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ROLE OF PHYTOCHEMICALS IN THE CANCER TREATMENT AND ITS IMPACT: A STUDY

Priyanka[1], Dr. Dr. Parveen Kumar[2]

Department of Chemistry

[1,2]OPJS University, Churu (Rajasthan)

Abstract

Plant-derived items find numerous utilizations in our everyday life. The food that we eat can be made mouth-watering by sprinkling a touch of flavors or decorating with herbs. These are gastronomic; at the same time, they are utilized as medicines too since antiquated occasions. Ayurveda is an old idea in India which gained its prominence over the ages. Sanskrit words ayur (which means life) and Veda (which means science or information) have been amalgamated to coin the term Ayurveda which signifies "the science of life". Ayurveda is a part of medication that incorporates and balances our body, brain, and spirit, which is important for satisfaction and great health. Therefore, a growing interest is arising around phytochemicals role in cancer prevention and treatment. Recent research suggests that the investigation of "new" phytochemicals and related molecular targets can be exploited to identify novel anti-cancer drugs, following sequential steps. This approach consists in the preliminary selection of phytochemical candidates for cancer prevention or therapy, basing on the pre-clinical results related to cell-transformation and anti-tumorigenic activity assays. This article is main focus on role of phytochemicals in the cancer treatment and its impact.

1. OVERVIEW

Plants have been used to treat various disease aliments from time immemorial. Ayurveda, Traditional Indian Medicine (TIM), and the Traditional Chinese Medicine (TCM) remain the most ancient (4500 BC) yet living traditions. In the ancient period, the knowledge of selection of right plants, a specific time for their collection, method of drug preparation with their specific use was transferred verbally from one generation to the next generation. The folklore system has documented all parameters about the drugs and their specific uses in the disease conditions[1-6].

All these are conventional medicines having different ways of thinking and social foundations. India is a tremendous nation with a wide scope of demographical and climatic varieties, attributable to which expanded plants develop, adding to the name "Botanical nursery of the World". Because of the customary uses and confirmations, Ayurveda idea continuously

increased. The use of elective medication for the administration of cancer has become a challenging and emerging region.

The disease cancer has been characterized as provocative or non-incendiary, expanding in 'Charaka' and 'SushrutaSamhitas'. The nervous system (Vata or air), the venous system (Pitta or fire), and the arterial system (Kapha or water) are three nuts and bolts of Ayurveda and significant for normal bodywork. In Ayurveda, cancer is an abnormality of these three systems (Tridoshas), leading to tissue damage lastly resulting in abnormal proliferation of cells. These herbal cures gained notoriety in the Western world and China too.

Western herbal methods use herbs that developed in Europe, North America, China, and India. This indigenous medication system dependent on plants has been all around reported for the prevention of tumors. Not just cancer, these herbal medicines are utilized to treat a wide range of health issues. All the time, these medicines are utilized as a remedy for tension, grief, roughage fever, peevish entrail disorder, menstrual clutters, and skin diseases, among many. Cancer, a consistently expanding global problem, is anything but a solitary procedure, yet includes a huge number of mechanisms including commencement, promotion, and progression. It is one of the underlying drivers of morbidity and mortality all throughout the world.

Phytochemicals with Anticancer Properties

Valid confirmations show that phytochemicals have critical antitumor potential around half of affirmed anticancer drugs from 1940 to 2014 starting from natural items or straightforwardly derived subsequently. A portion of the exceptional anticancer phytochemicals right now describe in the current review. These phytochemicals have been tried for hostile to cancer viability at both in vitro and in vivo levels. They possess correlative and covering mechanisms to hinder the cancer-causing process by searching free radicals, suppressing endurance, and proliferation of dangerous cells, just as diminishing intrusiveness and angiogenesis of tumors.

2. PHYTOCHEMICALS IN CANCER TREATMENT

Cancer is a severe health problem that keeps on being a leading reason for death around the world. Increasing information on the molecular mechanisms hidden cancer progression has prompted the development of countless anticancer drugs. In any case, the utilization of synthetically integrated drugs has not altogether improved the general endurance rate in the course of recent decades. Thus, new techniques and novel chemoprevention agents are expected to supplement current cancer treatments to improve proficiency.

They are naturally happening compounds from plants referred to as phytochemicals fill in as indispensable assets for novel drugs and are additionally hotspots for cancer therapy. Some average models incorporate taxol analogs, vinca alkaloids, for example, vincristine, vinblastine, and podophyllotoxin analogs. These phytochemicals regularly act using controlling molecular pathways that are ensnared in the development and progression of cancer.

