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Production and Organoleptic Test of Body Sanitizer Nanogold, Nanosilver, and Eucalyptus Oil in the Pandemic Covid 19

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ABSTRACT: The body lotion is one of the cosmetic body care products used by the public, which has a moisturizing effect and is quickly absorbed by the skin. Researchers aim to produce and test organoleptic nanogold nanosilver body sanitizer and eucalyptus oil during the Covid-19 pandemic. Innovations in making hand body lotions currently need to be developed, one of which is by renewing body lotion into a body sanitizer during the Covid-19 pandemic as an antimicrobial and antiviral. The body sanitizer formulation used refers to the manufacture of body lotion in general with the addition of nanogold, nanosilver, and eucalyptus oil. The type of research used is experimental. The types of lotions compared are Body Lotion Basic (A) and Body Sanitizer Lotion Nanogold, Nanosilver, and Eucalyptus Oil (B) by organoleptic testing, including color, aroma, texture, and stickiness. The results showed that the organoleptic test of panelists acceptance of nanogold nanosilver body sanitizer and eucalyptus oil was better and more preferred than basic body lotion.

KEYWORDS: Body Sanitizer; Covid-19; Eucalyptus Oil; Nanogold; Nanosilver.

INTRODUCTION

The coronavirus or better known as Covid 19, is an outbreak of an infectious virus that was originally identified in December 2019 in the city of Wuhan, China. Covid 19 is caused by *Severe Acute Respiratory Syndrome Coronavirus 2* or SARS-CoV-*2* [1]. On January 30, 2020, the World Health Organization (WHO) reported that Covid 19 is a serious public health condition at the center of world attention [2]. The rapid spread of Covid 19 can have a direct impact on health, economic, social, and other aspects of life. To reduce the impact due to Covid 19, it is necessary to carry out policies so that it can push the spread of covid 19**,** one of them by implementing a new order or *new normal*. *New normal***,** namely changes in behavior so that they continue to carry out activities as usual, but are added to the application of a health protocol that functions to prevent the spread of Covid 19 [3]. The Covid-19 pandemic has made us have to adapt to the new normal situation where we have to start changing our habits such as doing WFH (*Work From Home*), implementing online learning, quarantine, mandatory wearing of masks, etc.

The lotion is one of the skincare cosmetics, which is a liquid emulsion composed of oil and water phases, which is stabilized by an emulsifier and can protect and maintain skin moisture[4]. During the Covid-19 pandemic, the use of body lotions was still questionable in terms of their ability to protect the skin from germs due to the widespread Covid-19. This is because the function of body lotion, in general, is to moisturize the skin. The use of antimicrobial and antiviral body lotions requires updating the body lotion to suit the current Covid-19 pandemic conditions. So that a new innovation was carried out, namely by renewing body lotion into a body sanitizer. The body sanitizer formulation used refers to the manufacture of body lotion in general with the addition of nanogold, nanosilver, and eucalyptus oil.

Gold nanoparticles are one of the nanoscience products that have been developed and have many advantages. Gold nanoparticles or better known as *nanogold* or Au-NPs, are inert metals that tend to be reduced so that in a short time and in a long time, *nanogold* which already received on the body will not have a bad impact but have a positive impact that benefits the body [5]. *Nanogold* is a non-carcinogenic synthetic antioxidant. Apart from that, *nanogold* has strong antioxidant activity, is long-lasting, and is very effective in reducing free radicals. *Nanogold is* used in beauty products as an *antiaging* [6]. Based on research [7], showed that a solution of $HAuCl_4$ or positive colloidal gold nanoparticles has antioxidant activity. Through antioxidant activity test using the DPPH method shows the increasing concentration of *nanogold*, the percentage level of free radical reduction will also increase [6]. *Nanogold* is a material that is secreted by the body because it has no charge [8]. One of the advantages of *nanogold* is that *nanogold* has a very small size. This is because a large number of atoms on the surface of the material make the cross-sectional area of atomic interactions more active and facilitate the entry and exit of cells without disturbing the working system of the cell [6].

