiosis, inhibiting vascular ontogenesis as specified by the reduction in micro vessel density. In these researches, NCI-H460 cells were implanted into naked rats, & curcumin, 30 and 45 milligram/kilogram of body weight was inside the peritoneum inoculated into the rats every 4 days after the tumor reached 100 mm3 in size. Curcumin was revealed to suggestively decrease the proportion of tumor as related to the non-treated control.

2.5 Clinical researches

Many clinical types of research are continuing to study the efficiency & retreat of curcumin as a defensive curing agent for different types of cancers. In the forthcoming phase I clinical trials, curcumin was proved to be harmless even if taken in the large amount. (Cheng *et al.,* 2001) [5]. In this research, victims with a pre-infectious tumor are due to intestine metaplasia, bladder cancers Bowen's disease and oral leukoplakia were given a dose of curcumin which was taken vocally for the passage of 3 months at the daily dosage of and 8000, 4000, 2000, 1000, 500 mg. No venomousness was detected in these victims even at the maximum dosage (8000 mg/day). However, this dosage was intolerable by the victims because of its large volume. One more related research revealed that even one dosage of curcumin up and about to 12,000 milligrams had no limit of dosage poisonous effect in vigorous case, not even insignificant opposing action like dysentery (Lao *et al*., 2006) [14].

3. Conclusion

In past 30 years, numerous studies of curcumin effect on cell tissues and animals, as well as clinical studies, have shown its multiple medical benefits (more than 10,000 published papers in the last 10 years). Despite its very poor bioavailability and absorption in the body tissues, curcumin has been recognized as an important chemotherapeutic natural product. The highest medical value of curcumin is its strong antioxidant

effect and its binding to inflammatory transcription factors as to precursors whether chronic diseases or tumors. Despite a large number of papers, a very small number of clinical trials were conducted specifically on humans in order to fully confirm and prove its effectiveness. However, there is a very small detail present to clarify the fundamental process of curcumin action. Many Clinical judgments showed tolerance, safety, non-toxicity (even near 8000 mg/day), and the efficiency of curcumin. All these researches provide a platform for certain meaningful researches in larger groups as well as an open up path for further drug production in the future.

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