Natural Polyphenols: A Dietary Tool for the Prevention and Treatment of Cancer

Abu Hazafa, M.Phil Biochemistry, Department of Biochemistry, Faculty of Sciences, University of Agriculture Faisalabad, Pakistan.

Abstract

Statement of the Problem: The statistical analysis of cancer investigated as the second leading cause of death and major public health problem after cardiac arrest. In 2018, globally, 9.6 million people died because of cancer. The lung (11.6%), colorectal (10.2%), prostate (7.10%), skin (5.8%), and stomach cancer (5.7%) were reported as the most diagnostic cancer in previous years. Natural products are one of the richest sources of anticancer drugs, drug combinations, and chemotherapy strategies. Among all-natural compounds, polyphenols are suggested to be more potent anticancer drugs because of their no or less adverse effects, excess availability, and secure mode of action. Fruits, vegetables, beverages, and legumes are the primary sources of polyphenols. Aim: The present review investigated whether and how the natural compounds especially polyphenol namely flavonoids, phenolic acids, lignans, and stilbenes significantly reported in the prevention and treatment of cancer cells. Findings: The results stated that phenolic acids, lignans and stilbenes are examined in arresting the cell cycle at different phases such as S/G_2/M/G_1-phases during the treatment of colorectal (HCT-116), oral (H-400), bladder (T-24 and 5637*)*, and gastric (MKN-45 and MKN-74) cancer cells. The results revealed that polyphenols induced the apoptotic in the treatment of cervical (A-431), breast (MCF-7), prostate (DU-145), hepatocellular (hepG-2), and lung (SKLU-1) cancer cells, similarly polyphenols also reported in the treatment of breast (T47D and MDA-MB-231), cervical (HTB-35), colon (HT-29 and Caco-2), and prostate (PC-3) cancer cells by inhibiting the cell proliferation through various pathways including Wnt, NF-κB, Akt, caspase-3, MAPK, and CD95 pathways. Conclusion & Significance: Based on the *in vivo*, and *in vitro* studies, it is concluded that natural polyphenols mainly flavonoid and phenolic acids significantly reduced the cancer cells without affecting the healthy body cells. Recommendations are made that randomized clinical trials should be carried out for more trustworthy validation.