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Recently, researchers have developed many medical products are related to *Nanosilver* [9]. In general, the types and range of applications of *nanosilver* are growing and gradually being applied in various fields. With the increasing relationship between *Nanosilver* and *Nanosilver* the human body, we need to know and balance their biological safety within us [9]. Silver nanoparticles, also known as *nanosilver* or colloidal silver, have been used in many personal care products as cosmetic preservatives such as shampoo, toothpaste, and supplies for acne-prone skin [10]. This is inseparable from *nanosilver*, which has antibacterial activity. The smaller the size *of the nanosilver*, the stronger the antibacterial effect [11]. The smaller the particle size, the greater the surface area of the *nanosilver* and the greater the contact with bacteria [12]. *Nanosilver* has been shown to inhibit the growth of *dermatophytes*. Therefore, *nanosilver* is a potential *anti-infective* agent active against infectious organisms, including *Vibrio cholerae*, *Escherichia coli*, *Staphylococcus epidermis*, *Syphilis typhus*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa* [10].

The essential oil extracted from eucalyptus is described as a colorless liquid with a strong, sweet, woody odor. Eucalyptus essential oil is one of the famous plants used in herbal medicine due to its biological activity and healing properties[13]. Plants generally contain antimicrobial complexes, namely 1,8-cineole (*Eucalyptol*), limonene, and -pinene. They are active against HSV-1 in vitro. According to a study, *Eucalyptol* is used as an herbal remedy for the treatment of respiratory ailments [14]. During the Covid-19 pandemic, *in silico* stated that 1,8-cineole or *Eucalyptol* could prevent Covid-19 transmission by binding to the Covid-19 proteinase [15]. The *Mpro-eucalyptol* will form hydrogen bond interactions, hydrophobic interactions (HI), and strong ionic interactions [15]. 1,8-cineole *in silico* is able to prevent virus replication by binding to coronavirus derivative proteins or spike proteins [14]. Based on this, a study was carried out that aims to Production and Organoleptic Test of Body Sanitizer Nanogold, Nanosilver, and Eucalyptus Oil In the Pandemic Covid 19.

MATERIALS AND METHODS

Tools

The tools used in this research are 10 ml measuring cup, hot plate, watch glass, 100 ml beaker, 100 ml volumetric flask, 1000 ml beaker, test tube rack, spatula, dropper, micropipette, blue tip, glass funnel, test tube, analytical balance, Shimadzu 1800 UV-Vis spectrophotometer and a set of TEM instruments.

Materials

The materials used in this research are DPPH powder, HAuCl4, ethanol, AgNO3, aquadest, sodium citrate, eucalyptus oil, basic body lotion.

Methods

Synthesis and Characterization of Nanogold

Add 100 ml of distilled water into a beaker heated on a *hot plate* until it boils. Then 0.5ml, 1ml, 1.5ml, 2ml, 2.5ml, and 3ml of 1000 ppm $HAuCl_4$ mother liquor in the form of a yellow solution were added to each beaker containing boiled distilled water. Then, each beaker is added as much as 0.2 grams of sodium citrate in the form of white crystalline powder. After that, stirred and allowed to stand until the color changes to wine red. It results in the synthesis of *nanogold* at various concentrations, namely 5ppm, 10ppm, 15ppm, 20ppm, 25ppm, and 30ppm. Then characterized using Transmission Electron Microscopy (TEM) [6].

Synthesis Nanosilver

Add 100 ml of distilled water into a beaker heated on a *hot plate* until it boils. Then, 2 grams of sodium nitrate and 2 ml of $AgNO_3$ 1000 ppm then stirred and allowed to stand until the color changed to yellow. So that a *nanosilver* with a concentration of 20 ppm was formed [16].

Antioxidant Activity Test

A total of 0.002 g of DPPH powder was put into a 50 ml volumetric flask, then ethanol was added to the mark and shaken until homogeneous to obtain a dark purple solution which is a 0.04% DPPH solution. Then, the solution was placed in a dark room, and the DPPH solution was measured with a UV- Vis spectrophotometric instrument at a wavelength of 400 -600nm. So that the maximum wavelength absorption value (λ) of DPPH. is obtained**,** which will be used to measure the absorbance of the sample.
Samples of nanogold solution at each concentration were taken at 10 ml and added 5 ml of 0.04% DPPH solution. After that, the solution was shaken and allowed to stand for 30 minutes at room temperature. Then, the solution was measured with a UV- Vis

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spectrophotometric instrument at a maximum of DPPH (517nm). And the absorbance was recorded, and the percentage of free radical reduction was calculated [17].

