

Effectiveness of Red Ginger (*Zingiber Officinale* Var. *Rubrum*) as COVID-19 Treatment : Literature Review

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Abstract: This study aims to explore the efficacy of compounds in red ginger (*Zingiber officinale* var. *rubrum*) as an alternative to COVID-19 treatment. Red ginger, known for its active compounds such as gingerol, shogaol, and zingerone, has anti-inflammatory, antioxidant, and antibacterial properties. Through a literature review, this study examined various studies that highlighted the potential of red ginger in boosting the immune system, reducing inflammation, and inhibiting the replication of the SARS-CoV-2 virus. Results from several studies suggest that red ginger may play a role in improving lung function, reducing oxidative stress, and supporting the recovery of COVID-19 patients. Thus, red ginger offers potential as an adjunctive therapy in the management of COVID-19.

Keywords: Red Ginger, COVID-19, Antioxidants

Introduction

Traditional medicine is a very valuable cultural heritage and needs to be preserved as an effort to maintain body health naturally (Pranatha, 2023). In Indonesia, traditional medicine plays an important role in public health services, thanks to its abundant biodiversity. This country, with its mega-biodiversity, has various types of medicinal plants that have great potential, but many of them have not been optimally utilized (Nurjasmi, 2021). Saputro (2024), explains spice plants as a group of medicinal plants, often used in traditional medicine because they are known to have properties that can provide protection (preventive) against various diseases and improve body health (promotive). One of the spice plants that has long been used is red ginger (*Zingiber officinale* Rosc.). Ginger, which is thought to originate from South Asia, has spread throughout the world and has been used since ancient times as a cooking spice and herbal medicine (Firdaus, 2020).

In Indonesia, ginger is widely used, both as a traditional medicine and in making cooking spices and herbal drinks (Nugroho, B., 2024). Ginger belongs to the Zingiberaceae family and is known for its various varieties, such as red ginger, elephant ginger, and emprit ginger. Red ginger, in particular, is known for its high content of essential oils and gingerol, making it effective in treating various diseases (Susilawati, 2022). In the context of the COVID-19 pandemic (Prasetyawan, F., 2024) which has had a significant impact on global health (Mildawati, R., 2024), research on the potential of red ginger as an alternative or complement in treating this disease is becoming increasingly relevant. Red ginger contains active compounds such as gingerol, shogaol, and zingerone, which have anti-inflammatory, antioxidant, and antibacterial properties. These compounds have the potential to contribute to overcoming viral infections and accelerating the healing process.

The purpose of this article is to explore the efficacy of compounds in red ginger (*Zingiber officinale* var. *rubrum*) as an alternative treatment for COVID-19. This article will discuss in depth the bioactive components contained in red ginger, as well as their therapeutic potential in the context of treating and preventing COVID-19 infection (Akhmal, F., 2024). Thus, it is hoped that this research can provide better insight into the possibility of using red ginger as part of a comprehensive strategy in dealing with this pandemic.

Methodology

This study uses a literature review design . Ibrahim et al (2023) explained that the literature review method includes searching, collecting, and analyzing references such as journals, books, and relevant documents to compile a paper that discusses a particular issue or problem. In this study, the keywords used include "red ginger compounds", "red ginger content", and "red ginger for COVID-19" both in Indonesian and English. The selected articles must meet the inclusion criteria, namely published in the last 3 years (2021-2024), specifically on red ginger, written in Indonesian or English, in the form of scientific research articles (not literature reviews or community service journals) and available in full text . Article searches were carried out through Google Scholar to find literature that was in accordance with the focus of the study.

Result and Discussion

Result

After conducting a search for scientific articles via Google Scholar, 5 articles were obtained that met the inclusion criteria and were then analyzed in more depth as follows.

