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THE IMPORTANCE OF POLYPHENOLS IN THE DIET

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Abstract

The most diseases of our century are associated with poor nutrition in antioxidants. Antioxidants are found in nature in the form of polyphenols. Diet rich in polyphenols is a reliable ally in the fight against cell degradation. Studies have shown that flavonoids consumed through vegetable foods leading to improve health and offer body protection against adverse reactions and especially free radicals. In the present study were assessed a series of data supplied by famous researches regarding the polyphenols quantity contained in various fruits and vegetables.

It known only very few drugs that have a high significant content of flavonoids compared to fruits and vegetables, drugs that are administered strictly under medical control. Rating polyphenol content of fruits and vegetables from Romanian market offer to consumers the possibility of choice and consumption of plant foods that contributes significantly to improving the health status without adverse effects.

Keywords: polyphenols, flavonoids, bioflavonoids, plant food, health status

INTRODUCTION

The polyphenols or the phenolic compounds are a class of substances by spread within the plant kingdom. Currently, there are 8000 structures that one known as polyphenols. They are secondary metabolites of plants.

The flavonoids are a valuable group of plant compounds extremely important for phytotherapy and pharmacology. The flavones are characterized from a structural point of view in their molecule benzopyran nucleus (C6-C3-C6) substituted with a phenyl radical in the second and third position [2, 7].

The phenolic acids are part of the polyphenols group. These acids are generally cinnamic acid derivatives (C6-C3), and the main acids of this class are p-coumaric acid, caffeic acid, synapses acid, ferulic acid [12]. These are found in almost all seed plants, so this is probably the most widespread group of phytochemicals.

The phenolic acids are certain phenols, found in many foods such as garlic, flax, soy, green tea, citrus fruit. They are antioxidants that prevent

free radicals from attacking normal cells [15]. They neutralize carcinogens as nitroamins, which are formed in the stomach when food subpoena combine with certain natural enzymes. These acids acelerate the production of glutathione, and amino acid which is thought to be the most powerful detoxifying agonist in the entire human organism.

The bioflovonoids are known as vitamin P. This group of compounds give the yellow and orange colour to citrus fruit. Until recently, they have been perceived only as natural dyes. The studies in the domains have revealed that biovlavonoids are antioxidants that can prevent the development of certain cancers forms [16]. Furthermore, some bioflavonoids have other functions as well.

For example, one of them has proven to be effective in the treatment of capillary fragility and of bruisin tendency, specific for a large number of hypertensive patients. They can be successfully used in the treatment of bleeding gums. Laboratory experiments have proven that quercetin, hesperidin and catechin belonging to the same family, have an antiviral activity against herpes and influenza. Certain bioflavonoids reduce the inflammation caused by allergic reactions. However more research is needed on bioflavonoids known to the min order to discover their true potential.

Isoflavones found in vegetables such as beans large grain, peas, lentils and peanuts, block the estrogen receptors, thereby preventing the growth of estrogen-addicted tumor cells, such as cells prevailed in case of breast cancer. The isoflavones disable estrogen before it cause the growth of cancer cell.

MATERIALS AND METHODS

Out of foods rich in polyphenols, we can mention *Malus domestica* (apple), *Rubus fruticosus* (blackberry) with a high level of anthocyanin (an antioxidant that reduces the incidence of all cancer formes), *Camellia sinensis* (black tea, green) with teaflavina (content it destroys cancer cells), *Vaccinium myrtillus* (blueberries) with a high level of anthocyanins, *Brassica oleracea* (broccoli) polyphenols, *Prunus avium* (cherry) which contains anthocyanins, *Solanum lycopersicum* (cherry tomatoes) which contain flavonoids expressed in quercetin (anti-inflammatory, antioxidant, anticangerigen), *Coffea arabica* (coffee) which contains phenolic acids, *Vaccinium vitis* idaea (cranberry) containing procyanidins (they can prevent infection), *Theobroma cacao* (cocoa) - (epicatechine), *Citrus sinensis* (orange) which contains hesperidin (for healths heart), *Vitis vinifera* (red grapes).

