

Physical Evaluation of Orange Peel (*Citrus Sinensis*) Aromatherapy Balm

Cory Linda Futri Harahap^(⊠), Ayus Diningsih, and Ervina Silvia

University of Universitas Aufa, Padang Sidempuan City, Indonesia cory.harahap20@gmail.com

Abstract. Orange peel has beneficial contents. One is essential oil which can be used as medicinal raw and aromatherapy. Orange aromatherapy can stabilize the nervous system and lead to pleased feeling. This study aimed to evaluate the physical preparation of orange peel aromatherapy balm. The research method used experimental research. The concentration of orange peel extract was 0%, 5%, 10%, and 15%. It encompassed: organoleptic, homogeneity test, pH test, irritation test, and hedonic test. The finding showed white balsam preparations, semi-solid, orange peel distinctive smell, homogeneous, pH 5–6. There was no irritation on the respondents' skin, and preferably on 15% concentration. Based on the analysis of the study, it could be concluded that the physical preparation of aromatherapy balm met the standards, and the best concentration was 15%.

Keywords: Physical Evaluation · Balm · Orange Peel (Citrus sinensis)

1 Introduction

Aromatherapy is a method of treatment through the medium of smells that come from certain plants. Sweet citrus fruit is a source of aromatherapy plants. Citrus aromatherapy can stabilize the nervous system and cause feelings of pleasure. (Taukhit and Rudi 2018).

Therapy that uses essential oils is considered to be able to help reduce and even overcome psychological disorders and comfort disorders such as anxiety, stress, depression, and so on. In his experience, aromatherapy can be given in several ways, including inhalation, soaking, massage, and compresses (Widiarti and Suhardi 2015 in Tricintia et al. 2017).

Citrus fruit is a local fruit that is widely found in Indonesia, grows well in mountainous areas up to 1000 m above sea level. The roots are shallow so it should be planted in fertile soil. In Indonesia, sweet oranges are grown in Bangli, Batu, Punten, and Berastagi. Its production can reach 2.6 tons/ha/year. (Endarto and Endri 2016).

So far, sweet orange peels (Citrus sinensis) are considered trash (waste) by many people and thrown away. There are still many who don't know, sweet orange peels which they have considered as garbage actually have useful content and can be processed into products that are beneficial to the community. (Kartasapoetra 2001 in Lestari and Eva 2019).

In sweet orange peel there are chemical compounds that are used because they have pectin and essential oil constituent groups. The essential oil components of sweet orange peel consist of limonene (95%), mirsen (2%), octanal (1%), decanal (0.4%), citronellal (0.1%), neral (0.1%), valence (0.05%), sinnsial (0.02%) and sinensial (0.01%) (Seputri et al. 2010 in Lestari and Eva 2019).

Essential oils, also known as flying oils (essential oils, volatile oils) are oils that are produced by plants. The oil is volatile at room temperature, has a bitter taste, smells good according to the plant that produces it. Essential oils are used in industry for the manufacture of cosmetics, perfumes, and medicines as well as for providing aroma and taste. Orange essential oil is also beneficial for health for aromatherapy. The aroma of oranges can stabilize the nervous system, cause feelings of pleasure and calm, increase appetite, and cure disease (Istianto and Muryati 2014).

Citrus fruits are composed of components, namely Flavedo (which is the part that gives color to the orange peel, which contains carotene (yellow color) in oranges), Albedo (located under the flavedo, usually has a thick, white, and spongy layer). And Endocarp (which is the edible part of the fruit, where the endocarp contains a number of segments). Generally, citrus fruits have 9–13 segments. (Kurniawan et al. 2008).

Isolation of essential oil from orange peel can be done in several ways such as extraction with solvents, pressing, and by distillation/extraction. A simple and easy way to do this is by using the steam distillation method.

Distillation or distillation is a method of separating chemicals based on differences in the speed or ease of evaporation (volatility) of the material. In the distillation process, the mixture of substances is boiled until it evaporates, and this steam is then cooled back into a liquid form (Kurniawan et al. 2008; Iryani and Agustina 2018).

