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Curcumin - Breast Cancer Therapeutic Agent to Replace Allopathic Treatments with Extensive Side Effects

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Modern cancer treatments have numerous negative side effects and do not always produce desired outcomes. Herbs and spices represent alternative solutions to modern medicine and provide effective cancer prevention and treatment. They have also been used for generations in treating various ailments. Traditional Ayurvedic herbs and spices provide promising new therapeutic agents for breast cancer treatment due to their anti-inflammatory, antifungal, antiviral, and antioxidant properties. Allopathic treatments such as radiation therapy and chemotherapy present several side-effects that affect cell growth and negatively impact human organs. Ayurvedic medicines and herbal remedies slow the growth of breast cancer cells, which improves the patient's quality of life when an allopathic line of treatment is contraindicated. Turmeric has a long history of use as a traditional Ayurvedic medicine not only due to its antibiotic characteristics but also its ability to improve digestion and strengthen intestinal flora. In turmeric, the composite curcumin is a vigorous ingredient. Studies have shown that curcumin has anticancer and chemopreventive effects on breast cancer. The anti-cancer property of curcumin has been substantially investigated for preventing breast cancer and as a medication to treat existing cancer. Curcumin aids in arresting the cell cycle regulates several processes in the affected breast cells and keeps unaffected tissue healthy by preventing the uncontrolled cell growth and metastasis of breast cancer cells. Including turmeric into one's regular diet represents one of the best methods to prevent hormone-related cancers such as breast cancer. This paper reviews the promising therapeutic effects of curcumin in inhibiting the progression of breast cancer with fewer side effects than allopathic breast cancer treatments. The paper provides a brief statement regarding the prevention of breast cancer using curcumin and lists clinical trials on curcumin that may be useful to both researchers and allopathic physicians.

INTRODUCTION

Cancer is a collection of more than 100 diseases which is uncontrollable and incurable in nature. It may occur at any time and any at age and in any part of the body and is a major health burden in both developed and developing countries (Bhagat & Chaturvedi, 2016). As of 2009, the number of cancer patients has increased continuously (Ali, Wani, & Saleem, 2011). Around 8.8 million cancer patients died in 2015 and 1 in 6 patients died due to cancer. Cancer is a family of diseases in which cells in the tissues of the body grow and divide without normal control (Yasmin, Sharif, & Mohsin, 2013). This uncontrolled division of cells aggregates the cells and forms a mass or lump called a tumor. These tumors may be cancerous or non-cancerous, which is also known as malignant and benign respectively. Malignant tumors can grow and spread (metastasize) to distant areas of the body. According to Susan (2016a),

one in eight women have been affected due to breast cancer. This disease impacts over 1.5 million women each year and also causes the greatest number of cancer-related deaths among women. A research study by Siegel, Miller, and Jemal (2017) showed that approximately 231,840 new kinds of invasive breast cancer were determined among women. Furthermore, 60,290 cases were added in its natural breast cancer. From 2012 to 2015, over 40,290 cancer patients, especially women passed away due to the breast cancer.

Breast cancer is one of leading causes (world's second position) of death among both men and women. There are two types of breast cancer: non-invasive breast cancer and invasive breast cancer (Susan, 2016b). Early breast cancer that is confined to a very specific area of the breast and has not spread to surrounding tissues in the breast or armpit is known as non-invasive breast cancer. Non-invasive breast cancer (pre-cancerous) is an initial stage in which abnormal cells have not spread into the surrounding tissues. Early breast cancers that have spread beyond a very specific area of the breast to the surrounding area and/or armpit tissue are known as early invasive breast cancer. Invasive breast cancer usually first spreads to the lymph nodes from the original site, and then into the surrounding breast tissue. Mucinous (colloid) carcinoma, papillary carcinoma, and tubular carcinoma are types of invasive breast cancer.

A new bump or mass in the breast is a common indicator of breast cancer. Symptoms include skin irritation or dimpling, swell-

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ing of part of a breast, nipple pain, or scariness of the nipple or breast skin. Sometimes, breast cancer can spread to the axillary lymph nodes before the original mass in the breast is detected.

