Is Indian Costus Effective Against the SARS-CoV-2 Virus?

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Funding: No specific funding was received for this work.

Potential competing interests: No potential competing interests to declare.

Abstract

Indian costus is a medicinal plant that is widely used in the Middle East to treat a variety of health problems, especially respiratory diseases. Its active constituents, which include flavonoids, sesquiterpene terpenes, and anthraquinones, have powerful antioxidant and anti-inflammatory activities. During the COVID-19 pandemic, many people have turned to Indian costus to reduce the symptoms of the virus or to support their immune systems. This is because the plant is rich in active constituents and has been used for centuries to treat a variety of diseases.

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Introduction

Herbal medicine is a growing area of healthcare; this field of medicine uses medicinal herbs containing important active

ingredients that play a significant role in the prevention and treatment of multiple health conditions (Wid Ibraheem Kadm & Abood, 2017). Indian costus (Saussurea costus) is a medicinal plant classified under the Asteraceae family. It is found in India, and its active part is the root, which contains oil and other active constituents. Ayurvedic medicine in India uses costus root as a single drug or in combination with other drugs (Pandey et al., 2007). The genus *Saussurea* is rich in important active ingredients; the well-known ingredients are mainly terpenes, while different amounts of flavonoids, anthraquinones, alkaloids, tannins, inulin, and sesquiterpene lactones such as custonolide and dehydrocostus lactone are the major components (Bagheri et al., 2018). These constituents make this medicinal plant a source of medicinal prescriptions since Islamic civilization; in Arab countries, this plant is known as “Al-Kost Al-Hindi” and is used traditionally as a stimulant, antiseptic, repellent, sedative, bronchodilator, and has several health benefits, such as treating symptoms of respiratory conditions, including bronchitis and cough. Saussurea also possesses antiviral properties and can help improve immune system function (Saif-Al-Islam, 2020). During the COVID-19 pandemic, people turned to using medicinal herbs as antioxidants to support their bodies and reduce and manage the risk of COVID-19; herbal medicine may also be used in combination with modern medicine for this purpose; antiviral herbs, such as Indian costus, are used (Demeke et al., 2021). The pathogenicity of SARS-CoV-2 begins with the aid of the S protein, which plays a crucial role in the attachment of the virus to the host; it enters the cells by endocytosis after attachment to the angiotensin-converting enzyme-2 (ACE2). Clinical features begin with fever, dry cough, tiredness, and shortness of breath. Many people use medicinal herbs to reduce these symptoms (Li et al., 2021). The question of whether Indian costus is effective against SARS-CoV-2 is still being investigated. However, many medical compounds have been identified in this plant, including *Sesquiterpene terpenes* (ST), anthraquinones, alkaloids, and flavonoids. *Sesquiterpene terpenes* are the main compounds of *S. costus* root, which include dehydrocostus lactone (DCL) (46.8%), costunolide (CS) (9.3%), 8-cedren-13-ol (5.1%), and α-curcumene (4.3%). These constituents have been reported to possess medicinal properties and exhibit various bioactivities, including antifungal, antidiabetic, antihelmintic, antitumor, antiulcer, immunomodulatory, anti-inflammatory, and anti-hepatotoxic activities, in addition to flavonoids which have antimicrobial activity (Mujammami, 2020). The constituents of Saussurea costus have various medicinal properties. Myrcene acts on ACE receptors and may interfere with viral entry into cells. Myrcene and p-cymene have analgesic properties, while camphene, inulin, alpha-phellandrene, caryophyllene, and hexanoic acid act as expectorants (Saif-Al-Islam, 2020). On the other hand, costunolide is a sesquiterpene lactone that has been investigated for its anti-inflammatory activity. In one study, costunolide was shown to inhibit the protein and mRNA expression of interleukin-1 (IL-1), a pro-inflammatory cytokine. This suggests that costunolide may have potential as a treatment for inflammatory diseases (Zahara et al., 2014). In silico reverse docking studies of costunolide, cynaropicrin, and dehydrocostus lactone have shown potential as medications for COVID-19. These compounds were shown to inhibit the replication of SARS-CoV-2, the virus that causes COVID-19, in vitro. Further studies are needed to confirm these findings and to determine the safety and efficacy of these compounds in humans (Hajji et al., 2022).

Conclusion

Indian costus is an important medicinal plant because it contains **important** active constituents that make it a good choice

as an adjuvant treatment for the SARS-CoV-2 virus. In addition, it is available and affordable, making it accessible to many people, especially in the midst of the spread and development of many viral diseases. However, more research is needed to confirm these findings and to determine the safety and efficacy of Indian costus in humans.

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