UTILIZATION OF ALUM AND LEMON PEEL *(Citrus limon L.)* AS A NATURAL INGREDIENT FOR MAKING DEODORANT SPRAY

Nur Rahmayanti Afifah Sabri [1], Evi Mustiqawati[2] , Ratih Nurwanti[3]*

[1,2,3],Politeknik Baubau, Baubau, Indonesia

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CORRESPONDING AUTHOR

Name : Evi Mustiqawati
Address: Jl. Hayam Wuruk Kel. Bone-bone, Kec. Betoambari kota baubau
E-mail : evi.mustiqawati02@gmail.com

A B S T R A C T

Excessive sweating can cause problems for some people, such as unpleasant body odor. Spray deodorant is one way to treat body odor. Lemon peel is one of the herbal ingredients that can be used to make deodorant spray. Citric acid, which has antibacterial properties, is found in lemon peels. Ingredients such as potassium aluminum sulfate, which functions as an antiperspirant, can also be added. The purpose of this study was to determine the physical evaluation test of deodorant spray formulations with lemon peel extract (Citrus limon L.) in various concentrations and also to determine the formulations with different concentrations. This study is a type of qualitative research that uses experimental methods. The results of the study showed that deodorant preparations based on lemon peel extract (Citrus limon L.) from three concentrations carried out, namely 1%, 3% and 5%, showed that the three formulations were safe and good to use as deodorant sprays. The results of the physical evaluation test of the preparation include organoleptic test, homogeneity test, pH test, spray pattern test, dry time test and irritation test for the three formulations have met the criteria and requirements that have been set. This research makes an important contribution to the development of beauty products such as natural-based deodorants that are environmentally friendly and safe for the skin. With such positive results, lemon peel extract can be a potential natural ingredient option in the cosmetic and personal care industry.

INTRODUCTION

The body tries to regulate the temperature of the human body by sweating. Sweat is made up of water, salt, and body waste. Not all sweat smells bad. Apocrine and exocrine glands are the source of the body's sweat glands. The aprocrine glands in the armpits contain a variety of proteins and sugars that can be destroyed by odor-producing bacteria, ammonia. Fur adds to the surface so that bacteria that cause body odor can multiply more easily (Mu'tasim et al., 2023).

One of the products that can be used to eliminate body odor caused by bacteria present in sweat is deodorant. Currently, many deodorant products in various dosage forms are available in Indonesia. One of them is aroma spray. The advantage of using perfume spray deodorant is that they are not sticky to the skin, easily absorbed, and do not leave black stains on the armpits or clothes (Sabrina et al., 2022).

Indonesia currently has invaluable natural resources, including various types of plants (Wa Jumi *et al.*, 2023). Deodorants made from natural ingredients are hard to find and are not made in bulk for sale. Many plants available in Indonesia have deodorant potential, such as *Citrus limon L. Citrus aurantifolia S* is a traditional medicine that contains active substances that function as anti-bacteria (Mustiqawati & Yolandari, 2022). *Citrus limon L.* It is considered to have the ability to eliminate body odor due to its volatile essential oils that give it a distinctive aroma. (Veranita et al., 2021).

Spray deodorants are cosmetic products that are sprayed onto specific areas of the body to absorb sweat and reduce body odor. One of the advantages of spray deodorant compared to other types of deodorant is the way it is used. Deodorant spray is considered very clean because it does not stick to the user's skin (Mayang et al., 2019).

Citric acid, the main organic acid contained in lemon-feeling water, is a substance that has antibacterial properties in lemons, according to research conducted by Tomotake *et al.*, (2005). Flavonoids act as antimicrobials and antivirals and control photosynthesis in plants (Nurwanti *et al.*, 2024). In addition, Zu *et al.*, (2010) stated that essential oils such as limonene have antibacterial properties. This essential oil is also found in the fruit of lemon (Yeni et al., 2015). The purpose of this

study is to replace the bacteria that cause body odor with deodorant sprays made from natural ingredients.

