CHAPTER – 5

Flavonoids and Covid-19: A Molecular Perspective

Arzoo Chawla

| Aarzoochawla828@gmail.com

SOHAS , Gd Goenka University

Abstract

The emergence of coronavirus disease 2019 (COVID-19), caused by SARS-CoV-2, has resulted in an unprecedented global health crisis. Although vaccines and antiviral agents have contributed significantly to disease control, rapid viral mutations and limited therapeutic efficacy underscore the urgent need for alternative or complementary treatment strategies. Natural products, particularly flavonoids, have gained substantial interest owing to their broad pharmacological activities, including antioxidant, anti-inflammatory, antiviral, and immunomodulatory effects. Flavonoids, abundant in fruits, vegetables, herbs, teas, and wines, exhibit the potential to interfere with multiple stages of the SARS-CoV-2 life cycle. Emerging evidence suggests that these compounds can inhibit viral entry, replication, and assembly, while also modulating host cellular pathways to reduce excessive inflammatory responses such as cytokine storms, a major contributor to severe COVID-19 pathology.

This chapter provides a molecular-level overview of the antiviral potential of flavonoids against SARS-CoV-2, highlighting key aspects of viral structure, replication mechanisms, and host–virus interactions. Additionally, it discusses flavonoid-mediated inhibition pathways identified through molecular docking, in silico analyses, and preclinical studies. Collectively, the chapter underscores the relevance of flavonoids as promising candidates for the development of supportive or adjunct therapeutic strategies for COVID-19 management.

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