Antioxidant, antiradical, and antimicrobial activities of polysaccharides obtained by microwave-assisted extraction method: A review

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Highlights

- Great bio-functionalities of polysaccharides extracted by microwave-assisted (MAE)
- The high capacity of polysaccharides to quench $DPPH^{\cdot}$, $OH^{\cdot}$, $NO^{\cdot}$, $ABTS^{\cdot+}$, and $O_2^{\cdot-}$
- The dose-dependent reducing, chelating, and lipid peroxidation inhibition activities
- Uronic acids are the main constituents involved in the antioxidative properties
- Strong antibacterial, antifungal, and antiviral activities of MAE-polysaccharides

Abstract

The antioxidant and antimicrobial activities of polysaccharides extracted by microwave-assisted extraction (MAE) were reviewed. An ascending dose-dependent manner was found for the *in vitro* antioxidant (e.g., nitrite scavenging, phospho-molybdenum reduction, inhibition of lipid peroxidation (ILP), ferric reducing power, and ferrous metal ions chelating), and antiradical (against $DPPH\cdot$, $OH\cdot$, $ABTS\cdot$, $NO\cdot$, and $O_2\cdot^-$) activities. There was a positive and significant correlation between ILP and erythrocyte hemolysis inhibition, showing the excellent antioxidative properties to prevent the risk of cell damage. These carbohydrate-based polymers *in vivo* could reduce malonaldehyde and protein carbonyls and increase stress-resistance-related enzymes such as catalase, superoxide dismutase, and glutathione peroxidase. They showed an effective bactericidal activity against a wide variety of gram-negative and gram-positive bacterial infections. The *in vitro* strong antifungal and antiviral activities of sulfated polysaccharides extracted by MAE were also diagnosed without any cytotoxicity effect. Therefore, these biomacromolecules might be used to develop functional foods and nutraceuticals.