# An Analysys of Antioxidants Activity in Face Mask with Basic Ingredients of a Watermelon White Rind (*Citrullus vulgaris* Schrad)

Laila Dhunurain Rochmatika, Hesty Kusumastuti, and Siti Marwati

***Abstract*—** This study aims to determine antioxidants activity in the face mask from a white rind of watermelon *(Citrullus vulgaris* Schard*)* and the public acceptance of its face mask. This experiment includes the test of the antioxidants activity by DPPH (2,2-diphenyl-1-picrylhydrazyl) method and organoleptic test. In this research there are four variations of the mask. Test results of the antioxidants acitvity are: 33.816% for a pure face mask; 37.198% for a face mask with honey; 35.507% for a face mask with lemon; and 35.266% for a face mask from with honey and lemon. While the organoleptic test on 10 respondents indicates that 50% prefer the face mask with honey, 40% pure face mask, and 10% face mask with lemon. The result shows that the face mask of watermelon white rind with honey possesses the highest antioxidants activity and preference of the respondents.

***Keywords*—** face mask, watermelon's rind, antioxidants, DPPH

## I. Introduction

WATERMELON plant which has the scientific name of *Citrullus vulgaris* Schrad vines is relative of pumpkins (Cucurbitaceae), melon (*Cucumis melo*) and cucumber (*Cucumis sativus*). Original habitat of this plant is in dry tropical and subtropical regions . Therefore, watermelon fruit commonly found in Indonesia and the fruit that attracted many people in Indonesia.

Watermelon rind low in calories and contains 93.4 % water , 0.5 % protein , 5.3 % carbohydrate, fat 0.1 % , fiber 0.2 % , ash 0.5 % , and vitamins (A , B and C). In addition, it contains amino acids sitrullin ($C_6H_{13}N_3O_3$) , aminoasetat acid , malic acid , phosphoric acid , arginine , betaine , lycopene ($C_{40}H_{56}$) , carotene , bromine , sodium , potassium , sylvite , lysine , fructose , dextrose , and sucrose. Citrulline and arginine play a role in the formation of urea in the liver from ammonia and $CO_2$ that increases urine. High content of potassium which can help the heart and normalize blood pressure . Lycopene is an antioxidant that is superior to vitamin C and E. Nutrient -rich seeds with yellow oil content 20-45 % , protein 30-40 % , citrulline ,vitamin B12 , and the enzyme urease. Kukurbositrin active compounds in watermelon seed can stimulate the kidneys and keeping blood pressure remained normal. [1]

Antioxidants are compounds electron donor (electron donor) or reductant . This compound has a small molecular weight , but is able to inactivate the development of oxidation reactions, by preventing the formation of radicals. Antioxidants are compounds that can also inhibit oxidation reactions, by binding to free radicals and highly reactive molecules. As a result , the damage will be inhibited cells. [2]

According to Sadikin (2001) in Winarsih Hery (2007), free radicals attack the molecules around that radical will cause a continuous reaction, which then generates a new radical compounds. Impact of free radical reactivity of compounds vary, ranging from cell or tissue damage, autoimmune diseases, degenerative diseases, and cancer. [2]

One example of fruits that contain high levels of antioxidants is watermelon (*Citrullus vulgaris* Schrad).watermelon contains considerable citrulline. The contain of citrulline mostly located on the white rind of watermelon. Citrulline ia very beneficial for health citrulline are antioxidants vasodilation.

Citrulline amino acid is an organic compound that is used by the body to eliminate toxic compounds such as ammonia from the heart. Without the citrulline in the body will not be able to detoxify ammonia which is a waste product of the oxidation process. Citrulline helps the immune system to fight infection and boosts energy. It occurs in specific protein in skin cells, hair and nerves. These organic compounds necessary for metabolic processes and maintain nitrogen balance in the body. [3]

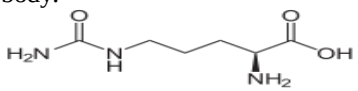



Fig.1 molecular structure of citrulline

Watermelon (Citrullus vulgaris Schrad.) is a natural and rich source of the non-essential amino acid citrulline. Citrulline is used in thenitric oxide system in humans and has potential antioxidant and vasodilatation roles. A method using gas chromatography–mass spectrometry (GC–MS) was developed to separate citrulline from glutamic acid, which co-elute when analyzed by high performance liquid chromatography. Watermelons were analyzed by GC–MS to

Laila Dhunurain Rochmatika is with Chemical Departement, Yogyakarta State University, Yogyakarta, Indonesia (phone: +6285643383893; e-mail: lailadhunurain@gmail.com).

Hesty Kusumastuti is with Chemical Departement, Yogyakarta State University, Yogyakarta, Indonesia, (phone: +6285799364698; email: hezty.kusuma@gmail.com).