The basic principle of the distillation method is that steam from water is used to remove the essential oil from the sweet orange peel tissue and then cooled with running water. The result obtained is a mixture of water and oil, because the difference in specific gravity will separate where the oil layer is on top and the water layer is on the bottom. The oil layer is then removed and put into a dark bottle.

In this study, the orange peel essential oil obtained will be applied as an aromatherapy balsam preparation.

Balsam is a liniment with a concentration like ointment, while ointment is a semisolid preparation intended for topical use on the skin or mucous membranes which functions to protect or relax the skin and relieve pain or pain (Zulkarnain and Aminullah, in Triana Olas 2019).

Balsam has become an inseparable part of our lives because it has many health benefits. Balsam is very useful for relieving headaches and also stomachaches or colds. This has been believed from generation to generation since ancient times. If someone has a cold, just rub it on the back and chest. It doesn't take long, the cold will disappear. (Oles 2019; Triana Olas 2019).

2 Methods

This type of research is an experimental research. This research was conducted at the Chemistry and Pharmacy Laboratory, Faculty of Health, Pharmacy Studies, Aufa Royhan University, Padangsidimpuan in June 2021–August 2021.

This research uses tools such as: knife, blender, distillation apparatus, separator funnel, porcelain dish, water bath, stirring rod, scale, beaker, spoon, dropper/measuring pipette, parchment paper, universal pH, and plastic pot.

The materials used in this study were sweet orange peel essential oil, menthol, paraffin solidum, and Vaseline album.

The research procedures include, firstly the sample (sweet orange fruit) is washed clean, then the orange peel is separated from the fruit. Slice the sweet orange peel with a size of ± 2 mm, then dry it at room temperature without being exposed to direct sunlight for 2–3 days so that more essential oils are produced (Mizu 2014). After that, blender the sweet orange peel until smooth. Weigh 150 g of mashed orange peel then put it in a distillation flask and add 200 ml of distilled water. Assemble the distillation apparatus, then carry out the distillation process for 2–3 h at a temperature of 1000 C (Kurniawan et al. 2008). Collect the distillate in an Erlenmeyer, then put it in a separating funnel. Let stand for 15 min until 2 layers are formed, namely the top layer (essential oil) and the bottom layer (water) (Lestari and Eva 2019). Discard the water, then tamping the essential oil in a dark bottle and store it in the refrigerator (Istianto 2010).

Then at the stage of making the balm, all you need to do is weigh all the ingredients needed, namely 2 g of menthol, 1 g of solid paraffin, 10 g of Vaseline album, and sweet orange peel essential oil. Then Vaseline album, solid paraffin, and menthol are melted on a water bath until they melt (mixture 1), remove and allow to cool slightly. Then enter the essential oil according to its concentration into mixture 1, stir until homogeneous. The homogenized balsam is put in a tightly closed container, labeled, and then packaged (Zulkarnain and Aminullah 2012 in Olas 2019) (Fig. 1).

Physical evaluation of the finished balsam preparation must be carried out to determine the quality and safety of the balsam preparation. Physical evaluation includes several tests, including: organoleptic test, homogeneity test, pH test, irritation test, and hedonic test (liking).

2.1 Organoleptic Test

Organoleptic test was carried out by observing the preparation from the shape, smell, and color of the preparation. According to the Ministry of Health of the Republic of Indonesia, the specifications for the preparation that must be met are to have a semisolid dosage form, the color must be in accordance with the specifications at the time of initial manufacture and the odor is not rancid.

2.2 Homogeneity Test

The homogeneity test of the balsam preparation is carried out by taking 1 g of balsam and then applying it to a piece of glass or other suitable transparent material which must show a homogeneous arrangement. Homogeneous preparations are characterized by the absence of lumps in the smear, an even structure and uniform color from the starting point of smearing to the end point of smearing.