Making Body Sanitizer

Body lotion basic as much as 540 mL was added with 60 mL nanogold, 60 mL nanosilver, and 15 drops of eucalyptus oil. Mix and stir. Then packaged in 30 mL tube bottles.

Organoleptic Test

Organoleptic test was carried out by 20 panelists to observe the physical appearance of the lotion, including color, aroma, texture, and stickiness on a hedonic scale with a value range of 1-4, the higher the preference level, the higher the preference score (1 = dislike, 2 = dislike it, 3 = like it, 4 = like it very much). The types of lotions compared are Body Lotion Basic (A) and Body Sanitizer Lotion Nanogold Nanosilver, and Eucalyptus Oil (B). This observation was carried out for 7 days of using each product [18].

RESULTS AND DISCUSSION

Synthesis of Nanogold

In the process of synthesizing *nanogold*, *nanogold* is obtained by mixing aquadest, gold solution ($HAuCl_4$) with sodium citrate. Where sodium citrate serves as a reducing agent. Sodium citrate in water is converted into citric acid through hydrolysis in water and will change color, which proves there is a reduction reaction in the mixture (Amiruddin & Taufikurrohmah, 2013). Over time, the color of the solution will become darker or more concentrated. This is due to a reduction reaction, namely, from the Au^{3+} in the $HAuCl_4$ to an uncharged metal ion (Au^0) [19].

When the gold atoms do not interact, the initially clear yellow solution will become a colorless solution, and when the gold atoms begin to interact, gold clusters will begin to form as the color of the solution changes. In a certain amount, the gold cluster turns dark blue, then dark red, and when the cluster size reaches nanometers, the solution becomes burgundy [20].

Figure 1. Synthesis *Nanogold* with Concentrations of 5 ppm, 10 ppm, 15 ppm, 20 ppm, 25 ppm, and 30 ppm

Morphological Characterization *of Nanogold*

Nanogold that has been made with a concentration of 20 ppm will then be characterized with *Transmission Electron Microscopy* or TEM instruments to determine particle morphology (shape and size) as well as the distribution of nanoparticles.

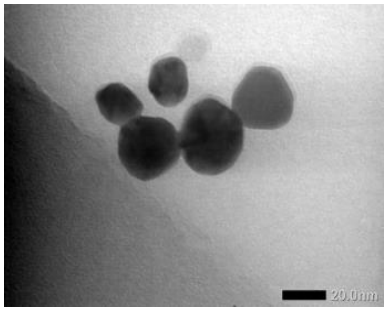

Figure 2. Results of TEM Photos with A Magnification of 20.0 nm with A Concentration *Nanogold* 20 ppm

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Based on the resulting data, it can be seen that the gold nanoparticles are *spherical*.

Table 1. Variations In Size of Nanogold That Have Been Characterized by Image J

Label	(nm)	
	1	**2**
1	19.073	19.233
2	26.594	25.698
3	30.261	29.644
4	26.739	26.296
5	22.294	17.059

Based on table 1 with 2 repetitions using Image J the smallest size of nanoparticles can be known is 19,073 nm and the largest nanoparticle size is 30,261 nm. The nanoparticle size range is 19-30 nm. The average size of *nanogold* based on the total number of existing particles is 24,289 nm. Particle size depends on the surface, with smaller sizes indicating higher activity[21].

Synthesis Nanosilver

Synthesis of nanoparticles is a process in which particles are made smaller than 100nm at once by changing their properties and or functions. In the process of synthesis *of nanosilver, nanosilver* is obtained by mixing aquadest, $AgNO_3$ solution with sodium citrate. In the synthesis of nanosilver, this method causes a change in the color of the solution from initially a colorless solution to a stable yellow, and the heating can be stopped. The colorless solution proves that there is no interaction between Ag atoms, and a stable yellow color proves that the Ag particles become nanometer in size, and the growth of the particle size (cluster) increases. The result of the synthesis is a yellow-brown colloid [22].

Figure 3. Results of the synthesis of nanosilver with a concentration of 20 ppm

Antioxidant Activity Test Nanogold.

The determination of the antioxidant activity of *nanogold* was carried out to determine the amount of antioxidant activity produced by *nanogold*. Analysis of antioxidant activity used was using the DPPH method (*1.1-diphenyl-2-picrylhydrazyl*). This is because this method is cheap, simple, sensitive, fast, and requires a small sample [23]. Free radical scavenging analysis with this method using UV- Vis spectrophotometric instrument. DPPH solution at concentration 0.04% maximum wavelength was measured using a UV- Vis spectrophotometric instrument at a wavelength of 400 -600nm.

