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Article

PRELIMINARY STUDY: POTENTIAL OF WATERMELON SEED WASTE *(CITRULLUS LANATUS)* FOR PRODUCTION OF HAIR TONIC SPRAY

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ABSTRACT

Hair is everyone's crown, but many people experience hair damage problems such as hair loss and baldness.Restoring hair health requires proper nutrition. Therefore, watermelon seeds are used as an ingredient, because they contain magnesium, phosphorus and zinc which can overcome damage and lengthen hair. The resulting innovation is a *hair tonic spray*, with the aim of finding out the effectiveness and duration of the results.Making *hair tonic spray* from 200 grams of ground watermelon seeds and mixed with 750 mL of n-hexane. Then boil it until it settles and changes color to clear. Leave for 3 days, then filter and add 50 mL olive oil.The hair tonic spray test was tested on 3 mice, then their fur was shaved. Spray *hair tonic spray* for 5 consecutive days with a ratio of 2 sprays a day, sprayed 1 time a day, and not sprayed at all. The result was that mice that were sprayed twice a day for 5 days grew thicker than before, compared to those that were sprayed once a day and those that were not sprayed at all. It was concluded that watermelon seed *hair tonic spray* effectively has the potential to lengthen hair

INTRODUCTION

Hair is one part of the human body which consists of several elements that are useful for a person's beauty and appearance, therefore hair is also called a crown. However, some people generally experience damage to their hair. Hair problems are not only experienced by elderly people, but this can occur in adults, teenagers, toddlers and even babies (Andini, 2009).The causes of hair damage are environmental factors and inappropriate use of hair care products. Apart from that, there are internal factors that cause hair damage, including genetic factors and nutritional factors (Novianti, 2016).

Common problems that many people often face with hair damage are hair loss, split ends, hair that feels rough, and fluffy hair (increased hair volume) and other hair damage.

Hair damage if left alone It can cause fatal damage to hair such as baldness, hair loss, split ends and so on, resulting in a reduction in the beauty of a person's appearance and can reduce a person's self-confidence. Reporting from research that has been carried out, data shows that almost 50% of the Indonesian population experiences hair damage, the causes vary from habits, namely smoothing or straightening hair, *curling* or perming hair, hair coloring, use of hair care chemicals, environmental pollution and/or internal factors that cause hair damage. causes it (Novianti, 2016).

This problem condition should be addressed and not be taken lightly by the community, considering that the resulting negative impact is quite large. In overcoming the problem of hair damage, nutrition is needed to restore hair to healthy hair, but in general the ingredients used relatively still use chemicals in making the products.

Chemicals have a negative impact on hair health, namely the hair shaft becomes brittle due to the chemical content in a product which then causes hair loss, baldness, hair becomes rough and hair becomes fluffy (Said, 2009). Therefore, the content of chemical substances is considered to be increasingly damaging to hair, therefore natural substances are needed that can nourish and nourish hair, namely watermelon seed extract as the main ingredient. Watermelon seeds come from watermelon, a fruit that is often found in Indonesia, therefore the large number of fruits obtained results in an increasing amount of waste being produced. In general, the flesh and rind of watermelon can rot on its own, but not the watermelon contents or seeds. Waste watermelon seeds are often found in the community, especially in market areas or in fruit shops in Kawedanan sub-district, Magetan city. People often throw away waste watermelon seeds rather than use them, in general the benefits resulting from their contents are quite large.

Watermelon seed extract is known to have many health benefits, one of which is caring for hair. Watermelon seeds contain amino acids, vitamin B6, and antioxidants which can help repair damaged hair and strengthen the roots (cuticle layer), thereby preventing hair loss. Apart from that, magnesium, phosphorus, zinc and iron are also the main ingredients that can treat hair damage problems and make hair healthy and shiny (Widyawati, 2019).

The innovation of watermelon seed extract is in the form of hair tonic spray as a solution to treat hair problems with additional ingredients from olives. Extracting watermelon seeds will make oil by roasting it, mashing it and taking the juice from the pulp, then adding a little olive oil as a moisturizer and supporting the process of forming new cells in the hair. The advantage of hair tonic spray from watermelon seed extract is that it has many advantages, including being a product that is free from chemicals so it is safe to use from adults to toddlers or children, there are no side effects after using it, and it overcomes various kinds of existing hair damage and Healthy hair because of the content of watermelon seeds themselves. This hair tonic spray is suitable for teenagers who not only have damaged hair, but can also be used for teenagers whose hair is already healthy, this is to add shine to their hair which can nourish, beautify and lengthen their hair. From making this product, it is considered possible to develop technology that is currently developing, namely changing watermelon seed waste into a product that has many benefits and is safe. In an environmental context, by utilizing this waste, waste that is not utilized can be put to good use. This product is targeted by the general public to overcome hair problems and by making this product it is hoped that it can cure diseases (hair damage) in accordance with the words of Allah SWT "Through their hands (intermediaries) and Allah SWT will heal him" (Surah At-Taubah verse 14).