Staging is used to assess the size of a tumor, whether it has spread, and how far it has spread. There are two methods used to describe the breast cancer stage: the TNM system and a scale from 0-IV (Willet, Michell, & Lee, 2010). The tumor, nodes, metastases (TNM) system of staging is as follows: T represents the size of the tumor (a scale from 1 to 4), N represents the number of lymph nodes affected (X for no nodes and a scale from 0 to 3 when nodes are affected), and M describes how far the cancer has spread (0 for no spread, 1 for spread). In the second system, the staging of breast cancer is range from 0-IV. The highest stage of breast cancer is IV-metastases. Table 1 represents another method of breast cancer staging.

There are many different methods to treat breast cancer, including chemotherapy, surgery, targeted therapy, and radiotherapy. Lumpectomy, during which the tumor is removed from the breast while sparing as much healthy tissue as possible, is often the first therapeutic approach to treat breast cancer and is usually performed at an early stage (Tamas, Gabrielle, Andras, Yeo, & Padina, 2015).

All treatments have beneficial properties as well as negative side effects. However, herbal treatment (curcumin) for individual cancer patients presents the best chance of successfully treating cancer while reducing the side effects of treatment as much as possible. Curcumin is a useful botanical supplement due to its physiological properties, which include anti-oxidative, pro-apoptotic, antiproliferative, and anti-angiogenic effects. Through these properties and other natural mechanisms of action, curcumin appears to prevent/inhibit cancer cell growth during cancer treatment while limiting side-effects. Table 2 describes various cancer treatments and their side effects.

Turmeric for Preventing and Curing Cancer
Turmeric Description
Turmeric is a yellow pigmented powdered spice that has numerous curcuminoids (the principal of turmeric), which include 77% curcumin, 17% demethoxycurcumin, and 3% bisdemethoxycurcumin (Shanmugam et al., 2015). Turmeric is isolated from the rhizomes of Curcuma longa, which is a member of the Zingiberaceae family (Bhowmik et al., 2015). Turmeric is obtained from the root of Curcuma longa, which is a green leafy plant belonging to the ginger family.

The main effective ingredient in turmeric is curcumin. It has powerful anti-inflammatory effects and is a very strong antioxidant (Lantz, Chen, Solyom, Jolad, & Timmermann, 2005). Its neutral radicals stimulate the body's own antioxidant enzymes. Turmeric is very medically useful in treating many health disorders such as liver problems, digestive disorders, skin diseases, and wounds. Turmeric has long been used in medicine as an anti-inflammatory treatment. Curcumin reduces cancer growth by targeting several related pathways and preventing molecule deregulation (Prianca, 2013).

Turmeric plants grow well at temperatures between 20°C and

Stage	Cancer Growth Level
I	The tumor is smaller than 2 cm and has not spread outside the breast.
II	Generally, the cancer tumor size is greater than 2 cm (>2 cm) but lesser than 5 cm (<5 cm) which is not spread to adjacent lymph nodes.
III	The size of a tumor is not definite and it will spread to more than 10 nodes in axilla/internal mammary lymph nodes. Due to these effects of cancer, they are enlarged in the breast.
IV	Cancer, regardless of size, has spread to distant organs such as to the bone, liver, lung, or lymph nodes.

Table 1. Stages of breast cancer.

30°C and need a considerable amount of annual rainfall to thrive. These plants grow to a height of 1 meter and have oblong leaves. Turmeric has a dark yellow color on the outside with the inside being orange. In common, natural plants are yearly form a group for their stems and certain stems are reseeded in the following season. The rhizome from which the turmeric is derived is tuberous with a rough and segmented skin. In ground, they mature beneath the plant's flora. The main rhizome is pointed or tapered at the distal end and measures 1 to 3 inches in length and 1 inch in diameter, with smaller tubers branching off. Turmeric rhizome can be ground to a yellow powder when it is dried. It has slightly acrid and bitter taste.

Turmeric has a long history of medicinal use and continues to be used by traditional practitioners. The plant has been shown to have a significant antimicrobial ability and has been used for centuries to treat infections and wounds as well as associated pain and inflammation.

