**Some Active Compounds Preventing and Treating Breast Cancers**

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Medicinal herbs and their active compounds are recognized as complementary treatments and prevention strategies for cancer. A lot of clinical trials have reported beneficial results of medicinal herbs and their active compounds for survival, immune modulation, and quality of life for cancer patients, when these medicinal herbs are used with a combination of conventional treatments [1].

 **Anticancer Effects of Medicinal Herbs and Their Active Ingredients**

Lots of clinical studies have indicated the spectrums of anticancer activities of various medicinal herbs are given below.

**Herbs for Breast Cancer**

* **Ginseng**

Ginseng has undergone countless investigations over the past two decades and is now recognised as one of the most often utilised medicinal herbs. The primary constituent of red variation ginseng, ginsenoside type Rh2, inhibits the growth of breast cancer cells in an in vitro experiment utilising the MCF7 breast cancer cell line. According to studies, ginseng use among cancer patients is rising for a variety of reasons, including how it enhances chemotherapeutic drug effectiveness, improves quality of life, and treats cancer-related symptoms. It also has properties and Rg-3 that have anticancer effects, though the molecular mechanisms are still unknown.

* **Garlic *(Allium Sativum)***

Sulphur compounds, which are more prevalent in garlic's fresh or crushed forms, have a larger concentration in garlic. Garlic has a variety of active substances, including alliin, however alliin is the most important one. Raw garlic contains alliin, an amino acid that is changed into allicin by the presence of the enzyme alliinase. The distinctive smell of garlic is caused by the active ingredient allicin. Allicin is an unstable substance that swiftly transforms into diallyl disulfide, a stable substance, because of its self-reactive characteristics. Numerous studies have demonstrated that garlic and the active ingredient diallyl disulfide slow the spread of breast cancer in both animal and human cells. Its mechanism of action involves encouraging apoptosis, controlling cell cycle arrest, and activating specific enzymes. These processes are in charge of eliminating substances that cause cancer.

* **Tumeric (*Curcuma longa*)**

Turmeric roots contain major active compound called curcuminoid. Curcuminoids are the polyphenol compounds this is mainly divided into three parts curcumin 1, curcumin 2 and Curcumin 3. The substance known as curcumin is non-toxic and secure. due to its anti-inflammatory and antioxidant qualities, it has medicinal value in treating various disorders. Numerous research have demonstrated the chemopreventative and therapeutic effects of curcumin against breast cancer and reported that it has an anti-cancer impact. Due to its anti-proliferative properties, the anticancer drug induces apoptosis, cell cycle arrest, and several enzymes are modulated. For several medications used to treat cancer, such as paclitaxel and docetaxel, curcumin acts as a bioenhancer. Liposomes and nanoparticles can be used to induce curcumin's property [2].

**. Green Tea (*Camellia Sinenis*)**

Catechins, which make up 30–40% of the dry weight of green tea leaves, are the primary active substance present in these leaves. These catechins have relative quantities of 13%, 6.4%, 59%, and 19% of epicatechin-3-gallate (ECG), epicatechin (EC), epigallocatechin-3-gallate (EGCG), and epicatechin (EC) [3]. Green tea and its principal active ingredient, EGCG, have been shown in numerous clinical investigations to have antineoplastic effects against breast cancer [4]. Numerous studies have demonstrated that green tea has antineoplastic properties and interacts favourably with traditional chemotherapy medicines. It works by modulating many intracellular signalling pathways, which is its mechanism. Apoptosis is significantly induced by the principal active ingredient of this substance, EGCG. a cup of green tea Because they slow the growth of breast cancer in premenopausal women and also prevent its recurrence, polyphenols and other ingredients are helpful in the treatment of breast cancer [2].

* **Linseed (*Linum usitatissimum*)**

Linseed, commonly known as flax seed, contains short chain omega-3 fatty acids and many other nutrients [5]. The possible health benefits of linseed are mainly due to the presence of alpha-linolenic acid. It contains insoluble as well as soluble fibers, mainly lignans, which have estrogenic and antioxidant effects [2]. Studies have observed that consumption of linseed decreases the risk of breast cancer. In the Ontario Women’s Diet and Health Study, it was reported that in the case-control study, the number of cases (2999) (breast cancer patients) and the number of controls (3370) showed that consumption of flaxseed significantly decreased the risk of breast cancer [6]. Tamoxifen is a well-known medicine used for the treatment of positive estrogen receptors and metastatic breast cancer [7]. But it also has many side effects, such as hot flashes, So the intake of flaxseed and soy, which are rich in phytoestrogens, decreases the side effects and enhances the effect of the drug Tamoxifen [8]. A study on mice reported that consumption of flaxseed with tamoxifen decreased the growth of tumor cells by 74%, while 53% caused tumor regression [ 9].

