Protective effect of flavonoids against the colorectal cancer

Hülya Servi *1 , **Furkan Ayaz** 2

1Mersin University, Biotechnology Department, Türkiye, hulyaservi582@gmail.com, 19133015@mersin.edu.tr
2Mersin University, Biotechnology Research and Application Center, Türkiye, furkanayaz@mersin.edu.tr

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Abstract
Cancer is a disease that can be determined by the independent increase of cells in a random part of the body compared to other surrounding normal tissues, moreover, their infiltration into the surrounding tissues, and a change in the normal differentiation pattern of the tissue resident cells. It also metastasizes to other parts of the body when these cells pass into the circulation. Colorectal cancer, on the other hand, is among the most diagnosed cancers in Turkey, as it continues to exist with high prevalence rates all over the world. It can occur in cases where epithelial cells can benefit from self-renewal and reproduction caused by the epigenetic mutations. With next generation sequencing techniques and genetic studies on tumor cells, cancer-forming and/or tumor suppressor genes have been identified in our digestive tract. The development and differentiation of the treatment methods day by day and the widespread use of screening tests that are being conducted led to a decrease in the incidence of the disease and a decrease in deaths caused by the disease. It is known that phytochemicals in the plant-based foods can be used by taking advantage of their cancer prevention feature. In line with this information, flavonoids have antioxidant properties and are found in many plant-derived foods. In this article, we will focus on the formation of colorectal cancer and how much cancer can be prevented thanks to the flavonoids.

Introduction

Cancer is the formation of cell populations that can reproduce without control, are caused by excessive changes in DNA and gene expression, which also have the ability of spreading to the distant sites in the body [1]. Worldwide, an average of 1 million people is diagnosed with cancer annually, and 500,000 of this die due to the colorectal cancer. On average, 1/3 of these tumors are located in the rectum and 2/3 in other parts of the colon, especially in the left colon [2]. Colorectal cancer usually occurs in people who do not have a family history of colorectal cancer. Influencing factors include diabetes, long-term radiation exposure, age, obesity, smoking and alcohol, malnutrition, and long-lasting intestinal diseases [3]. Colorectal cancer is associated with, hamartomatous and juvenile polyposis syndromes, breast, ovarian and uterine cancers [4]. Many plant-derived agents are being studied in more detail for cancer chemotherapy because they can provide less side effects and have a higher rate of treatment success. These herbal-derived agents are bioactive compounds named as "secondary metabolites" produced by the plants. Flavonoids, phenols, glycosides, alkaloids are among them. In order to elicit anticarcinogenic functions, these compounds must be induced by activating proteins and/or inducing antioxidant functions by inhibiting proteins, signaling pathways and enzymes that affect the occurrence of cancer, or by stimulating the DNA repair mechanism and apoptosis [1]. Flavonoids have antioxidant, antimutagenic, antitumor, antiviral, antiproliferative and anti-inflammatory properties [5]. These properties of phenolic compounds interact with many metabolic pathways and may therefore provide protection against colorectal cancer. However, there is

not enough evidence for this issue [6]. Another feature of flavonoids is that they can act as protective agents of malignant tumors at different stages of formation by protecting DNA against oxidative damage. But stil the flavonoids have many antitumoral functions for the prevention of the cancer. If we focus on some of the properties of the flavonoids, these can be listed as; suppression of the mutagenic genes and antimutagenic effect, antioxidant effect by inactivation of carcinogens, suppression of angiogenesis and the clearance of the free radicals [7]. According to other studies, colorectal cancer development has strong correlation with the diet and nutrition. Especially high-fat diets negatively affect the prognosis of the colorectal cancer. The reason for this is that high-fat diets increase the secretion of the intestinal bile acids and these are effective in intestinal tumorigenesis by causing significant changes in the intestinal microbial composition. As a result of these studies, the protective effect of dietary fibers against colorectal cancer was observed. In addition, dietary fibers reduce the transit time of the colonic content, reducing exposure to carcinogens and creating a healthy intestinal barrier. For this reason, the diet should include plant-based foods and beverages such as fruits and vegetables, whole grains, tea, coffee, and wine in order to increase the prognosis rates of the colorectal cancer [8].

Results

There is a biological mechanism responsible for the genetic and environmental factors that are responsible for the formation of cancer. Proper nutrition is a very important factor in cancer. However, a single nutrient or phytochemical cannot be effective in preventing tumor progression or preventing cancer, but it is very important to take them together with other nutrients in a balanced diet rich in fruits and vegetables. As a result of the research by different study groups, the relationship between flavonols and cancer is contradictory. In some studies, especially in long-term studies, it has been observed that flavonol intake reduces the risk of lung, breast, larynx and colorectal cancers, but in other studies, no significant relationship was found between cancer risk and flavonol intake [7]. In addition, enlightening the society and ensuring participation in screening programs are important points for early diagnosis and treatment of the colorectal cancer [9]. It is important to ensure more participation in these programs and to determine environmental factors for planning [10].

Discussion

Early detection is the primary goal in colorectal cancer. Studies are carried out on phytochemicals in plants as therapeutic agents for the prevention/treatment of cancer [1]. Research continues for chemotherapeutic drugs with the discovery of chemicals in nature due to the resistance of cancer cells to treatments. In order to prevent diseases such as cancer, many natural compounds with effective antitumorogenic properties have been discovered and thus, the tendency towards natural ones has increased. Plants form the basis of traditional medicine, which has many effects for many cancer diseases. There are studies that reveal that the use of plants containing phytochemical complex contents of various chemical-containing structures such as polyphenol, flavanoid, phenolic acid and irinotecan together with chemotherapeutic agents can be effective in reducing the toxic side effects by reducing the effective dose of chemotherapeutics [11]. However, since these studies are new and scarce, more attention should be paid to these studies.

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