The Torch
Vol. 2 (14)

Plants in cancer chemoprevention

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Cancer, a major cause of death all over the world has led to the advancement of modern chemotherapies to improve the health of cancer patients. But advanced metastasised cancer remains challenging for which safer, effective and affordable chemoprevention and treatment become indispensable. Chemoprevention of cancer using various natural phytochemical compounds has been widely accepted to prevent and cure cancer. Natural compounds target cancer cells by inducing extrinsic and intrinsic apoptosis pathways and do not cause adverse side effects. Natural compounds have high binding affinities for specific receptor systems, and their biological activity is often highly selective. Phytochemicals, such as Vinca alkaloids, texans, podophyllotoxins, camphothecins, amygdalin, curcumin and quercetin have been clinically used as potent anticancer agents. Several compounds have been characterised, and in vitro and in vivo anticancer activity have been studied against cancer cell lines and animal models. Curcumin, gingerol and resveratrol have been reported to reduce breast, ovarian and skin cancers. To evaluate normal treatment approaches involving natural compounds, understanding how coding and non-coding RNAs, oncogenes, downregulated tumour suppressor genes, and mutated genes respond to these drugs is essential. Recent evidence suggests that differential gene expression in different cell lines is induced by flavonoids and alkaloids. Despite promising results from experimental studies, only a few of these compounds have been tested in clinical trials, which have shown variable results. Phytochemicals have several impacts on intrinsic DNA repair mechanisms and might influence tumour suppressors and inhibit cellular proliferation pathways. Understanding their interaction with cancer cells, the immune system and oxidative stress pathways might help in the emergence of safe, non-toxic and economical anticancer therapeutics in the future.

Keywords: Cancer, Natural compounds, Phytochemicals, Anticancer activity, Apoptosis

Citation:
Swathi B. Plants in cancer chemoprevention. The Torch. 2021. 2(14). Available from:
https://www.styvalley.com/pub/magazines/torch/read/plants-in-cancer-chemoprevention.