



## Role of Polyphenols as Antioxidant in Human Health

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### Description

Dietary polyphenols have received tremendous attention among nutritionists, food scientists, and consumers because of their role in human health. Researches of recent years convincingly confirm the role of polyphenols in the prevention of degenerative diseases, especially cancer, cardiovascular diseases and neurodegenerative diseases. Polyphenols are powerful antioxidants that complement and supplement the functions of antioxidant vitamins and enzymes as a defense against oxidative stress caused by excess reactive oxygen species.

Polyphenols have been found to be powerful antioxidants that can neutralize free radicals by donating an electron or hydrogen atom. The highly conjugated system and certain hydroxylation patterns, such as the 3-hydroxyl group in flavonol, are believed to be important in antioxidant activity. Although polyphenols are chemically characterized as compounds with phenolic structural features, this group of natural products is very diverse and contains several subgroups of phenolic compounds.

Fruits, vegetables, whole grains, and other foods and beverages such as tea, chocolate, and wine are rich sources of polyphenols. The diversity and wide distribution of polyphenols in plants has led to different ways of classifying these natural compounds. Polyphenols have been classified by their source of origin, biological function, and chemical structure.

Polyphenols suppress the generation of free radicals, thus reducing the rate of oxidation by inhibiting the formation or deactivation of active forms and precursors of free radicals. Most often, they act as direct scavengers of radicals in chain reactions of lipid peroxidation (chain breakers). Chain breakers donate an electron to a free radical, neutralizing the radicals and becoming stable (less reactive) radicals themselves, thus terminating chain reactions.

In addition to scavenging radicals, polyphenols are also

### ARTICLE HISTORY

Received: 03-Oct-2022, Manuscript No. EJMOAMS- 22-77362;

Editor assigned: 07-Oct -2022, PreQC No. EJMOAMS- 22-77362 (PQ);

Reviewed: 21-Oct-2022, QC No. EJMOAMS- 22-77362;

Revised: 27- Oct-2022, Manuscript No. EJMOAMS- 22-77362 (R);

Published: 03-Nov-2022

known as metal chelators. Chelation of transition metals such as  $\text{Fe}^{2+}$  can directly reduce the Fenton reaction rate, thus preventing oxidation caused by highly reactive hydroxyl radicals. Polyphenols do not work in isolation. It was found that polyphenols can indeed function as an antioxidant and participate in the regeneration of essential vitamins.

Although polyphenols such as flavonoids can be absorbed through the gastrointestinal tract, plasma concentrations are low, usually less than  $1 \mu\text{mol/L}$ , in part because of rapid metabolism in human tissues.

### Phenolic acids

Phenolic acids are derivatives of benzoic and cinnamic acids and are present in all grains. These acids show high antioxidant activity in vitro and are therefore beneficial to human health due to their antioxidant potential and prevent cell damage from free radical oxidation reactions.

### Flavonoids

Almost every group of flavonoids has the ability to act as antioxidants. It has been reported that flavones and catechins appear to be the most potent flavonoids for protecting the body against reactive oxygen species. Flavonoids help regulate cell activity and fight free radicals that cause oxidative stress in our body. Simply put, they help your body function more efficiently while protecting it from daily toxins and stressors. Flavonoids are also powerful antioxidants.

### Isoflavones

Isoflavones are protective antioxidants that reduce the formation of radicals and reactive oxygen species by breaking down hydrogen peroxide without generating radicals, by quenching reactive singlet oxygen, and by trapping and quenching radicals before they reach their cellular targets.