The specific mechanisms incorporate increasing antioxidant status, cancer-causing agent inactivation, inhibiting proliferation, acceptance of cell cycle capture and apoptosis, and a guideline of the immune system. The essential objective of this review is to describe what we know to date of the active compounds in the natural items, alongside their pharmacologic action and molecular or specific targets. Ongoing patterns and holes in phytochemical based anticancer medication discovery are likewise explored. The creators wish to grow the phytochemical look into the zone for their logical sufficiency as well as for their potential druggability. Thus, the accentuation is given to data about anticancer phytochemicals, which are assessed at the preclinical and clinical level. Cancer is a significant general health problem that has a noteworthy worldwide impact on both created and creating nations. In 2018, an expected 18.1 million new instances of cancer occurred overall which are probably going to increment to 23.6 million new cases every year by 2030. Considering the high profile nature of the disease, its treatment has been a consistent battle with generally less achievement.

3. PHYTOCHEMICALS USED IN CURRENT CANCER THERAPY

The four significant classes of clinically utilized plant-derived anticancer compounds incorporate vinca alkaloids, taxanediterpenoids, camptothecin derivatives, and epipodophyllotoxin. Aside from these phytochemical classes, other plant-derived anticancer agents from various classes, for example, combretastatins, homoharringtonine (omacetaxinemepesuccinate, cephalotaxine alkaloid), and ingenolmebutate are likewise utilized. Poor fluid solvency and noteworthy lethal symptoms despite everything remain a significant concern. In this manner, the ebb and flow focal point of research are toward annihilating the impact of these factors. A few analogs and prodrugs have been synthesized, and methods have been concocted to upgrade fluid solvency and tumor specificity.

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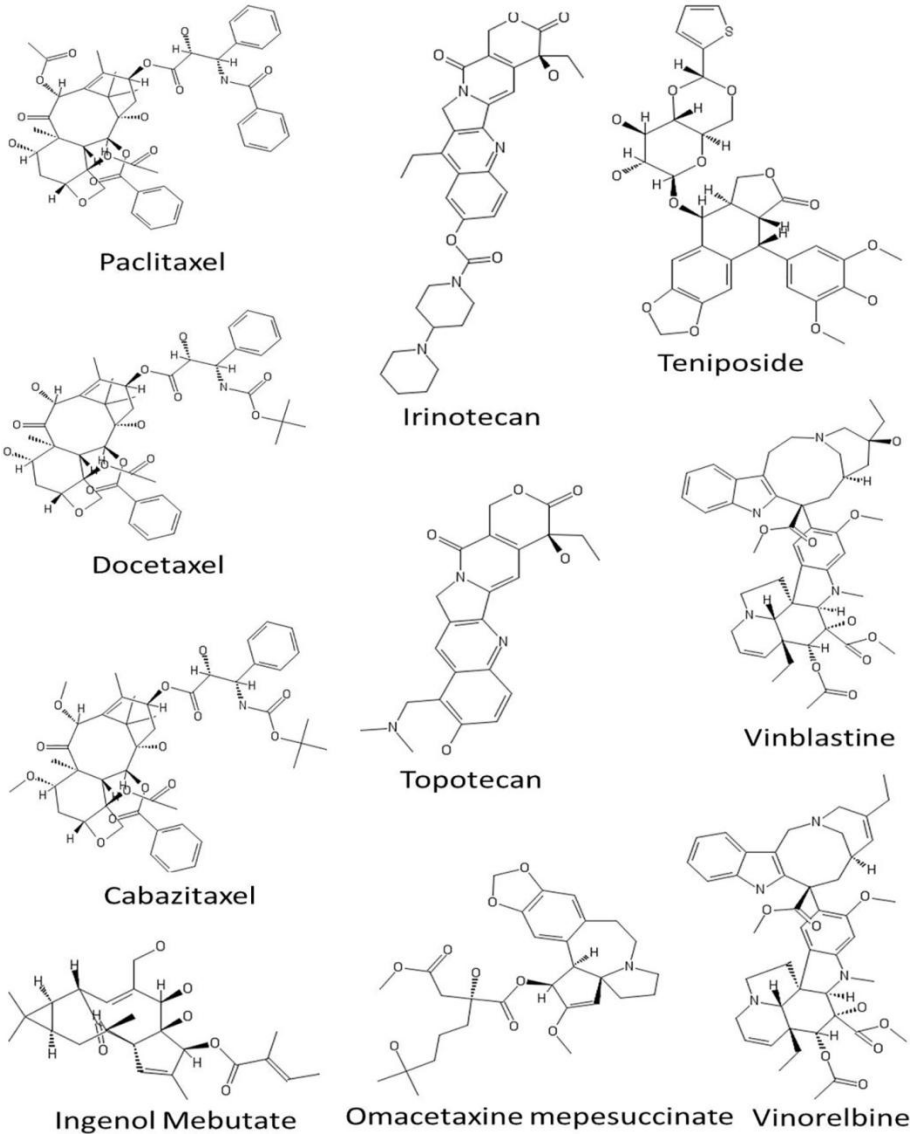

