Indonesian Journal of Global Health Research
Volume 4 Number 3, August 2022
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

THE EFFECTIVENESS OF TOMATO FRUIT ANTIOXIDANT HANDBODY LOTION

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ABSTRACT

Antioxidants are found in various types of fruits and vegetables, one of which is tomatoes (Licopersicon esculentum Mill). Tomatoes contain lycopene, flavonoids and vitamin C compounds as antioxidants. Tomato fruit is made into juice by using the extraction method. Tomatoes with direct use are less effective, so they are made in the form of pharmaceutical preparations in the form of hand body lotion gel using tomato juice. The purpose of this study was to determine the effectiveness of tomatoes as antioxidants in handbody lotion gel preparations using the DPPH method. This research used experimental research method with 3 concentration formulas of tomato juice handbody lotion, namely 5%, 10% and 15%. The physical evaluation test showed that the results had met the physical requirements of the handbody lotion (organoleptic, homogeneity, spreadability, adhesion, viscosity, pH, lotion type and hedonic test). The results showed that tomatoes have effectiveness as antioxidants. This test was carried out using the DPPH method on the preparation of handbody lotion gel tomato juice formula II, the IC50 was 6,620 g/mL, which was greater than formulas I and III. The smallest IC50 value was obtained from formula III, which was 5,205 g/mL. The smaller the IC50 value, the stronger the antioxidant power.

Keywords: antioxidant, tomato juice, hand body lotion

First Received	Revised	Accepted
08 May2022	12 June 2022	08 August 2022
Final Proof Received		**Published**
16 August 2022		28 August 2022

How to cite (in APA style)
Ariyanti, A., Masruriati, E., Setyowati, D., & Nurulita, F. (2022). The Effectiveness of Tomato Fruit Antioxidant Handbody Lotion. Indonesian Journal of Global Health Research, 4(3), 611-620. https://doi.org/10.37287/ijghr.v4i3.1197.

INTRODUCTION

Premature aging is the aging process of the skin with a faster time than it should, this can happen to anyone, especially in Indonesia because of the tropical climate with abundant sunlight. The degenerative process on the skin will occur faster because it is often exposed to ultraviolet (UV) rays. Premature aging occurs as a result of environmental factors as well as from a person's internal factors. One of the main causes is exposure to free radicals from ultraviolet light. Free radicals are molecules that have one or more unpaired electrons. These electrons are easily reactive and act faster than other molecules to form free radicals. This can lead to cell damage such as premature aging and other diseases. One way to capture free radicals is with antioxidant compounds such as vitamin C and vitamin E (Aizah, 2016).

Antioxidants are compounds that can neutralize free radicals by donating electrons to free radical compounds. Antioxidant compounds can counteract the damage caused by free radicals to normal cells, proteins and fats. Antioxidants are found in many vegetables and fruits. One fruit that has high enough antioxidants is tomato (Lycopersicum esculentum Mill). The main content in tomatoes is lycopene, this compound contains very high antioxidants.

Other content of tomatoes include flavonoids, vitamin C and vitamin E which are also useful as antioxidants (Pujiastuti & Kristen, 2019).

Tomato (Lycopersicum esculentum Mill) is a natural source of antioxidants. The results show that consuming tomatoes regularly can reduce the risk of certain types of cancer and can ward off free radicals. The high antioxidant power in tomatoes can increase physical health to be maintained and can make you stay young because of the lycopene compound in tomatoes. Lycopene is the highest antioxidant compound in tomatoes, because it is one of more than 600 types of carotenoids that act as antioxidants. Lycopene is a natural color pigment in tomatoes, watermelons, grapes and guavas (Alissya Swastika NSP, Mufrod, 2013). Judging from the antioxidant effect found in tomatoes, tomato juice is made which is formulated into pharmaceutical preparations in the form of hand body lotion gel as a skin treatment to protect the skin from free radicals such as exposure to ultraviolet rays that cause damage to the skin, such as dry, dull, rough skin. , wrinkles and other skin problems. Hanbody lotion is an emulsion in the form of a liquid preparation including oil and water phases, the presence of the emulsion makes the lotion preparation stable contains more than one active ingredient. So that the preparation remains stable and fast it is made in liquid form, easy and even application when applied to the body's skin surface, so that it can spread quickly and quickly absorb into the skin layer (Febrianto et al., 2021).

In this study, tomato juice (Lycopersicum esculentum Mill) was formulated in a semi-solid dosage form. The semi-solid preparation chosen was lotion gel because the lotion preparation has several advantages, namely easy to apply, high enough dispersion and penetration, does not give an oily effect when used, provides a cooling effect on the skin, and is easily washed off with water. Lotion preparations have been widely circulated to the wider community because they contain various benefits including being able to moisturize the body's skin (Iskandar et al., 2021) .

