

## **Abstract**

Plant products have been used to treat various diseases since ancient times thanks to the many active substances they contain. One such group of substances are alkaloids. Alkaloids are biologically active substances which, in addition to antimicrobial, anti-inflammatory, antioxidant and many other properties, also possess antiviral properties. As a result, they can help treat viral infections, which are still a major medical problem today. Alkaloids affect all steps of virus replication, both viral components but especially cellular processes, without which a successful progress of viral cycle is not possible. In connection with the treatment of viral infections, the tropane, troponol, purine and isoquinoline alkaloids have been best investigated, which are also the subject of this work. The tropane alkaloid atropine acts mainly on enveloped viruses due to its ability to change the properties of biological membranes. Purine alkaloid caffeine, thanks to its ability to inhibit the cellular enzyme phosphodiesterase, causes an increase in intracellular cAMP levels and it has an impact on viral replication. Its antioxidant and immunomodulatory properties are also beneficial for the treatment. The anti-inflammatory effects of the tropane alkaloid colchicine stem from its ability to inhibit the dynamics of cellular microtubules. As a result, it not only prevents the secretion of proinflammatory cytokines by inhibiting the folding and activation of the inflammasome and the intracellular transport of vesicles, but also affects the motility and chemotaxis of leukocytes. Because of these anti-inflammatory properties, it could be used for the treatment of the new COVID-19 disease. Like caffeine, the isochocholine alkaloid papaverine has the ability to inhibit cellular phosphodiesterase. In addition, it inhibits the transcription and phosphorylation of viral proteins. It also reduces the phosphorylation of components of the cellular signaling MAPK/ERK pathway, thereby disrupting the nuclear export of viral ribonucleoprotein and thus the replication of the influenza virus. Another isochocholine alkaloid, berberine, also does not interact directly with virus components, but suppresses virus-induced signaling. It reduces the phosphorylation of MAP kinase pathways. All of these mechanisms may find application in the treatment of viral diseases, especially those for which we do not yet have effective drugs or vaccinations, or where there is a risk of developing resistance. Therefore, research on plant alkaloids has great potential in improving the treatment of viral diseases.