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Irritation Test and Students' Perception of Tobacco Extract Bar Soap (*Nicotiana tabacum*) Made from Cooking Oil Waste

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Abstract

The purpose of this study was to analyze the irritation test and students' perceptions of the effects that might be caused by the use of tobacco extract bar soap made from waste cooking oil. The research was carried out in three stages, namely cleaning up cooking oil waste, making tobacco extract bar soap made from cooking oil waste, and clinical trials of soap on panelists. The results showed that the clarification of cooking oil waste succeeded in changing the concentrated cooking oil waste to a brighter color. The resulting tobacco extract soap made from cooking oil waste has a pH and water content according to the Indonesian National Standard (SNI) for bar soap. Clinical testing of the soap on 10 students showed that the tobacco extract soap did not cause significant irritation symptoms to the students' skin.

Key words: bar soap, irritant,perception, tobacco extract

INTRODUCTION

Tobacco leaves are known to inhibit the growth of several gram-positive and gram-negative bacteria and have fungistatic and fungicidal properties (Putri et al., 2014). Extraction of the active ingredients in tobacco is generally carried out using a rotary tube, but some alkaloid compounds can also be extracted in a simple way using a water solvent (Suhendry, 2010).

Antimicrobial compounds in tobacco extracts can be used to inhibit the growth of skin-infecting microbes. In a preliminary study conducted by researchers, it was proven that tobacco stem extract had activity in inhibiting the growth of acne-causing Propiniobacterium acnes bacteria. In addition, tobacco extract can also inhibit the growth of Staphylococcus aureus bacteria (Puspita, 2011).

To facilitate the utilization of the antimicrobial activity in tobacco extracts, it is necessary to process the extracts into ready-to-use materials, for example in the form of ointments or soaps. Preparations in the form of soap have several advantages. Tobacco extract in the form of soap not only has anti-microbial activity, but soap can also clean the surface of the skin (Wahyuni, 2018). Soap for cleaning the skin is usually available in two types, namely liquid soap and solid soap (bar soap). Based on their appearance, bar soap consists of three types, including opaque, translucent, and transparent soap (Hernani et al., 2010).

Solid soap or bar soap generally consists of fat or oil, base in the form of NaOH and additives. Oil or fat as the

basic ingredient for making soap can be replaced as needed or desired. So that it can be modified to utilize unused materials (waste).

One of the wastes that has the potential to be used as a soap base is cooking oil waste. If cooking oil is used repeatedly, its quality will decrease due to hydrolysis and oxidation processes. According to Guenther (1987) used cooking oil can precipitate fat in blood vessels and cause liver cancer. So that cooking oil that has decreased in quality may not be used again for cooking.

By utilizing waste cooking oil as a basic ingredient for making soap, it is hoped that it can reduce the disposal of waste cooking oil into the environment. Waste cooking oil that is discharged into the environment can cause pollution to the environment. Bar soap made from cooking oil waste has been carried out a lot.

Prihanto and Irawan (2018) have found the appropriate concentration of NaOH and reaction temperature to obtain bar soap that meets the quality standards for bath soap. Excessive concentration of NaOH will produce a soap with high levels of free alkali. Meanwhile, according to the quality requirements for bath soap (SNI 06-3532-1994), the free alkali content calculated as NaOH in soap is a maximum of 0.1%.

The lower the free alkali content, the better the soap is for the skin. A slightly alkaline level does not irritate the skin (Prihanto and Irawan, 2018). However, the low alkaline content means that the use of NaOH in the soap-making composition is also low. The addition of NaOH that is too low in solid soap can cause the soap to produce a little foam so that the cleaning power of the soap will also be low (Dalimunthe, 2009). To overcome this, it can be done by adding glycerol to the soap. Glycerol can increase saponification (foam formation) and bind water from the air so that it can moisturize the skin. In theory, low-alkaline bar soap is safe for the skin and does not cause irritation, however, to ensure whether there is an irritating effect caused by soap, it is necessary to carry out a clinical soap irritation test on predetermined panelists.

The panelists in this study were students who generally used soap to treat acne on the skin. Students are expected to be able to provide objective perceptions so that the results of clinical trials are appropriate and can be used in the development of further research properly.

In addition to clinical trials to prove that there is no irritation caused by soap, it is also necessary to conduct clinical trials on the antibacterial effectiveness of soap preparations against the reappearance or growth of bacteria on the skin after using soap. This is done to ensure the quality of tobacco extract preparations in the form of bar soap made from waste oil still has good antimicrobial activity.

