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Spices and Herbs as Antioxidants

Umesh Kumar¹ and Dr. Anil Batta^{2*}

¹Tutor, Department of Biochemistry, MM Institute of Medical Sciences & Research
Mullana -Ambala

²Professor, Department of Biochemistry, MM Institute of Medical Sciences & Research
Mullana -Ambala

*Corresponding author

Abstract

-TOCOPHEROL is well recognized and accepted as the nature's most effective lipid-soluble, α -chain-breaking antioxidant, protecting cellular membranes from being attacked by lipid peroxy radicals. Vitamin E prevents the propagation of lipid peroxy radicals in cellular membranes. When sorted by antioxidant content, clove has the highest mean antioxidant value, followed by peppermint, allspice, cinnamon, oregano, thyme, sage, rosemary, saffron, and estragon, all dried and ground, with mean values ranging from 44 to 277 mmol/100 g. Spices and herbs are rich sources of antioxidants. They have been used in food and beverages to enhance flavor, aroma and color. Due to their excellent antioxidant activity, spices and herbs have also been used to treat some diseases. Spices, herbs and supplements include the most antioxidant rich products in our study, some exceptionally high. Berries, fruits, nuts, chocolate, vegetables and products thereof constitute common foods and beverages with high antioxidant values. Clove, oregano, and thyme are all among the commercially available spices with the highest total antioxidant capacity. Several phytochemicals found in these spices, such as rosmarinic acid (Lee et al. 2006) in thyme and oregano (Shan et al. 2005), eugenol in clove and allspice (Chainy et al. A plant-based diet protects against chronic oxidative stress-related diseases. Dietary plants contain variable chemical families and amounts of antioxidants. It has been hypothesized that plant antioxidants may contribute to the beneficial health effects of dietary plants. Our objective was to develop a comprehensive food database consisting of the total antioxidant content of typical foods as well as other dietary items such as traditional medicine plants, herbs and spices and dietary supplements. This database is intended for use in a wide range of nutritional research, from in vitro and cell and animal studies, to clinical trials and nutritional epidemiological studies.

Keywords: oxidative stress, Berries, Dietary plants, spices and herbs, -Tocopherol



Introduction

Antioxidants are compounds that may help delay or even prevent cell damage in the body. When a person consumes them in large amounts, antioxidants may help defend the body against oxidative stress from potentially harmful free radicals, which are unstable atoms. When free radicals build up in a person's blood, they can create oxidative stress. Oxidative stress may increase the risk of developing cancer, heart disease, and many other chronic illnesses and health problems. Many healthful foods contain antioxidants. If a person consumes some or all of these foods regularly, they may increase their antioxidant levels, potentially helping them prevent the damage that doctors associate with oxidative stress. The body's trillion or so cells face formidable threats, from lack of food to infection with a virus. Another constant threat comes from chemicals called free radicals. In very high levels, they are capable of damaging cells and genetic material. The body generates free radicals as the inevitable byproducts of turning food into energy. Free radicals are also formed after exercising or exposure to cigarette smoke, air pollution, and sunlight. [1]Free radicals come in many shapes, sizes, and chemical configurations. What they all share is a voracious appetite for electrons, stealing them from any nearby substances that will yield them. This electron theft can radically alter the "loser's" structure or function. Free radical damage can change the instructions coded in a strand of DNA.

It can make a circulating low-density lipoprotein (LDL, sometimes called bad cholesterol) molecule more likely to get trapped in an artery wall. Or it can alter a cell's membrane, changing the flow of what enters the cell and what leaves it. An excessive chronic amount of free radicals in the body causes a condition called oxidative stress, which may damage cells and lead to chronic diseases. [2]We aren't defenseless against free radicals. The body, long used to this relentless attack, makes many molecules that quench free radicals as surely as water douses fire. We also extract free-radical fighters from food. These defenders are labeled "antioxidants." They work by generously giving electrons to free radicals without turning into electron-scavenging substances themselves. They are also involved in mechanisms that repair DNA and maintain the health of cells. There are hundreds, probably thousands, of different substances that can act as antioxidants. The most familiar ones are vitamin C, vitamin E, beta-carotene, and other related carotenoids, along with the minerals selenium and manganese. They're joined by glutathione, coenzyme Q10, lipoic acid, flavonoids, phenols, polyphenols, phytoestrogens, and many more. Most are naturally occurring, and their presence in food is likely to prevent oxidation or to serve as a natural defense against the local environment. But using the term "antioxidant" to refer to substances is misleading. It is really a chemical property, namely, the ability to act as an electron donor.