Fig. 1. Schematic of Making Aromatherapy Balsam from Essential Oil of Orange Peel

2.3 pH Test

pH examination is one part of the physico-chemical examination criteria in predicting balsam preparations. The pH value is measured using a pH stick/meter 3 times for each formulation of F1, FII, FIII, and FIV balsams for 1 week (7 days) by pH method. Stick/meter is inserted into the preparation, then the color change that occurs on the pH stick/meter will show the pH value of the balm. The pH measurement is intended to determine the properties of the balm in irritating the skin and the stability of the active ingredients. Normal skin ranges from a pH of 4.5 to 6.5. A pH value that exceeds 7 can cause skin irritation (Gozali 2009 in Rukmana 2017).

2.4 Irritation Test

Determination of the number of volunteers is done by using purposive sampling method (volunteers have been selected by researchers with certain criteria) by inclusion to facilitate monitoring/observation during the irritation test. The irritation test was carried out on the skin of volunteers by applying 2–3 times a day on the inner forearm for 2 consecutive days. Results are read after 48–72 h to assess test results.

There were 11 volunteers who were used as respondents, with the following criteria:

- Healthy body
- Age between 17-40 years old
- Do not have a history of diseases related to allergies
- Volunteers are the closest people and are often around the test so it is easier to monitor and observe if there is a reaction that occurs on the skin being observed

Recognize signs of skin irritation, including:

- Itchy skin

If the itching is bothersome and you are anxious to scratch, this could be an early sign of skin irritation. Many are trivial with this symptom because they think this itching will go away by itself. In fact, if not treated, the itching will get worse and worsen the skin condition.

- Red and swollen skin

This condition can occur before or at the same time as itching. Not only is the redness visible on the skin, but the skin will also swell.

- The skin gives rise to rashes

The stages of irritation that are getting worse are the appearance of a rash or small red spots that feel hot/stinging.

2.5 Hedonic Test

The hedonic test was carried out to find out public opinion regarding the physical quality of the sweet orange peel essential oil balsam preparation that had been made.

3 Results

The result of distillation of essential oil of sweet orange peel (Citrus sinensis) by steam distillation method produces essential oil as much as 2.5 ml/150 g dry weight of sweet orange peel. The volatile oil produced by water vapor distillation has a distinctive aromatic odor such as a pungent and colorless sweet orange peel (Alfianur 2017).

Several tests were carried out on balsam preparations that had been mixed with essential oils, including:

3.1 Organoleptic Test

The results of observations on formulas I, II, III, and IV have acceptable organoleptic properties, namely semi-solid, white color, and have a characteristic menthol odor for formula I, while formulas II, III, and IV have a characteristic odor of sweet orange peel essential oil.

The results of the examination for 7 days during the storage period of balsam preparations can be seen in the following Table 1.

Parameter					
Day	Formula	Color	Shape	Smell	
0	FI	White	Semi Solid	Menthol	
1		White	Semi Solid	Menthol	
2		White	Semi Solid	Menthol	
3		White	Semi Solid	Menthol	
4		White	Semi Solid	Menthol	
5		White	Semi Solid	Menthol	
6		White	Semi Solid	Menthol	
7					
0	FII	White	Semi Solid	Sweet orange peel essential oil	
1		White	Semi Solid	Sweet orange peel essential oil	
2		White	Semi Solid	Sweet orange peel essential oil	
3		White	Semi Solid	Sweet orange peel essential oil	
4		White	Semi Solid	Sweet orange peel essential oil	
5		White	Semi Solid	Sweet orange peel essential oil	
6		White	Semi Solid	Sweet orange peel essential oil	
7		White	Semi Solid	Sweet orange peel essential oil	
0	F III	White	Semi Solid	Sweet orange peel essential oil	
1		White	Semi Solid	Sweet orange peel essential oil	
2		White	Semi Solid	Sweet orange peel essential oil	
3		White	Semi Solid	Sweet orange peel essential oil	
4		White	Semi Solid	Sweet orange peel essential oil	
5		White	Semi Solid	Sweet orange peel essential oil	
6		White	Semi Solid	Sweet orange peel essential oil	
7		White	Semi Solid	Sweet orange peel essential oil	
0	F IV	White	Semi Solid	Sweet orange peel essential oil	
1		White	Semi Solid	Sweet orange peel essential oil	
2		White	Semi Solid	Sweet orange peel essential oil	
3		White	Semi Solid	Sweet orange peel essential oil	
4		White	Semi Solid	Sweet orange peel essential oil	
5		White	Semi Solid	Sweet orange peel essential oil	
6		White	Semi Solid	Sweet orange peel essential oil	
7		White	Semi Solid	Sweet orange peel essential oil	

