SEKOLAH TINGGI ILMU KESEHATAN TELOGOREJO

Science and Community Pharmacy Journal
Volume 1 *Issue* 2 *Year* 2022 *Pages* 91-98
E–ISSN : 2830–6139 | DOI:
Web https://ojs.stikestelogorejo.ac.id/

The Effect of the Addition of Virgin Coconut Oil (Vco) on the Physical Stability of Carrot Sunscreen Preparations (Daucus carota L.)

Ummi Kalsum[1)]; Nadiya Nihlatunnaja[2)]; FirstcavAulia Rachma[3)]

1) ,2), 3) Program Studi S-1 Farmasi STIKES Telogorejo Semarang

*Correspondence to: *418031@stikestelogorejo.ac.id*

Abstract: UV rays have harmful side effects of free radicals, dry skin can reduce the body's defenses against the effects of free radicals, antioxidants have activity as a free antiradical, Carrots have antioxidant activity due to the presence of carotenoid compounds, Fatty acid content from VCO which has the function of softening and moisturizing the skin.This study aims to determine the effect of the addition of Virgin Coconut Oil (VCO) on physical stability in the formulation of carrot sunscreen cream preparations. As well as Knowing the effectiveness of antioxidants on carrot tubers. Research methods test the physical characteristics of the preparation (organoleptic, pH, homogeneity, adhesion and dispersion), Cycling test cream stability test and in the onewayanova test.The results of the study obtained the influence of the stability of oily texture and rancid odor in formula III (21%) and based on data analysis, the higher the concentration, the wider the distribution power of the preparation and the decrease in the adhesion of the preparation. Conclusion The addition of Virgin Coconut Oil (VCO) affects the stability of texture and smell in formula III (21%) and based on data analysis the addition of Virgin Coconut Oil (VCO) to carrot sunscreen cream (Daucus carota L.) the higher the concentration the wider the dispersal power of the preparation and the decrease in adhesion of the preparation.

Keywords: Carrot, VCO, Sunscreen, Cream, Cycling test

INTRODUCTION

The total ultraviolet light contained by solar radiation when it reaches the surface of the earth is UVA (90-99%) with a small amount of UVB (<10%) (Korać &; Khambholja, 2011). UVA is more efficient in causing darkening of pigment production of tanning erythema. UVA has significant side effects including immunosuppression, photoaging, eye damage, and skin cancer (Korać & Khambholja, 2011). Dry skin can reduce the performance of the body's defenses against infection and the effects of free radicals (Nova, 2012).

The effects of free radicals from UV rays can be prevented using antioxidant compounds. Antioxidants are antiradical compounds that can neutralize reactive free radicals into non-reactive which is relatively more stable so that it can protect cells from the harmful effects of free radicals (Soebagio et al., 2007). Carrots (Daucus carota L.) have sunscreen activity due to the presence of carotenoid compounds (Prasanth et al., 2020). The results of the antioxidant cream test containing 2% carrot extract were shown to have the greatest antioxidant effectiveness of 35.80% and after UVA irradiation had antioxidant activity of 35.06% (Ika, 2011).

The content of VCO fatty acids which has the function of softening and moisturizing the skin, increasing skin moisture and accelerating skin healing (Atmanto, 2019). The high consumer demand for a high-quality product at an affordable price and All in one, namely Protecting the skin from UV radiation, antiaging and wrinkle reduction, moisturizing and cooling effects on the skin (Korać & Khambholja, 2011).

Based on this description, so researchers are interested in conducting research to analyze the effectiveness of antioxidants and physical characteristics of carrot sunscreen preparations that have been added Virgin Coconut Oil (VCO) so that all in one sunscreen moisturizer cosmetic preparations with natural ingredients are carrots (Daucus carota L.) and Virgin Coconut Oil (VCO).

METHODS

Design of Research

This research is experimental study. This research was conducted at the Laboratory of pharmaceutical technology and pharmaceutical biology STIKES Telogorejo Semarang. This study was conducted to determine the effect of variations in the concentration of Virgin Coconut Oil (VCO) on the physical characteristics of carrot extract sunscreen cream preparations (Daucus Carota L.).

Carrot extraction (Daucus Carota L.)

From 4 kg of carrots, simplisia weighing 150 g was obtained, from 150 g of simplisia, 1.6 g of extract was obtained with a yield of 1.06% (Hasrawati, 2019). Carrot simplisia powder weighed 1 kg and then put in a maceration vessel and then macerated with n-hexane solvent with a ratio of 1: 5 (Anggraeni et al, 2020). Soaking is carried out for 84 hours, this time is the time of saturation of solvents to extract beta-carotene compounds (Sarindang, 2018), then re-maceration is carried out for 24 hours. Then the maserat results are concentrated using a rotary evaporator and continued with concentration in a vapor dish above the water bath then the yield is calculated.