Based on the background, research on the use of watermelon seed extract hair tonic spray as a solution to treat hair loss needs to be carried out. By developing a hair tonic spray product containing watermelon seed extract, it is hoped that it can provide an effective and safe solution for those who experience hair damage. So the aim of this research is to find out how to make or formula for hair tonic spray from watermelon seed extract, its effectiveness or

changes after using watermelon seed hair tonic spray and to find out how long it takes to obtain results from its use.

METHODS

The method used in developing this innovation is modification and addition of ingredients in the form of watermelon seed extract from existing products. Obtaining data in articles is through direct research techniques (observation) which are supported by adequate literature sources. Held on 10-26 June 2023 at Genengan Village, Kawedanan District,

Magetan Regency. Innovation consists of the planning stage, design stage, data collection and development stage.

At the planning stage, an innovative product was found from processed watermelon seed waste with the aim of minimizing the problems of waste that is underutilized by society and increasing the use value of waste, namely by creating an innovative hair tonic spray product. The next stage is the design stage. The design stage in designing the program for making hair tonic spray products, determined the idea for the name of the product innovation "Whis: Watermelon Seeds Hair Oil Shine". Based on research data from research literature related to the content of watermelon seeds and the processing/manufacture of hair tonic spray, through experiments in making the product the ingredients used were watermelon seeds obtained from Kawedanan sub-district, Magetan, East Java. N-hexane solvent to obtain oil contained in grains and to facilitate the evaporation process in the filtration process. Meanwhile, the equipment used includes a stove for heating, a closed jar, tissue and cloth for filtering, a strainer, a spoon/stirrer and other containers as support.

200 grams of watermelon seed powder was extracted with 750 mL of n-hexane solvent at a certain temperature of around 80°C. This was done until it appeared clear, which was around 15 minutes, then left for 5 days and then filtered. The results obtained were that there were n-hexane precipitates and watermelon seed extract in the form of oil will appear. The manufacturing scheme can be seen in Figure 1.

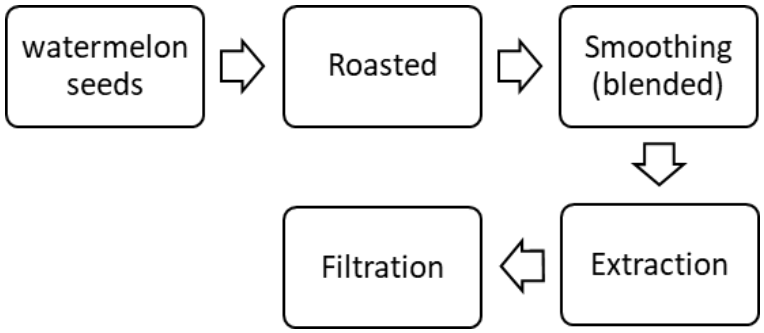

Figure 1. Method for Making *Hair Tonic Spray*

The formulation of watermelon seed extract, namely the comparison or ratio between watermelon seed powder and n-hexane, can be formulated as follows

$$\text{Formulation} = \frac{\text{Watermelon seed powder weight (g)}}{\text{Solvent Weight (mL)}} = \frac{200\ g}{750\ mL} = 0{,}2\ g/mL$$

Testing aims to determine its effectiveness using *organoleptic tests*, pH tests and animal tests. Preclinical tests were carried out by administering watermelon hair spray to animals to assess its toxicity and activity (Meles, 2018). Organoleptic tests utilize human senses as observation tools, such as smell, sight and other senses needed in the testing process which include taste, aroma, color and texture (Sunaeni et al., 2021). pH test to determine the nature of a solution, namely acidic, neutral or basic. Product testing on animals is mice, by shaving all their fur.

The number of mice needed is 3 with a supply of 4 mice, namely 1 mouse is sprayed with hair tonic regularly twice a day, 1 mouse is sprayed once a day and/or rarely sprayed, while the last mouse (2 in number) is not sprayed at all.