METHOD

This research was conducted from February to March 2022 at the Kendal Stikes Laboratory, Central Java, using experimental research methods.

Tools and materials

The tools used are UV-Vis spectrophotometer, analytical balance, ultra turrax, Rion VT-04E viscometer, blender, vacuum filter, filter cloth, separating funnel, water bath. (Pujiastuti & Kristen, 2019). The ingredients used are fresh tomatoes (*Lycopersicum esculentum Mill*) obtained from tomato plantations in the Kendal area, Central Java which are bright red in color with a slightly sour sweet taste, DPPH (2,2-Diphenyl-1-picryllydrazyl), ethanol, triethanolamine, tamarind stearate, cetyl alcohol, glycerin, sodium tetraborate, nipagin, nipasol and distilled water (Astuti et al., 2021) .

Making Tomato Juice

Fresh tomatoes as much as washed with running water and then mashed using a blender for 10 minutes without adding water, filtered using a vacuum filter until a smooth filtrate is obtained and does not mix with seeds and skin.

Evaluation of Physical Properties of Tomato Juice

Organoleptic test

That is a test using the five senses such as observing smell, color, taste and visual consistency.

Viscosity test
Performed using a viscometer VT-04E, rotor no 3. The results will be read on the device, the results are the viscosity of tomato juice with units of d.Pa.S (desi Poise seconds).

Specific gravity test
This test was carried out using a pycnometer with a temperature of 25°C (Aizah, 2016)

Tomato Fruit Extract Handbody Lotion Gel Formula
Tomato fruit gel hanbody lotion was made with 3 concentration variations including 5%, 10% and 15%. Each preparation is made as much as 100 grams. The formula for the preparation of tomato juice can be seen in Table 1.

Table 1.
Formula HandBody Lotion Gel Tomato Juice

Material Name	Amount of Ingredients (%)		
	FI	FII	FIII
Tomato juice	20	35	50
Propylene glycol	15	15	15
Tween 80	10	10	10
Liquidum parffin	10	10	10
cetyl alcohol	8	8	8
Stearic acid	6	6	6
Sodium benzoate	0.3	0.3	0.3
Aquadest arrived	100	100	100

Making Handbody Lotion Gel Tomato Juice
Preparation of preparations from tomato juice begins with the determination of the water phase and the oil phase. The oil phase consists of cetyl alcohol, stearic acid and liquidum paraffin. The aqueous phase consisted of tomato juice, tween 80, propylene glycol, sodium benzoate and aquadest . Sodium benzoate is dissolved in water. Heat 10 mL until dissolved, then mix with tomato juice, propylene glycol, and Tween 80 and mix well in a 70˚C water bath (Pujiastuti & Kristen, 2019). Melt the stearic acid in a 70˚C water bath until complete, then add the cetyl alcohol and liquid paraffin, and stir until smooth. The mixture of the oil phase with the water phase in a cup at a temperature of 70°C, while stirring, is sufficient to produce 150 parts of the handbody lotion formulation. The handbody lotion formulation was cooled to room temperature while stirring. Stir until a thick and homogeneous mass is formed.

Testing the Physical Characteristics of Tomato Extract Handbody Lotion Gel Preparations
Organoleptic Test
Organoleptic testing was carried out by observing the H&B lotion preparation containing tomato juice which included the color, smell and taste of the H&B lotion when applied to the skin.

Homogeneity Test
Weigh 0.1 g handbody lotion gel tomato juice for homogeneity test. Place the handbody lotion emulsion in the middle of the slide, then flatten it and cover it with another glass object. Use a magnifying glass to observe the homogeneity of the emulsion for the presence of coarse particles or irregularities homogeneity about the preparation.

pH test
Hand body lotion formulation Tomato juice gel was tested for pH using pH Universal. Apply the handbody lotion emulsion formulation pH indicator and observe the color change on the pH indicator paper. Then the resulting color is equated to the pH indicator in the container.

Viscosity Test
Tomato Juice H&B Lotion Viscosity Test will be carried out by entering 120 grams of preparation into the container, then use a Brookfield viscometer to measure the viscosity type DV-E. Install the #64 spindle by turning the spindle wrench clockwise and starting to measure. The spindle speed is set to 10 rpm. Viscosity measurements are recorded from the earliest numbers and often appear on the viscometer screen , the percentage is about 58%.