METHODOLOGY

This type of research is a qualitative research conducted through laboratory experiment methods. The object of the research was the manufacture of alum preparations and lemon peel extracts *(Citrus limon L.).* CTools used include blenders, stirring rods, petri cups, glass mouthpieces, beakers, measuring cups, packaged plastic bottles, filter paper, droppers, pH meters, rotational evaporators, spoons, and analytical scales. CThe ingredients used are aquadest, alcohol, glycerin, lemon peel, propylene glycol and alum.

Research Procedure

Lemon Peel Extract Manufacturing

Prepare the equipment and materials used. Sort the wet lemons that have been collected Then wash the lemons under running water. Weigh the peel and pulp of the lemon. Drying in the sun to dry is the drying process. After drying, the ingredients are mashed with a blender. The sample was placed in a container and soaked in seventy percent alcohol for three consecutive days while stirring occasionally. To distinguish between maserat and dregs, filter paper is used to filter. After that, it is re-soaked in seventy percent alcohol and macerated twice a day. Then maserat data is collected. Then it is heated using a rotary evaporator to extract.

Preparation Formulation

Material	F1	F2	F3	Function
Lemon peel extract	1	3	5	Active substances
Alum	3	6	9	Active substances
Propylene glycol	3	3	3	Preservatives
Glycerine	3	3	3	humectants
Aquadest	Ad 60 mL	Ad 60 mL	Ad 60 mL	Solvent

Each ingredient is weighed for the manufacture of 60 mL per formula. Lemon peel extract is then put into the mortar Then add alum, glycerin and propylene glycol which have been dissolved using aquadest to grind until homogeneous. Then put the solution in a bottle and then fill the aquadest up to 60 mL.

Evaluation of the Physical Properties of the Preparation

Organoleptic Test

Organoleptic tests examine products with human intuition. Through these observations, the color, aroma, and texture of the preparation can be described.

Homogeneity Test

A certain number of preparations are sprayed on a piece of transparent glass to test its homogeneity. The preparation should have the same composition and not mix unevenly.

pH Test

To find out the pH of the spray, you can soak it in a pH meter. The goal is to find out the pH of the topical preparation, which should correspond to the pH of the skin, which is approximately 4.5 to 6.5.

Spray pattern test

To evaluate the spray pattern, the material is sprayed onto the glass from a distance of 5 cm. Then, using a ruler, the diameter of the formed spray is measured.

Dry time test

For drying time testing, the spray preparation will be applied to the forearm and then calculated how long the spray liquid will dry. No more than five minutes are required to dry.

Irritation Test

An irritation test is carried out to find out if the preparation can cause irritation to the skin. When the test is carried out, the underarm skin is sprayed with deodorant. Wait about 10 minutes. This test is done on people who have normal or sensitive skin.

RESULTS & DISCUSSION

Citrus *Limon L.* The one used in this study is the trowel part. In this study, the extraction process was carried out using the maceration technique. Maceration is a simple extraction technique that uses solvents and stirring at room temperature. The purpose of maceration is to extract nutrients that are not heat-resistant and that are heat-resistant. The maceration method was chosen because it is cheap and easy to do with basic tools. Since the solubility of a compound depends on the polarity of the solute and solvent components, the type of solvent used gives different results. After water, methanol, and finally ethanol, the polarity of the solvent decreases. When the polarity of the solvent increases, the extract immersion decreases because the solutes are usually less polar. In addition, there are variations in secondary metabolite compounds that can be dissolved by certain types of solvents, which has an impact on the inhibition of the extract (Setyawardhani, 2021).

Organoleptic Test

	F1	F2	F3	Standard
Color	Lemon yellow color	Turmeric yellow color	Reddish yellow color	Typical color and smell of the sample or fragrance, liquid form
Aroma	Characteristic smell of lemon fruit aroma	Characteristic smell of lemon fruit aroma	Distinctive smell of lemon fruit but more intense	
Texture	Liquid and easy to apply	Liquid and easy to apply	Liquid and easy to apply	

Source : Primary Data, (2024)

Organoleptic tests were carried out to determine the color, aroma, and texture of the deodorant preparations made in this study.