Some substances that act as antioxidants in one situation may be pro-oxidants—electron grabbers—in a different situation. Another big misconception is that antioxidants are interchangeable. They aren't. Each one has unique chemical behaviors and biological properties. They almost certainly evolved as parts of elaborate networks, with each different substance (or family of substances) playing slightly different roles. This means that no single substance can do the work of the whole crowd.

Observation

Health benefits of antioxidants:

Antioxidants came to public attention in the 1990s, when scientists began to understand that free radical damage was involved in the early stages of artery-clogging atherosclerosis. It was also linked to cancer, vision loss, and a host of other chronic conditions. Some studies showed that people with low intakes of antioxidant-rich fruits and vegetables were at greater risk for developing these chronic conditions than were people who ate plenty of those foods. Clinical trials began testing the impact of single substances in supplement form, especially beta-carotene and vitamin E, as weapons against chronic diseases. Even before the results of these trials were in, the media and the supplement and food industries began to hype the benefits of

“antioxidants.” Frozen berries, green tea, and other foods labeled as being rich in antioxidants began popping up in stores. Supplement makers touted the disease-fighting properties of all sorts of antioxidants. The research results were mixed, but most did not find the hoped-for benefits. Most research teams reported that vitamin E and other antioxidant supplements didn't protect against heart disease or cancer. [3] One study even showed that taking beta-carotene supplements actually increased the chances of developing lung cancer in smokers. On the other hand, some trials reported benefits; for example, after 18 years of follow-up, the Physicians' Health Study found that taking beta-carotene supplements was associated with a modest reduction in the rate of cognitive decline. [4] These mostly disappointing results haven't stopped food companies and supplement sellers from banking on antioxidants. Antioxidants are still added to breakfast cereals, sports bars, energy drinks, and other processed foods, and they are promoted as additives that can prevent heart disease, cancer, cataracts, memory loss, and other conditions. Often the claims have stretched and distorted the data: While it's true that the package of antioxidants, minerals, fiber, and other substances found naturally in fruits, vegetables, and whole grains helps prevent a variety of chronic diseases, it is unlikely that high doses of antioxidant supplements can accomplish the same feat.



Inference

Epidemiological prospective studies show that higher intakes of antioxidant-rich fruits, vegetables, and legumes are associated with a lower risk of chronic oxidative stress-related diseases like cardiovascular diseases, cancer, and deaths from all causes. [30-33] A plant-based diet is believed to protect against chronic oxidative stress-related diseases. [2] It is not clear if this protective effect is due to the antioxidants, other substances in the foods, or a combination of both. The following are nutrients with antioxidant activity and the foods in which they are found:

Vitamin C: Broccoli, Brussels sprouts, cantaloupe, cauliflower, grapefruit, leafy greens (turnip, mustard, beet, collards), honeydew, kale, kiwi, lemon, orange, papaya, snow peas, strawberries, sweet potato, tomatoes, and bell peppers (all colors)

Vitamin E: Almonds, avocado, Swiss chard, leafy greens (beet, mustard, turnip), peanuts, red peppers, spinach (boiled), and sunflower seeds.

Carotenoids including beta-carotene and lycopene: Apricots, asparagus, beets, broccoli, cantaloupe, carrots, bell peppers, kale, mangos, turnip and collard greens, oranges, peaches, pink grapefruit, pumpkin, winter squash, spinach, sweet potato, tangerines, tomatoes, and watermelon

Selenium: Brazil nuts, fish, shellfish, beef, poultry, barley, brown rice

Zinc: Beef, poultry, oysters, shrimp, sesame seeds, pumpkin seeds, chickpeas, lentils, cashews, fortified cereals

Phenolic compounds: Quercetin (apples, red wine, onions), catechins (tea, cocoa, berries), resveratrol (red and white wine, grapes, peanuts, berries), coumaric acid (spices, berries), anthocyanins (blueberries, strawberries).

Conclusion

Excessive free radicals contribute to chronic diseases including cancer, heart disease, cognitive decline, and vision loss. This doesn't automatically mean that substances with antioxidant properties will fix the problem, especially if they are taken out of their natural context. The studies so far are inconclusive but generally don't provide strong evidence that antioxidant supplements have a substantial impact on disease. Keep in mind that most of the trials conducted have had fundamental limitations due to their relatively short duration and inclusion of people with existing disease. At the same time, abundant evidence suggests that eating whole in fruits, vegetables, and whole grains—all rich in networks of naturally occurring antioxidants and their helper molecules—provides protection against many scourges of aging.

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