Adhesion Test
Weigh up to 0.1 g of handbody lotion with tomato juice in the center of the target glass and cover with the other target glass. Place a 50 g load on the target glass cover for 5 minutes. Attach the end of the slide cover and the lower end of the slide to the clamps on the adhesive tester and remove the load bracket. The length of time the two slides were separated from the test apparatus was recorded as the formulation adhesion time to the dispersal diameter. A weight of 50 g was applied to the cover slip and allowed to stand for 1 minute, then the diameter of the distribution was recorded. added weight 50 grams to multiples of 200 grams, the diameter and area of distribution were then measured.

Protection Power Test
The protective power test was carried out by wetting it with filter paper with a diameter of 10 cm . Phenolphthalein (PP) indicator, then dried. Apply 0.5 g of the prepared tomato juice H&B lotion evenly on the filter paper, spread over the entire surface of the filter paper. tension. The filter paper was covered with a 2.5 x 2.5 cm filter paper which was coated with the prepared paraffin wax . Melt, then add 1 drop of 0.1N KOH to the area. The time of color change on the filter paper was recorded. The test results showed a pink stain on the filter paper indicating protection.

Emulsion Type
Testing the type of emulsion to be used is a coloring method. This test will be carried out using took a little handbody lotion with tomato juice and placed it in the object glass, then spiked with 1 drop of methylene blue, mixed until kind of and observed using a microscope. If the external phase is colored blue, then the preparation is oil in water (W/A) type (Yusuf et al., 2017) **.**

Tomato Fruit Extract Handbody Lotion Gel Stability Test
Testing the stability of H and body lotion gel tomato juice was carried out using the mechanical test method. This method is carried out using a 14 mL handbody lotion gel inserted into a centrifugation tube. The centrifugation tube is inserted into the centrifugation at a speed of 3600 rpm for 4, five hours, then the preparation was observed for physical changes which were marked using emulsion phase separation. Testing the stability of Handbody lotion gel tomato juice was carried out from modifications based on research by Setiawati et al., 2014 which customized using the type of centrifuge used (Febrianto et al., 2021) .

Antioxidant Activity Test

The antioxidant activity test in this study was influenced by using the diphenyl picryl hydrazyl (DPPH) method using the H&B way lotion juice for tomatoes was dissolved in 10 mL of water, 1 mL of the solution was taken and added using 4.0 mL of DPPH. The mixture was then homogenized and left for 30 minutes. The next step is to measure the absorbance at a wavelength of 517 nm and measure the blank. The results of the determination of anti-radicals were compared using vitamin C (Aizah, 2016) . The absorption value of the DPPH solution is calculated as % inhibition was calculated using the formula:

$$\% I = \frac{(\ blangko - Abs\ )}{\text{Abs blank}} \text{ x100 \%}$$

RESULTS

Organoleptic Preparation of Handbody Lotion Gel Tomato Juice

Juice handbody lotion preparations were carried out visually to determine the shape, color , smell, and taste of the preparation when applied to the skin (Bhagaskara & Solandjari, 2018) . The results of organoleptic observations of handbody lotion gel tomato juice were 1/2 solid, orange in color, and odorless. When applied , the skin feels soft. All formulas make the same organoleptic , this is because all three formulas use the same ingredients and manufacturing methods . Deep orange all formulas are found based on tomato juice hue . The intensity of the orange hue obtained based on the three formulas are slightly different. In formula I the orange hue is obtained younger than formula II & III hue . In formula III the intensity of the orange hue is obtained more concentrated based on formulas I & II. The difference in the intensity of the orange hue obtained based on the three formulas determined the variation of the concentration of tomato juice that is worn In each formula, the concentration of tomato juice increases which used more and more intense orange hue obtained .

Homogeneity Handbody Lotion Gel Tomato Juice

Homogeneity testing was carried out to determine the mixture of lotion preparation ingredients. The homogeneity of a preparation is determined the deep mixing process preparation time (Aryantini et al., 2020) . Based on the research output , it is known that increasing the concentration of tomato juice does not suggesting the homogeneity of tomato juice handbody lotion preparations , because all components of the material are mixed homogeneously.

pH Handbody Lotion Gel Tomato Juice

The purpose of measuring pH is to determine the degree of acidity or alkalinity of a preparation that is can suggest calm in time of application (Nurfita et al., 2021) . The results of testing the pH of tomato juice handbody lotion preparations for all formulations obtain the same pH, the pH obtained is 5. The desired pH is in accordance with the specified pH, which is around 4,5 – 8. Have an adequate pH level alkaline this causes the skin to become dry, whereas if the pH is too acidic it will cause irritation.

