Introduction. Coronaviruses (CoV) are a family of single-stranded RNA viruses that cause respiratory, intestinal, painful, and neurological diseases in humans and animals. Some human CoVs cause mild respiratory disease, but some, including severe acute respiratory syndrome CoV (SARS-CoV) and Middle East respiratory syndrome CoV (MERS-CoV), cause severe disease. A recent research project showed that amplification homology between SARS-CoV-2 and SARS-CoV was 79.5%, and SARS-CoV-2 belongs to the same beta-coronavirus (β CoV) as MERS-CoV and SARS-CoV. There is more and more evidence of the antiviral potential of plant compounds. In addition, modern pharmacological research and clinical trials have revealed numerous pharmacological actions of individual phytochemicals. All hypotheses mentioned in this review are based on the assumption that the immune response against COVID-19 is similar to that of other coronaviruses, which should be confirmed by future studies.

Curcumin has antiviral activity against a wide range of viruses, including influenza virus, adenovirus, hepatitis, human papillomavirus (HPV), human immunodeficiency virus (HIV), herpes simplex virus-2 (HSV2), and Zika viruses. It exerts antiviral activity through various mechanisms, ranging from inhibition of viral entry into cells, inhibition of viral encapsulation and viral protease, inhibition of viral replication, and modulation of multiple signaling pathways.

Baicalin and baicalein have been shown to inhibit SARS-CoV in vitro, and scutellarin can also bind to the ACE2 receptor to prevent viral invasion. At the same time, they alleviated complications caused by the virus through anti-inflammatory effects, improved immune response and other functions.

Resveratrol inhibits SARS-CoV-2 replication with reduced cytotoxicity. The ability of resveratrol to inhibit SARS-CoV-2 replication was assessed in Vero cells in vitro using quantitative reverse transcription polymerase chain reaction and immunofluorescence assays. Research has shown that resveratrol and polydatin derived from the Chinese medicine Polygonum cuspidatum are specific and selective inhibitors of 3-chymotrypsin-like protease and papain as SARS-CoV-2 protease in vitro. Melatonin interacts with CD147, the preferred cellular receptor of SARS-CoV-2, which diffuses in cell walls, particularly in erythrocytes and endothelium. This feature is seen as a protective mechanism against several pathological pathways that can occur during COVID-19, such as hemoglobin denaturation, iron accumulation, hypoxia, cardiomyocyte damage, and hypercoagulation.

Glycyrrhizin has demonstrated potential therapeutic benefit in COVID-19 infections through multiple mechanisms. This includes inhibiting the accumulation of intracellular reactive oxygen species (ROS), signaling molecules that play a critical role in the inflammatory response triggered by viral infections. Inhibition of reactive oxygen species generation by glycyrrhizin can also reduce activation of nuclear factor kappa-beta (NFkB), c-Jun N-terminal kinase (JNK), p38, and redox signaling processes known to be involved in viral replication.

Quercetin exhibits potent immunomodulatory properties by suppressing the expression of several pro-inflammatory cytokines and signaling pathways. Studies have shown that treatment with quercetin-loaded micro emulsion (QR-ME) during a 22-day study reduced airway inflammation by reducing the expression of IL-5 and IL-4. Quercetin also reduced the activation of the NF-κB inflammatory pathway and the expression levels of P-selectins.

NAC inhibits NF-κB as well as replication of human influenza viruses (strain H5N1, Vietnam/VN1203) in human lung epithelial cells in a dose-dependent manner. NAC also reduced the production of pro-inflammatory cytokines (IL-8, CXCL10, CCL5 and IL-6), thus reducing the chemotactic migration of monocytes. In addition, NAC has been shown to inhibit the reproduction of other viruses such as human immunodeficiency virus (HIV) and respiratory syncytial virus (RSV). NAC may help prevent or control infections caused by RNA viruses because the drug enhances the signaling functions of TLR7 and mitochondrial antiviral signaling protein (MAVS) in the production of IFN-1. IFNs are able to inhibit the replication of SARS-type corona-
viruses, so they may be useful in the treatment of COVID-19.

Conclusions. The global pandemic caused by the novel coronavirus disease 2019 (COVID-19), for which there is still no effective vaccine or treatment, has resulted in a global public health emergency. Despite the lack of clinical data, compelling evidence from the literature suggests that some nutraceuticals and plant compounds derived from plant extracts have potential for use in the treatment of COVID-19. Although there is already strong evidence in the literature for the potential of these compounds to combat the current COVID-19 pandemic, new evidence is gradually emerging. However, the clinical evidence provided is still inconclusive, and there are also inconsistencies in the data, as some clinical studies have not achieved the desired effects. Given these factors, randomized controlled trials are needed to address and clarify questions regarding the use of these compounds. Thus, there is an urgent need for clinical testing of compounds that could help fight the COVID-19 pandemic.

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**SUMMARY**

**APPROACH TO THE TREATMENT AND PREVENTION OF COVID-19: VIRUS-SPECIFIC NUTRACEUTICALS AND PLANT EXTRACTS**

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In this research review, we identified nutrients that could potentially be effective in people with coronavirus infection. Therefore, the use of nutraceuticals, which contain natural substances with immunomodulatory, antioxidant, and antiaggregation properties, can contribute both to reducing the risk of SARS-CoV-2 infection and to reducing the severity of the course of the disease itself. These opportunities should not be neglected in the fight against such a difficult disease as COVID-19.

**Key words:** COVID-19, nutraceuticals plant extracts, prevention.

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