Table 1. Research Results on the Efficacy of Compounds in Red Ginger in Handling Covid 19

No	Researchers and Years	Title	Research result
1.	Suherman, M., & Maulidya, SAI (2023)	In Silico Study: Secondary Metabolites from Red Ginger Rhizome (<i>Zingiber officinale</i> Var. <i>Rubrum</i>) as potential inhibitors OF3CLpro AND PLpro OF SARS-CoV-2	This study aims to evaluate the potential of red ginger rhizome (<i>Zingiber officinale</i> var. <i>rubrum</i>) as an inhibitor of PLpro and 3CLpro of SARS-CoV-2, which play an important role in the replication of the COVID-19 virus. Through in silico simulations using molecular docking and molecular dynamics, it was found that of the 27 red ginger compounds tested against PLpro, all had lower binding energies than the reference ligand, indicating good inhibition potential. However, none of the compounds were effective against 3CLpro. One of the compounds, ar-curcumin, showed strong interaction with PLpro through hydrogen bonds and high stability in molecular dynamics simulations, making it a potential material to be developed as a COVID-19 drug.
2.	Hidayat, R., & Wulandari, P. (2023)	The Herbal Potential of Ginger (<i>Zingiber officinale</i> Roscoe) and	This study found that the essential oil of red ginger (<i>Zingiber officinale</i> var. <i>rubrum</i>) has the potential to improve the immune

		Guava (Psidium guajava L.) as Supplements for the Management of Coronavirus Disease 2019 (COVID-19)	system. Red ginger essential oil is able to increase the humoral immune response in immunosuppressed mice. The humoral immune response is part of the immune system that involves production of antibodies by B cells to fight pathogens. By enhancing this response, red ginger can help the body more effectively fight infections, including COVID-19.
3.	Suhendy, H. (2021)	Formulation of red ginger (Zingiber officinale Rosc. var. rubrum) antioxidant herbal drink	The results of this study indicate that the formulated red ginger herbal drink has very strong antioxidant activity and meets the established quality standards. The composition of the drink consists of 14.23 mL of red ginger juice, 57 mL of UHT milk, 35.7 grams of sugar, and 143.07 mL of water, which creates optimal taste and antioxidant benefits. Organoleptically, the product remains stable for one day, with a pH of 5.8, a viscosity of 16 cp (100 rpm), and good homogeneity. Evaluation of antioxidant activity using the DPPH method showed that the IC ₅₀ value for ascorbic acid was 6.39 µg/mL, while for the red ginger herbal drink it was 8.44 µg/mL. This shows that this herbal drink has very strong antioxidant activity, although slightly lower than ascorbic acid. This high antioxidant activity has the potential to provide benefits in handling COVID-19 by reducing oxidative stress and inflammation that often accompany viral infections, as well as supporting the immune system in fighting disease.
4.	Lorensia, A., Pratama, AM, Sukarno, DA, & Suryadinata, RV (2021)	Effects of Red Ginger (Zingiber officinale var rubrum) to Improve Lung Function in reducing the risk of COVID-19 in Stable COPD Patients	This study shows that red ginger (Zingiber officinale var. rubrum) infusion is effective in improving lung function in patients with chronic obstructive pulmonary disease (COPD). Using a pre-post design from May to September 2021, 21 adult patients in Mojoanyar District, Mojokerto, underwent 250 grams of red ginger infusion therapy for 4 months. The results of data analysis showed that all data were normally distributed (P-value > 0.05) and the t-test showed significant changes every month (P-value = 0.000). This proves that red ginger infusion can significantly increase

			FEV1 and FVC values, indicating improved lung function in COPD patients. These findings are also relevant to the treatment of COVID-19, considering that COVID-19 infection can worsen lung conditions, and the use of plant-based therapies such as red ginger can offer an additional approach in supporting lung recovery and improving respiratory function in COVID-19 patients.
5.	Wahid, RAH, Purwaningsih, O., & Pamungkas, PB (2023)	Phytochemical Profiling and Antioxidant Activities of Red Ginger (<i>Zingiber officinale</i> var. <i>rubrum</i>) Cultivated Eco-Farming	This study revealed that the use of eco-enzyme significantly increased the phytochemical content and antioxidant activity of red ginger rhizomes (<i>Zingiber officinale</i> var. <i>rubrum</i>). Red ginger showed flavonoid, phenolic, and terpenoid content in all treatments. Eco-enzyme with a concentration of 0.3% gave the best results in increasing flavonoid content, which was 0.11%. Meanwhile, a concentration of 0.5% eco-enzyme produced the highest phenolic content, which was 53.54%. Antioxidant activity measured using the DPPH method showed an inhibition percentage of 73.65%, with red ginger treated with 0.5% eco-enzyme having the highest antioxidant activity with an IC50 value of 4.238 ppm. These findings indicate that eco-enzyme can be used to increase the phytochemical content and antioxidant potential of red ginger. Given the potential of red ginger as a source of antioxidants, the resulting product can play a role in handling COVID-19 by helping to increase the immune response and reduce inflammation. Thus, red ginger enriched with eco-enzyme has the potential to be a useful additional supplement in efforts to prevent and treat COVID-19, as well as in the development of environmentally friendly and antioxidant-rich food products.

