A Short Review on the Efficacy of Derivatives of Curcumin

Rege Sameera[1, *], Megha Varshneya[1], Shamim Momin[1]

[1] Department of Oils, Oleochemicals and Surfactants Technology, Institute of Chemical Technology, Nathalal Parekh Marg, Matunga (East), Mumbai-400 019, India

Article Information

Identifiers and Pagination:

Year: 2022
Volume: 3
Issue: 3
E-location ID: e100622205859
Publisher ID: e100622205859
DOI: 10.2174/2665978603666220610161741

Article History:

Received Date: 01/01/2022
Revision Received Date: 18/03/2022
Acceptance Date: 30/03/2022
Electronic publication date: 2022

[*] Address correspondence to this author at the Department of Oils, Oleochemicals and Surfactants Technology, Institute of Chemical Technology, Nathalal Parekh Marg, Matunga (East), Mumbai- 400 019, India; E-mail: sameerarege@gmail.com

Curcumin with medicinal value should possess good bioavailability and stability. Unfortunately, the bioavailability of curcumin is less, and its stability depends on the medium. After intake of curcumin, it undergoes metabolism to form metabolites, which are bioactive and show better bioavailability than curcumin. Hence, the disadvantages of curcumin can be overcome by the formation of its synthetic derivative. In this review paper, the derivatives of curcumin, namely tetrahydrocurcumin, hexahydrocurcumin, octahydrocurcumin, deketene curcumin, and dimethoxycurcumin are discussed. The diketo group, diene moiety, and ortho-methoxy phenolic groups present in curcumin influence its properties. Curcumin undergoes degradation in alkaline and non-polar mediums, mainly because of its property to exhibit keto-enol tautomerism, which is further enhanced due to the presence of diene moiety and ortho-methoxy phenolic groups. If the keto-enol tautomerism is inhibited by its derivatization, then its stability is improved. This is especially true in the case of hexahydrocurcumin, octahydrocurcumin, and deketene curcumin, which do not possess an active methylene group. Although tetrahydrocurcumin undergoes keto-enol tautomerism, the degradation of enol tautomer is prevented due to the absence of diene moiety. The activities of curcumin are medium dependent, whereas the activities of hydrogenated derivatives of curcumin and deketene curcumin are medium independent. Dimethoxycurcumin exhibits keto-enol tautomerism and can undergo degradation in alkaline and non-polar mediums at a faster rate

than curcumin. The reason is that the strong activating hydroxyl groups in curcumin are replaced by a stronger activating methoxy group in dimethoxycurcumin. On the other hand, in acidic and polar mediums, the rate of beneficial activities of dimethoxycurcumin is more than curcumin. Also, the bioavailability of the above-mentioned derivatives of curcumin is more than curcumin.

Keywords: Curcumin, derivatization, reduced derivatives, deketene curcumin, dimethoxycurcumin, methoxy phenolic groups.