RESULTS AND DISCUSSION

Hair tonic spray is a hair care product that is used to improve the health of hair and scalp. Hair tonic spray usually contains a mixture of natural ingredients and chemicals such as essential oils, herbs and so on. The hair tonic content is useful for nourishing the hair and scalp, so it can help overcome hair problems such as hair loss, dandruff, itching and can provide a refreshing feeling to the scalp (Rusdiana, 2017).

Several studies have been conducted to evaluate the effectiveness of hair tonic in improving hair and scalp health. A chemical laboratory study shows that using hair tonic made from natural ingredients can help increase hair growth and reduce baldness in rabbits (Mulyanti, 2019). Other research published in the pharmaceutical journal Malahayati shows that hair tonic can nourish hair growth thereby stimulating faster hair growth (Yasir, 2019). Hair tonic has various ways of working depending on the formula and ingredients used in the manufacturing process, but in general hair tonic works by stimulating hair growth, increasing blood circulation in the scalp, maintaining moisture in the hair and scalp and increasing hair elasticity (Hidayah , 2020). Apart from having various benefits for hair health, hair tonic can be used easily and practically unlike other hair care products such as shampoo, conditioner, hair mask, cream bath and so on. Hair tonic can be used every morning or evening by rubbing or spraying it on the hair and scalp, then massaging the hair and scalp so that the liquid is absorbed and stimulates hair growth, no need to rinse it like other hair care products (Fajar Widayanti , 2008).

The main ingredient for making hair tonic spray is watermelon seeds. Watermelon seeds are the part that is located in the flesh of the watermelon, small in size, numerous in number, oval or imperfectly oval in shape, slightly sharp at the tip and mostly black or brownish in color. In this section, it is used as the main ingredient in the process of making hair tonic spray, this can be done because the content of watermelon seeds is rich in nutrients that are good for hair health. Per 100 grams of watermelon seeds, calcium (Ca) contains 50 mg, iron (Fe) contains 8 mg, zinc (Zn) contains 10 mg, magnesium (Mg) contains 42 mg, water contains 6 g, protein contains 25 g, and carbohydrates contains 19 g (Kalie, 2008).

Even though the content of watermelon seeds is already known, in making products through the oil stage, phytochemical screening is also carried out on watermelon seeds which aims to determine the main compound groups to strengthen the results of product testing. The results of the phytochemical screening indicate that watermelon seeds contain flavonoids, alkaloids, tannins . , saponins, polyphenols, anthraquinones, monoterpenes/ sesquiterpenes, and triterpenoids/ steroids (Ruswandi et al, 2022). The results of the research show that watermelon seed oil contains high concentrations of unsaturated fatty acids, namely linoleic acid and this fatty acid is a fat that cannot be produced by the body itself so it is important in the formation of cell membranes (Ausi & Barliana, 2016).

Judging from its contents, watermelon seeds have the potential to be used in hair care products because they contain compounds that can strengthen hair and prevent hair loss. Studies show that watermelon seeds contain high-quality proteins and amino acids necessary for healthy hair growth. The protein content in watermelon seeds can help strengthen hair and prevent hair loss (Khalilpour et al., 2017).

Watermelon seeds themselves are rich in zinc and have antimicrobial activity which is useful in cleaning the scalp from bacteria or germs which can disrupt the health of the hair and skin (Ishfahan & Eka, 2022). Another unique thing is that oil extraction is carried out traditionally and simply with existing tools without using machines or chemical equipment, so that the high concentration is linoleic acid and this fatty acid is a fat that cannot be produced by the body itself so it is important in the formation of oil. cell membrane (Ausi & Barliana, 2016).

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Making hair tonic spray uses watermelon seeds that have been dried or roasted as the main ingredient. Drying is done to reduce the water content contained therein (Sipahutar et al., 2023). The drying method can be done with the help of sunlight, namely with a processing period of 1 week, or it can be roasted on a stove over medium heat and if you want a fast process then use an oven. The method used in this research uses 2.

The method is direct drying and roasting so that the results obtained are maximum. Once dry, the watermelon seeds are mashed 3 times until they are completely smooth. The results of drying and grinding watermelon seeds are shown in Figure 2.

(a) (b)

Figure 2. Watermelon seeds before mashing (a) and after mashing (b)

The extraction process uses n-hexane. 200 grams of watermelon seed powder is mixed with 750 mL of n-hexane, then boiled until it settles and changes color to clear. The boiling process uses medium heat because in this process the n-hexane solution evaporates quickly so boiling only takes 15 minutes.

The results of watermelon seed extract are shown in Figure 3.