Foreign researchers have performed studies on various types of *Malus domestica* - apples (red and yellow) and on the juice and puree obtained from them. They noticed a variation in the quantity of polyphenols according to shelf-life of fruits. The apple juice was analyzed in both concentrated and diluted from the mashe apple was lyophilized and successively extracted with 80% methanol. The determination of polyphenols was performed with to Folin-Ciocalteau method by evaluating the same total of the flavonioides and the flavan-3-inches. The result points ont that the red apple juice has a major flavonoid content [9, 19].

Recently, the researchers have studied the average concentrations of the major phenolic compounds in six cultivars of apples. They discovered that the average phenolic concentrations among the six cultivars were: quercetin glycosides, 13.2 mg/100 g fruit; vitamin C, 12.8 mg/100 g fruit; procyanidin B, 9.35 mg/100 g fruit; chlorogenic acid, 9.02 mg/100 g fruit; epicatechin, 8.65 mg/100 g fruit; and phloretin glycosides, 5.59 mg/100 g fruit [1].

The most commonly found compounds in apple peels consist of the procyanidins, catechin, epicatechin, chlorogenic acid, phloridzin, and the quercetin conjugates. The catechin, procyanidin, epicatechin, and phloridzin, appear in varions amounts in the apple fresh. However in much lower concentrations than in the peels. Chlorogenic acid tends to be higher in the flesh than in the peel [8].

The recent studies performed on a group of 20 fruit, which have been used to determine total of polyphenols with the help of thee aluminum chloride colorimetric assay method show the following: Apple, yellow (unpeeled) *Malus pumila* 99.7; Apple, yellow (peeled) *Malus pumila* 75.8; Apple, red (unpeeled) *Malus pumila* 125.4; apple, red (peeled) *Malus pumila* 303.6; Apple green (unpeeled) *Malus pumila* 118.1; apple, green (peeled) *Malus pumila* 97.5; Blackberry *Rubus coesins* 355.3; Raspberry *Rubus ideaus* 178.6; Strawberry *Fragaria vesca* 244.1; Sweet cherry *Prunus avium* 78.8; Sour cherry *Prunus cerasus vulgaris* 429.5; Blueberry *Vaccinium myrtilus* 670.9; White Grape *Vitis vinifera* 184.1; Black grape *Vitis vinifera* 213.3 total phenolics expressed in mg fresh mass GAE/100g [20, 10].

Broccoli is a vegetable with a high content of polyphenol compounds. Its inflorescence valuable because is a good source of polyphenol compounds, glucosynolanes and vitamins. Broccoli has an antineoplasmic action, due to its significant content of antioxidants [6].

This vegetable is one of the most important sources of flavonoles in the human diet.

Both forms of raw material were substantially diversified in respect to content of examined components. Raw broccoli contained 2900 \pm 30 mg of polyphenols and 139.9 \pm 0.7 g of dry substance in kg of vegetable. Frozen

broccoli respectively, contained 1080 ± 20 mg of polyphenols and 90.9 ± 0.03 g of dry mass in kg of raw material. Polyphenol compounds are substances, which quantity in fresh raw material is changeable and depends on many factors [18].

RESULTS AND DISCUSSION

The foods studied have antioxidant properties that prevent the occurrence of varions forms of cancer such as: breast cancer, prostate cancer, gastric cancer, malignant melanoma and leukaemia. They help in the cure of gastritis with *Helicobacter pylori*. They have cardio-protective, maintaining control over blood pressure. They prevent formation of cataract. Strengthen bones and prevent osteoporosis, through increased calcium content and strengthen the immune system.

The green tea is particularly rich in flavonoids that help maintain health (the flavonoids represent 30% of weight of a leaf). The green tea contains catechins and their derivatives. The most common green tea catechin is Epigallocatechin-3-gallate (EGCG), playing essential role against cancer development [4].

Catechins should be give more consideration, along with antioxidants such as vitamins E and C, as a major factor in supporting health. Rich in polyphenols, it reduces the growth of new blood vessels necessary for tumor development and metastasis. It is also a powerful antioxidant, a detoxifier (activates liver enzymes that remove toxins from the body and facilitates cancer cell death by apoptosis). In the laboratory has proven that green tea increases effects of radiation on cancer cel [11, 15, 17].

