Biomacromolecular JournalBMMJ

Curcumin Versatility on Protein and Life Sciences

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ABSTRACT

Curcumin, a natural polyphenolic product, exhibits therapeutic activity against several diseases, attributed mainly to its chemical structure and unique physical, chemical, and biological properties. The o-methoxyphenol group and methylenic hydrogen of curcumin are responsible for the antioxidant activity. Curcumin interacts with proteins through non-covalent and covalent bonding. Curcumin could bind directly to numerous signaling molecules, like inflammatory molecules, cell survival proteins, protein kinases, protein reductases, histone acetyltransferase, histone deacetylase, xanthine oxidase. The β-diketo group forms chelates with transition metals, thereby reducing the metal-induced toxicity. Curcumin could not show anticancer activity without OH in the phenolic group. Our results demonstrated curcumin decreases protein fibrillation and ROS generation (1). However, its low bioavailability due to low solubility and low stability in physiological conditions is a significant challenge in the field of its efficient and effective utilization in medicinal purposes. We attempt to increase the bioavailability of curcumin that encapsulated in camel Beta-Casein increased the solubility of curcumin at least 2500-fold and curcumin encapsulation with gum Arabic and whey protein nanofibrils improved antioxidant activity (2-4). Today, the antiviral potential of curcumin has received a lot of attention. Our published review paper in this field showed that curcumin has the antiviral activity against the virus of of HIV, HBV, HPV, HSV1, HCV, HuNoV, MERS-coronavirus and SARS-Cov2 through the direct interaction with viral replication machinery or activation and suppression of signaling pathway that essential for viral replication (5).

Keywords: Curcumin, Functional groups, Protein fibrillation, Bioavailability, Antiviral activity

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