Health Benefits for the Prevention and Cure of Cancer
The anti-cancer potential of turmeric (curcumin) has received substantial interest from researchers in recent years. Figure 1 shows the anti-cancer activities of curcumin, which suppress the growth of tumor cells and inhibit cancer invasion and metastasis (Shanmugam et al., 2015). The curcumin and the water extracts of turmeric protect against DNA damage. The anti-inflammatory and antioxidant effects of the herb appear to inhibit cancer induced by the cell cycle. Curcumin in turmeric plays an important role in treating several types of cancer, including breast cancer, by promoting cancer cell death, minimizing inflammation, and slowing down tumor growth. It also contains polyphenol curcumin (Superoxide dismutase 1 (SOD1)), which has been clinically demonstrated to prevent cancerous cell development in the prostate as well as to inhibit melanoma, chest sickness, brain tumor, pancreatic harm, and leukemia, among many others (Kocaadam, & Sanlier, 2015). Curcumin may be useful in neutralizing chest and prostate cancer developments. These effects are associated with disturbing and diminishing metastatic potential. Curcumin plays a positive role in preventing growth before tumors can arise and also in preventing metastasis. The generation of ROS and the c-Jun N-terminal Kinase (JNK) pathway prevents the formation of reactive oxygen

Cancer Treatment	Side Effects
Surgery	Bleeding, blood clots, damage to nearby tissues, pain, and infection
Radiation therapy	Fatigue, skin irritation, fever/chills, and mild-faint
Chemotherapy	Damage in many organ cells like the bladder, heart, kidneys, lungs, and nervous system, as well as hair follicles
Targeted cancer therapy	Skin problems, intense itching, allergies in the skin, trouble breathing, and dizziness.

Table 2. Cancer treatments and their side effects.

species (ROS) with the same efficacy of chemotherapeutic drugs by inducing apoptosis (Pramela, & Saikishore, 2013). Reduce tumor activation via JNK, apoptosis and cyclophosphamide-induced tumor regression with curcumin supplementation for human breast cancer. Invasive tumors are promoted by their individual, particularly established a network of blood vessels based on the process known as "Angiogenesis" (Barron, 2015). Curcumin minimizes the strength of these tumors by killing the abnormal cell clusters, in time of starving and create their own blood supply. This ingredient can produce beneficial anti-cancer effects at high doses of up to 3,600 mg per day (Yoon, Kim, Lim, Kwan, & Choi, 2010). Paraptosis (similar to apoptosis) is an anti-cancer effect that significantly reduces breast cancer size by stimulating paraptosis (the non-apoptotic form of programmed cell death that distinct from autophagy and apoptosis) in breast cancer cells. Curcumin stops the replication of cancer cells and changes them to a resting state.

Curcumin-based therapeutic agents produce fewer side effects as well as halting the cancer cells growth (Sundarajan, 2012). Curcumin encapsulated with theragnostic (therapeutic and diagnostic) magnetic nanoparticles was effectively used to treat triple negative breast cancer (treated with an integration therapy including surgery, chemotherapy and radiation therapy. Encapsulated curcumin enhances the curcumin used in cancer treatment via electrical pulses. Curcumin can inhibit breast cancer-related leptin gene expressions in T47D (invasive ductal carcinoma), which are breast cancer cell lines (HTB-133) with the metastatic origin, and a decrease in leptin gene expression and secretion was positively associated with a decrease in ERα expression (Nejati-koshki, Akbarzadeh, & Pourhassan-Moghaddam, 2014). The chemopreventive agent of curcumin has natural and synthetic substances that defeat or slow tumor formation in breast cancer with negligible side effects (Bachmeier et al., 2006). The primary target of chemoprevention occurs by inhibiting neoplastic (abnormal growth of tissue) cell transformation and inhibiting or discontinuing tumor promotion and progression. The approaches existent in the literature, curcumin wields its anti-cancer effects are different and under attack different stages of regulation in apoptosis and cellular growth. This natural compound can avoid chemoresistance in breast cancer cells by preventing the taxol-induced activation of Nuclear

Factor Kappa B (NFkB) this causes a tumor. Curcumin prevents metastases through the inhibition of NFκB and the AP-1-mediated expression of Major Matrix Metalloproteinases (MMPs). Curcumin-induced apoptosis (cell suicide) safely discards and degrades worn-out cells from the body without danger to other cells (Mock, Jordan, & Selvam, 2015; Nejati-koshki et al., 2014).

