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Breast Cancer and Non-conventional Treatments: A Mini Review

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Abstract

Cancer is a disease recognized as an uncontrolled multiplication and spread of abnormal forms of the body's own cells. It is incurable and a mortal disease, but recently, researches are developing and progressing in order to find a cure against this disease. Then attention is put on using and introducing herbal medicine due to their safety and effectiveness. A critical discussion is presented about the possible role of phototherapy of being a serious cure for some kind of cancer which includes breast cancer. This review article focuses on the current natural treatments available for breast cancer prevention, the management or even its treatment and the consequence of their use.

1. Introduction

Breast cancer is the major frequent reason of mortality amongst women world that affects also men (Bolton *et al.*, 2019). It is known as a genetic disease with mutations of BRCA gene but it can have epigenetic factors which are integrated into this disease; such as age, smoking, diet, habit, infection disease, rays etc. (Hortobagyi *et al.*, 2005). Those factors play a pivotal role in cancer development. However, medicine has always been an art of caring for the human being as a whole. The treatment and management of these diseases use various approaches like surgery, radiotherapy, hormone therapy and chemotherapy (Lukaszewicz *et al.*, 2010). For premature and locally advanced breast cancer, treatment is used to the aims of curing, while for metastasis (Spread of cancer cells from the place where they first formed to another part of the body according to the National Institute of Cancer NCI), the intent is an improvement in the clinical form of disease, quality of life and survival rates. Agents used to treat breast cancer are varied, such as alkylating agents (cyclophosphamide), chemotherapeutic agents (cisplatin), anti-metabolite (methotrexate), hormone and antagonist miscellaneous (Anjum, 2017), and natural products such as tamoxifen and doxorubicin that their use showed an improvement survival percentage (Borner, 1994; Hanrahan *et al.*, 2005). The goal of therapies is to ensure the maximum lethal effect on tumour cells. Unfortunately, it also attacks some healthy cells that cause side effects such as nausea, vomiting, mucositis, neutropenia, myelosuppression, fatigue (Zhang *et al.*, 2002). Recently, several pathways have been inaugurated to develop molecules aimed at reducing the toxicity of cancer treatments (Lewis, 1994). Taking the example of chemotherapy, one of the most used conventional therapies; agents which are currently used to reduce the toxicity of chemo treatment, are divided into two families: The first is known as

chemoprotective drugs which aim to decrease the toxic effect of chemotherapy on healthy tissue without reducing anti-tumour activity (Raymond, 1996). The second family presented by the chemo-correctors which are drugs that interfere with mechanisms independent of the cytotoxicity of anticancer drugs. Nevertheless, it should be mentioned that in this arsenal of drugs most of the molecules are derived from chemical synthesis and cannot be without side effects. In order to find an alternative to the use of these synthetic molecules; pharmaceutical research is oriented more towards the exploitation of molecules of natural origin as a medicinal plant and the introduction of phytotherapy. This review aims to introduce the different a medicinal plant used all over the world and taking apart of preventing breast cancer and protecting against side effect showed while using conventional medicine.

2. Medical plant and their protective part on breast cancer

The reason so to continue to assess unconventional therapies is the purpose of quality of life improvement and increasing the number of survivals. According to the estimation of the World Health Organization, people living especially in Asia, Latin America and Africa, 80 % of the world population, still relies on herbal medicine and phytotherapy (Robinson, 2011; Xu and Chen, 2011). Phytotherapy is standard as the employ of plants and plant product for medical purpose.

The success of medicinal plants at reducing the adverse effects of cancer therapies has encouraged researchers to look for a protective, preventive or even curative effect of different natural extract such as herbs, fruits, leaves, flowers, lichens and fungi, medicinal plants etc. (Shareef, 2016). Those medicinal plants are complex mixtures of one or more plants which contain active ingredients. A range of herbs has been used to prevent the development of breast cancer or to protect against side effects

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produced after conventional treatment. These plants proceed thanks to the active substances they contain such as flavonoids, ligands polyphenols, carotenoids, terpenoids. This action is measured by the maintenance of the immune system and the stimulation of anti-tumour properties.

