

ANTIOXIDANT EFFECT IN RED GINGER (*ZINGIBER OFFICINALE* VAR. *RUBRUM*) EXTRACT DURING THE COVID-19 PANDEMIC

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ABSTRACT

Background: Ginger (*Zingiber officinale* (L.) Rose) has been used as spice for over 2000 years. Its roots and the obtained extracts contain polyphenol compounds (6-gingerol and its derivatives), which have a high antioxidant activity. Methods for the characterization of antioxidants are presented and illustrated by their application to commercial ginger preparations, since it has been widely speculated that ginger might be beneficial to human health because it exerts antioxidant activity. This study aimed to investigate antioxidant effect of in red ginger (*zingiber officinale* var. *rubrum*) extract during the COVID-19 pandemic.

Subjects and Method: This was an experimental study. A sample of red ginger extract involved five drink instant products. These products were assessed to measure the antioxidant level. Antioxidant activity was examined by soaking in radical free of 1,1-difenil-2-pikrilhidrazil using UV-Vis Spectrophotometry.

Results: The study showed that instant ginger sample A was included in the category of moderate antioxidant activity, while the other four instant ginger samples B, C, D, and E were included in the category of weak antioxidant activity. Furthermore, for the positive control, vitamin C is included in the category of very strong antioxidant activity.

Conclusion: The instant red ginger product from the research results showed that four of the five samples belonged to the category of weak antioxidant activity.

Keywords: red ginger, antioxidant, COVID-19.

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BACKGROUND

At the end of December 2019, in Wuhan, China was surprised by the discovery of a mysterious outbreak of pneumonia characterized by fever, dry cough, fatigue, and occasional gastrointestinal symptoms. In January 2019 it was reported that thousands of Chinese citizens were stricken with this outbreak (Wu, et al., 2020). The outbreak is called coronavirus-19 (COVID-19) which causes severe acute respiratory Ssyndrome-Coronavirus-2 (SARS-Cov-2).

This epidemic has become a global pandemic because its spread is

so massive that almost all countries have reported finding cases of COVID-19, not least in Indonesia, where the first case occurred in early March 2020. This disease can become more dangerous if it affects the elderly and those who are sick. have a congenital disease (comorbid). Several inherited diseases that can increase the risk factors for COVID-19 include Hypertension, Diabetes, Heart, Asthma, Cancer, and Kidney Failure (COVID-19 Task Force, 2020; WHO, 2020).

Red ginger (*Zingiber officinale* var. *Rubrum*) was first cultivated in Asia (Indonesia and Malaysia) but is

now also cultivated in other tropical countries (Africa, India). The rhizome of red ginger can be used as a spice, food flavoring, and also as a traditional medicine (Supu, et al., 2018).

Red ginger is well known in Asia for its medicinal uses. Ginger extract has been determined to have antioxidant, anticancer, antibacterial, and treat joint inflammation properties. Ginger extract contains oleoresin and essential oil which has a yellow, oily and sharp aroma. Oleoresin contains phenolic compounds that play a role in antioxidant activity, such as gingerol, shogaol, and zingerone. Gingerol, where 6-gingerol is the main constituent of oleoresin which is susceptible to heat, light and oxygen. Gingerol and shogaol are the sources of the spicy and tangy taste in ginger (Febriani et al., 2018; Mao et al., 2019; Mulia et al., 2019).

In big cities the level of pollution is high, so antioxidants are needed to protect the body from the effects of free radicals. Free radicals can be obtained naturally from inside and outside the body. Produced naturally by the digestion of food. While from the outside can be caused by cigarette smoke, pollution, and radiation. Free radicals that cannot be handled by the body can trigger chronic diseases, such as cancer, autoimmune disorders, aging, cataracts, joint inflammation, and heart disease. The body naturally cannot produce antioxidants as needed, so we need to consume foods with high antioxidant content. (Huy et al., 2008; Widayat et al., 2018).

Red ginger is one of the herbal plants that have high antioxidant activity. The results of the research by

Widayat et al. (2018) showed that the ratio of 1:3 red ginger extract and water provided higher antioxidants. The highest antioxidant was obtained from the use of mixed sugar, which was 88.56%. This value did not decrease compared to pure ginger extract antioxidants, namely 91.46%. According to research by Yuliani, et al. (2016) resulted that the ethyl acetate fraction of red ginger rhizome ethanol extract has very strong antioxidant power with an IC₅₀ value of 41.27 ppm.

During the COVID-19 pandemic, red ginger is an herbal plant that is relied on to increase the body's immunity. Therefore, instant red ginger drink products are sought after by consumers in the market. Especially in the online market, which during the current COVID-19 pandemic is needed to reduce crowds and citizens' mobility. Ordering instant red ginger products can be easily ordered on the marketplace available on our gadgets.

Therefore, the aimed of the study was to determine the antioxidant activity of instant red ginger on the market during the COVID-19 pandemic.

SUBJECTS AND METHOD

1. Study Design

This was an experimental study. A sample of red ginger extract involved five drink instant product, this research was conducted in August to September 2021.

2. Population and Sample

The population in this study were instant red ginger extract products in the Indonesian market. The samples in this study were five instant red ginger extract products with various brands (test solution), while vitamin C was

used for control (positive control solution). The research was conducted at the Pharmacy Laboratory of the University of Muhammadiyah Kudus, Central Java.

3. Study Variables

The dependent variable is antioxidant activity. The Independent variables were the concentration of red ginger extract solution (test solution) and the concentration of vitamin C solution (positive control solution).