Table 1. Organoleptic Tet Results for Balsam

Information:

FI: Blank in white

FII: Contains sweet orange peel essential oil with a concentration of 5%

FIII: Contains sweet orange peel essential oil with a concentration of 10%

FIV: Contains sweet orange peel essential oil with a concentration of 15%

3.2 Homogeneity of Preparations

The homogeneity test on balsam preparations with concentrations of FI, FII, FIII, and FIV did not contain coarse grains on the glass object, so that the balsam preparation was said to be homogeneous. The results of the homogeneity test can be seen in Table 2.

3.3 PH Determination

The pH results of aromatherapy balsam preparations were 6 for formulas I, II, and III. While formula IV, obtained pH 5. The results of the pH test of balsam preparations can be seen in the following Table 3:

3.4 Irritation Test on VOLUnteer's Skin

Based on the tests carried out, there was no irritation to the volunteers' skin. This can be seen in Table 4.

Formula	Homogeneity Test
0% formula	+
5% formula	+
10% formula	+
15% formula	+

Table 2. Test Results for Homogeneity of Balsam. Preparations

Information:

+ = Homogeneous (no coarse grain).

- = Not Homogeneous there are coarse grains).

Table 3. Data for pH Measurement of Balsam Preparations

Formula	Day 0	3rd day	7th day	Average pH
FI	6	6	6	6
FII	6	6	6	6
FIII	6	6	6	6
FIV	5	5	5	5

Information:

FI: Blank in white

FII: Contains sweet orange peel essential oil with a concentration of 5%

FIII: Contains sweet orange peel essential oil with a concentration of 10%

FIV: Contains sweet orange peel essential oil with a concentration of 15%

Obervation Formulation				
	0%	5%	10%	15%
Rash	-	-	-	-
Itchy rash	-	-	-	-
Rough skin	-	-	-	-
redness	-	-	-	-
Swollen	-	-	-	-

Table 4. Irritation Test Data on Volunteers' Skin

Information:

+ = Irritation Occurs.

- = No irritation.

3.5 Hedonic Test (Favorite Test)

The results of the hedonic test showed that the balsam preparation with the 15% formula was preferred by the respondents, as shown in Table 5.

4 Discussion

The formulations of balsam preparations were divided into 4 groups, namely balsam preparations with concentrations of sweet orange peel essential oil 0%, 5%, 10%, and 15%.

The tests carried out include:

4.1 Organoleptic Test

According to M. Anief, 1997, the parameters of good quality ointment are semi-solid dosage form, the ointment has a distinctive smell to the extract used, and the color is like the extract.

The results of the data obtained, organoleptic observations showed that the balsam preparation of sweet orange peel essential oil had a white color with a semi-solid texture, and a distinctive aroma of sweet orange peel.

4.2 Homogeneity Test

The homogeneity test was carried out visually and seen in the absence of separate particles and was carried out with the aim of seeing the active substance of the preparation made. (Aulton 1988 in Gultom 2019).

The four balsam preparations can be said to be homogeneous. This can be seen from the absence of lumps/coarse grains after the balsam preparation is applied to a piece of glass, the structure is even, and has a uniform color.

Respondent	Balsam Preparations					
	0% formula	5% formula	10% formula	15% formula		
Respondent 1	+	+	+	++		
Respondent 2	+	+	+	++		
Respondent 3	-	+	+	++		
Respondent 4	-	+	+	++		
Respondent 5	+	+	+	++		
Respondent 6	+	+	+	++		
Respondent 7	+	+	+	++		
Respondent 8	+	+	+	++		
Respondent 9	-	+	+	++		
Respondent 10	+	+	+	++		
Respondent 11	+	+	+	++		

Table 5. Hedonic Test Data

Information: ++ = Really like. + = Like. - = Don't like it.