Medicinal plants used against breast cancer are vast, taking the example of Chinese Medicinal Herbs, which are known according to researches; to have a beneficial effect during the treatment of breast cancer by controlling the side effects and toxicities attributed to cancer therapies, preventing its recurrence, prolonging survival and improvement of bone marrow (Zhang *et al.*, 2007). Furthermore, those herbs are divided into two groups, the first one take care of reducing therapeutic toxicity, acting an anti-inflammatory and promoting blood circulation (Sun, 2002). The second class works aim to strengthen the resistance of the body and immunity, relieve fatigue, remove toxins and had an anti-neoplastic action (Borner, 1994). Same proprieties were observed in other natural extracts such as garlic, *Arctium Lappa*, *Curcuma longa* (Craig, 1999; Sakarkarm and Deshmukh, 2011). Research has proved that sterols present in plants stimulate different protective enzymes against breast cancer such as glutathione transferase and prevent cancer cell's proliferation. A broad spectrum of these plants is used as anti-breast cancer and their extract act by inhibiting the synthesis of mevalonate which leads to the synthesis of sterols and isoprenoids that are shown to be crucial for tumour-growth, so as a result, the inhibition leads to a decrease of the tumour (Buhaescu and Izzedine, 2007). For example, Green Tea plays a crucial role in treating and preventing breast cancer. It induces necrosis and apoptosis of tumour cells (Averi, 2006) and protects cells from DNA damage produced by oxygen reactive species (Keum, 2000). Data collected of daily green tea drinkers showed a significant lower mammographic density percentage (19.5%) than did non consumers (21.7%; $P = 0.002$), and utilization of either black tea or green tea lead to significant 50% decrease of the risk of breast cancer in women (Yuan, 2013). Echinacea act through raising the number of natural killer cells, promoting lymphocyte's activity leading to the increase of phagocytises by macrophages (Craig, 1999). Flaxseed is known to be used commonly by a breast cancer patient. It contains a rich supply of lignans which can be converted to mammalian lignans which appear to be anticarcinogenic, lignan metabolites and estrogens tolerate to have a structural similarity so lignan can unite to estrogen receptors and inhibit the growth of estrogen-stimulated breast cancer, and shown a low incidence of breast cancer tumour after injection. Furthermore, its use showed prevention of malignancies and reduction of tumour development (Tan *et al.*, 2004). It is important to mention that extract from other plants like *Vernonia amygdalina* was found to inhibit the proliferation of breast cancer MCF-7 cells (Yedjou *et al.*, 2018). From the other side, Genistein which is a principle isoflavonoid of soja has been demonstrated in inducing apoptosis in MCF-7 and T47D breast cancer cell lines (Levitsky and Dembitsky, 2015). In the last decades, attention has been paid not only to the treatment with medicinal plants, but also to their introduction into our eating habits. This fact has shown that the use of fruits, plants and their extract plays a major role in the prevention and treatment of cancers more specifically breast cancer. The consumption of olive oil and IH636 Grape Seed Extract on mammographic density in women at high risk of developing breast cancer, demonstrated according to The National Cancer Institute (NCI), a decrease in developing breast cancer thanks to hydroxytyrosol, a component of olive oil. Obtained from *Taxus brevifoliana* Taxol is a newly discovered chemotherapy agent gave positive responses to patients with metastatic breast cancer (Craig, 1999). From other side, Broccoli has a major role of protecting against breast cancer. The indole-3-carbinol contained in Broccoli can combat breast

cancer by converting a cancer-promoting estrogen into a more protective variety (Li *et al.*, 2018).

It is important to also assess the safety of each of these interventions. If a positive effect is sought, an intervention by definition can also always produce side effects. So according to research, there is insufficient data that doesn't guarantee the safety of those medicinal extracts (Cassidy, 2003). As it is proven recently, some element such as vitamin D which protect against breast cancer were demonstrated that its receptor (VDR) genes has a role of increasing breast cancer risk. The regulation of calcium transport during lactation, hormonal differentiation and milk production in the breast involves the exploitation of vitamin D; so much research has shown vitamin D as a risk factor for breast cancer to be targeted for the prevention of cancer (Khan *et al.*, 2013). So researches are progressing to provide the quality and efficiency of these products aiming to have a crucial cure of breast cancer.