From the background explanation above, it is deemed necessary to carry out an antimicrobial test and an irritation test of tobacco extract soap clinically. Namely by testing the soap directly on human skin to find out its effect.

The purpose of this study was to analyze the irritation test and students' perceptions of the possible effects of

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clinically using tobacco extract bar soap made from cooking oil.

METODE

This study used a descriptive qualitative approach to analyze the irritation test of tobacco extract bar soap made from cooking oil waste. Irritation test was conducted on 10 panelists who met the criteria, namely as students, not currently sick (fever, runny nose, chills, or other flu symptoms), not currently pregnant (for women), not having a history of allergies to food or drugs, do not have previous skin problems (irritation, itching, allergies, etc.), and are willing to be panelists in this clinical trial study.

The research was conducted from May to August 2020 through 3 stages. The first stage is cleaning up cooking oil waste, the second stage is making tobacco extract soap made from cooking oil waste, and the third stage is clinical trials of tobacco extract soap made from cooking oil waste on panelists. The clarification of waste cooking oil is carried out by adding activated carbon in a ratio of 1:1 to waste cooking oil at a temperature of 100 °C. Furthermore, the activated carbon is separated again from the cooking oil waste.

The stage of making tobacco extract soap made from waste cooking oil is carried out by heating 200 ml of waste cooking oil that has been clarified at 50°C. Then added 1 gram of stearic acid and 60 ml of 25% NaOH solution with stirring until trace. After reaching the trace, the mixture is added 4 grams of vegetable glycerol. The soap is allowed to stand for two weeks so that the saponification reaction is perfect. The finished basic soap is heated until it melts and 10% tobacco extract is added. The solution is stirred until homogeneous and put into the soap mold. The soap is left until it hardens again and is ready to be used.

Tobacco extract bar soap made from waste cooking oil was then tested on panelists who met the requirements. The test was carried out by rubbing the test soap on the back of the left hand, while the back of the right hand was rubbed with the soap that the panelists used daily. The use of test soap was carried out twice a day for three days, then the panelists had to fill out the questionnaire that had been given.

To ensure the data entered by the panelists, interviews were conducted with the panelists, and observations of the effect of the test soap on the panelists' skin were carried out after 3 days of use. The data obtained were then sorted and described to obtain an overview of whether there was irritation occurred on the skin of the panelists after using tobacco extract bar soap made from waste cooking oil.

RESULT AND DISCISSION

Cleaning of Cooking Oil Waste

The waste cooking oil used in this research is cooking oil that has been used for cooking or frying two or three times. The cooking oil is dark yellow and there is dirt left over from fried food. The used cooking oil waste still has a normal pH of around 6 to 7.

Filtering cooking oil waste using filter paper can separate cooking oil

from food residue in the frying process, but does not change the color of the cooking oil. Bleaching the color of waste cooking oil or bleaching is done by using activated carbon. Namely, the cooking oil that has been filtered is heated at 70°C then added activated carbon which has been refined, and stirred for 60 minutes. The last stage of this process is to separate the cooking oil resulting from clarification or bleaching from the remaining activated carbon. The physical comparison of cooking oil waste before and after clarification can be seen in Figure 1.

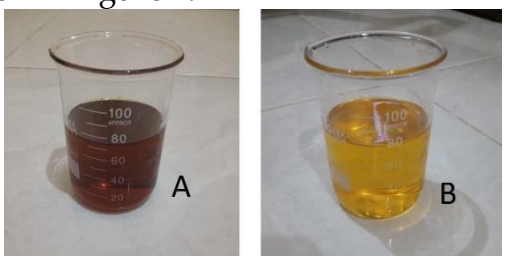

Figure 1. Cooking oil waste before (A) and after (B) clarification

From the bleaching process, waste cooking oil with a brighter color was obtained (Figure 1), but this study did not measure how much color or transparency changes in waste cooking oil. The color of waste cooking oil as a base for tobacco soap determines the quality of the soap. The clearer the waste cooking oil used, the better the soap will be. This also applies to the aroma of waste cooking oil. The more neutral the smell or aroma, the better the quality of the soap produced.

Tobacco Extract Bar Soap

Bar soap made from waste cooking oil is made with the basic ingredients of waste cooking oil that have been clarified beforehand. Waste cooking oil contains fatty acids which are reacted with NaOH to obtain a saponification reaction. The reaction of NaOH and fat in waste cooking oil can trigger the formation of foam or soap.

The NaOH used in the soap-making process must be precise so that it can produce a soap with sufficient foam because if the amount is too small the soap will not produce foam.