The Receptor Activator of Nuclear Factor Kappa-B (RANKL) is a protein molecule that is present in breast cancer cells in high amounts. Mostly these tumor cells are highly active and spread more aggressively. Curcumin is widely used to reduce RANKL in tumor cells. Curcumin can block RANKL and other inflammatory and tumor-promoting molecules in cells such as LOX-5, COX-2, TNF, NFKbEGFR, MMP2, TGF-B1, bFGF, and VEGF. Turmeric was used in various herbal formulas to treat and prevent breast cancerous cells.

One of the most familiar breast cancer cells is the Michigan Cancer Foundation-7 (MCF-7). Turmeric creates anti-cancer activity against MCF-7 cell lines as well as leukemic THP-1 (Priyanka, & Shubhangi, 2015). SRB (Sulforhodamine-B) and MTT (2-5 dimethyl tetrazolium) were used to assess cell cytotoxicity with a microplate reader and IC50 value. Curcumin has anti-inflammatory properties, which reduce pain and minimize whole-body damage after radiation treatment. It also protects the p53 gene in pre-cancerous breast cells when the remaining DNA is damaged and is protective in potentially pre-cancerous or re-cancerous cells without any side effects.

Curcumin participates in many beneficial biological activities in breast cancer signaling pathways. Firstly, curcumin suppresses MMP gene expression activity. Curcumin also inhibits cell proliferation in triple-negative breast cancer cells through the Epidermal Growth Factor Receptor (EGFR) - Mitogen-Activated Protein Kinases (MAPK) signaling pathway. Furthermore, curcumin inhibits cell migration and invasion via the TGF-beta/ Smad pathway and the Akt/SKP2 signaling pathway. It also enhances sensitivity and induces apoptosis to tamoxifen. Lastly, curcumin reduces metastatic activity in estrogen receptor-negative breast cancer cells.
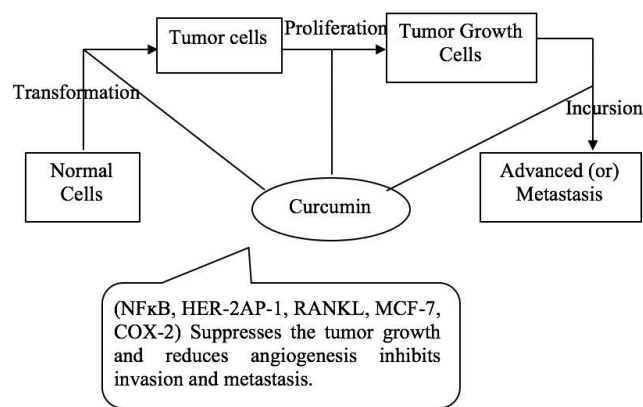
Figure 1. Circumin anti-cancer characteristics.

Nutritional Profile

Turmeric is made up of protein (6.3%), fat (5.1%), carbohydrates (69.4%), water (13.1%) and minerals (3.5%) (Nisar et al., 2015). The plant contains iron, calcium, copper, zinc, manganese, and potassium and is also a good source of vitamin B6, vitamin C, and vitamin E (Turmeric Nutrition Facts, 2009). Iron is an important co-factor for cytochrome oxidase enzymes in metabolism at the cellular level and is required for red blood cell production. Manganese is utilized by the human body as a co-factor for the anti-oxidant enzyme superoxide dismutase. Potassium is an important component of healthy cell growth as well as the fluids that help regulate blood pressure and heart rate.

Turmeric is an easily available herb that contains a phytonutrients profile. These phytonutrients have important activities such as anti-inflammatory, antibacterial, antioxidant, and antiprotozoal properties. Curcumin is an antioxidant compound and non-toxic novel drug not only to control breast cancer and also controls various diseases such as carcinogenesis, inflammatory disorders and oxidative stress-induced pathogenesis.