Only when containing over 70% cocoa is rich in antioxidants and many polyphenols. These molecules slow cancer cell growth and angiogenesis limited. Consumption of up to 20 g per day (a fifth tablet) is not excessive caloric intake and also effectively cut hunger. Its glycemic index is moderate, much lower than that of corn flour buns or white.

Epidemiologic studies suggest an inverse association of tea consumption with cardiovascular disease. The antioxidant effects of flavonoids in tea (including preventing oxidative damage to LDL) are among the potential mechanisms that could underlie the protective effects. Other possible mechanisms include attenuating the inflammatory process in atherosclerosis, reducing thrombosis, promoting normal endothelial function, and blocking expression of cellular adhesion molecules. Cocoa and chocolate can also be rich sources of flavonoids. Flavanols and procyanidins isolated from cocoa exhibit strong antioxidant properties *in vitro*. In acute feeding studies, flavanol rich cocoa and chocolate increased plasma antioxidant capacity and reduced platelet reactivity [5]. Lycopene in tomatoes is associated with an increased life of patients with prostate cancer given that they consume at least twice a week tomato sauce. To release the lycopene should be cooked tomatoes (made into sauce). Absorption is facilitated by the presence of body fat (oil).

Some studies were also found in the literature on the antibacterial properties of other species of the *Solanum genus*. For example, *S. torvum* showed activity against *Bacillus subtilis*, *B.cereus*, *Pseudomonas aeruginosa* and *S. aureus*, while *S. nigrum* was active against *Salmonella typhi*. *S. trilobatum* was able to reduce bacterial load in an aqua culture system and S. incanum could inhibit the grow thof *B. subtilis*, *B. cereus*, *B. pumilus*, *Enterobacter aerogenes*, *E. cloacae*, *Micrococcus kristinae* and *S.aureus* [3, 13, 14, 15, 16, 19].

Oranges, tangerines, lemons, grapefruit contain anti-inflammatory flavonoids. Also stimulates detoxification of liver cancer affected areas. It has been shown that flavonoids contained in tangerine peel penetrates the brain cancer cells hastening death through apoptosis and reduce their potential to invade neighboring tissues.

CONCLUSIONS

Polyphenols are substances with proven antioxidant, antibacterial and antifungal. Research in recent years have established that flavonoids, phenolic acids and gallic acid are more effective in preserving of meat (frozen) than ascorbic acid. The most effective were ellagic acid, gallic acid, quercetin and myricetin. Flavonoids and vitamins act synergistically.

Were confirmed immuno-stimulatory effects and their anticarcinogenic. The most common flavonoid-glycosides in food are: quercetin, rutin, hesperidin and robinin. These substances are hydrolysed in the intestinal bacterial flora and the effect becomes biologically active aglycones.

These substances have antioxidant properties very important as they help the body fight free radical formation in excess (substances that promote cell aging). By this mechanism may be elucidated by other polyphenols have the ability to protect the body from many diseases. they have proved effective in cardiovascular diseases as polyphenols prevent oxidation of bad cholesterol which is the origin phenomenon artery obstruction. Also all compounds and polyphenols antioxidants prevent tumor formation. Effect: prevents agents underlying the harmful genetic mutations. Polyphenols have been shown effective against osteoporosis because they act like some hormones. Quercetin is a flavonoid that forms the essential "backbone" of several flavonoids, including the citrus, rutin, hesperidin, and tangeritin narigin. Quercetin has potent anti-inflammatory properties by inhibiting the initial inflammatory processes. Inhibit the production and release of histamine and other mediators of the allergic / inflammatory, so it is used with good results in treating arthritis, rheumatic and osteoarthritis. In addition, quercetin has antioxidant effects and protect the vitamin C is abundant in apples and tea.

In experiments with fat cells, both quercetin and its metabolites influenced glucose utilization. A change in energy regulation may be an important process, creating new points of departure for future research on the molecular mechanisms of polyphenols, which will allow effective description of their effects on health.

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