Figure 1: Chemical structures of some anticancer agents in clinical use

Other Plant-Derived Anticancer Agents

Ingenolmebutate (IM) is a hydrophobic ester of the diterpeneingenol isolated from normal Australian plant Euphorbia peplus (Euphorbiaceae). IM is approved for the topical treatment of actinic keratosis, a typical skin condition that outcomes from introduction to chronic ultraviolet radiation, which can prompt squamous cell carcinoma, if not treated. IM presents two mechanisms of action: at high fixations (~200–300 µM), it induces quick induction of cell death in the treated zone, and at low focuses (~0.1 µM) it activates fiery reaction, fit for dispensing

with the residual cells. Pharmacology, method of action, pharmacokinetics, dosing, and defeat of administration of ingenolmebutate have been reviewed. Homoharringtonine (HHT) is a naturally-happening ester of the alkaloid cephalotaxine isolated from different trees of the Cephalotaxus class (Cephalotaxaceae) and is approved for the treatment of chronic myeloid leukemia.

4. ROLE OF PHYTOCHEMICALS IN THE CHEMOPREVENTION OF TUMORS AND ITS IMPACT

Overwhelming evidence of epidemiological data, in vivo, in vitro and clinical studies suggests that the plant-based diet may reduce the risk of chronic diseases (e.g. cardiovascular disease, hypertension, diabetes and cancer) due to the presence of biologically plant compounds active or phytochemicals. Phytochemicals include those compounds derived from plants that have specific biological activity in humans.

They can also be called natural bioactive molecules that can be beneficial for human health. In fact, unique phytochemicals and enriched natural extracts capable of interfering with self-renewal pathways and drug resistance in cancer cells have been studied. This is a milestone in improving cancer treatment because the currently used synthetic anticancer drugs are often highly toxic to healthy organs and weaken the patient's immune system. In fact, in terms of prevention, its beneficial effects have been described in several epidemiological investigations, which have highlighted, despite the limitations of this type of study, a reliable relationship between diets rich in phytochemicals and the reduction of the risk of development of various diseases, including cancer.

In fact, in particular, the high intake of fruit and vegetables, the dietary components richest in phytochemicals, has been correlated with a decrease in the risk of various types of cancer. However, it is estimated that one third of all cancer deaths are preventable through "healthy" lifestyles, including proper nutrition. A large number of phytochemicals, such as carotenoids, antioxidant vitamins, phenolic compounds, terpenoids, steroids, indoles and fibers, have been found to be responsible for reducing the risk.

Phytochemicals can be assimilated to chemotherapy, which often derives from natural substances, extracted directly from plants or other natural sources or chemically derived from natural compounds. In addition, behind traditional medicine, a large number of cancer patients are using plant-derived compounds in the context of complementary therapies. Therefore, there is growing interest around the role of phytochemists in cancer prevention and treatment. Recent research suggests that research on "new" phytochemicals and related molecular targets can be

used to identify new anticancer drugs, following sequential stages. This approach consists in the preliminary selection of phytochemical candidates for cancer prevention or therapy, on the basis of preclinical results related to cell transformation and anti-tumor activity tests. Phytochemicals should be further validated by in vivo models, resulting in pharmacokinetic and pharmacodynamic interactions and molecular targets.

5. CONCLUSION

Natural plants have been utilized to prevent and to treat different diseases for a huge number of years. The old Chinese head, the Red Emperor, or ShenNung, arranged the primary medicinal herbal literature, Pentsao in 2,800 BC. In managing diseases, prevention is considered a predominant methodology. An original copy thought being composed by the old Chinese ruler, the Yellow Emperor, "The Saint gets those evil be as opposed to those being sick, and thinks about those in normality as opposed to those in chaoses. Medication a disease after it's developed, or extinguishes mayhem after it's obvious, is same as delve a well when in thirsty, or throwing a sword in a fight Is that to some degree late?"

There are excellent wellsprings of bioactive components exerting their health valuable impacts, and all the time, these sources are materials for gourmet food utilizations. Certain bioactive components from the plants have been affirmed for their enemy of cancer activities. There is a gauge that around 50-60% of cancer patients in the United States use agents derived from various pieces of plants or supplements (integral and elective medicine), solely or correspondingly with traditional remedial routine, for example, chemotherapy and additionally radiation therapy.

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