However, if the amount of NaOH is added to be more too much will cause the soap to become very alkaline which can cause a burning effect on the skin. Therefore, the accuracy of the amount of NaOH in the composition for making bar soap must be precise.

In this study the concentration of NaOH used was 25%, NaOH was added to a mixture of 200 mL of waste cooking oil and 1 gram of stearic acid. The addition was carried out at 55 °C, stirring continuously for 45 minutes. After that, 4 ml of glycerin was added to the mixture and then allowed to stand for two weeks.

After being left for two weeks, it is hoped that the saponification reaction has gone perfectly. Then the soap is melted again by heating it. After the soap melts, 5% of the total soap is added with tobacco extract. Considering that tobacco extraction uses a water solvent, the addition of tobacco extract cannot be done in large quantities. Too much water content can reduce the quality of bar soap and make the texture soft.

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Figure 2. Tobacco Extract Bar Soap

Tobacco extract bar soap made from waste cooking oil that has a brownish color, with water content close to 15%, so the texture of the soap becomes a bit softer than regular bar soap. On the other hand, tobacco extract soap has a standard pH for soap, which is close to 9. Apart from that, soap can also produce good foam when used, and does not cause a burning feeling on the skin.

This tobacco extract soap has a fairly high glycerol content. Glycerol in soap can function to moisturize the skin, so the skin doesn't become dry after using soap. However, glycerol has the character of absorbing or attracting water from the air. So if the soap is left in the open it becomes watery and makes the soap not durable and easily damaged. To overcome this, soap must always be stored in a dry place and tightly wrapped using plastic wrap.

Irritation Test

The irritation test was carried out on ten panelists consisting of four men and six women, aged between 20 and 24 years. The ten panelists have met the requirements, namely student status. are not currently sick (fever, flu, etc.), are not currently pregnant for women, have no history of food or drug allergies and sensitive skin, and are willing to be panelists in this study.

Irritation test data was obtained from questionnaires, observations, and interviews. The questionnaire was made based on indicators of skin irritation, namely the appearance of itching on the skin, red skin, swelling of the skin, and sore skin. From the results the questionnaire filled out by the panelists is presented in Table 1 below.

Tabel 1. Irritation Test Question Score

Question	Total Score	**Average Score**
1	14	1,4
2	10	1
3	10	1
4	10	1
5	12	1,2
6	10	1
7	10	1
8	10	1
9	10	1
10	10	1
11	10	1
12	12	1

From the results of the questionnaire, it is known that almost all statements about irritation show negative results, namely the overall score is 1. Statements with a score of more than one are statement number one and statement number five. Both statement number one and statement number five are statements related to signs of irritation in the form of itching on the skin. As for other signs of irritation in the form of a feeling of pain,

heat, and swelling of the skin, the panelists did not feel it appear for three days using tobacco extract soap.

The same thing applies to the observed data. The results of observations or observations of the skin of the panelists found that the use of tobacco extract soap did not cause symptoms of irritation in the form of the appearance of red color and swelling of the skin.

From the interview results, the appearance of skin irritation symptoms in the form of itching on the skin can be confirmed. First, third, eighth, and tenth panelists claimed to experience itching on the skin that was given tobacco extract soap. Students argue that itching appears a few moments after applying tobacco soap and lasts a short time. So when it was confirmed regarding the continuation of their participation as panelists, they preferred to continue.

The research conducted, obtained tobacco extract with characteristic dark color, characteristic smell of tobacco, and a pH close to 7 which means normal. According to Cahyono (1998), tobacco contains phenol nitrate and nicotine. These materials are derivatives of alkaloid compounds in tobacco. Tobacco leaf extract processed using a water solvent has a stronger antibacterial effect than tobacco stem extract using the same solvent (Sandika, 2019) so in this study tobacco leaf extract was used to be applied to form soap.

The soap used in this study was a type of bar soap made from cooking oil waste. Waste cooking oil has great potential to be used to make bar soap. Cooking oil is oil from processed palm oil. Likewise, the basic ingredients of bar soap in general come from palm oil.

The waste cooking oil used in this research is the leftover cooking oil for personal use which is used two to three times. This is intended so that the waste of cooking oil used as raw material for soap is not of poor quality. According to Afrozi et al. (2017), cooking oil that is used repeatedly will decrease in quality in several ways, including the color of the cooking oil turns darker due to the degradation of α and β carotene, xanthophyll, and anthocyanins which give the cooking oil a clear yellow color.