Siti Marwati is with Chemical Departement, Yogyakarta State University, Yogyakarta, Indonesia, (phone: +628156805989; email: watikimuny@yahoo. co.id).

determine the citrulline content among varieties, types, flesh colors, and tissues. Citrulline content ranged from 3.9 to 28.5 mg/g dry weight (dwt) and was similar between seeded and seedless types (16.6 and 20.3 mg/g dwt, respectively). Red flesh watermelons had slightly less citrulline than the yellow or orange flesh watermelons (7.4, 28.5 and 14.2 mg/g dwt, respectively). Rind contained more citrulline than flesh on a dry weight basis (24.7 and 16.7 mg/g dwt, respectively) but a little less on a fresh weight (fwt) basis (1.3 and 1.9 mg/g fwt, respectively). These results indicate that watermelon rind, an underutilized agricultural waste, offers a source of natural citrulline.[4]

DPPH (2,2-diphenyl-1-picrylhydrazyl) are free radicals compounds that can be used to determine the ability of a compound as an antioxidant or free radical by looking at the percentage of damping by means of UV-Vis spectrophotometer at a wavelength of 517 nm. DPPH is a stable compound and can only be mitigated by antioxidants that can provide hydrogen atom. Because of this, the more hydroxyl groups given, the more a compound ability increase as an antioxidant or free radical. Because of the unpaired electron, DPPH gives a strong absorption at 517 nm. When electrons become paired by the presence of free radicals catcher, the absorbance decreases corresponding stoichiometric number of electrons captured. The presence of antioxidant compounds can change the color of DPPH solution from purple to yellow. [5]

## II. PROCEDURE

### *A. Material*

Watermelon, perfume, honey, lemon, bengkoang + rice starch, methanol was obtained from Merck Indonesia, DPPH solution was obtained from Sigma-Aldrict Singapore.

### *B. Preparation of face mask*

Watermelon white rind was separated, cleaned and mashed. Mush watermelon white rind is squeezed and filtered to produce the extract. Add 200 grams of that extract into 50 grams of watermelon extract bengkoang + rice, stirred and heated until thickened. Add 12-15 drops of perfume after thick mixture has cooled . Then the mixture is divided into 4 parts , namely A, B , C , and D ( respectively the 40 grams), and add 1 ml of honey on the B, 1 ml lemon on the C, and 0.5 ml of honey + 0.5 ml of lemon on the D. The four samples will later be determined by face mask samples which have the highest levels of antioxidants and preference of the respondents.

### *C. Test of antioxidantss activity*

Each sample of mask is taken as much as 1 ml, and then mixed with 9 ml of methanol. Mixed with a vortex and centrifuged for 5-10 minutes in order to be taken filtrate. Then add 1 ml of 20 mM DPPH solution into 1 ml filtrate sample, and incubating at room temperature for 30 minutes. After the solution was diluted with methanol to volume 5 ml, read the absorbance of the sample with a spectrophotometer UV-Vis Thermo Spectronic Genesys 20 at a wavelength of 517 nm. To determine levels of antioxidants, this analysis is also needed on the reference solution. Blank solution was prepared by mixing all solution like the above procedure, but 1 ml of the filtrate was replaced with 1 ml of methanol.

### *D. Community Acceptance Test Levels*

The test is performed on 4 kinds of variant covers pure mask (sample A) , with the addition of honey mask (sample B) , the mask with the addition of lemon (sample C) and mask with the addition of honey and lemon (sample D) was given to 10 respondents which has an average age of 20 years who has normal skin types to assess the quality and level of preference based on some aspects. Aspects assessed include the terms of scent, appearance, comfort, and the effects felt by the respondents.

## III. RESULTS AND DISCUSSION

### *A. Analysis of Antioxidants Levels*

Results of testing the antioxidants content -based face masks watermelon white coating with DPPH method :

TABLE I
LEVELS OF ANTIOXIDANTSS

| No | Code Samples | antioxidants levels ( % ) |
|---|---|---|
| 1. | Sample A ( pure ) | 33,816 |
| 2. | Sample B ( addition of honey ) | 37,198 |
| 3. | Sample C ( addition of lime juice ) | 35,507 |
| 4. | Sample D ( the addition of honey and lime juice ) | 35,266 |
| 5. | White rind of skin watermelon extract | 29,250 |

DPPH (2,2 - diphenyl - 1 - picrylhydrazyl) method is used to determine the antioxidants activity in inhibiting the oxidation process. The antioxidants activity was defined as the percentage levels of antioxidants in the face mask made from watermelon white rind .

Levels of antioxidants compounds of a sample can be determined by calculation through DPPH method using the formula :

$$\% \text{ Antioxidants} = \frac{\text{OD Blank} - \text{OD Sample}}{\text{OD Blank}} \times 100\%$$

Where OD Blank is the result of a spectrophotometer to read the blank solution, while OD sample is the result of a spectrophotometer to read the sample solution .