6. Conclusion

Medicinal plants may have some adverse effects while using them during conventional treatment, but it is important to mention that the adverse effects of the phytotherapeutic agent are less as compared with synthetic drugs. So researches are continuing to the aim of providing the demanded quality with the same efficacy of medicinal plants. According to the above analyses, this research stated that the use of different medicinal plant and herbs have a great contribution to prevent breast cancer and protecting against side effect rather than using conventional medicine with mentioning that those extract are not always safe an medicine has to continue searching a radical solution without side effects of breast cancer.

References

1. Anjum F, Razvi N, Masood M.A., 2017. Breast cancer therapy: a mini review. *MOJ Drug Des Develop Ther.* 1(2):35-38. <https://doi.org/10.15406/mojddt.2017.01.00006>
2. Bolton, C.D., Sunil, T.S, Hurd, T., Guerra H., 2019. Hispanic Men and Women's Knowledge Beliefs Perceived Susceptibility and Barriers to Clinical Breast Examination and Mammography Practices in South Texas Colonias. *J Community Health.* <https://doi.org/10.1007/s10900-019-00682-1>
3. Borner, M., Bacchi, M., Goldhirsch, A., Greiner, R., Harder, F., Castiglione, M., et al., 1994. First isolated locoregional recurrence following mastectomy for breast cancer: results of a phase III multicenter study comparing systemic treatment with observation after excision and radiation. *Swiss Group for Clinical Cancer Research. J. Clin. Oncol.* 12(10), 2071-2077.
4. Buhaescu, I., Izzedine, H., 2007. Mevalonate pathway: a review of clinical and therapeutical implications. *Clin. Biochem.* 40(9-10), 575-584. <https://doi.org/10.1016/j.clinbiochem.2007.03.016>
5. Cassidy, A., 2003. Are herbal remedies and dietary supplements safe and effective for breast cancer patients?. *Breast Cancer Res.* 5(6), 300. <https://doi.org/10.1186/bcr724>
6. Craig, W. J., 1999. Health-promoting properties of common herbs. *Am. J. Clin. Nutr.*, 70(3), 491-499. <https://doi.org/10.1093/ajcn/70.3.491s>
7. Hanrahan, E.O., Broglio KR, Buzdar, A.U., Theriault, R.L., Valero, V., Cristofanilli, M., et al., 2005. Combined-modality treatment for isolated recurrences of breast carcinoma: Update on 30 years of experience at the University of Texas M.D. Anderson Cancer Center and assessment of prognostic factors. *Cancer: Interdisciplinary International Journal of the American Cancer Society*, 104(6), 1158-1171. <https://doi.org/10.1002/cncr.21305>
8. Hortobagyi, G.N., de la Garza Salazar, J., Pritchard, K., Amadori, D., Haidinger, R., Hudis, C.A et al., 2005. The global breast cancer burden: Variations in epidemiology and survival. *Clin. breast cancer*, 6(5), 391-401. <https://doi.org/10.3816/CBC.2005.n.043>
9. Keum Y.S., Park K.K., Lee J.M., Chun K.S., Park J.H., et al., 2000. Antioxidant and anti-tumor promoting activities of the methanol

