

IN VITRO EVIDENCE OF QUERCETIN 'S ANTIOXIDANT SUPERIORITY: ROLE OF B-RING IN LDL OXIDATION

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ABSTRACT

As a widely studied flavonoid of plant origin, quercetin exhibits a high degree of antioxidant activity because it can both scavenge free radicals and inhibit oxidative stress. This study has tested the in vitro antioxidant activity of quercetin utilizing a Cu-mediated low-density lipoprotein (LDL) oxidation assay which is a reliable model for testing the antioxidant activity. From the structural analysis, it was noted that the presence of two adjacent hydroxyl groups in the B ring of quercetin is important for its radical scavenging activity. Other structural features, such as the C4 keto group and C2-C3 double bond, were of lesser importance to the radical scavenging ability. These results reinforce the importance of the catechol moiety (ortho-dihydroxy structure) in quercetin's antioxidant activity. Further studies examined quercetin's activity relative to other flavonoids and confirmed his higher antioxidative activity owing to his optimal molecular structure. The study also examined quercetin's stability and solubility in aqueous systems noting other issues that arise such as low bioavailability. Regardless, the central focus continued to be the intrinsic antioxidant properties without considering additional enhancement of the formulation. The results showed that quercetin as a natural antioxidant has great potential to combat oxidative damage in chronic diseases. With regards to their relevance to quercetin, these findings confirm its potential as a nutraceutical for managing conditions like oxidative stress, atherosclerosis and even neurodegeneration. The research aids in understanding the mechanisms involved in quercetin's antioxidant activity, reinforcing the notion of its usefulness in functional foods, phytopharmaceuticals and dietary supplements.

KEYWORDS: Quercetin, Antioxidant activity, Free radical scavenging, Lipid peroxidation

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