* **Black Cumin (*Nigella sativa*)**

Nigella sativa is a medicinal herb that has many active compounds. But its main active compound is thymoquinone. This active compound is found in Nigella sativa in amounts ranging from 30 to 48% [10]. There are many studies that have proven that the active compound thymoquinone inhibits tumorigenesis and enhances apoptosis in cell lines of breast cancer [11]. It also shows antineoplastic properties [12]. Similarly, in another in vitro study, it was investigated whether long-term use of thymoquinone inhibited the proliferation of breast cancer cell lines in humans [13]. The combination of conventional anti-cancer drugs and thymoquinone enhances the effect of the drug [14].

These herbs have an anti-cancer effect due to their active compounds. The anti-cancer properties of conventional antineoplastic drugs such as paclitaxel, doxorubicin, 5-fluorouracil, and tamoxifen can be improved by the combination of these anti-cancer herbs, which also decreases their toxicity. It is also required to nano-formulate these active compounds and co-deliver them with conventional chemotherapeutic drugs to enhance their effectiveness.

Finally, by using these unique biologically active compounds from these herbs, we can improve the quality assurance, harmful effects, and safety factor of conventional antineoplastic drugs. More clinical trials are required to provide key evidence for these medicinal herbs.

* Yin, S.-Y. *et al.* (2013) ‘Therapeutic applications of herbal medicines for cancer patients’, *Evidence-Based Complementary and Alternative Medicine*, 2013, pp. 1–15. doi:10.1155/2013/302426.
* McGrowder, D.A. *et al.* (2020) ‘Medicinal herbs used in traditional management of breast cancer: Mechanisms of Action’, *Medicines*, 7(8), p. 47. doi:10.3390/medicines7080047.
* Cabrera, C., Artacho, R. and Giménez, R. (2006) ‘Beneficial effects of green tea—a review’, *Journal of the American College of Nutrition*, 25(2), pp. 79–99. doi:10.1080/07315724.2006.10719518.
* Zhang, M. *et al.* (2006) ‘Green tea and the prevention of breast cancer: A case-control study in Southeast China’, *Carcinogenesis*, 28(5), pp. 1074–1078. doi:10.1093/carcin/bgl252.
* Dribnenki, J.C. *et al.* (2007) ‘2149 solin (low linolenic flax)’, *Canadian Journal of Plant Science*, 87(2), pp. 297–299. doi:10.4141/p05-082.
* Lowcock, E.C., Cotterchio, M. and Boucher, B.A. (2013) ‘Consumption of Flaxseed, a rich source of Lignans, is associated with reduced breast cancer risk’, *Cancer Causes &amp; Control*, 24(4), pp. 813–816. doi:10.1007/s10552-013-0155-7.
* Puhalla, S., Brufsky, A. and Davidson, N. (2009) ‘Adjuvant endocrine therapy for premenopausal women with breast cancer’, *The Breast*, 18. doi:10.1016/s0960-9776(09)70286-3.
* VandeCreek, L.; Rogers, E.; Lester, J. Use of alternative therapies among breast cancer outpatients compared with the general population. Altern. Ther. Health Med. 1999, 5, 71–76.
* Chen, J. *et al.* (2004) ‘Dietary flaxseed enhances the inhibitory effect of tamoxifen on the growth of estrogen-dependent human breast cancer (MCF-7) in Nude mice’, *Clinical Cancer Research*, 10(22), pp. 7703–7711. doi:10.1158/1078-0432.ccr-04-1130.
* Boskabady, M.H.; Shirmohammadi, B. Effect of Nigella sativa on isolated guinea pig trachea. Arch. Iran. Med. 2002, 5, 103–107.
* Sundaravadivelu, S. *et al.* (2019) ‘Reverse Screening Bioinformatics Approach to identify potential anti breast cancer targets using thymoquinone from neutraceuticals black cumin oil’, *Anti-Cancer Agents in Medicinal Chemistry*, 19(5), pp. 599–609. doi:10.2174/1871520619666190124155359.
* Rajput, S. *et al.* (2013) ‘Molecular targeting of AKT by thymoquinone promotes G1 arrest through translation inhibition of cyclin D1 and induces apoptosis in breast cancer cells’, *Life Sciences*, 93(21), pp. 783–790. doi:10.1016/j.lfs.2013.09.009.
* Motaghed, M.; Al-Hassan, F.M.; Hamid, S.S. Cellular responses with thymoquinone treatment in human breast cancer cell line MCF-7. Pharmacogn. Res. 2013, 5, 200–206.
* Ganji-Harsini, S.; Khazaei, M.; Rashidi, Z.; Ghanbari, A. Thymoquinone could increase the efficacy of tamoxifen induced apoptosis in human breast cancer cells: An in vitro study. Cell J. 2016, 18, 245–254.