The cooking oil waste used in this study is still relatively good, which is indicated by the color of the cooking oil which is not too dark or thick. So that after going through the cleaning process a good color can be obtained easily, so the quality of the bar soap produced is also good. Even so, the process of clearing the waste cooking oil is still being carried out to remove the dirt that is carried away and help improve the color of the waste cooking oil which is an ingredient in bar soap.

The quality of bar soap made from waste cooking oil is not only determined by the quality of the clarified cooking oil. Other factors that affect the quality of bar soap are the pH of the soap, the foam it produces, and the softness of the bar soap when used. Bar soap made from waste cooking oil has a pH between 7 and 9. The quality standard for the degree of acidity or the pH of solid soap ranges from 9.0 to 10.8 (Gusviputri et al., 2013). Thus, the bar soap used has a pH below the quality standard.

The low pH value of extract bar soap made from waste cooking oil is due to the high water content in the soap,

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while the free alkali content or NaOH level is low. Prihanto and Irawan (2018) found that the level of NaOH concentration in bar soap is inversely proportional to the water content of the soap. The high water content in tobacco extract soap made from waste cooking oil is strengthened by the texture of bar soap which tends to be softer than bar soap in general.

The foam produced by tobacco extract soap made from waste cooking oil is included in the sufficient category. Where when used soap can produce a sufficient amount of foam to clean the surface of the skin. In the process of making soap made from waste cooking oil, soap is not immediately used. However, wait for two weeks. This process goes well so that the saponification reaction takes place perfectly and the soap produces sufficient foam even though it has a high water content.

Tobacco extract soap made from waste cooking oil has a pretty good quality in terms of quality. However, the durability of this soap at room temperature is somewhat less good. The addition of glycerin to soap has a good effect on the skin, which can moisturize the skin and make the soap more transparent (Afrozi et al., 2017). But on the other hand, the property of glycerin is to absorb water from the environment (Setyoningrum, 2010). In the open state, soap that has a high glycerol content will attract water from the surrounding air so that the surface of the soap becomes wet or runny. The wet surface of the soap will level it the water in the soap becomes softer and breaks down quickly.

Solution for circumstances thereby to protect the soap from direct contact with air. Namely, wrap soap withplastic wrap to avoid direct contact with air Which can make it moist and juicy. The soap irritation test conducted on ten panelists showed mild irritation symptoms in 40% of the panelists on the first day. Mild symptoms that appear are itching on the skin that is applied to bar soap extract tobacco made fromwaste oil fry. Itchy appears as a mild itch and lasts a short time then goes away. This is happening at the moment
first use soap tobacco extract.

Tobacco extract added to bar soap made from waste cooking oil contains alkaloid active substances. Alkaloids in tobacco are widely used as pesticides and antimicrobials. This is because alkaloids can interfere with DNA synthesis and damage cell walls (Puspita, 2011). This was reinforced by Sandika's research (2012) which proved that alkaloids can denature proteins in larger animals, in this case, worms based on their physical characteristics.

The itching sensation experienced by some of the panelists at the beginning of the use of tobacco extract bar soap made from cooking oil waste was more due to skin contact with the active alkaloid substance from tobacco extract. But it is not lasts a long time because the body immediately responds and the itch disappears immediately.

This statement was reinforced by panelist questionnaire data that on the second day of use, cases of itching on the skin of panelists reduced to only 20% of panelists who still felt this

with a reduced level of itching from the previous day. Whereas on the third day of use, none of the panelists felt itching on the skin after using tobacco extract bar soap made from waste cooking oil.

Overall, the irritation test using tobacco extract bar soap made from cooking oil waste showed negative results. This means that tobacco extract bar soap made from waste cooking oil does not cause significant irritation to the skin.

CONCLUSION

From the results of the study, it can be concluded that tobacco extract bar soap made from waste cooking oil did not cause significant irritation to the panelists' skin and students gave positive perceptions of extra tobacco bar soap made from waste cooking oil.

REFERENCE

Angga LI., Prenggono M.D., Budiarti L.Y.2015. Identifikasi Jenis Bakteri Kontaminan pada Tangan Perawat di Bangsal Penyakit Dalam RSUD Ulin Banjarmasin Periode Juni-Agustus 2014. Berkala Kedokteran.

Ayu DF., Ali A., Sulaiman R. (2010). Evaluasi Mutu Sabun Padat dari Minyak Goreng Bekas Makanan Jajanan di Kecamatan Tampan Kota Pekanbaru dengan Penambahan Natrium Hidroksida dan Lama Waktu Penyabunan. Makalah Prosiding.

