

Role of Curcumin as Anticancer Agent

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Abstract: *Turmeric contains a major component called curcumin that borrows from the ginger family which is a member of ginger family of Zingiberaceae, which is used for ayurvedic medicines, in beauty products and as food. Curcumin acts as a powerful medicine, which relieves inflammation and pain. Curcumin is obtained from in Curcumin longa plant Curcumin is a natural polyphenol molecule, which exhibits anticancer, chemo preventive, chemo and radio-sensitization properties. It has been known to have beneficial effects on patients undergoing treatment for cancer as it reduces inflammation caused by cancer. Curcumin's widespread availability, safety, low cost and multiple, cancer fighting functions justify its development as a drug for cancer treatment. The current review explores the various studies done Curcumin with special reference to anticancer property. Method: Extensive electronic search was done on PubMed, EMBASE and Cochrane database for relevant studies and selected studies were summarized, analyzed and compiled. Result: Several studies worldwide have demonstrated the anticancer properties of this very potent agent.*

Keywords: Cancer, chemopreventive, Curcumin oil, polyphenol molecule, anti-inflammatory

1. Introduction

Cancer is one of the most common causes of death worldwide since the last decade or two. It is a disease in which cells in one part of the body starts growing and form lumps in a way that is not normal. It is defined as an abnormal growth of cells, which end to proliferate in an uncontrolled way and in some cases to metastasize. Uncontrolled growth of cells causes carcinomas in any part of the body.

2. Types of Cancer

The major types of cancer are carcinoma, sarcomas, leukemia, lymphomas and myeloma, brain and spinal cord cancer and oral cancer.

Carcinomas: It starts in epithelial tissues, these cover the outside of the body as the skin carcinomas are the most common types of cancer; they make up about 85% of all cancer in the UK.

Sarcoma: Cancer that begins in the connective or supportive tissues such as bone cartilage, fat muscles or blood vessels.

Leukemia: Cancer that starts in blood forming tissues such as the bone marrow and causes abnormal blood cells to be produced and go in to the blood, lymphoma and myeloma cancer that begin in cells of the immune system.

Myeloma: It is also known as multiple myeloma; it is cancer that starts in plasma cells. Plasma cell is a type of white blood cell made in the bone marrow; they produce antibodies also called immunoglobulins to help to fight infection. Plasma cells can become abnormal, multiply uncontrollably and only make a type of antibody that doesn't properly fight infection. Brain and spinal cord cancers: These are known as central nervous systems cancers. Oral cancers: Cancer that forms in tissues of the oral cavity (the mouth) or the oropharynx (the part of the throat the back of the mouth).

3. Treatment

There are only few lines of treatment available for cancer like Chemotherapy, Radiotherapy, Surgery, Hormone Therapy and Target Therapy.

Chemotherapy is type of cancer treatment that uses drugs to kill cancer cells. Radiation therapy is a cancer treatment that uses high doses of radiation to kill cancer cells and shrink tumors. High doses radiation therapy kills cancer cells or slows their growth by damaging their DNA. Cancer cells whose DNA is damaged stops dividing or dies when the damaged cells die, they are broken down and removed by the body. It takes days or weeks of treatment before DNA is damaged enough for cancer cells to die. Then cancer cells keep dying for weeks or months after radiation therapy ends. Targeted therapy is the foundation of precision medicine; it is a type of cancer treatment that targets the changes in cancer cells that help them grow, divide. Hormone therapy is a cancer treatment that slows or stops the growth of cancer that uses hormones to grow hormone therapy is also called hormonal therapy hormone treatment, or endocrine therapy.

4. Side effects

Cancer treatments causes serious side effects including but not limited to anemia, appetite loss, bleeding and bruising, constipation, delirium, diarrhea, lymphedema (swelling) etc.

Several studies are being done worldwide to reduce the side effects of chemotherapy and radiation therapy. This has led to the exploration of several herbal plants for anticancer and healing properties.

Phytomedicine used in the treatment of cancer

Cancer is reported to cause about 0.4 million deaths annually. The cost of diagnosis and treatment of cancer in India is enormous. A study was done for health technology assessment to understand the role, effect on mortality and adverse event occurrence, and cost effectiveness of phytomedicines in cancer treatment. The result showed that when taken with conventional cancer treatment,

phytomedicines shows clinical and cost effectiveness. Domestic manufacturing and practice of phytomedicine should be encouraged. It supported the view that phytomedicine is a cost-effective option and will help in decreasing the mortality and improving the quality of life of patients. Phytomedicine inclusion might help in lessening the socio-economic burden of India (Tanushree Chaudhary *et al.*, 2015).