4. Operational Definition of Variables

Antioxidant activity is a test for antioxidants in their activity to inhibit free radicals, one of which uses the DPPH method.

Red ginger extract solution is a solution obtained from the extraction of red ginger which here is obtained from instant red ginger products.

Vitamin C solution is a solution obtained from vitamin C where vitamin C is a high antioxidant vitamin group.

5. Instruments

The main tool used in this research is the UV-Vis Spectrophotometry instru-

ment. While the materials used in this study were samples of five instant red ginger extract products with various brands, vitamin C, DPPH (1,1-phenyl-2-picrylhydrazil), methanol, and aquadest.

6. Data Analysis

Determination of antioxidant activity will be carried out by determining the maximum absorption wavelength of DPPH, and then the antioxidant activity will be determined.

RESULTS

Determination of the maximum absorption wavelength of DPPH (1,1-diphenyl-2-picrylhydrazyl) was used by the UV-Vis Spectrophotometry instrument in the wavelength range of 400-600 nm and the results showed that the maximum wavelength was read at 516.2 nm. Then, the IC₅₀ measurement results from instant red ginger extract can be seen in table 1, and The IC₅₀ measurement results of the vitamin C positive control solution can be seen in table 3.

Table 1. Instant red ginger antioxidant activity test results

Red Ginger Extract Solution	IC ₅₀
A	136,301 ppm
B	901,603 ppm
C	785,782 ppm
D	695,848 ppm
E	967,049 ppm

Table 2. The results of the antioxidant activity of vitamin C

Concentrate (ppm)	Attenuation (%)	IC ₅₀
4	47.20	4,106 ppm
6	64.80	
8	94.24	
10	96.64	

DISCUSSION

Instant red ginger (*Zingiber officinale* var. *Rubrum*) used as samples are five

kinds of MSME products found in the online market. Shopping for products online, especially during the current

Covid-19 pandemic, is very helpful because it can reduce mobility and crowds in public places. According to Taufik et al. (2020) during the Covid-19 pandemic, the needs of the community and government for the availability of medicines and health products encourage increased production and demand so that innovative MSMEs can adapt to this.

Determination of antioxidant activity in instant red ginger samples was carried out quantitatively using the DPPH (1,1-diphenyl-2-picrylhydrazil) method. The DPPH method is a method that can be used to measure antioxidant activity in a fast, simple, and inexpensive way. DPPH is a test to determine antioxidant activity with the ability to ward off free radicals (Prasetyo et al., 2021). A compound can be said to have antioxidant activity if the compound is able to donate its hydrogen atom to bind to DPPH to form reduced DPPH which is characterized by the loss of purple color. Determination of antioxidant activity is expressed in IC₅₀ (µg/mL or ppm) as antioxidant capacity (Wiendarlina et al., 2019).

The result of determining the maximum wavelength that will be used to measure the absorbance of the sample and positive control is 516.2 nm. This wavelength was obtained from the measurement of the maximum wavelength of 0.5 mM DPPH solution with a UV-Vis Spectrophotometer instrument in the wavelength range of 400-600 nm (Hasibuan et al., 2020; Souhoka et al., 2021).

The antioxidant activity of the instant red ginger test solution was expressed in terms of the percentage of

attenuation against DPPH free radicals. The difference in absorption between DPPH absorbance and the measured test absorbance is a way to get the percent reduction of instant red ginger. The amount of antioxidant activity is indicated by the IC₅₀ value, namely the concentration of sample solution needed to inhibit 50% of DPPH free radicals (Widayat et al., 2018; Yuliani et al., 2016)

The results of the antioxidant activity test of instant red ginger showed that product A with an IC₅₀ value of 136.301 ppm was included in the category of moderate antioxidant activity. Meanwhile, products B, C, D, and E are included in weak antioxidant activity with IC₅₀ values of 901,603 ppm each; 785,782 ppm; 695,848 ppm; and 967,049 ppm. As for the positive control, vitamin C with an IC₅₀ value of 4.106 ppm was included in the category of very strong antioxidant activity. From the results of this study, it can be seen that four of the five instant red ginger products belong to the category of weak antioxidant activity.

According to research by Widayat et al. (2018), it showed that red ginger extract with a water ratio of 1:3 gave the highest antioxidant yield, and the addition of sugar obtained the highest antioxidant in the use of mixed sugar, namely 88.56%. This value did not experience a significant decrease compared to pure ginger extract antioxidants, namely 91.46%. Another study by Ghasemzadeh et al. (2010) showed that the type of solvent in the extract affected the antioxidant activity of ginger extract. Methanol showed the greatest ability to extract antioxidants

and inhibit free radicals by DPPH among the three solvents (methanol acetone and chloroform).

Another study by Purnomo et al (2010) showed that the type of heating process, both roasting and boiling, affected the antioxidant quality of ginger rhizome extract (*Zingiber officinale* Ross). It was found that roasting or boiling for 6 minutes gave the best effect on antioxidant activity. Based on the results of this study, it can be seen that several factors caused four of the five samples of instant red ginger to be included in the weak intensity for antioxidant activity. These factors are the extraction method, the time and duration of the roasting and boiling process.

The results of this study can be concluded that the instant red ginger had weak antioxidant activity.

AUTHOR CONTRIBUTION

Anisa Sholikhati as the person in charge of preparing research proposals and conducting research as well as compiling research journals. Lailatul Farikhah assists in conducting research and compiling research journals. Muhammad Ridwanto takes care of licensing the use of the laboratory and preparing tools and materials.

CONFLICT OF INTEREST

There is no conflict of interest in this study.

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