Badan Standarisasi Nasional. 2016. SabunMandi padat. SNI 3532-2016. Dewan- Dewan Standarisasi Nasional. Jakarta. 1-10

Camargo, FB., Gaspar, JLL., Maia Campos, PMBG. 2011. Skin Moisturizing Effects of Panthenol-Based Formulations. Universidade De Sao Paul: Brazil.

Dalimunthe, NA. 2009. Pemanfaatan Minyak Goreng bekas Menjadi Sabun Mandi Padat. Thesis. Universitas Sumatera Utara.

Gusviputri A. 2013. Pembuatan Sabun dengan Lidah Buaya (Aloe vera) sebagai Antiseptik Alami. Widya Teknik 12 (1) hal: 11-21.

Hernani, Bunasor TK, Fitriana. 2010. Formula Sabun Transparan Anti Jamur dengan Bahan Aktif Ekstrak Lengkuas (Alpinia galangal L. Swartz.). Bul. Litro. 21 (2) hal: 192-205

Manggau MA., Damayanti R., Lukman M. 2017. Uji Efektivitas Kelembaban Sabun Transparan Ekstrak Rumput LautCokelat (Sargassum cristaefolium C. Agardh) dengan Variasi Konsentrasi Sukrosa. Journal of Pharmaceutical and Medicinal Sciences. Vol. 2(1), pp: 21-26

Nurnasari E., Wijayanti KS. 2019. Aktivitas Anti Bakteri Minyak Atsiri Daun Tembakau terhadap Pertumbuhan Bakteri Escherichia coli dan Staphylococcus aureus. Jurnal Kefarmasian Indonesia. Vol. 9, No. 1, Februari 2019. Hal: 48-56

Puspita EP. 2011. Aktivitas Antibakteri Ekstrak Tembakau Temanggung Varietas Genjah Kemloko. Skripsi. Institut Pertanian Bogor.

Puspita KC., Tjahjani S. 2017. Pemurnian

 DOI: https://doi.org/10.35719/mass.v4i1.127

Jelantah dengan Karbon Aktif Tempurung Keluwak (Pangiumedule) sebagai Adsorben. Prosiding Seminar Nasional Kimia FMIPA UNESA. ISBN: 978-602- 0951-15-7 Hal: 163-169

Prihanto A, Irawan B. 2018. Pemanfaatan Minyak Goreng Bekas Menjadi Sabun Mandi. Metana. Vol. 14 (2).

Desember 2018. Hal: 55-59.

Putri RN, Barid I, Kusumawardani, B. 2014. Daya Hambat Ekstrak Daun Tembakau terhadap Pertumbuhan Mikroba Rongga Mulut. Stomatognatic (J.K.G Unej), Vol. 11, No. 2, 2014, Hal: 27-31.

Sandika B, Ducha N, dan Raharjo. 2012. Pengaruh Pemberian Air Rebusan Akar Delima (Punicagranatum L) terhadap Mortalitas Ascaris suum secara In Vitro. Jurnal LenteraBio. Vol 1 (2) hal. 81-86.

Suhendry, Sri. 2010. Pengambilan Nikotin dari Batang Tembakau. Jurnal eksergi. Vol X. no 1. Juni 2010. Halaman 44 – 48.

Ubaidillah I, Triadini R, Erlina, Mariam N, Andari, M. 2009. Pemurnian Minyak Jelantah dengan Kulit Pisang Kepok (Musa paradiasacal) untuk Pedagang Makanan di Gelap Nyawang. Program Kreativitas Mahasiswa. Bandung: Institut Teknologi Bandung.

Untari EK, Robiyanto. 2018. Uji Fisikokimia dan Uji Iritasi Sabun Antiseptik Kulit Daun Aloe vera (L.) Burm. F. Jurnal Jamu Indonesia.Vol. 3 (2). 2018. Hal: 55-61

Wahyuni S. 2018. Formulasi dan Uji Aktivitas Antibakteri Sabun Padat Transparan Ekstrak Lengkuas (Alpinia galanga (L.) Willd.) dan Ekstrak Kulit Batang Banyuru. (Pterospermum celebicum Miq.) terhadap Bakteri Gram Positif dan Gram Negatif. Makassar: Universitas Hasanuddin.

Widyasari E, Yanuarsyah FD, Adinata RN. 2018. Sabun Minyak Jelantah Ekstrak Daun The hijau (Camellia sinesisis) Pembasmi Staphylococcus aureus. Bioedukasi. Vol. 11, No. 2, Hal: 66-71

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