

POTENTIAL ANTI-CANCER SUPERFOODS: A MINIREVIEW

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Received: 12 Mar 2016, Revised and Accepted: 10 Jun 2016

ABSTRACT

Cancer, a leading cause of mortality worldwide, has gained much attention and concern for its debilitating effects. Among the various oncological treatments and therapies like surgery, radiation, hormonal therapy, immune therapy, targeted therapy, Chemoprevention or Chemotherapy has recently being recognized as a promising strategy for prevention of afflicting disease like cancer. Chemoprevention is the use of natural or synthetic agents (alone or in combination) to suppress or prevent the process of oncogenesis. The role of diet and nutrition in cancer development has been overlooked for decades, despite of its strong scientific evidence. Only in recent years, plants, vegetables, herbs and spices of traditional diet and medicines have been accepted as one of the main sources of chemo preventive substances.

Keywords: Anticancer super food, Chemoprevention, traditional diet.

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INTRODUCTION

Cancer is currently estimated to be a major cause of deaths worldwide. It is actually a generic term encompassing over 100 diseases that occur as a consequence of cellular mechanisms like dedifferentiation, uncontrolled cell division and proliferation and acquiring of invasive properties.

According to a report last year, there are estimated 14.1 million cases of cancer diagnosed and 8.2 million cancer deaths worldwide with lung cancer to lead the chart [1]. A person's risk of developing cancer depends on many factors, including age, genetics, and exposure to risk factors (including some potentially avoidable lifestyle factors). Cancer risk factors are overall similar worldwide. Smoking, insufficient physical activity, alcohol, diet, overweight and obesity, sun exposure and infections account for a high proportion of cancers worldwide [1].

The major common cancers with devastating potent threat all over the globe are lung, prostate, colorectum, stomach, and liver cancers for men and breast, colorectum, lung, cervix and stomach cancers for women.

W. H. O has suggested that cancer can be reduced and controlled by implementing evidence-based strategies for cancer prevention, early detection of cancer and patient management. The therapeutic modalities available currently worldwide are surgery in combination with or without radiotherapy and/or chemotherapy. One of the preventive anticancer measures used all over are natural medicine or plant-based herbal formulations or pure phytochemicals. Scientific evidence highlights on the fact that reduction in risk of chronic disease like cancer is associated with intake of a diet that includes mostly of plant-based foods such as vegetables, fruits, whole grains, and legumes combined with restricting intake of saturated and trans fats and added sugars, and maintenance of a body mass index (BMI) < 25 [2].

In this review, we try to emphasize on plant-based anticancer super foods that hold an appealing significant role in combating the dogma related with an increase in a number of cancer cases globally. The fact that cancer cases are rising but mortality rates are not decreasing is a major topic of concern.

In spite of good advances in diagnosis and treatments, in this modern era of molecular medicine, many efforts have failed to develop a perfect anticancer medicine or drug. Here comes the right place for natural dietary sources as an option as a chemoprevention to avoid cancer or to slow it down of already existing in a patient.

Thus, cancer survivors and patients opt for a change in their diet habits and lifestyle choices after being diagnosed with cancer. There has been found a vital relationship between dietary lifestyle and oncogenesis [3].

Scientists and nutritionists recommend nutritional management support and specialized natural medicines for maintenance of nutrition and hydration status of the patients and promote their ideal quality of life. To understand the impact of diet and other lifestyle components on cancer, one must be acknowledged with cancer biology and molecular mechanisms leading to cancer.

Dietary habits are known to accompany economic development and urbanization. The interaction between dietary and/or environmental components can lead to carcinogenic activation. There has been a change in the quality of foods and beverages consumed as the populations evolved from primary agricultural society to a modern, urbanized, sedentary lifestyle and culture. This may be the reason why there are double the cases of cancers in western developed countries like U. S. A as compared to Asian traditional developing countries like India. India has a lower incidence of cancer than the global average, with just half the number of new cases recorded every year per capita than the global average. However, the incidence has grown from over 700 new cases per million populations to nearly 1,000 new cases per million people; the numbers show. This is a matter of concern [4].

Promising potential naturally occurring super foods and phytochemicals against cancer

Maintenance or improvement in nutrition status is the key goal of medical nutrition therapy [4]. Thus there is an emerging need of incorporation of cancer-preventive foods in our diets for greater health and vitality. Many nutrients have been recognized to have an influence on cell cycle progression and proliferation. As we know cancer is not a single disease, and it can have many different causes. That makes it virtually impossible for anyone nutrient to protect against all types of cancer.