Viscosity Handbody Lotion Gel Tomato Juice

Viscosity test is carried out to determine the viscosity of a preparation. Viscosity testing in this study used a Brookfield viscometer type DV-E (Indriaty, 2019) . Viscosity test results can reviewed in Table II.The viscosity obtained based on all formulas meet the viscosity conditions of skin moisturizing preparations, namely 2000-50000 cP. Viscosity value obtained , then a statistical analysis was carried out shows that the viscosity data based on all formulas obtained are normally distributed, in formula I the significance value is 0.780 ($p > 0.05$), in formula II the significance value is 0.463 ($p > 0.05$) & in formula III the significance

value is 1,000 (p > 0.05). Viscosity data are also similarly distributed using a significance value of 0.369 (p > 0.05). Normal distributed viscosity data & Then the Anova test was carried out. Based on the Anova test, the viscosity of the H&B lotion preparation of tomato juice using The disparity in the concentration of tomato juice shows that there is a disparity which not significant (p = 0.086 > 0.05). This means that the concentration of tomato juice is not hypnotize the viscosity of tomato juice handbody lotion preparations .

Stickiness of Handbody Lotion Gel Tomato Juice

The adhesion test was carried out to determine the duration of the inherent lotion when applied to the skin. The results of testing the stickiness of tomato juice Handbody lotion preparations can reviewed in Table II. Based on the research output , it is known that the greater the concentration of tomato juice, the lower the adhesion ability . It is determined The consistency of tomato juice is in the form of a watery liquid resembling aquadest as a result, the amount of aquadest is high spiked on each formula less and less. In the formula using a higher concentration of tomato juice, it uses a smaller amount of aquadest . The concentration of tomato juice affects the stickiness according to the handbody lotion preparation of tomato juice, the greater the concentration of tomato juice obtained worn reported a decrease in adhesion according to the preparation of handbody lotion with tomato juice . Good adhesion will make when connection use longer skin , as a result can put impact maximum . The results of statistical analysis showed that the adhesion of all formulas was normally distributed. In formula I , the significance value is 0.307 (p > 0.05), formula II has a significance value of 1,000 (p > 0.05) & formula III has a significance value of 0.463 (p > 0.05). Adhesion data according to the three distributed formulas is not homogeneous using a significance value of 0.014 (p < 0.05). The results of the statistical analysis of the stickiness of the tomato juice handbody lotion showed that the data were normally distributed and the variants were different (no). homogeneous) so that it was continued using the one way ANOVA test using the post hoc Games Howell. Based on the one way ANOVA test, the stickiness of the hand body lotion gel preparation of tomato juice using The disparity in the concentration of tomato juice shows that there is a disparity which means (p = 0.004 < 0 xss=removed> 0.05) is not the same not homogeneous , formulas I & III (p = 0.073 > 0.05) are not the same not significant, formulas II & III (p = 0.092 > 0.05) are not the same not homogeneous. Based on statistical analysis, the concentration of tomato juice had no effect on the stickiness of handbody lotion gel with tomato juice . This means disparity the output of the handbody lotion adhesion test in each formula is not the same however meaningless .

Table 2.
Viscosity and Adhesiveness of Tomato Juice Handbody Lotion

Formula	Average Viscosity (Cp) ± SD	Average Adhesion (sec) ± SD
I	35250 ± 161	1.42±0.18
II	34850 ± 125	1.03±0.01
III	35100±60	0.92±0.04

Spreadability Handbody Lotion Gel Tomato Juice

The dispersion test were carried out to obtain information on the stability of the spread of the lotion when used on the skin. A good lotion that easily absorbs the skin layers and does not have a large molecular pressure so that it can easily penetrate the skin layers. Then result of the study stated that the addition of the load made the diameter of the spread larger , as a result , the wider the distribution. The spread area can be demonstrated the ease of applying the preparation in the skin (Mu et al., 2022) . The results of statistical analysis showed that the diameter distribution of all formulas obtained was normally distributed, in formula I the

significance value was 0.068 (p > 0.05), in formula II the significance value was 0.887 (p > 0.05) and in formula III the significance value was 0.905 (p > 0.05). 0.05). The distribution diameter data according to the three formulas is similarly distributed using a significance value of 0.218 (p > 0.05). The results of statistical analysis of the dispersive power of tomato juice handbody lotion gel preparations showed that the data were normally distributed and , as a result, continued to use the Anova test. Based on the ANOVA test, the distribution diameter of the handbody lotion gel preparation of tomato juice using The disparity in the concentration of tomato juice shows that there is a disparity which not significant (p = 0.098 > 0.05). This means that the concentration of tomato juice is not hypnotized the distribution diameter of handbody lotion preparations of tomato juice .