Curcuminoids [1,7-bis (4-hydroxy-3-methoxyphenyl)-1, 6 heptadiene-3, 5-dione (diferuloylmethane)] are phenolic compounds present in turmeric. Phenolic compounds are powerful antioxidants that defend the human body against free radicals. Turmeric is abundant in curcuminoids, which enhance the antioxidant activity of the plant. Curcuminoids are a group of chemical compounds of turmeric which consists of bisdemethoxycurcurmin, curcumin and demethoxycurcumin. Figure 2 shows the structure of three curcuminoids (Mock et al., 2015). These have the property against breast cancer growth called antioxidant activities which can be exploited to shelf-life of food and retain their functionalities include functionality, nutritional quality, palatability and safety. Curcuminoids (natural polyphenols) are used to improve cell communication and to minimize prostaglandins and cytokines. The active components of turmeric are flavonoid curcumin (diferuloylmethane) and essential oils obtained through the distillation (steaming) of turmeric rhizomes, which include sabinene -0.6%, acineol -1%, a-phellandrene -1%, borneol -0.5%, diferuloylmethane 3-4%, and zingiberene -25% (Akram, Shahab, Khan, & Asif, 2010). These components are extracted from turmeric essential oil, which can combat serious health problems. These diverse substances also have their own remarkable nutritional value and carry many medicinal benefits. In industry-based applications, curcumin act as a pigment in turmeric extract called turmeric oleoresin (starting material) and other composites are proteins, resins and sugars. Despite 0.3-5.4 % of raw turmeric, curcumin is an active constituent.

Clinical Trials

A clinical trial administered curcumin to 25 patients with pre-destructive changes in various organs. A group of reverse smokers are known to be at a high risk due to palatal cancers. A dose of 1g/day of turmeric was administered for a period of 9 months (Aggarwal, Kumar, & Bharti, 2003). As a result, turmeric considerably helps the precancerous lesions progression and genotoxic damage.
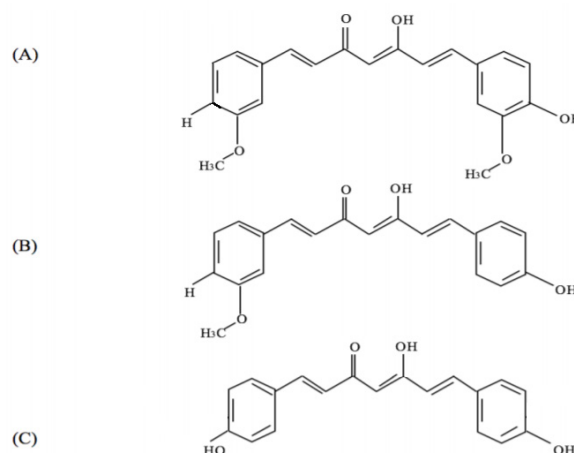
Figure 2. Structures of Curcuminoids. A) Curcumin. B) Desmethoxycurcumin. C) Bisdemethoxycurcumin.

The study demonstrated that curcumin could stop the precancerous changes related to malignant tumor development. Research has likewise demonstrated that there are low rates of cancer in nations in which individuals eat curcumin at levels of approximately 100 to 200 mg per day over long periods of time.

A wide variety of studies also revealed that the seeds of curcumin have the potential to destroy cancerous cells. Docetaxel is a microtubule inhibitor that is used to treat metastatic disease or in combination with other chemotherapeutics in the early stages of breast cancer (Subash, Sridevi, & Bharat, 2012). An open-label phase I trial including 14 patients consisted of administering Docetaxel (100mg/m2) as a 1-h intravenous infusion 3 weeks on day 1 of the week for six cycles. Curcumin was given orally at 0.5g/day for seven consecutive days in a cycle and escalated until a dose-limiting toxicity occurred. Furthermore, 14 patients with the stage of metastatic breast cancer (advanced stage) were given 100mg/m3 of docetaxel every 3 weeks on day 1 of the week for 6-cycles as well as orally escalating dose of curcumin was provided for 7 consecutive days ranging from 500 mg/day until a dose-limiting toxicity was observed (Bayet-Robert et al., 2010).

Curcumin is used as a chemopreventive agent for patients with high-risk/pre-malignant lesions (Aggarwal et al., 2002). Curcumin was administrated orally at 8,000mg/day and tested on 25 patients with an age of 60 years in a 3-month regimen. Curcumin is not toxic to humans even at high doses. To analyze the growth inhibitory activity of curcumin, breast cancer cells such as MDA-MB-231 and MCF-7 were treated with curcumin for 1 or 2 days, and cell activity was measured using an MTT assay (Lv et al., 2014). The growth of these cells significantly decreased over a period in a dose-dependent manner.