Anticancer foods in daily use

Tea, Green tea, Onions, leafy vegetables, olive oil, argan oil, fruits, traditional Asian spices, herbs, tomatoes are a few examples of foods that consist of several molecules that can inhibit the proliferation of cancer cells with an ability to act as "chemo preventers". The cancer-preventive effects of these molecules have contributed to various mechanisms, including the induction of cell cycle arrest and/or apoptosis, as well as the antioxidant functions. Recent focus is given

on antioxidant activity of chemopreventers, especially because oxidative stress participates in the initiation and progression of various pathological conditions, as well as cancer. Great focus is applied on wide use of natural food-derived antioxidants as they are known to reduce oxidative damage and thus they are receiving greater attention as potential anti-carcinogens [5].

Pomegranate juice (PJ)

Pomegranate is a widely available fruit that has been recently gaining increasing importance as a potent inhibitor of prostate cancer progression. Evidence shows that consumption of PJ on patients with recurrent prostate cancer resulted in the prevention of metastatic progression of disease [6]. Consumption of PJ can result in cell death of hormone-refractory prostate cancer cells. Specific components of PJ that are effective inhibitors of growth and metastasis are leucolin, ellagic acid, and punicalic acid that probably work in synergism. PJ is also known to promote adhesion and decrease migration of cells that do not undergo apoptosis (programmed cell death). Furthermore, PJ also inhibits chemokine receptor. A wide range of genes responsible for suppression of cancer development are known to be the possible targets of pomegranate. It is also recognized as a potential inhibitor of DNA damage which is a characteristic event of initiation of cancer development [7].

Cinnamon extract

Cinnamon is a widely consumed traditional herbal medicine that has diverse metabolic advantages such as anti-oncogenic activity. Scientific evidence reports the anti-neoplastic effect of cinnamon on cervical cancer. As we know cinnamon is a daily used ingredient in many Asian countries, this explains the fewer occurrences of chronic diseases like cancer in these countries as compared to the western. As reported aqueous cinnamon extract affects the growth kinetics of cancer cells by downregulating the expression of oncoproteins and by inducing apoptosis [8].

Ginger species

The rhizomes of ginger species *Curcuma zedoaria* is seen to possess anti-proliferative constituents named curzenone, neocurdione, curdione, alismol, zederone and a mixture of sterols which have shown to induce apoptosis by activating caspase-3 [9]. Many ginger species are used as spices, food preservatives, cooking ingredients, and also the alternative medicine against many chronic diseases in some countries of Asia.

Turmeric (*Curcuma longa*)

The active, vital component of turmeric, curcumin (yellow pigment), is a non-toxic compound well known for its inhibitory effect on the growth of cancer during the early period (tumor initiation). Chemopreventive properties of curcumin are extensively studied for several types of cancers. Extensive studies have confirmed the anticarcinogenic activity and potential chemoprophylactic value of curcumin [10-13]. Curcumin was shown to down-regulate cancer-promoting gene expression as well as prostate-specific antigen (PSA) in the Prostate cancer cell line [10]. This antiandrogenic effect promises to show a beneficial chemopreventive effect.

Tomatoes

Epidemiological and scientific evidence suggests the use of tomatoes for anti-cancer therapy. The frequent consumption of tomatoes and its products is associated with decreased risk of cancer development. This possible role of tomato as an anti-cancer substance can be credited to its compound known as lycopene. Lycopene is a primary carotenoid responsible for red color of tomatoes and is known to help in cancer prevention and slowing down the process of oncogenesis and also avoid cancer initiation by reducing the oxidative DNA damage and by influencing the expression of genes governing stimulation of cancer [14].

There are many such other naturally occurring substances used in daily routine which can help prevent cancers such as Wine has many

antioxidant compounds that prevent cancer initiation that may take place a result of the formation of reactive oxygen species in the body [15]. Green tea has polyphenols that show anticancer activity, Ethanolic extract of propolis (honey bee glue) also is studied extensively for its effect on cancer cells by induction of apoptosis and many more.

CONCLUSION

With the change in cancer patients lifestyles and dietary patterns, conventional chemotherapy has slowly now started to fail probing towards exploring new alternative approaches to reduce morbidity and also the toxic side effects of chemotherapeutic drugs. Plants have been known as a major source of anti-cancer agents for a long time in the history of oncology treatment.

Recently, a great emphasis is being given on usage of plant-derived natural compounds such as Curcumin, Paprika, Carotenoids, Lycopene, Sulforaphane, Polyphenols, Flavonoids, Zeaxanthins and Isocyanates, etc. as potential chemotherapeutic agents. Researchers have proved these compounds to be extremely promising agents for fighting cancer when incorporated in the diet as anti-cancer superfoods. Thus there is a need for the search of such natural-based anticancer therapies, explores the antineoplastic potential of these chemotherapeutic cancer superfoods and highlights the metabolic and molecular targets of these potential anti-cancer superfoods.

CONFLICT OF INTERESTS

Declare none

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How to cite this article

- Sanskruti Saka, Anshika Nikita Singh, Neeti Sharma. Potential anti-cancer superfoods: a minireview. *Int J Curr Pharm Res* 2016;8 (3):19-21.