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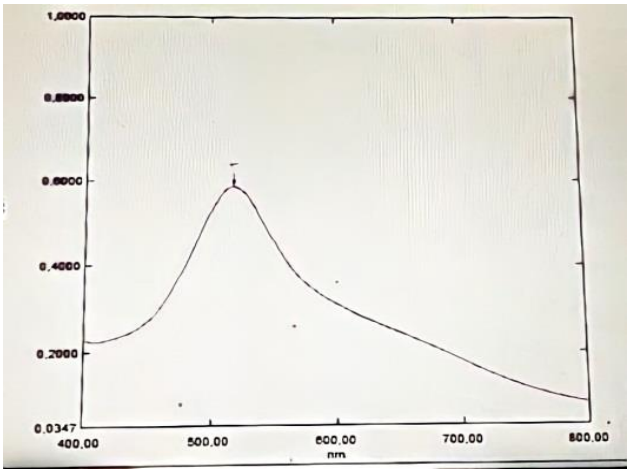

Figure 4. Maximum Wavelength of DPPH

The maximum of DPPH is 517nm, and the value of is obtained absorbance is 0.8675. Furthermore, the absorbance value obtained is used as the initial absorbance value of DPPH**,** then it is used to calculate the free radical scavenging activity of DPPH.

Table 2. Nanogold Antioxidant Test Results

Concentration (ppm)	Abs Control	Sample	% Inhibition
5	0.8675	0.4833	44.29
10	0.8675	0.4455	48.65
15	0.8675	0.4197	51.62
20	0.8675	0.4066	53.13
25	0.8675	0.3782	56.40
30	0.8675	0.3327	61.65

Based on the data obtained, the percentage of free radical scavenging by *nanogold*. Antioxidant activity can be expressed as a percentage of attenuation. The following calculations are used to calculate the damping percentage.

$$\% \text{ Inhibition} = \frac{Absorbance\ DPPH - Absorbance\ Sample}{Absorbance\ DPPH} \text{ x } 100\%$$

Antioxidant substances from nanogold can further inhibit DPPH. The Au atom reacts with DPPH, then the N radical atom of DPPH bonds to the Au atom. This is due to the coordination of covalent bonds formed between Au atoms and N atoms. The interaction of *nanogold* with DPPH radicals occurs through electron transfer. The Au atom will capture the N atom, which has a lone pair of electrons, and an AuN bond will be formed. When a coordinating covalent bond is formed, the N radical atom becomes stable, indicating that the Au atom has scavenged free radicals from DPPH [6].

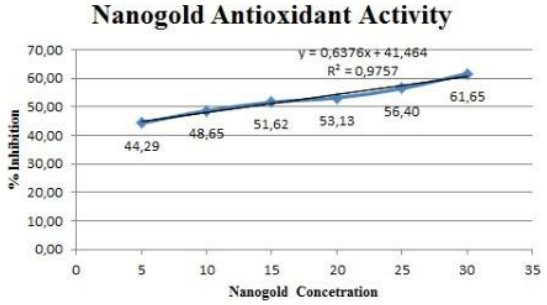

Figure 5. Graph of the Relationship between *Nanogold* and Percent Reduction

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the graph shows that the higher the concentration of added nanogold, the higher the percent reduction value, and more gold particles are formed, which scavenge DPPH free radicals.

The antioxidant activity of the DPPH method is expressed by IC_{50} (inhibitory concentration), where IC_{50} is a number indicating the concentration of the sample (ppm), which is able to reduce free radicals by 50%. Antioxidant activity may be classified as very strong if it has an IC_{50} value of less than 50 ppm, classified as strong if it has an IC_{50} value of 50-100 ppm, classified as moderate if it has an IC_{50} value of 100-150 ppm, classified as weak if it has an IC_{50} value of 150-200 ppm, and classified as very weak if it has an IC_{50} value of 200 ppm [24].

Figure 5 shows the regression equation y= 0.6376x + 41.464 with R^2= 0.9757 with nanogold concentration (ppm) as the abscissa (x-axis) and the value of % attenuation (antioxidant) as the ordinate (y-axis). From this equation, the IC_{50} value will be obtained by replacing y = 50 in the linear regression equation, and x is the concentration of the extract to be sought, where the value of x obtained is the amount of concentration needed to reduce 50% of DPPH radical activity[25]. So that the value of x is 13.3877, which is the IC_{50} value. From the results obtained, nanogold is a very strong antioxidant because it has an IC_{50} value of less than 50 ppm.