Phytomedicine is practiced in clinical treatment of diseases in most part of the world as it involves scientific research and information on the use of plant medicinal components and their safety in use. There are methods that are used to evaluate the orthodox medicine. Herbs, unlike the orthodox medicine that focus on given chemicals, contain very many bioactive compounds. The phytomedicines may involve use of a combination of herbs to come up with a therapy that will heal the body and strengthen its immune system to fight diseases better where plant-based medicines are provided by doctors and pharmacist as 'phytomedicine' to their patients. Phytomedicine is more evidenced on herbal medicine as it involves scientific research to ascertain the potency of the herbs before they are prescribed to the patients. The scientists have found out that uses of natural products work better in cancer treatment as they target multiple pathways thereby inhibiting growth and spread of the cancer cell in the body. Some of these phyto-medicines help in killing cancer cells by inducing apoptosis in tumors. EGCG and GSE are two popular plant extracts that have attracted much attention in recent years due to their antioxidant, anti-microbial, anti-carcinogenic and anti-inflammatory properties. Some of the natural plants components that have been used in phytomedicine to treat cancer include; resveratrol, saponins, silymarin, curcumin, peach compounds, green tea extracts, coffee enemas and grape seed extracts. (Dragan Jovanov *et al.*, 2017)

Ayurveda

Ayurveda is considered the oldest healing science. In Sanskrit, Ayurveda means "The science of life" Ayurveda knowledge originated in India more than 5,000 years ago and is often called the "mother of all healing". The principles of many of the natural healing systems now familiar in the west have their roots in Ayurveda including homeopathy and polarity therapy. There are indications from animal studies that some herbal products used in Ayurveda might have properties of anticancer effects. Although laboratory experiments suggest it is possible that some substances used in Ayurveda might be developed into effective treatments there is no scientific evidence that any are effective as currently practiced.

Anti-cancer drugs

Cancer can be cured by adding some anti-inflammatory cancer our drugs like curcumin. Turmeric has properties such as anti-oxidant, antimicrobial, hepatoprotective, anti-inflammatory Anti septic and antimutagenic that can work as the treatment of oral cancer.

Curcumin oil

Turmeric and specially its more most active compound curcumin have many scientifically proven health benefits, such as the potential to prevent heart disease, Alzheimer and

cancer. It's a potent anti-inflammatory and antioxidant and may also health improve symptoms of depression and arthritis (Kris Gunner's 2018).

At this time, there isn't enough evidence recommended curcumin for preventing or treating cancer bur research is ongoing. Curcumin is a substance found in the spice turmeric has long been used in as in medicine to treat variety of melodies now some research suggests that curcumin may help to prevent or treat cancer.

Curcumin is thought to have antioxidant properties which means it may decreases swelling and inflammation it's been explored as a cancer treatment in part because inflammation appears to play a major role in cancer laboratory and animal research suggest that curcumin may prevent cancer, slow the spread of cancer , may chemotherapy more effective protect healthy cells from damage by radiation therapy. curcumin is being studied for use in many types of cancer.

Studies of curcumin in people are still in the early stages. Clinical trials are underway to investigate curcumin as a way to prevent cancer in people with pre-cancers condition as a cancer treatment and as a remedy for signs and symptoms causes by cancer treatment. Research is ongoing and there isn't enough evidence to recommended curcumin at this time. It's unclear how curcumin may interact with medication.

Prior studies have shown that turmeric contains the polyphenolic components curcumin in which anti-inflammatory and anti-cancer properties have been studied for many decades. Curcumin has been found to suppress initiation, progressing and metastases of a variety of tumors in which cytokines have been studied in protein kinases and other negative molecules, which is very expensive and has fewer side effects. The current review focuses on the diverse molecules, targets modulated by curcumin that contribute to its efficacy against various human diseases. For example, curcumin is given as an adjuvant along with chemo therapy medicines that can protect healthy cells and cancer (Shanmugam Mk *et al.*, 2015).

Another study demonstrated that curcumin is helpful in treating cancer and preventing it from growing. It regulates not only the various pathways of the immune system, cell cycle checkpoints apoptosis and antioxidant response but also numerous intracellular targets, including pathway and protein molecules controlling tumour progression (Abir Kumar Panda *et al.*, 2017).

Surgical chemotherapy and radiation systems play an important role in the treatment of brain tumors. Whose previous record is not correct, curcumin should be given as an adjuvant in the treatment of brain tumors with chemotherapy because curcumin already has its place in therapy due to its anti-inflammatory properties and also has anti-cancer properties. Both *in vitro* and *in vivo* research have demonstrated its considerable usefulness against brain tumors. Curcumin is a successful nutraceutical compound, which should be used in the treatment of human brain tumors (Neil V.Kinger *et al.*, 2016).

5. Conclusion

Curcumin from *Curcumin longa* plant with its polyphenol molecule is well known as a powerful anti-inflammatory and analgesic. It has been used in India since ages for wound healing and as a beauty product because of its beneficial effects on skin. Ayurveda has always cited its numerous health benefits. Now studies report that curcumin has anticancer properties. Various studies have shown and supported the use of curcumin as a powerful adjuvant therapy for cancer. It not only helps in killing cancer cells, but also reduces the side effects of chemotherapy drugs on healthy cells. Further research needs to be done to provide more data on its mechanism of action and to establish it as a potential anticancer agent.

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