

Hypothetical Protective Effects of Crocin Carotenoid against Coronavirus-Induced Organ Damage: The Possible Role of the NF- κ B Signaling Pathway

Hypothesis

The coronavirus disease 2019 (COVID-19) pandemic is a major global medical and economic burden in that it had caused over 85 million infected cases and over 1.8 million deaths worldwide by the end of December 2020. Severe acute respiratory syndrome coronavirus (SARS-CoV-1) and Middle East respiratory syndrome coronavirus (MERS-CoV) are infectious diseases similar to COVID-19. However, unlike COVID-19, they did not create pandemics.¹⁻³ A major pathological hallmark of these infections is the so-called “cytokine storm”, which is an unregulated production of inflammatory cytokines inducing detrimental inflammation and causing organ injury and lethal multiple organ failure such as severe pulmonary, cardiovascular, and kidney failure in SARS-CoV-2 infection.^{4, 5} The coronavirus also induces inflammatory cascades, and thus, cause vasculopathy and coagulopathy, which might lead to lung cell degeneration and cardiovascular disease.^{4, 5} Mitochondrial dysfunction, oxidative stress, and inflammation and apoptosis pathways associated with COVID-19 might also induce multiple organ failure.^{4, 5} At the molecular level, the toll-like receptor 4 (TLR4)/toll/interleukin-1 receptor/resistance protein (TIR)-domain-containing adapter-inducing interferon- β (*TRIF*)/nuclear factor kappa-light-chain-enhancer of activated B cells (NF- κ B) pathway is a common factor in activating cytokine production in infectious and inflammatory processes, including SARS-CoV-2 infection. Current data indicate the involvement of the cytokine inflammatory pathway, Janus kinase/signal transducers and activator of transcription, C-reactive protein, and the colony-stimulating factor in COVID-19-induced inflammatory events. Nonetheless, the clear role of the TLR4/TRIF/NF- κ B pathway in this regard is still unknown.^{6, 7}

Currently, there is no effective treatment for SARS-CoV-2 infection. A compound with potential for the treatment of SARS-CoV-2 infection is crocin carotenoid. Several studies have suggested the antiviral potential of crocin carotenoid in inhibiting the replication of several viruses similar to the coronavirus.⁸ Additionally, multiple experimental and clinical studies have reported the anti-inflammatory potential of crocin in various infectious and inflammatory disorders. Moreover, Crocin carotenoid has properties both for protection against vascular damage and for the inhibition of thromboembolic events. Hence, its hypothetical protective effects against cardiovascular, cerebrovascular, and respiratory events.⁹ A preliminary study in humans has shown that at doses of 50 to 150 mg/kg, crocin carotenoid might have antiviral and anti-inflammatory effects during coronavirus-induced cytokine storms.⁹ On the other hand, preliminary results show that crocin carotenoid could not only modulate the TLR4/TRIF/NF- κ B pathway and thus, control cytokine production, vasculopathy, and coagulopathy in infections but also mediate organ damage by inflammatory cascades.^{6, 7} Despite such properties, the protective effects of crocin carotenoid against coronavirus-induced inflammatory damage and its efficacy in the management of coronavirus replication have yet to be elucidated. Accordingly, we hypothesized that crocin carotenoid might confer antiviral and anti-inflammatory clinical benefits against SARS-CoV-2 infection, inhibit the vascular damage that leads to thromboembolic events after SARS-CoV-2 infection, and thus, protect the lung and cardiovascular systems. We welcome studies to further define the mechanism of action and potential clinical effects of crocin carotenoid in SARS-CoV-2 infection.

Conflict of Interest: None declared.

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