

Research Suggests St. John's Wort and Echinacea Could Protect Against COVID-19

By: Sally Robertson, B.Sc., News Medical



Researchers in Saudi Arabia have conducted a study demonstrating the antiviral effects of two medicinal herbs against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) – the agent that causes coronavirus disease 2019 (COVID-19).

The team's analysis of *Hypericum perforatum* – also called St. John's Wort – and two species of Echinacea (Purple Cone Flower) showed that each herb, as well as the two combined, exerted inhibitory and virucidal effects on SARS-CoV-2-infected Vero E6 cells.

The effects were most potent when cells were treated with *H. perforatum*. A combination of the two herbs was the second most effective, and treatment with Echinacea alone was the least effective.

Leena Hussein Bajrai and colleagues from King Abdulaziz University in Jeddah recommend that clinical trials are initiated to investigate the herbs as potential treatments for SARS-CoV-2 infection.

A pre-print version of the research paper is available on the *bioRxiv** server, while the article undergoes peer review.

Effective antivirals are urgently needed

Although most SARS-CoV-2 infections cause mild-to-moderate COVID-19, a substantial proportion leads to severe disease characterized by vasculitis, coagulopathy, and multi-organ damage that can lead to death. Such advanced disease can be caused by the overproduction of certain cytokines such as tumor necrosis factor-alpha (TNF- α), interleukin -6 (IL-6), and interferon-gamma (IFN- γ).

Although some vaccines protecting against SARS-CoV-2 infection have recently become available, their efficacy is a topic of intense debate, particularly since new variants have arisen in the virus's genomic structure.

Effective antivirals are therefore still urgently needed as treatment approaches, says the team.



More about the medicinal plants

H. perforatum or St. John's Wort has long been known for its medicinal effects across a range of bacterial and viral infections. In vitro and in vivo studies have previously demonstrated the antiviral activity of *H. perforatum* against infectious bronchitis virus (IBV), hepatitis C, and coronaviruses other than SARS-CoV-2.

Three species of Echinacea (Purple cone Flower), namely *E. angustifolia*, *E. purpurea*, and *E. Pallida*, have also traditionally been used as remedies to treat influenza and to boost the immune system. In vivo and in vitro studies have previously shown that Echinacea influences cytokine

production, increases expression of the lymphocyte activation marker CD69, and reduces the severity of illness.

One study conducted in 2009 showed that *E. purpurea* extract inhibits infection with H5N1 influenza by blocking the receptor-binding activity of the virus.

What did the researchers do?

The team investigated the antiviral effects of *H. perforatum* and two Echinacea species (*E. purpurea* and *E. angustifolia*) on Vero E6 cells incubated with SARS-CoV-2. The effects of treating the cells with a mixture of the herbs (H.E) were also investigated.

Their mode of action was assessed using three approaches: direct treatment of virus-infected cells, pre-treatment of cells prior to viral infection, and a virucidal activity assay.

Quantitative real-time polymerase chain reaction (qRT-PCR) was used to measure the mRNA expression of the RNA-dependent RNA polymerase (RdRP) gene, viral load, and virus neutralization every 12, 16, 24, 36, and 48 hours post-infection.

What did the study find?

When virus-infected cells were treated with the extracts, *H. perforatum* showed the greatest efficacy, with an IC50 value (concentration that inhibits 50% of target) of 1.56mg/mL, followed by the H.E mixture (IC50: 6.25mg/mL), and Echinacea (IC50: 6.25mg/mL).

The greatest reduction in viral load was observed for *H. perforatum*, followed by the H.E mixture and Echinacea. Both *H. perforatum* and the H.E mixture reduced viral load for up to 36 hours, while Echinacea reduced it for up to 24hrs of addition.

Next, the cells were incubated with the extracts at 37°C for two hours prior to infection. The effective concentration was highest for *H. perforatum*, at 1.56 µg/mL, followed by the H.E mixture (6.25 mg/mL) and Echinacea (6.25 mg/mL).

For the virucidal activity assay, SARS-CoV-2 was incubated with the extracts for two hours before it was added to cells. Again, *H. perforatum* exhibited the greatest effect, followed by the H.E mixture, and Echinacea. Incubation with *H. perforatum* or the H.E mixture reduced viral load for more than 48 hours, while Echinacea reduced viral load for up to 36 hours.

"*H. perforatum* showed the highest inhibitory effect in all three antiviral assays, while Echinacea showed the lowest inhibitory effect," writes the team.

Future directions

The researchers say the study provides clear evidence for the first time that a mixture of *H. perforatum* and Echinacea demonstrates anti-SARS-CoV-2 activity. They suggest testing whether the mixture can boost the inhibition of the virus in clinical trials.

The mixture could be useful for treating SARS-CoV-2-infected patients with mild or severe disease and for protecting people who have contact with infected patients, says Bajrai and colleagues. However, treatment with *H. perforatum* is preferable since it demonstrated a higher efficacy, they add.

The researchers also recommend using either Echinacea or H.E as a prophylactic approach to SARS-CoV-2 infection.

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Journal reference:

- Bajrai L, et al. In vitro screening of antiviral and virucidal effects against SARS-CoV-2 by *Hypericum perforatum* and Echinacea. **bioRxiv**, 2020. doi: <https://doi.org/10.1101/2021.01.11.426295>, <https://www.biorxiv.org/content/10.1101/2021.01.11.426295v1>