Organoleptic

An organoleptic test was conducted to observe the physical appearance of the lotion, including color, aroma, texture, and stickiness. Organoleptic testing was carried out on *basic body lotion* (**Product A**) and *body sanitizer lotion nanogold nanosilver* and eucalyptus oil (**Product B**) with 20 panelists.

Figure 6. Body Lotion Basic (A) and Body Sanitizer Lotion Nanogold Nanosilver Eucalyptus oil (B)

- ***Color***

In the color test using the sense of sight for product A, 20 panelists answered, and the results obtained were 2 panelists did not like the color of product A, 13 panelists liked it, and 5 panelists really liked the color of product A, namely basic body lotion. With the resulting average of 3.15 included in the like category.

In the color test for product B, 20 panelists answered, and the results obtained were 11 panelists liked the color of the product, and 9 panelists really liked the color of product B, namely body sanitizer lotion nanogold nanosilver and eucalyptus oil. With the resulting average of 3.45 in the like category. As seen from the average size produced, panelists prefer the color of product B to product A.

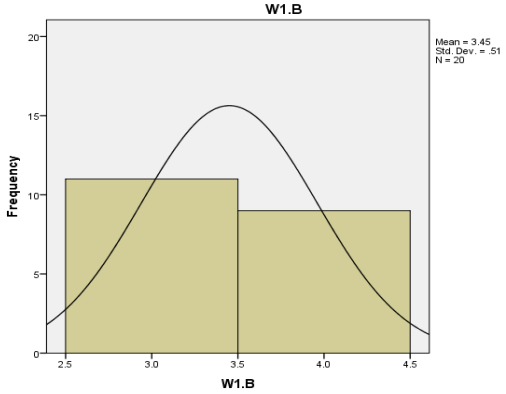

Figure 7. Histogram of Product B Color Test Result

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- ***Fragrance***

In the fragrance test using the sense of smell for product A, 20 panelists answered, and the results obtained were 1 panelist did not like the fragrance of product A, 7 panelists did not like it, 9 panelists liked it, and 3 panelists really liked the fragrance from product A, namely basic body lotion. With the resulting average of 2.7, it is included in the less favorable category.

In the fragrance test for product B, which was answered by 20 panelists and the results obtained were 3 panelists did not like it, 10 panelists liked the product fragrance, and 7 panelists really liked the fragrance from product B, namely body sanitizer lotion nanogold nanosilver and eucalyptus oil. With the resulting average of 3.2 in the like category. So, judging by the average size produced, the panelists preferred the fragrance of product B to product A.

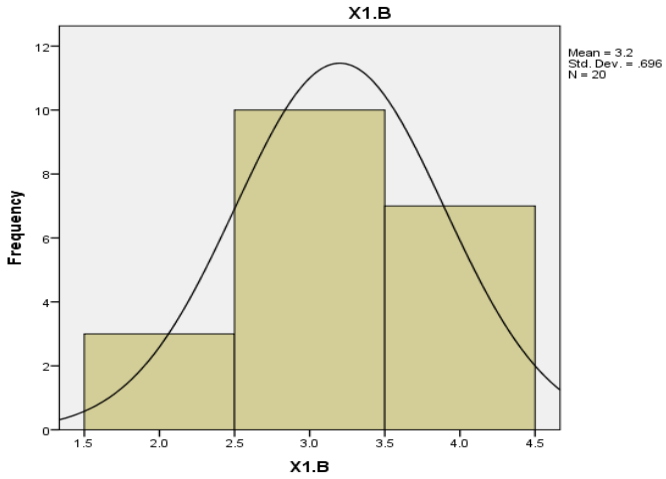

Figure 8. Histogram of Product B Fragrance Test Results

- ***Texture***

In the texture test using the sense of touch for product A, 20 panelists answered, and the results obtained were 3 panelists did not like it, 16 panelists liked it, and 1 panelist really liked the texture of product A, namely basic body lotion. With the resulting average of 2.9, it is included in the less favorable category.