Protective Power of Tomato Extract Handbody Lotion Gel

Protection power testing is carried out to determine the ability of protection or protection against foreign effects from the outside can reduce effectiveness according to handbody lotion. Protection power test using phenolphthalein (PP) and 0.1 N KOH as indicators. Research output data in All formulas have protection _ good . Differences in the concentration of tomato juice have no effect on the protection power according to the handbody lotion made. This is shown using no appear deep red hue all filter papers according to the three formulas (Iskandar et al., 2021) . The results earlier stated that the preparation of hand body lotion with tomato juice can protect against use as a result can block the reaction between potassium hydroxide using phenolphthalein which is shown using no red hue .

Antioxidant Activity of Preparations from Tomato Juice

To test the antioxidant activity of the preparation, the DPPH (2,2-diphenyl-1-picryl hydrazil) method was used using a UV-Vis spectrophotometer. The activity of the antioxidant lotion is known by calculating the magnitude of the decrease in intensity and the resulting purple color using DPPH solution and the results are directly proportional to the decrease in the concentration of DPPH solution, this can occur because there is a reaction between the DPPH molecule and the hydrogen atom released by one molecule of the sample component so that it can form DPPH compounds and cause the purple color to decay. yellow (Aizah, 2016) . The absorbance value of the test results was used to determine the percent inhibition value. The results of vitamin C inhibition can be seen in Table III below.

Table 3.
Percent Inhibition of Vitamin C

Concentration (ppm)	Absorbance	Percent Inhibition
0	0.6195	0.000
5	0.5415	9,856
10	0.5115	16,705
15	0.4401	26.731
25	0.3701	39,702
50	0.2205	63,450
100	0.0870	85.601

The antioxidant activity of handbody lotion gel tomato juice was expressed in the percent inhibition by the radical DPPH method. Because there is a difference in absorption between the absorbance of DPPH and the absorbance of the sample measured by means of a UV-Vis spectrophotometer. (Widianingsih, 2016). The percentage results of inhibition and IC50 of the three formulations can be seen in Table IV.

Table 4.
Antioxidant Activity of Preparations from Tomato Juice

Formula	Percent Inhibition	IC50 (µg/mL)
I	4,991	5.701
II	5,550	6,620
III	4,670	5,205

Based on Tables III and IV, it was found that the percent inhibition of vitamin C was greater than the percent inhibition of preparations from tomato juice, because vitamin C was proven to have high antioxidant activity. The percent inhibition value of DPPH cannot be used as the main parameter to determine the antioxidant activity of a sample, because the response of each test concentration does not describe the best antioxidant activity among the tested samples. Percent inhibition was obtained from the test used to calculate the IC50 value which is the main parameter of antioxidant activity (Frtriani, 2018) .

DISCUSSION

The amount of antioxidant activity is indicated by the IC50 value, the concentration of the sample solution used to inhibit 50% of DPPH free radicals. Antioxidant activity test using the DPPH method on the preparation of handbody lotion gel tomato juice formula II obtained an IC50 of 6,620 g/mL which is greater than formulas I and II. The smallest IC50 value was obtained from formula III, which was 5,205 g/mL. The smaller the IC50 value, the stronger the antioxidant power (Rubiyanto, 2020). Based on the results of antioxidant activity tests that have been carried out, it can be seen that formula III has a stronger antioxidant power than formulas I and II, because formula III contains the highest concentration of tomato fruit by 50%. The effect of antioxidants obtained is mainly due to the presence of phenolic compounds such as flavonoids and phenolic acids. Generally, compounds that have antioxidant activity values are phenolic compounds. The results of the research above, the total phenolic content in the methanol extract of tomatoes was 546.950 mg/L equivalent to 1859.50 mg/kg of fresh tomatoes and high lycopene levels in fresh tomatoes.

CONCLUSION

The concentration of tomato juice did not affect the characteristics of the handbody lotion gel preparation of tomato juice, which included organoleptic tests, homogeneity, pH tests, protection, dispersion and adhesion of the preparations. The results of the mechanical stability test of handbody lotion gel tomato juice in all formulas underwent phase separation. Handbody lotion gel preparations have antioxidant effectiveness due to the content of lycopene and vitamin C compounds in tomatoes which are useful for warding off free radicals. Tomato juice hand body lotion gel has effectiveness as an antioxidant with IC50 values in formula I of 5,701 g/mL, formula II of 6,620 g/mL and formula III of 5,205 g/mL. Formula III has a stronger antioxidant power than formulas I and II, because formula III contains the highest concentration of tomato fruit by 50%.

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