Homogeneity Test

Formula	Homogeneity	Result	Standard
F1	Homogeneous	Qualify	Homogeneous
F2	Homogeneous	Qualify	
F3	Homogeneous	Qualify	

Source : Primary Data, (2024)

Homogeneity tests are carried out to ensure that all deodorant preparation materials are well mixed. The results showed that the three formulas were well mixed and met the standards.

pH Test

Formula	Ph	Result	Standard
F1	5,06	Qualify	4,5 – 6,5
F2	5,06	Qualify	
F3	5,07	Qualify	

Source : Primary Data, (2024)

The pH test results show that formula 1 has a pH value of 5.06, formula 2 has a pH value of 5.06, and formula 3 has a pH value of 5.07. These three values meet the skin's pH standards that affect skin safety, which ranges between 4.5 and 6.5.

Spray Pattern Test

Formula	Spray Pattern (cm)	Result	Standard
F1	5 cm	Qualify	5 - 7 cm
F2	5 cm	Qualify	
F3	5.2 cm	Qualify	

Source : Primary Data, (2024)

The spray pattern test was carried out to determine the spray pattern on the deodorant preparation. Where for all three formulas meet the standard of a good spray pattern, which ranges from 5 to 7 cm.

Dry Time Test

Formula	Dry time	Result	Standard
F1	1m 33s	Qualify	< 5 minutes
F2	1m 48s	Qualify	
F3	2m 5s	Qualify	

Source : Primary Data, (2024)

The results of the dry time test showed that formula 1 took 1 minute 33 seconds, formula 2 took 1 minute 48 seconds and formula 3 took 2 minutes and 5 seconds. The results showed that the three formulas met the dry time testing standard, which was less than 5 minutes.

Irritation Test

Formula	Skin Type	Irritation	Result	Standard
F1	Normal/*Sentitive*	Negative	Qualify	No irritation
F2		Negative	Qualify	
F3		Negative	Qualify	

Source : Primary Data, (2024)

To find out if deodorant can cause skin irritation, irritation research was conducted. All three formula studies show that normal, sensitive skin is not irritated.

The purpose of this study is to study the method of making lemon peel extract *(Citrus limon L.)* for deodorant spray and to physically test its stability.

Anshori (2017) states that skin care products often use lemon, a fruit rich in vitamin C. Most free radicals come from outside sources, such as foods that contain dyes, so people need antioxidants to protect the body from them. Vitamin C functions as an excellent anti-aging antioxidant to fight free radicals and brighten the skin (Nurwanti *et al.,* 2023).

According to Klepak and Walkey, 2000 in Sinaga et al, (2021) Spray deodorant is used to spray on the armpits to absorb sweat and reduce body odor. It is very hygienic because it is used without direct contact with the skin.

Formulation made on the manufacture of deodorant from lemon peel extract *(Citrus limon L.)* It is divided into several formulations, namely formulations 1, 2 and 3 with different concentrations. Formulation 1 with a concentration of 1% uses lemon extract 0.6 grams/mL, alum 1.8 grams/mL, propylene glycol 1.8 grams/mL, glycerin 1.8 grams/mL and aquadest ad 60 mL. Formulation 2 with a concentration of 3% uses lemon extract 1.8 grams/mL, alum 3.6 grams/mL, propylene glycol 1.8 grams/mL, glycerin 1.8 grams/mL and aquadest ad 60 mL. Formulation 3 with a concentration of 5% uses lemon extract 3 grams/mL, alum 5.4 grams/mL, propylene glycol 1.8 grams/mL, glycerin 1.8 grams/mL and aquadest ad 60 mL.

The formulation used in the manufacture of deodorant spray consists of alum, propylene glycol, glycerin and aquadet. In the manufacture of deodorant spray, alum functions as an antiperspirant, namely overcoming excessive body odor and narrowing the sweat ducts so that the volume of sweat decreases (Mahmudah et al., 2023). Propylene glycol is used as a preservative that functions so that the preparation is avoided from microorganisms, glycerin is used as a humectant that aims to moisturize the skin and aquadest is used as a solvent.