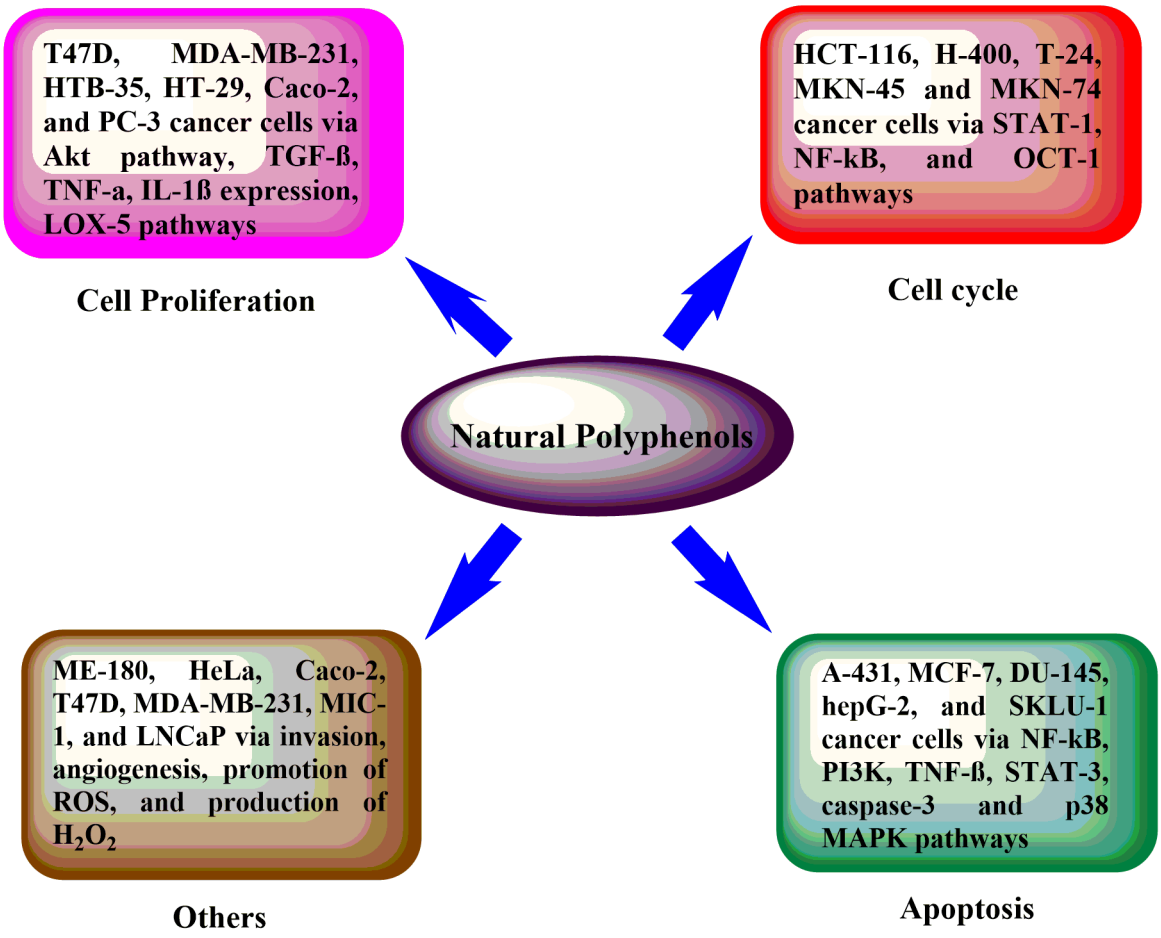


Figure 1: The treatment of different cancer cells by natural polyphenols: This figure represents the treatment of different cancer cells through various pathways.

References

1. Chen, H.-S., Bai, M.-H., Zhang, T., Li, G.-D., & Liu, M. (2015). Ellagic acid induces cell cycle arrest and apoptosis through TGF-β/Smad3 signaling pathway in human breast cancer MCF-7 cells. *International journal of oncology, 46*(4), 1730-1738.
2. Eroğlu, C., Seçme, M., Bağcı, G., & Dodurga, Y. (2015). Assessment of the anticancer mechanism of ferulic acid via cell cycle and apoptotic pathways in human prostate cancer cell lines. *Tumor Biology, 36*(12), 9437-9446.
3. Fantini, M., Benvenuto, M., Masuelli, L., Frajese, G., Tresoldi, I., Modesti, A., & Bei, R. (2015). In vitro and in vivo antitumoral effects of combinations of polyphenols, or polyphenols and anticancer drugs: Perspectives on cancer treatment. *International journal of molecular sciences, 16*(5), 9236-9282.
4. Guillermo-Lagae, R., Santha, S., Thomas, M., Zoelle, E., Stevens, J., Kaushik, R. S., & Dwivedi, C. (2017). Antineoplastic effects of honokiol on melanoma. *BioMed research international, 2017*.
5. Majdalawieh, A. F., & Mansour, Z. R. (2019). Sesamol, a major lignan in sesame seeds (Sesamum indicum): Anti-cancer properties and mechanisms of action. *European journal of pharmacology*.
6. Rayan, A., Raiyn, J., & Falah, M. (2017). Nature is the best source of anticancer drugs: Indexing natural products for their anticancer bioactivity. *PLoS One, 12*(11), e0187925.
7. Seca, A., & Pinto, D. (2018). Plant secondary metabolites as anticancer agents: successes in clinical trials and therapeutic application. *International journal of molecular sciences, 19*(1), 263.
8. Sun, G., Zhang, S., Xie, Y., Zhang, Z., & Zhao, W. (2016). Gallic acid as a selective anticancer agent that induces apoptosis in SMMC-7721 human hepatocellular carcinoma cells. *Oncology letters, 11*(1), 150-158.
9. WHO 2018. Available at: https://www.who.int/news-room/fact-sheets/detail/cancer
10. Hazafa, A., Rehman, K.-U.-., Jahan, N., & Jabeen, Z. (2019). The Role of Polyphenol (Flavonoids) Compounds in the Treatment of Cancer Cells. *Nutrition cancer*, 1-12.



Biography

This is Abu Hazafa. He is born on 15th October 1996 in Pakistan. He is M.Phil Scholar at the University of Agriculture, Faisalabad, Pakistan. He completed his M.Sc at the same subject and same university, and B.Sc with Zoology-Botany-chemistry combination from Punjab University, Lahore, Pakistan. He is organizer of A.Q Research Group, and he is also an associate member and research assistant at International Society of Engineering Science and Technology (ISEst), UK.

Email: abuhuzaifavirk@gmail.com