Discussion

Based on the analysis results of the five articles, the efficacy of compounds in red ginger (*Zingiber Officinale* Var. *Rubrum*) in handling COVID-19 can be seen from various things. The following is a deeper discussion of these findings.

The Potential of Red Ginger Compounds in Inhibiting Virus Activity

Research by Suherman and Maulidya (2023) revealed the significant potential of compounds from red ginger (*Zingiber Officinale* Var. *Rubrum*) in inhibiting the activity of the SARS-CoV-2 virus. In silico studies using molecular docking and molecular dynamics showed that all 27 compounds tested showed lower binding energy to PLpro compared to reference ligands, indicating good inhibition potential. Ar-curcumin, one of the compounds, showed strong interaction and high stability with PLpro, making it a superior material for COVID-19 drug development. This finding also emphasizes the importance of red ginger as a source of bioactive compounds that can target important parts of virus replication. Thus, red ginger not only offers the possibility of new treatments but also has the potential to expand the spectrum of COVID-19 therapy, especially in the context of plant-based drug development.

Strengthening the Immune System

Research by Hidayat and Wulandari (2023) revealed that essential oil from red ginger has the potential to boost the immune system, especially through humoral immune response. Increased antibody production can help the body fight infections more effectively. This argument is important because a strong immune system is key to fighting infections such as COVID-19, where a weak immune response can lead to serious complications. Red ginger as an immunostimulant has the potential to fill the gap in conventional approaches by boosting the body's defenses against viruses. Thus, in addition to reducing inflammation, red ginger can also strengthen immune defenses, offering an additional solution in COVID-19 management.

Antioxidant Activity and Oxidative Stress Reduction

According to Suhendy (2021), red ginger herbal drink shows strong antioxidant activity, with an IC₅₀ of 8.44 µg/mL. This activity is relevant in the context of COVID-19 because oxidative stress plays a role in worsening viral infections and increasing inflammation. Reducing oxidative stress can help alleviate the effects of inflammation and improve the body's immune response. This argument is important because uncontrolled inflammation is often a major factor in complications of infection. With red ginger's ability to neutralize free radicals, this herbal drink can be part of a more holistic strategy for preventing and treating COVID-19, reducing the oxidative burden on the body and supporting recovery.

Improving Lung Function in COPD Patients

Research by Lorensia et al. (2021) showed that red ginger infusion significantly improved lung function in patients with chronic obstructive pulmonary disease (COPD). This is relevant in the treatment of COVID-19, considering that infection can worsen existing lung conditions. Red ginger offers an additional approach to improving lung function, which is important in the context of viral infections that affect the respiratory system. Thus, red ginger not only provides benefits for patients with COPD but can also help restore lung function in COVID-19 patients, offering an alternative therapy that focuses on lung health and supports recovery.

Increased Phytochemical Content and Antioxidant Activity

Wahid et al.'s (2023) research shows that the use of eco-enzyme increases the flavonoid and phenolic content and antioxidant activity in red ginger. This increase in antioxidant activity with an IC₅₀ value of 4.238 ppm strengthens the potential of red ginger in increasing immune responses and reducing inflammation. This argument is important because phytochemicals such as flavonoids and phenolics have a major role in overcoming oxidative stress and supporting general health. The use of eco-enzyme to increase phytochemical content shows innovation in optimizing the benefits of red

ginger, which can be an additional supplement in the prevention and treatment of COVID-19, as well as supporting the development of environmentally friendly and antioxidant-rich food products.

Conclusion

The compounds found in red ginger, particularly ar-curcumin, demonstrate significant antiviral activity by inhibiting SARS-CoV-2 replication, which may lead to the development of new therapeutic options. Additionally, red ginger's ability to enhance immune response, reduce oxidative stress, and improve lung function makes it a valuable adjunct in managing COVID-19, especially for patients with compromised respiratory systems. Furthermore, the innovative use of eco-enzyme to enhance red ginger's phytochemical content further strengthens its potential as an immune booster and anti-inflammatory agent. Overall, red ginger offers a multifaceted approach to COVID-19 therapy, combining antiviral, immunomodulatory, and antioxidant properties, making it a promising candidate for complementary treatment strategies.

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