In the formulation test of the physical stability test of deodorant spray preparations from lemon peel extract *(Citrus limon L.)* There is an organoleptic test, where organoleptic testing aims to check the physical appearance of the deodorant spray preparation such as checking the shape, smell and color. Based on the results of the research conducted in formulation 1, it shows a lemon yellow color, a distinctive smell of lemon fruit, a liquid dosage form and easy to apply. Formulation 2 shows a turmeric yellow color, a characteristic smell of lemon fruit aroma, a liquid dosage form and easy to apply. Formulation 3 shows a reddish-yellow color, a characteristic smell of lemon fruit aroma but more concentrated, liquid preparation form and easy to apply.

The purpose of the subsequent homogeneity test of the preparation is to ensure that the active ingredient is mixed with the base material so that there are no lumps or non-homogeneous parts. Deodorant preparation from lemon peel extract *(Citrus limon L.)* has a homogeneous texture, according to research. The results meet the requirements, which means there are no coarse grains that are not mixed evenly. This shows that the deodorant spray product has met the standards.

pH testing is carried out to ensure that the deodorant preparation is suitable for the acidity or wetness of the skin so that it can be applied comfortably to the skin. The test results for formula 1 showed a pH of 5.06, formula 2 showed a pH of 5.06, and formula 3 showed a pH of 5.07. All of these results show that all formulas produce a good pH, because the pH value of the skin remains between 4.5 and 6.5, according to Kurniawan (2023) so it is safe to use.

To ensure that the preparation to be used can be used properly, a spray pattern test is performed. The results showed that formula 1 had a value of 5 cm, formula 2 had a value of 5 cm, and formula 3 had a value of 5.2 cm. Therefore, it can be concluded that all three formulas can be used well when used according to the standard, which is between 5 and 7 cm. According to Suyudi (2014) in Maesaroh (2021), the viscosity of the preparation and the spraying distance are two components that affect the variation of spraying patterns. The purpose of this spraying pattern inspection is to determine the quality of the spray applicator used.

Dry time testing is carried out to prevent microorganisms that generally like watery conditions from spreading and make it easier for users to use the preparation. For example, formula 1 takes 1 minute 33 seconds, formula 2 takes 1 minute 48 seconds, and formula 3 takes 2 minutes 5 seconds, according to the results. So, all three formulas meet the dry-time testing requirements. According to Nurlaela et al. (2016) in Kurniawan et al. (2023), the dry time required for testing is less than 5 minutes.

To find out if the preparation can cause irritation to the skin, an irritation test is performed. According to the results of the irritation test, six people, three for normal skin, and three for sensitive skin. During the test, the respondents' underarm skin was smeared with a mixture of deodorant. After ten minutes, the respondent took no action. If there is no alcohol, normal, sensitive skin will not be irritated.

Based on the results of the research that has been carried out, it has been shown that the deodorant preparation of lemon peel extract *(Citrus limon L.)* From the three concentrations that have been made, the results are obtained that the three formulations are good and safe to use for normal and sensitive skin. The results obtained can be said for all three formulations to be good, but in the organoleptic test that formulation 3 has a stronger odor than formulations 1 and 2 so that it is less comfortable when used because it has a strong odor.

CONCLUSION

The results of the research that have been carried out show that the deodorant preparation of lemon peel extract *(Citrus limon L.)* From the three concentrations that have been made, namely 1%, 3% and 5%, the results are obtained that the three formulations are safe and good to use as deodorant sprays.

The results of the physical evaluation test of preparations from organoleptic testing, homogeneity test, pH test, spray pattern test, dry time test and irritation test based on the results that have been carried out in formulations 1, 2 and 3 can be said to meet the criteria and conditions that have been set.

The limitations of this study lie in consumer testing and diversity of preferences. Deodorants are used by different groups with different preferences, ranging from odor, texture, to durability. Finding a formulation that suits most consumers while maintaining product quality is one of the limitations of this research.

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