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Naturally occurring polyphenols and their potential in disease prevention

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Abstract

Background: Epidemiological, clinical and laboratory studies have implicated solar ultraviolet (UV) radiation in various skin diseases including premature aging of the skin and melanoma and nonmelanoma skin cancers. Chronic UV radiation exposureinduced skin diseases or skin disorders are caused by the excessive induction of inflammation, oxidative stress and DNA damage, etc. The use of chemopreventive agents, such as plant polyphenols, to inhibit these events in UV-exposed skin has been gaining attention. Chemoprevention refers to the use of agents that can inhibit, reverse, or retard the process of these harmful events in the UV-exposed skin. A wide variety of polyphenols or phytochemicals, most of which are dietary supplements, have been reported to possess substantial skin photoprotective effects. Several polyphenols suppress lipid peroxidation to maintain the cellular status of antioxidant enzymes like superoxide dismutase, catalase and glutathione peroxidase. Due to the NF-κB suppressing effect of polyphenols, some of them (e.g. curcumin, resveratrol, quercetin and green tea polyphenols) have been shown to decrease the expression of chemokines and cytokines. Polyphenols in healthy foods or drinks such as chocolate, red wine, or beer are readily metabolized to phenolic acids and aldehydes by the microflora of the intestine, raising the possibility that these metabolites are responsible for their anti-inflammatory properties. Polyphenols are known for their unique property of activation at multiple levels, through the modulation of MAPK, Akt and NF-κB signaling pathways, inhibiting the production of inflammatory cytokines and chemokines, suppressing the activity of COX and iNOS and decreasing the production of ROS/RNS. Akt plays crucial roles in mammalian cell survival signaling and has been shown to be activated in various cancers. Several phytochemicals including genistein, curcuminoids and catechins are known to suppress the activation of Akt, thus, inhibiting cancer cell growth. Almost all cell types, when exposed to TNF-α, LPS or other stimuli, activate NF-κB and AP-1 transcription factors, leading to the expression of inflammatory genes, such as COX-2, iNOS, cell adhesion molecules, inflammatory cytokines and chemokines. Thus, all the dietary agents that can suppress these transcription factors have the potential of inhibiting the expression of COX-2, iNOS, cell adhesion molecules, TNF-α and interleukins. Several dietary components including resveratrol, curcumin, and green tea catechins have been shown to suppress COX-2 giving the benefit of decreasing the production of reactive oxygen species. The iNOS, which is responsible for the release of free radical nitric oxide, was suppressed by several phytochemicals and dietary agents stimulated with LPS and interferon-γ (IFN-γ). Other sources of the antioxidant properties of polyphenols is their free radicals scavenger features, which is primarily based on their structure.

Keywords

COX-2, iNOS, chemokines

Background

Polyphenols are normally happening intensifies discovered generally in the natural products, vegetables, cereals and drinks. Organic products like grapes, apple, pear, cherries and berries contains up to 200–300 mg polyphenols per 100 grams new weight. The items produced from these organic products, additionally contain polyphenols in critical sums. Normally a glass of red wine or some tea or espresso contains around 100 mg polyphenols. Grains, dry vegetables and chocolate likewise add to the polyphenolic intake.

Polyphenols are optional metabolites of plants and are for the most part associated with guard against bright radiation or hostility by pathogens. In food, polyphenols may add to the harshness, astringency, shading, flavor, scent and oxidative security. Towards the finish of twentieth century, epidemiological examinations and related meta-investigations unequivocally proposed that drawn out utilization of diets wealthy in plant polyphenols offered some insurance against advancement of malignant growths, cardiovascular infections, and diabetes, osteoporosis and neurodegenerative diseases. Polyphenols and other food phenolics is the subject of expanding logical interest in view of their conceivable valuable impacts on human wellbeing. This survey centers on the current comprehension of the natural impacts of dietary polyphenols and their significance in human wellbeing and illness.

Circulation of phenolics in plants at the tissue, cell and sub cell levels isn't uniform. Insoluble phenolics are found in cell dividers, while dissolvable phenolics are available inside the plant cell vacuoles. Certain polyphenols like quercetin are found in all plant items; organic product, vegetables, cereals, natural product juices, tea, wine, and imbuements and so on, though flavanones and isoflavones are explicit to specific nourishments. Much of the time, nourishments contain complex combinations of polyphenols. The external layers of plants contain more elevated levels of phenolics than those situated in their inward parts. Numerous components influence the polyphenol substance of plants, these incorporate level of readiness at the hour of reap, natural elements, handling and capacity. Polyphenolic substance of the nourishments are enormously influenced by ecological factors just as edaphic factors like soil type, sun openness, precipitation and so forth The level of readiness impressively influences the fixations and extents of different polyphenols. All in all, it has been seen that phenolic corrosive substance diminishes during maturing, though anthocyanin focuses increment. Numerous polyphenols, particularly phenolic acids,

are straightforwardly associated with the reaction of plants to various sorts of pressure: they add to mending by lignifications of harmed regions have antimicrobial properties, and their focuses may increment after infection.

Another factor that straightforwardly influences the polyphenol substance of the food sources is capacity. Studies have demonstrated that polyphenolic substance of the food sources change on capacity, the explanation is simple oxidation of this polyphenols. Oxidation responses bring about the arrangement of pretty much polymerized substances, which lead to changes in the nature of food sources, especially in shading and organoleptic attributes. Such changes might be advantageous, similar to the case with dark tea or destructive as in carmelizing of organic product. Capacity of wheat flour brings about stamped loss of phenolic acids. After a half year of capacity, flour contained similar phenolic acids in subjective terms, however their fixations were 70% lower contrasted and new. Cold stockpiling, conversely, has slight impact on the substance of polyphenols in apples, pears or onions. Cooking likewise majorly affects centralization of polyphenols. Onions and tomatoes lose somewhere in the range of 75% and 80% of their underlying quercetin content in the wake of bubbling for 15 min, 65% in the wake of cooking in a microwave, and 30% after frying.

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