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INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)
(Int Peer Reviewed Journal)
Vol. 04, Issue 10, October 2024, pp : 439-444

e-ISSN : 2583-1062
Impact Factor : 7.001

A REVIEW ON ANTI-CANCER EFFECT OF TURMERIC

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ABSTRACT

Turmeric's active component is called curcumin. According to a new study, there are several health advantages when curcumin and an anti-cancer agent are combined. Its origin is the curcoma longa plant, an ancient Indian spice. Curcumin has been shown in numerous studies to contain anti-oxidant, anti-carcinogenic, and anti- inflammatory properties. which are currently employed to treat cancer cells by regulating blood artery flow. Even if cancer treatment has come a long way, turmeric's ability to constantly fight cancer cellscannot be ignored.

Mostly the cancer cells generate ATP in a different way in comparisonwith healthy cells, the curcumin selectively kills tumor cells by not impacting the healthy tissues. The purpose of this article is to tell theAnti-cancer nature of turmeric with its great potential along with the various mechanisms on how turmeric reacts in the treatment of different cancer types. The beneficial effects of turmeric are traditionally achieved through prolonged dietary intake, even in small amounts. A full understanding of the mechanism of action is required.Researches have shown curcumin to be highly pleitropic molecule have the potential to interact with the numerous molecular targets. A careful literature survey reveals that curcumin, the most active component of turmeric contributes significantly in certain types of cancer. The anticancer potential of curcumin is mainly due to its ability to inhibit and or activate various intercellular transcription factors which regulates the expression of proteins and development. The mechanism of action and effects are discussed brieflyin present review.

1. INTRODUCTION

As the leading cause of death, cancer is a dangerous illness. Treatments for this condition are constantly being improved. Understanding how molecular behaviour changes that contribute to the growth of cancer cells is the best method to prevent cancer and provide patients the right treatment. Patients can choose from a variety of standard treatment programs, each of which is specifically designed to target a particular cancer cell in order to stop the tumour's growth and minimize adverse effects. Certain anticancer medications derived from plants were effective in treating cancer in addition to chemically produced cancer agents. For example, Pacific Yew, Curcuma Longa (Curcumin), and numerous others.

Turmeric's main active component is curcumin, which has a strong anti-cancer effect. Curcumin lowers the ATP synthase concentration. Three of the four cell lines found in the body—the epithelial, endothelial, neuron, and fibroblast cell lines—can have their cellular levels of ATP reduced. As you may be aware, cancer cells use apeculiar oxygen-free process to take oxygen from glucose and turn it into ATP. (Cancer cells develop quickly without oxygen, therefore theycan withstand low oxygen levels). This is the point at which turmeric starts to work against these cells.

The regular increase in cancer cells necessitates addressing the gene directly in order to stop the cancer cells from growing. This also allows for control of blood vessel flow. Recent research indicates that curcumin has the opposite effect on cancer cells. These can quickly kill the cells and stop them from proliferating. In-depth investigation, tests, and other experiments are required to provide more convincing evidence for the same. Curcumin has been the subject of numerous pharmacokinetic investigations, which have revealed that the medication is soluble in acetone but insoluble in water. Additionally, pharmacodynamic studies have revealed that the drug's physiologic and biochemical effects are absorbed. It has the power to reduce both acute and long-term inflammation.

This has the potential to reduce the incidence of newly diagnosed cancerbrought on by radiation. Human leukemia cells undergo apoptosis, which allows curcumin to manifest its anticancer properties in the body. Its particular inhibitory action in human cancer cells and human breast carcinoma cells has been demonstrated in a number of investigations. Furthermore, curcumin exhibits a significant impact ontumor cell growth.

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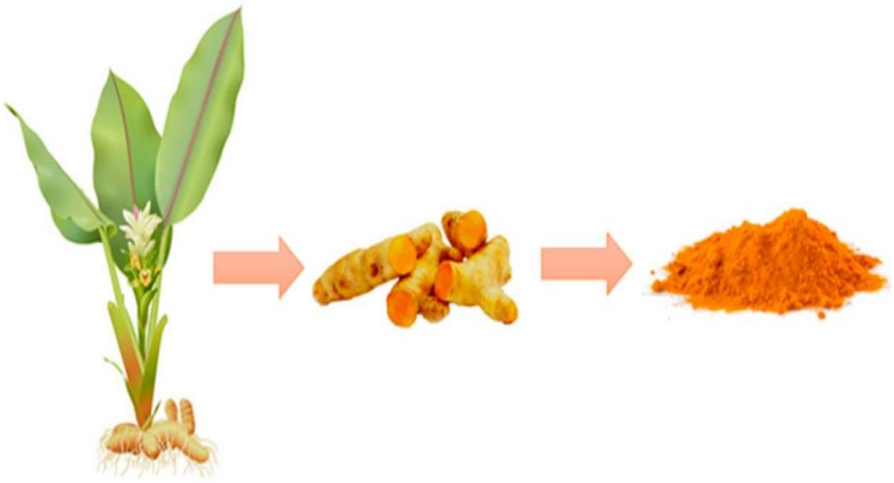
Chemical constituents:-

