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Vegetable Antioxidants- Way to Improve Human Health

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Abstract

Vegetables are rich sources of natural antioxidants, including vitamins, phenolic compounds, flavonoids, carotenoids, and other bioactive phytochemicals that play a key role in promoting human health. These antioxidants help neutralize reactive oxygen species (ROS), reduce oxidative stress, and protect cells from damage that contributes to chronic diseases such as cardiovascular disorders, diabetes, cancer, and neurodegenerative conditions. Regular consumption of antioxidant-rich vegetables—such as leafy greens, cruciferous vegetables, tomatoes, carrots, and peppers—has been associated with improved immune function, better metabolic balance, and enhanced overall physiological resilience. This review highlights the major classes of vegetable-derived antioxidants, their mechanisms of action, and their importance in disease prevention and health maintenance. Understanding the role of vegetable antioxidants provides a strong foundation for promoting dietary strategies aimed at improving human health and reducing the global burden of lifestyle-related diseases.

Keywords: *Vegetable antioxidants, Dietary antioxidants, Antioxidant-rich vegetables, Phytochemicals and Bioactive compounds*

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In modernization, eating habits are more shifted towards better taste and palatability and less on nutritiveness so the problems like fastened aging, cardiovascular disorders, chronic diseases, and autoimmune diseases, etc. are getting increased day by day and even today some people unknowingly and carelessly keeping their diet until they get affected. But in recent times, health is a concern, and people are shifting towards healthy dietary habits due to the fear of different diseases and disorders as these antioxidants make a huge impact on human health. Antioxidants are natural compounds that protect cells in the human body from damage caused by free radicals and other compounds. These are present in the form of phytochemicals among different vegetables and some fruits, with some crops having higher levels.

Free radicals- What and How?

The scientific definition of free radicals is a molecule or atom having one or more unpaired electrons in its orbit. In the human body, mainly oxygen-derived free radicals are seen affecting health. These free radicals try to stabilize in the human body by robbing electrons from the stable molecules nearby thus causing a chain reaction by one robbing others nearby molecules this reaction causes a disaster by initiating lipid peroxidation and that leading to disintegration, breakage of cell membranes and also causing oxidation reactions of cellular compounds like proteins, lipids, and DNA (Halliwell *et al*., 1995). According to Ames (1983), this oxidation causes the human body serious illness and reduces its natural capability to prevent aging.

How Free radicals originated?

Free radicals are formed in the human body due to natural processes like metabolism and also by the immune system sometimes to combat microbes and also due to air pollution, radiation, smoking, alcohol, fried foods, pesticides, and food

adulterants.

How do Antioxidants stop free radicals?

The antioxidants stop the occurrence of the reaction by donating their electrons to the free radicals.

Vegetables rich in Antioxidants:

Other than improving human health antioxidants are also used in food preservation but as long as talking about human health vegetables play a major role by having different phenolic compounds like Ascorbic acid, carotenoids, other pigments, and flavonoids.

All leafy greens like kale, and spinach as well as cruciferous vegetables like broccoli and cauliflower are rich sources of antioxidants along with other vitamins like Vitamin A and Vitamin C. The cruciferous members are rich in antioxidants due to the presence of glucosinolates which break down in the body to form isothiocyanates and have anti-cancer properties. The Chinese cabbage i.e. Pak Choi also has high antioxidant properties against hypochlorite ions.

Another vegetable crop high in antioxidants is the Solanaceae family of vegetables such as tomato, Brinjal, and Pepper. These vegetables are rich in a compound called lycopene, which has been shown to have powerful antioxidant properties. Lycopene is not broken down even in storage and also after cooking. Lycopene is thought to help protect the skin from damage caused by UV rays, as well as reduce the risk of heart disease and certain types of cancer.

Both Chilli and Capsicum is also rich source of ascorbic acids along with capsaicinoids present in the pericarp having antioxidant properties.

Among the cucurbits refreshing fruits like watermelon and muskmelon are also rich sources of vitamins like C and A, lycopene, and carotenoids so making a rich source of antioxidants.

Red Onions are also a rich source of antioxidants which are used in almost all dishes in the country. It is also found that carrots are having the best antioxidant properties even after cooking due to the presence of carotenoids, anthocyanins, ascorbic acid, and tocopherols along with the phenolics such as coumaric and caffeic acids.

Legumes like French bean has phenolic, and phytic agents, and ascorbic acids act well against free radicals.

The other leafy vegetables like drumstick, curry leaf, amaranthus, fenugreek, lettuce, spinach, etc. are also having rich antioxidant compounds which help improve human health.

CONCLUSION

Having a diet rich in antioxidants can have many health benefits. Eating a variety of these vegetables can ensure an adequate intake of antioxidants and a healthy diet. So as per ICMR guidelines, each individual must consume 300g of vegetables daily for a healthy life. People should stop looking at the doctor after they get diseases but they should get themselves checked and get a proper diet plan from a certified nutritionist as one says “Prevention is better than cure”.

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