Curcumin is an inhibitor of NFκB and has been shown to de-

crease NFκB activation in human participants (Williams, 2017). To decrease NFκB, participants consumed 8 grams of curcumin by mouth daily for 8 weeks and showed tolerance with no associated toxicities in patients with pancreatic cancer and other premalignant conditions. Curcumin also inhibited the camptothecin-induced death of cultured breast cancer cells and attenuated cyclophosphamide-induced breast tumor regression. Breast cancer patients receiving cytotoxic chemotherapy are excluded from curcumin-based chemoprevention trials because it exhibits serious side effects on patients with breast cancer. Cancer patients treated daily with PF4FP capsule which contains 0.018 grams curcumin and 0.002 grams desmethoxycurcumin and 0.2 grams of curcuma essential oils with 0.18 grams curcumin. According to an oral curcumin study, observing the production of PGE2 could be helpful for clinical trials using other COX-2 inhibiting agents (Plummer et al., 2001). Turmeric has been successfully used in the treatment of bowel cancer, breast cancer, and skin cancer cells.

Several positive clinical animal model studies have led to curcumin clinical trials to test its efficacy and safety as a chemopreventive agent. Some of these clinical trials have already been completed, the results of which are as follows. Curcumin was tested in rats along with anti-nephrotoxicity CUR at 200mg/kg for a period of 50 days (Kalpravidh et al., 2010). The end results suggested that turmeric can considerably reduce the activities of inflammation and apoptosis through the histopathological examination. Cottonseed oil which contained curcumin was administrated in mice at 5 mg/day for 4 weeks, which inhibited the growth of PC3 xenografts (Hatcher Planalap, Cho, Torti, & Torti, 2008). Oral curcumin of 8 g/day was administrated for three months that have been studied in human. Curcumin inhibits the development of intestinal adenomas (Pramela & Saikishore, 2013).

The comparative benefits of both turmeric and chemotherapy (without turmeric) breast cancer treatment have been studied in various stages of patients with breast cancer (Bayet-Robert et al., 2010; Hung et al., 2012; Pramela, & Saikishore, 2013).

In TNBC, curcumin was given orally at 30μmol/ml and 6g of docetaxel per day for 3 consecutive weeks in a cycle. This action significantly prevented cancer cell proliferation. Consumption of 45mg of Dimethyl Sulfoxide (DMSO) by HER2-positive breast cancer patients for 4 weeks suggested that curcumin inhibited the development of intestinal adenomas and reduced the presence of mutated BRCA genes (Hung et al., 2012). Oral curcumin was administered for inflammatory breast cancer at a dosage level of 1.5g per day for 30 days. This led to a drastic reduction in inflammation and apoptosis during histopathological examination. Curcumin also provides benefits in advanced or metastatic breast cancer, in which docetaxel was administered at 100mg/m2 for 3 weeks. 70% to 90% of patients developed grade 3-4 neutropenia (Stemmler et al., 2001). Curcumin demonstrated safe, well tolerated, efficacious treatment for breast cancer cells.

In chemotherapy treatments, various drugs are consumed depending on the tumor characteristics and breast cancer type. Trastuzumab (Herceptin) was consumed in TNBC to kill cancer cells throughout the body. HER2-positive cancer was treated with trastuzumab (Herceptin) and pertuzumab (Perjeta) to kill cancer cells that have spread to other parts of the body. Anthracycline, doxorubicin, epirubicin, and paclitaxel are taken for inflammatory breast cancer. These treatments determine and attack cancer cells. In advanced or metastatic cancer, tamoxifen, aromatase, and goserelin are consumed to shrink or slow the growth of tumor cells.

Turmeric provides many benefits without side-effects, whereas chemotherapy treatments present with many side-effects such as shortness of breath, leg swelling, severe fatigue, severe diarrhea, and others.

DISCUSSION

Turmeric is a fascinating herb that can be used to treat all types of breast cancers such as triple-negative breast cancer, HER2-positive breast cancer, inflammatory breast cancer, and advanced or metastatic breast cancer, among others. Conventional treatments such as radiotherapy, chemotherapy, and others present difficulties because they kill healthy cells and cause permanent damage to other organs of the body. Curcumin from turmeric helps prevent breast cancer by managing the normal growth of cells as well as controlling the changes of pathways in breast cancer cells. This controlling pathway inhibits the growth of cancer cells as well as cancer cell division without affecting neighboring cells.