Among the four samples of the mask, sample B (addition of honey) has the highest levels of antioxidants compared to other samples. It shows the antioxidants activity of the sample B with the addition of honey mask is higher than others in the sample to inhibit the oxidation process. The addition of honey has great influence to increase antioxidants activity in the samples of this mask.

### *B. Community Acceptance Test Levels*

The aims of organoleptic test in studies watermelon white rind mask is also to determine the level of quality and consumer preference for white rind mask made from a

watermelon. Aspects assessed include the terms of scent, appearance, comfort, and the effects felt by the respondents. Here are the results of organoleptic test :

TABLE II
ORGANOLEPTIC TEST

| NO | Type of mask | Assessment Scale | | | |
|---|---|---|---|---|---|
| | | Color | Scent | Texture | Leisure |
| 1. | sample A | 3 | 2 | 3 | 4 |
| 2. | sample B | 3 | 3 | 4 | 4 |
| 3. | sample C | 3 | 3 | 4 | 3 |
| 4. | sample D | 3 | 3 | 3 | 3 |

The first assessment was in terms of color. Assessment the quality and level of preference in color term invloved by 1 (very unattractive), 2 (unattractive), 3 (moderate), 4 (attractive) and 5 (very attractive). From the 10 respondents stated that most of the color appearance, the mask is quite interesting. Basically all the colors samples on the same mask is brownish. The brown color coused by the rice and bengkoang flour extract.

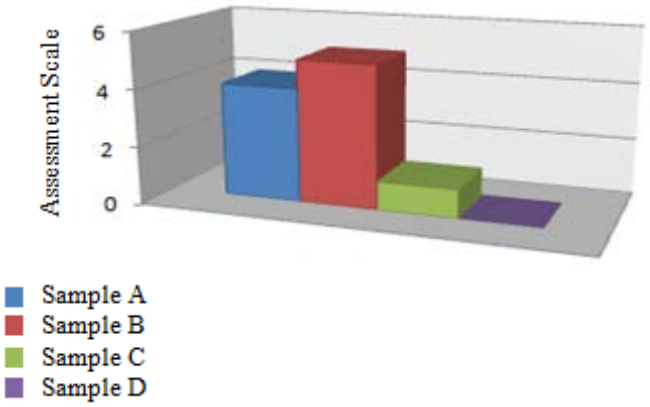
The second assessment is in term of scent. Assessment the quality and level of preference in scent term invloved by 1 (very fragrant), 2 (not sweet), 3 (moderate), 4 (fragrant) and 5 ( very fragrant ). From the 10 respondents stated that most of the masks scent is moderate. Basically masks scent is same in all samples. The pungent scent that is quite possible due to the addition of rice and bengkoang starch. This resulted that the scent of rice and bengkoang starch is more dominant than watermelon extract, thus causing the emergence of pungent scent mask.

The third assessment is in term of texture. Assessment the quality and level of preference in texture terms invloved by 1 (very rough), 2 (coarse), 3 (moderate), 4 (smooth) and 5 (very smooth). From the 10 respondents stated that most of the texture terms is quite smooth but still leaves a rough part. Basically the mask texture is same on all samples. The smooth texture is quite possible because the addition of rice and bengkoang starch and the rough part coused by the tiny grains which can't filtered from watermelon white rind extract.

The fourth assessment is in term of comfort when used on the face. Assessment the quality and level of preference in comfort terms invloved by 1 (very uncomfortable), 2 uncomfortable), 3 (moderate), 4 (comfortable) and 5 (very comfortable). From the 10 respondents stated that most of the mask is quite comfortable until comfortable when used on the face skin.

The organoleptic test was also carried out an overall assessment of the water white rind mask from watermelon skin. Data obtained from this test are :

Based on the data of five respondents (50 %) prefer white mask with the addition of honey (sample B), four respondents (40 %) liked the mask variant without addition of other ingredients or pure (sample A) and 1 respondent ( 10 % ) liked the mask variant with the addition of lemon juice (sample C) . Thus, it can be concluded that the mask with the addition of honey (sample B) has the highest percentage choosen by respondents.




## IV. CONCLUSION

From these results can be concluded that:

1. Antioxidants content of face masks: sample B 37.198%, sample C 35.5072%, sample D 35.2657%, sample A 33.8164%. Antioxidants contained in watermelon white rind mask is higher than the watermelon white rind extract which equals to 29.25%.
2. The level of public acceptance of facial mask made from watermelon white rind covering the aspects of color, texture, scent, and comfort of face masks are: sample B 50%, sample A 40%, samples C10% and sample D 0%.

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