- extract of heat-processed. *Cancer letters*, 150(1), 41-48. [https://doi.org/10.1016/S0304-3835\(99\)00369-9](https://doi.org/10.1016/S0304-3835(99)00369-9)
10. Khan, M. I., Bielecka, Z. F., Najm, M. Z., Bartnik, E., Czarnecki, J. S., Czarnecka, A. M., Szczylik, C., 2014. Vitamin D receptor gene polymorphisms in breast and renal cancer: current state and future approaches. *Int. J. Oncol.*, 44(2), 349-363. <https://doi.org/10.3892/ijo.2013.2204>
 11. Levitsky, D. O., Dembitsky, V. M., 2015. Anti-breast cancer agents derived from plants. *Nat. Prod. Bioprospect.*, 5(1), 1-16. <https://doi.org/10.1007/s13659-014-0048-9>
 12. Lewis, C., 1994. A review of the use of chemoprotectants in cancer chemotherapy. *Drug Safety*, 11(3), 153-162. <https://doi.org/10.2165/00002018-199411030-00002>
 13. Li, Y., Buckhaults, P., Li, S., Tollefsbol, T., 2018. Temporal efficacy of a sulforaphane-based broccoli sprout diet in prevention of breast cancer through modulation of epigenetic mechanisms. *Cancer Prev. Res.*, 11(8), 451-464. <https://doi.org/10.1158/1940-6207.CAPR-17-0423>
 14. Lukaszewicz, K., Wtorek, J., Bujnowski, A., Skokowski, J., 2010. Monitoring of breast tissue thermo-ablation by means of impedance measurements. In *Journal of Physics: Conference Series* (Vol. 224, No. 1, p. 012136). IOP Publishing.
 15. Raymond, E., 1996. Les médicaments chimioprotecteurs. Mécanismes d'action et applications cliniques. *La Revue de médecine interne*, 17(11), 936-944. [https://doi.org/10.1016/0248-8663\(96\)88125-2](https://doi.org/10.1016/0248-8663(96)88125-2)
 16. Robinson, N., 2011. Integrative medicine—traditional Chinese medicine, a model?. *Chin. J. Integr. Med.*, 17(1), 21-25. <https://doi.org/10.1007/s11655-011-0602-9>
 17. Sakarkar, D. M., Deshmukh, V. N., 2011. Ethnopharmacological review of traditional medicinal plants for anticancer activity. *Int J Pharm Tech Res*, 3(1), 298-308.
 18. Shareef, M., Ashraf, M. A., Sarfraz, M., 2016. Natural cures for breast cancer treatment. *Saudi Pharm. J.*, 24(3), 233-240. <https://doi.org/10.1016/j.jsps.2016.04.018>
 19. Sun, S. P., 2002. The development of traditional Chinese medicine in treatment of breast cancer. *Chinese Journal of Surgery of Integrated Traditional and Western Medicine*, 8(6), 455-7.
 20. Tan, K. P., Chen, J., Ward, W. E., Thompson, L. U., 2004. Mammary gland morphogenesis is enhanced by exposure to flaxseed or its major lignan during suckling in rats. *Exp. Biol. Med.*, 229(2), 147-157. <https://doi.org/10.1177/153537020422900203>
 21. Xu, H., Chen, K. J., 2011. Integrating traditional medicine with biomedicine towards a patient-centered healthcare system. *Chin. J. Integr. Med.*, 17(2), 83-84. <https://doi.org/10.1007/s11655-011-0641-2>
 22. Yedjou, C., Izevbigie, E., Tchounwou, P., 2008. Preclinical assessment of Vernonia amygdalina leaf extracts as DNA damaging anti-cancer agent in the management of breast cancer. *Int. J. Environ. Res. Public Health*, 5(5), 337-341. <https://doi.org/10.3390/ijerph5050337>
 23. Yuan, J. M., 2013. Cancer prevention by green tea: evidence from epidemiologic studies. *Am. J. Clin. Nutr.*, 98(6), 1676-1681. <https://doi.org/10.3945/ajcn.113.058271>
 24. Zaveri, N.T., 2006. Green tea and its polyphenolic catechins: Medicinal uses in cancer and noncancer applications. *Life Sci.*; 78(18), 2073-2080. <https://doi.org/10.1016/j.lfs.2005.12.006>
 25. Zhang, M., Liu, X., Li, J., He, L., Tripathy, D., 2007. Chinese medicinal herbs to treat the side-effects of chemotherapy in breast cancer patients. *Cochrane Database of Systematic Reviews*, (2). <https://doi.org/10.1002/14651858.CD004921.pub2>
 26. Zhang, W., Wang, B., & Shi, L. (2002). Application of traditional Chinese medicine in modern breast cancer therapy. *Chinese Journal of Integrated Traditional and Western Medicine in Intensive and Critical Care*, 9(1), 54.