5.1% fat, 6.3% protein, 69.4% carbohydrates, 13.1% moisture, and3.5% minerals constitute turmeric. Its oil contains nearly 53% sesquiterpene, 25% zingiberene, 1% cineol, 0.5 percent borneol, and 1% phellandrene. It is also a decent source of retinol, a fat-soluble vitamin that contains 310 kcal per 100 g and approximately 91 mg. The World Health Organization considers a daily intake of approximately 2.5 mg/kg to be safe. B.W The non-evaporative fraction of turmeric is primarily composed of curcumin (71.5%), bisdemethoxycurcumin (9.1%), and desmethoxycurcumin (19.4%)*7,8+.3.5% minerals, 5.1% fat, 6.3% protein, 69.4% carbohydrates, and 13.1% moisture make up turmeric, while its oil has roughly 53% sesquiterpene, 25% zingiberene, 1% cineol, 0.5% borneol, and 1% sesquiterpene.

Constituents	Composition
Curcuminoids	1-6%
Volatile essential oil.	3-7%
Fiber.	2-7%
Mineral matter.	3-7%
Protein.	6-8%
Fat.	5-10%
Moisture.	6-13%
Carbohydrates.	60-70%

Biological Source:-

These compounds are natural phenols and produce a pronounced yellow colour that is often used to colour foods and medicines. Curcumin is obtained from the root of turmeric. Curcuminoids are soluble in dimethyl sulfoxide (DMSO), acetone and ethanol, but are poorly soluble in lipids.



Side Effects:-

Studies using high doses of curcumin have reported some mild adverse effects, including nausea, diarrhoea, headache, skin rash,and yellow stool. Use of curcumin with piperine (a black pepper

extract) may cause adverse drug reactions because piperine greatlyincreases intestinal permeability.

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Curcumin and its effects on human health:-

Turmeric has a significant influence on science and medicine. Turmeric is made from ground plant roots and is available on shelves and in spice cabinets. Because of its bright yellow colour, processed turmeric has been used as a dye in many cultures. Turmeric powder is also a major ingredient in curry powder. Turmeric products that are sold commercially include extracts, teas, powders, and capsules. The primary active component of turmeric is called curcumin. Turmeric is suggested for a number of medical conditions by the traditional Indian medical system known as ayurveda. These include inflammation and persistent paint. Western medicine is starting to research turmeric's potential as a painkiller and healing substance.

Mechanism of Action of Curcumin as Anti-cancer Agent:-

1. Curcumin helps in Breast cancer

1. It helps in preventing the occurrence of breast cancer- By maintaining the normal signalling and growth of the cells. It also protects the cells from inflammation and oxidation and keeps them away from turning into cancer cells.
2. Turmeric help in healing breast cancer Curcumin helps in controlling the growth and proliferation of the cancer cells of the breast, thus healing the tumor and preventing it from moving to larger stages.
3. Curcumin induces programmed cell death in cancer cells. It induces the pro apoptotic genes in the breast cancer cells and causes their death. This kills the tumor and heals the cancer and its symptoms.

- Curcumin regulates the signalling pathways in cancer cells Curcumin from turmeric helps in controlling the signalling pathways in the cancer cells which are usually dysregulated in these cells. Controlling these pathways helps in regulating growth and division of not just cancer cells but neighbouring affected tissues as well.
- Curcumin stops the cell division process in cancer cells Curcumin disrupts important steps in the cell division process ofthe cancer cells which ultimately halt this process and does not allow the cells to grow. Thus, curcumin shows cytostatic effects on breast cancer cells.
- Slowing down its spread to other organs. lt always helps in slowing down the spread of cancer to other organs such aslungs.
- Helps in easing the symptoms of breast cancer Helps in easing the symptoms of breast cancer by helping in management of pain, redness & swelling. This process is accomplished by the ability of Curcumin to control inflammation of the cells.