-- = Dislike.

4.3 PH Test

The pH value that has been tested on the balsam preparation is in accordance with normal skin pH, so it is safe to use. Normal skin ranges between pH 4.5–6.5. A pH value that exceeds 7 is feared to cause skin irritation (Gozali 2009 in Rukmana 2017).

4.4 Irritation Test

Based on the results of the study, the four balsam preparations were safe to use because there were no side effects in each volunteer.

4.5 Hedonic Test

The formulation of 15% balsam preparation is preferred by volunteers/respondents. This is because this formula has a stronger aroma than other formulas3 respondents did not like balsam with a formula of 0%, because the aroma is the same as the smell of balsam in general.

5 Conclusions and Suggestions

5.1 Conclusion

Based on the results of the research that has been done, it can be concluded that:

- 1. Sweet orange peel essential oil can be formulated in balsam preparations with a pH of 6 at concentrations of 0%, 5%, and 10%, respectively. At a concentration of 15% obtained a pH of 5.
- 2. The preparation of sweet orange peel essential oil aromatherapy balm with a formula of 15% was preferred by volunteers/respondents because it contains more sweet orange peel essential oil so the aroma is stronger.

5.2 Suggestion

- 1. For Aufa Royhan University, it is hoped that this research can be used as material to add insight and knowledge for students about the Physical Formulation and Evaluation of Aromatherapy Balsam Preparations from Sweet Orange Peel.
- 2. For the community, it is recommended to be able to do/apply what has been done by researchers in overcoming and reducing the problem of sweet orange peel waste.
- 3. For further researchers, it is recommended to carry out further testing (with higher concentrations and longer time), and to make aromatherapy balm preparations from other variants of citrus or other natural ingredients that have a distinctive aroma.

References

- Alfianur, 2017. Identification of the Compounding Components of Sweet Orange Peel Essential Oil (*Citrus sinensis*. L) Origin Selorejo And Antibacterial Activity Test Using Paper Disc Method: (Thesis).
- Endarto O., Endri, 2016. Guidelines for Cultivating Healthy Oranges. Research Institute for Citrus Fruits and Subtropical Fruits (Balitjestro).
- Gultom, ER, 2019. Formulation of Gel Mask Preparations from Ethanol Extract of Sweet Orange Peel (*Citrus sinensis L*). (Essay).
- Iryani, A, S., Agustina, D., 2018. Production of Essential Oil from Kaffir Orange Peel (*Citrus histrix*) By Extraction Method.*Proceedings of the Research Results Seminar*: 159–161.
- Istianto Mizu, Muryati 2014. Research Institute for Tropical Fruits, Agricultural Research and Development Agency, Ministry of Agriculture.
- Kurniawan A., Chandra K., Nani I., Mudjijati, 2008. Extraction of Orange Peel Oil by Distillation, Pressing, and Laeching Methods. *WidyaTeknik*, 7(1):15–24.

37

- Lestari, D., Eva, V. 2019. Aromatherapy Candles From Sweet Orange Peel Essential Oil (*Citrus sinensis*).
- Rukmana W., 2017. Formulation and Physical Stability Test of Chinese Ketepeng Leaf Extract (*Cassia AlataL.*): (Thesis)
- Taukhit., Rudi, H. 2018. The Effect of Combination Therapy of Lavender Aromatherapy and Dhikr on Reducing Stress and Blood Pressure in Hypertensive Patients. *Journal of Nursing Notokusumo*, 6(1): 68–79.
- Triana Olas, 2019. Formulation and Physical Evaluation of Balm Preparations from White Ginger Essential Oil (*Zingiber officinale*).
- Tricintia, Y., Ivana, T., Agustina, DM 2017. The Effect of Giving Lavender Aromatherapy on Stress Levels in Undergoing OSC 6th Semester Students Batch 8 at STIKES Insan Asylum Banjarmasin.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (http://creativecommons.org/licenses/by-nc/4.0/), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