(a) (b)

Figure 3. Extraction before changing color (a) and after changing color (b)

Set aside for 3 days, then the dregs are squeezed using a special cloth or tissue to filter and left again for 3 days with the aim that the dissolved or still mixed n-hexane can be separated from the oil from the watermelon seed extraction. So that the pure filtration results of extracting watermelon seeds are minimal if there is a mixture of other solutions.These factors influence the quality and effect of extraction use. The filtration results are shown in Figure 4.

(a) (b)

Figure 4. 1st filtration (a) and 2nd filtration (b)

The addition of olive oil is carried out after the watermelon seed filtration process, namely in a ratio of 2: 1. The results of the filtration and addition of olive oil are shown in Figure 5.

(a) (b)

Figure 5. Before mixing olive oil (a) and after mixing olive oil (b)

Previous research was carried out by Ariana and Kehide, extracting watermelon seed oil using the main ingredients of watermelon seed powder and n-hexane using Soxhlet

equipment and concentrating with a rotary evaporator. The difference between the two lies in the ratio of ingredients and processing time. According to Kehide, 50 grams of watermelon seed powder and 250 mL of n-hexane solvent are extracted at a temperature of 60-65ÿC for 10, 12, 14, 16, 18 and 20 hours until the liquid is ready. The resulting product is clear, whereas according to Ariana the watermelon seed oil extraction process uses additional ingredients, namely 300 mL of ethanol and n-hexane at a temperature of 80ÿC (Saptaningtyas, 2020), (Ariani, 2015). The production of Watermelon Seed hair tonic spray product extraction has advantages compared to other hair tonics, namely that it is free from chemicals so it does not harm the scalp. Hair tonic which comes from plant parts (fruit, seeds, flowers) has a high level of effectiveness on hair, namely lengthening, increasing hair volume, does not cause irritation and the color resulting from extraction is deep yellow so it can attract consumers (Gintik et al., 2019). Apart from the community, product development is also being developed for animals. Tests were carried out on mice which experienced significant changes for just a few days and after that trials were carried out on cats to determine the effectiveness of the product to be tested.

Product Test

A. Organoleptic Test

Tests that utilize human senses as observation tools, such as smell, sight and other senses needed in the testing process which include taste, aroma, color and texture (Sunaeni et al., 2021). Watermelon seed oil extraction obtained 20 mL with a deep yellow color, due to xanthophyll pigments (Ketaren, 1986). The smooth, odorless texture and dark colored oil are also caused by the low water content produced during the extraction process. The lower the water content in the oil, the higher the quality, because water content is the quality of the oil (Kurniawan et al., 2008).

B. pH

Test Test to determine the nature of a solution, namely acidic, neutral or basic. The pH test on watermelon seed oil extraction obtained a value of 5 from the universal indicator. Watermelon seeds have high acidity, which means that the normal pH produced is in the range of 3.5-5 (Saptaningtyas, 2020).

C. Product Testing on Animals

The animals tested were mice, by shaving all their fur. The number of mice needed is 3 with a supply of 4 mice, namely 1 mouse is sprayed with hair tonic regularly twice a day, 1 mouse is sprayed once a day and/or rarely sprayed, while the last mouse (2 in number) is not sprayed at all. The results of changes in mice hair are shown in Figure 6.

(a) (b)

(c) (d)

Figure 6. The first day of giving hair tonic spray to mouse 1 (2x a day) (a), the 3rd day of changes to mouse 1 (b), and the 5th day of changes to mouse 1 (2x a day) (left), mice 2 (1x a day) (right) (c), and mice 3 (not given serum at all (d)

CONCLUSION

Making hair tonic spray uses dry watermelon seeds and then grind them. Extraction of 200 grams of watermelon seed powder is mixed with 750 mL of n-hexane, then boiled until it settles and turns clear and the final stage is filtered 2 times. Obtained 20 mL with a deep yellow color, smooth, odorless, has a pH of 5 and test results on mice that were sprayed twice a day had thick fur, sprayed once a day had little fur growth and those that were not sprayed did not grow at all. Based on producing dense hair for 5 days after cutting the hair, so that the hair that grows looks like the original hair before shaving. The second mouse that was given *hair tonic* once a day or rarely, produced a little hair growth but not so much after 5 days of use, while the 2 mice that were not given *hair tonic spray* did not experience hair growth.

The main conclusions of the study may be presented in a short Conclusions section, which should stand alone. The conclusion section should lead the reader to important matter of the paper (answer of the objectives of the study). It also can be followed by suggestions or recommendations related to further research.

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