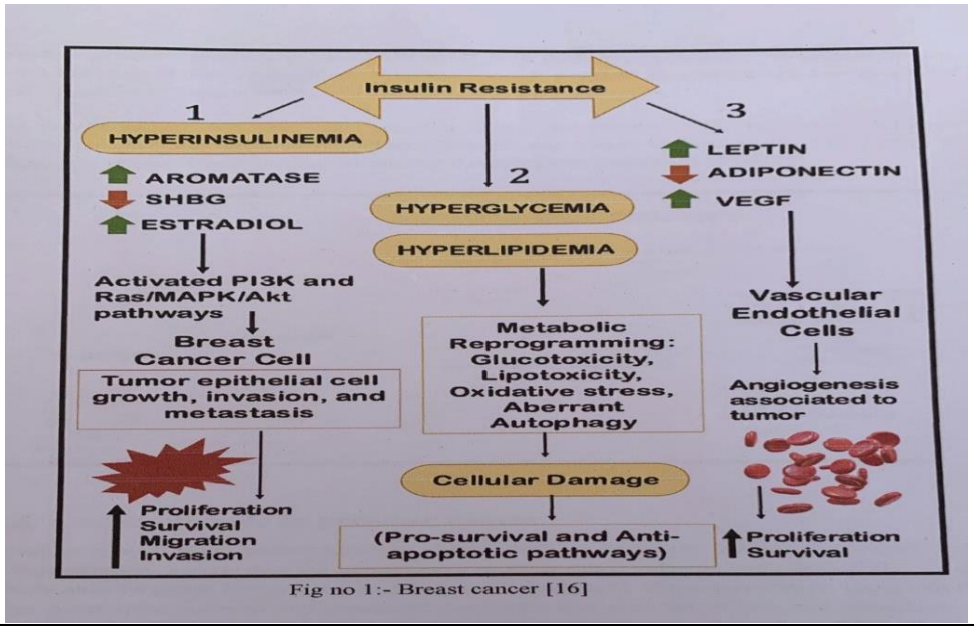

Fig no 1:- Breast cancer [16]

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2. Curcumin effect in lungs cancer:-

Although targeted therapy is becoming common, hemotherapy is still the go-to treatment for advanced lung cancer. The practical use of chemotherapy is typically constrained by serious adverse effects. As a result of herbal medicine's safety and efficacy as an adjuvant therapy during the past few decades, professionals have become more and more interested in 181.

Despite significant progress in the treatment of lung diseases, no existing medication has yet shown evidence of disease-modifyingefficacy. There is a critical need to develop new drugs that might be useful in clinical

In a recent study it is found that Curcumin effects are limited in the gastrointestinal tract. Pretreatment with curcumin shows the initiation of lung tumours by benzopyrene as a result of curcumin's effects. These results indicate that curcumin can cause high effect.

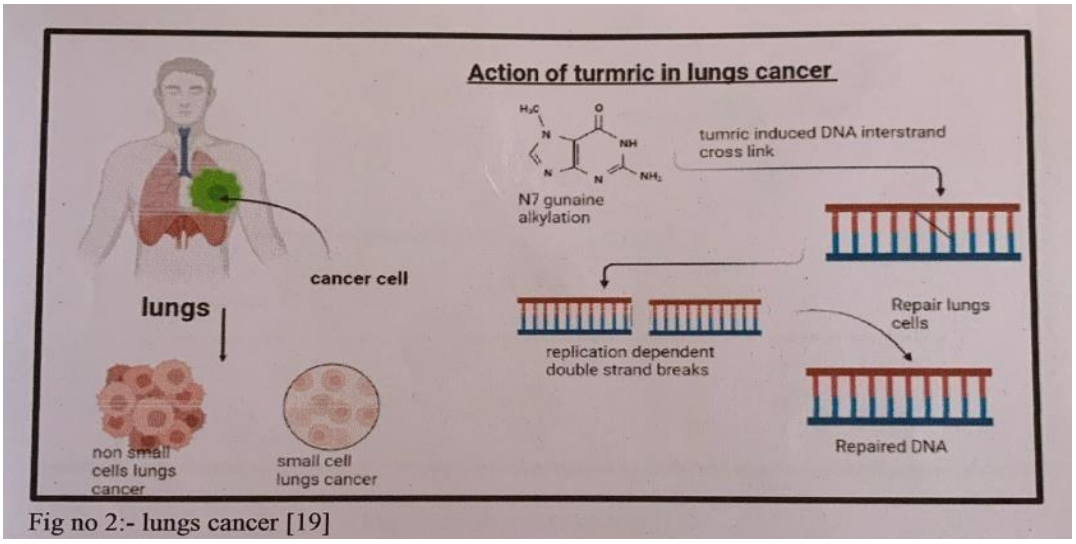

Fig no 2:- lungs cancer [19]