This paper compiles a description of turmeric, including the history, essence, as well as its several uses for preventing breast cancer. This review details the clinical trials of breast cancer models. Curcumin was found to inhibit the formation of tumors and cancer cell proliferation. However, most of the clinical trials were conducted directly on human beings, which presents with risks in human activities. In clinical trials, a small amount of curcumin was consumed for a long period, which presented with ineffective results and slowed the inhibiting process. Notably, an excessive dosage of curcumin could also cause ulcers or cancer and reduce the number of red and white blood cells in the body. Most clinical trials administer curcumin dosages at a constant level, and the levels are not changed based on the severity of breast cancer. Constant doses of curcumin over a long period of time can produce gastrointestinal side-effects. There are several challenges and risks in curcumin that hinder its use in preventing and treating breast cancer. (i) The hydrophobic nature of curcumin results in very low solubility in aqueous solutions. (ii) Curcumin stability is one of the largest challenges in cancer treatment due to its poor bioavailability, especially upon oral administration. The herbal spice of curcumin indicates low absorption and poor solubility. Therefore, its administration in nanoparticles is beneficial due to their characteristics of greater solubility and absorption (Lee et al., 2014). In-depth studies on the biological interactions between cells and curcumin nanoparticles are needed to obtain a better understanding of the mechanism to increase colonic residence duration and selective accumulation in inflamed tissues.

In metastatic breast cancer, docetaxel was considered the best drug to inhibit breast cancer cells; however, it had a long re-

sponse time. The response rate of the dosage will be improved by combining docetaxel with paclitaxel. Cottonseed oil containing dissolved curcumin was also considered in clinical trials but led to allergic reactions ranging from skin irritation to difficulty in breathing and hypotension due to high doses. The problems related to curcumin administration will be investigated in the future, and a detailed study is required to create awareness regarding the use of curcumin to cure different breast cancer types and the appropriate dosage levels.

Curcumin is safe and presents fewer side-effects. The permissible dosages of various forms of turmeric are: cut root, 1.5 to 3.0g; dried powder, 1.0 to 3.0g; and supplement, 1.2 to 1.7g. A broad population consumes curcumin based on these dosage levels to prevent cancer as well as other common diseases such as jaundice, venereal diseases, bloody urine, hemorrhage, toothache, chest pain, and others. The consumption of larger doses of curcumin leads to skin problems, nausea or vomiting, and indigestion. However, these are minor side-effects compared with those of anti-cancer drugs. A broad range of cumin users also consult with doctors before including turmeric in a regular diet.

Nearly 99% of breast cancer cases occur in women due to unawareness (Holy, 2016). To reduce this level, breast cancer awareness must be increased, including education regarding its causes in earlier stages and in maintaining a regular diet beginning in childhood. Curcumin prevents breast cancer and reduces breast cancer cell proliferation to 38% of its previous rate after consuming the appropriate dosage (Sundararajan, Cooper, & Natarajan, 2015). In forthcoming reviews, regular dosages of curcumin used to avoid minor side-effects will be discussed.

CONCLUSION

Turmeric has been used in Ayurvedics and Chinese medicine as an anti-inflammatory medicine to treat various medical problems such as those associated with the liver, skin, and wounds. Curcumin provides benefits for breast cancer treatment when used alone and for cancer treatment in combination with conventional therapies, as it inhibits various breast cancer cells and suppresses tumor growth with fewer side effects. Clinical trials with curcumin have promising results regarding its safety, tolerability, non-toxicity, and efficacy. Curcumin has been used in many countries for various medical treatments and is able to target multiple signaling pathways implicated in breast cancer. The herb represents a safe and promising molecule for treating cancer as well as other diseases.

In the future, the molecular mechanism of herbal spices will be explored, including a discussion of carefully controlled trials for establishing the effectiveness of turmeric and its precious medical properties. This study discussed the side-effects induced by allopathic treatments in patients with various types of breast cancers, such as fatigue, skin irritation, fever/chills, bleeding, blood clots, damage to nearby tissues, pain, infection, and others. The side effects will be subjected to statistical tests to raise awareness in both affected and non-affected people. Curcumin treatments in

subjects at various ages based on the severity of breast cancer will also be concentrated on. This study only addresses turmeric and its biological activities for breast cancer treatment. In the future, the survey will be extended to address the prevention and inhibition of breast cancer cells in other spices such as cardamom, fenugreek, and cinnamon.

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