In the texture test for product B, 20 panelists answered, and the results obtained were 9 panelists liked the texture of the product, and 11 panelists really liked the texture of product B, namely body sanitizer lotion nanogold nanosilver and eucalyptus oil. With the resulting average of 3.55 in the like category. So, judging by the average size produced, the panelists preferred the texture of product B to product A.

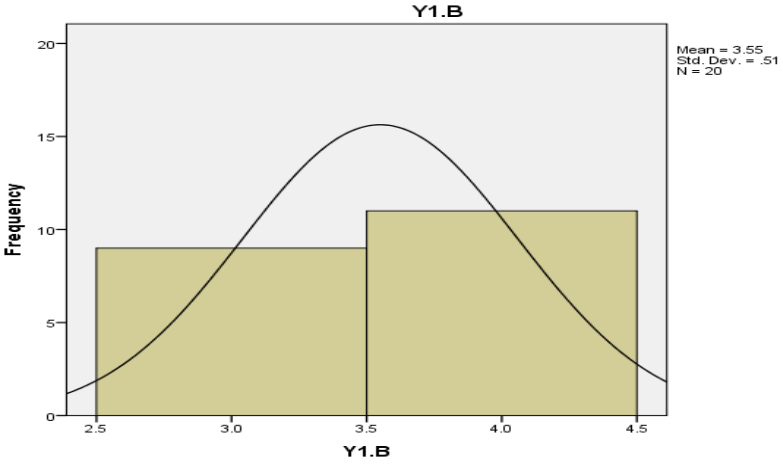

Figure 9. Histogram of Product B Texture Test Result

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- ***Stickiness***

In the stickiness test using the sense of touch for product A, 20 panelists answered, and the results were obtained. Namely, 4 panelists did not like it, 15 panelists liked it, and 1 panelist really liked the stickiness of product A, namely basic body lotion. With the resulting average of 2.85, it is included in the less favorable category.

In the stickiness test for product B, 20 panelists answered, and the results obtained were 12 panelists liked the stickiness of the product, and 8 panelists really liked the stickiness of product B, namely body sanitizer lotion nanogold nanosilver and eucalyptus oil. With the resulting average of 3.4 in the like category. So that judging from the average size produced, panelists prefer the stickiness of product B than product A.

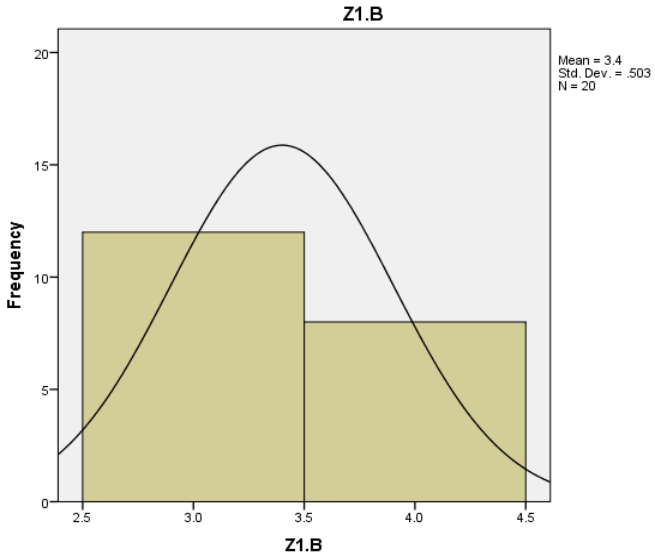

Figure 10. Histogram of Product B Stickiness Test Results

In the organoleptic test conducted by 20 panelists, it was found that product A caused 55% of the skin to be more smooth, 60% caused the skin to become moister, 100% did not cause itching on the skin, 10% caused a burning sensation on the skin, and 10% causes redness and irritation of the panelists skin.

While the results obtained in product B are 100% causing smoother skin, 100% causing the skin to be moister, 100% not causing skin itching, 100% not causing skin burning, and 95% not causing redness and irritation on the skin of the panelists.

CONCLUSIONS

The best lotions are Body Sanitizer Nanogold Nanosilver and Eucalyptus Oil because they have antioxidant activity to reduce free radicals and can be seen from the response of the panelists to the product through organoleptic test who tend to prefer Body Sanitizer Nanogold Nanosilver and Eucalyptus Oil products compared to the basic lotion. In addition, Body Sanitizer Nanogold Nanosilver and Eucalyptus Oil are able to make the skin smoother, more moist, safe to use and do not cause skin irritation.\

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