3. Brain cancer effects by Curcumin

Curcumin is an anti-cancer agent & chemical compound that is evaluated in clinical trials in the treatment of human brain treatment. It has been demonstrated to be a successful treatment for brain cancers, particularly glioblastoma multiforme (type of cancer that occurs in brain and spinal cord), in preclinical in vitro and in vivo research. Curcumin's capacity to cause GYM cell cycle arrest, induce autophagy, disrupt molecular signalling, activate apoptotic pathways, prevent invasion and metastasis, and boost the effectiveness of current chemotherapeutics all contribute to the potentiation of theseeffects

4. Curcumin role in prostate cancer

Prostate is a small gland present between a man's bladder & rectum. When the malignant cells are formed in the prostate then the symptoms of prostate cancer occur in one's body.

A study over curcumin found that it may help in the treatment of prostate cancer. Curcumin the warm, bitter spice contains anticancerous properties that stop the growth and spreadness of cancerous cells. It stops the fibroblast that are responsible to produce the collagen & other fiber which leads to prostate cancer

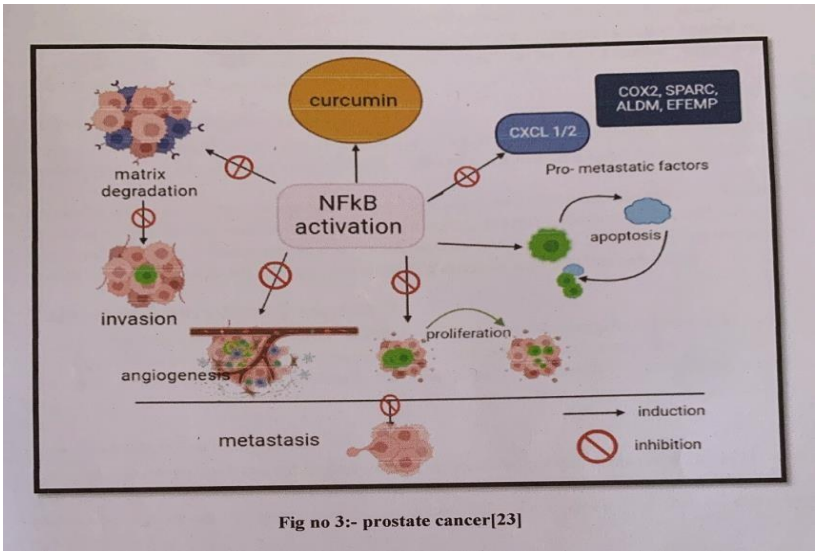

Fig no 3:- prostate cancer[23]

5. Curcumin role on Head & Neck Cancer

Head & Neck cancer has the greatest impact on human's life. All current head and neck cancer therapy plans, however, have drawbacks. As a result, ongoing research is being done to find less hazardous treatments to lower treatment morbidity for head and neck cancer Additionally, in vivo head and neck cancer xenograft growth was inhibited by curcumin in animal models. To reduce the toxicity of other chemotherapeutic drugs and radiation in head and neck cancer, the use of curcumin as a single agent or in combination with other chemotherapeutic agents and radiation is seen.

2. CONCLUSION

During in vitro and in vivo investigations against a variety of malignancies, curcumin has demonstrated admirable promise. Clinical studies have also demonstrated that curcumin does not exhibit any negative effects up to a daily intake of 8 to 12 g. There are still problems to be overcome with lesser solubility and lessstability under physiological conditions during human testing. Similar difficulties were overcome in the case of the FDA-approved anticancer medication taxol, a plant-derived anticancer agent.

Drugs made from chemicals have been created, and there are already various cancer therapies. Chemotherapy, for example, has limitations since it has toxic effects on tissues that aren't its target, aggravating human health conditions. As a result, there is a demand for complementary therapies that use naturally occurring anticancer chemicals, with plants as the preferred source. The potential anticancer properties of secondary metabolites found in the plant kingdom, including polyphenols, flavonoids, and brassinosteroids, have been investigated. They have all been demonstrated to have anticancer properties, including growth inhibition, target selectivity, antioxidant activity, induction of apoptosis and cytotoxicity of cancercells. Some of the first substances to be used were drugs derived from vinca alkaloids, which are currently being studied in clinical Phase Ill studies with Pacitaxel and other anticancer drugs.

These substances are easily obtained from the environment andare not particularly harmful to healthy human cells.

Additionally, new technologies like nanoparticles are being developed for use in the administration of anticancer drugs and treatments. Their advancement could be used to manage prolongedmedication release and aid in efforts to design tissue-specific therapies that lessen the severity of negative effects from treatments.

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