

Role of Phytochemicals in the Prevention of Breast Cancer

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Worldwide, breast cancer is the most common cancer in females and is the leading cause of deaths in women. Statistically 30 % of all cancer in developed countries are diet related, breast cancer being no exception. Number of epidemiological and clinical studies strongly supported the association between nutrition and development of cancer, including breast. Lack of physical activity, alcohol consumption, obesity is some of the risk factors responsible for increasing the risk of breast cancer. It has been reported that consumption of fruits, nuts, vegetables etc. appear to be protective against breast cancer. Different mechanisms have been proposed behind the protective role of these dietary components. Phytochemicals or secondary metabolites present in these diets are majorly responsible for their protective action. These phytochemicals may be protective in action, by acting against oxidative stress, DNA damage or by blocking cancer pathways [1,2].

Many mechanisms have been reported for polyphenols in reducing the cancer recurrence such as (a) antioxidative nature of polyphenols (b) enhancing antioxidative gene (c) decreasing the proliferation of cancer cells (d) blocking transcription factors involved in cancer expression (e) by increasing histone deacetylase activity. Antioxidant effect is one of the key mechanisms that is responsible for the health benefits of polyphenols [3,4]. Reactive oxygen species (ROS) are radicals which damage critical biomolecules and eventually result in several biological effects ranging from alterations in signal transduction and gene expression to mutagenesis, mutagenesis and thus have mutagenic activity that promotes carcinoma initiation and progression. The potent antioxidant and anticancer activity of polyphenols is due to the ability of scavenging highly reactive species, such as ROS, reactive nitrogen species (NOS) chlorine species, peroxy-nitrous acid (ONOOH), and hypochlorous acid (HOCl) [5].

It has been that polyphenols block migration and invasion of breast cancer cells by regulating and inhibition of series of transcription factors viz. nuclear factor-kappa B (NF- κ B), epithelial-to-mesenchymal transition (EMT), vascular endothelial growth factor (VEGF), mammalian targeting function of rapamycin (mTOR), matrix metalloproteinases (MMPs) and other signaling pathways. High exposure of estrogen on estrogen receptor (ER) is highly related to breast cancer via increased cell proliferation. Several phytoes-

trogens owing to the similarity in the structure of non-steroidal compounds binds to the estrogen receptor and thus inhibit the action, as well as the production or interference of estrogens. Flavonoid compounds which are widely distributed in fruits and nuts involved in the recognition of ER receptors significantly reduced cancer size with decreased Cytochrome P450 enzyme [6].

Natural polyphenols present in diet play an important role in the prevention of breast cancer through broad spectrum of mechanistic actions. Many studies have shown that natural polyphenol inhibits cell proliferation, migration, invasion and inhibits metastasis formation. Polyphenols down regulate or inhibit many transcription factors which are responsible for breast cancer. Natural phytochemicals which are ant breast cancer agent might be used as chemotherapy agent may help impede the progression of breast cancer.

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