Formulations sunscreen cream

The cream is made in three variations of Virgin Coconut Oil (VCO) concentrations. Made by melting the oil phase of stearate acid, cetyl alcohol, propyl paraben, methyl paraben, liquid paraffin and Virgin Coconut Oil (VCO) on a bath at 50oC In another container, make a water phase by dissolving methyl paraben and TEA in aquadest and heated to a temperature of 70oC. Carrot extract is put in a mortar and dissolved with glycerin. Then added the water phase little by little crushed until homogeneous, then added the oil phase little by little while grinding slowly until homogeneous. Then put in a container.

Table 1. Cream Formula Design

Bahan	Formula(%)		
	F1	F2	F3
Ekstrak wortel	2	2	2
VCO	7	14	21
Asam stearate	5	5	5
TEA	2	2	2
Tween 80	5	5	5
Span 80	5	5	5
Setil alcohol	2	2	2
Paraffin cair	20	20	20
Gliserin	2	2	2
Metil paraben	0,18	0,18	0,18
Propil paraben	0,02	0,02	0,02
Aquadest ad	100	100	100

Data Analysis

Univariate analysis

Univariate analysis in this study on the results of physical characteristics of carrot sunscreen preparations with VCO in the form of organoleptis data, homogeneity, pH, dispersion, adhesion and cycling test. The presentation of data can be a table

Bivariate analysis

Bivariate analysis in this study was to determine the effect of variations in the concentration of Virgin Coconut Oil (VCO) in carrot sunscreen preparations on the stability of the preparation. The stability test data obtained were analyzed using IBM SPSS Statistics 22 with the ANOVA one-way test.

RESULT AND DISCUSSION

Preparation of carrot extract (Daucus carota L.)

20 kg of fresh tubers are washed clean, then cut crosswise with a thickness of 1 cm, then drying is done by oven with a temperature of 50oC for 32 hours, then 1,249 g of dry simplisia is obtained, then grinding is carried out using a grinder until simplisia powder is obtained, simplisia powder is sifted with sieve number 40. The powder obtained is 1,823 g. Extraction is carried out by maceration method by weighing 1kg of simplisia powder then soaked using 5 L of n-Hexan for 84 hours because that time is the time of solvent saturation to extract beta-carotene compounds (Sarindang, 2018) with occasional stirring then remaceration for 24 hours to maximize the results of extraction. After obtaining maserat then concentrated using a Rotary Evaporator with a temperature of 50oC then concentrated again on a waterbath with a temperature of 50oC so that a thick extract of 19 g was obtained so that the yield obtained was 1.9%.

Formulations of sunscreen cream

The cream is made by successively melting the phases of stearic acid oil, cetyl alcohol, propyl paraben, liquid paraffin and Virgin Coocnut Oil (VCO) on a water bath at 50oC. in another container phase water by dissolving methyl paraben and TEA in aquadest and heated to a temperature of 50oC then added tween 80 and span 80. The extract is put into a mortar dissolved with glycerin then put the oil phase and water phase into the mortar while stirring slowly until homogeneous then the cream is put into a container (Rosmianti, 2018). In making sunscreen cream preparations, preparations are obtained that are too thin so that they are overcome by increasing the concentration of seil alcohol which originally used a concentration of 2% increased to 5%, this is because Methyl alcohol functions as a coating agent, emulsifying agent (2-5%) and stiffening agent (2-10%). In lotions, creams, and ointments cetyl alcohol is used for its emollient, water-absorbing and emulsifying properties (Rowe et al., 2009).

Making cream preparations with variations in concentration of Virgin Coconut Oil (VCO) aims to determine the effect of adding Virgin Coconut Oil (VCO) on the physical stability of the preparation. The test results on the ability to reduce skin moisture evaporation show that the higher the concentration of Virgin Coconut Oil (VCO), the greater the ability of the cream as a moisturizer to reduce skin moisture evaporation (Sasniwiati, 2011).The variation in the concentration of Virgin Coconut Oil (VCO) used is 7%, 14% and 21%.

Preparation Evaluation

Table 2. Organoleptis Test Results

Organoleptis	F I	F II	F III
Color	*orange*	*orange*	*orange*
Smell	typical carrot extract	typical carrot extract	typical carrot extract
Texture	Soft	Soft	Soft

From the results of organoleptic testing as a whole, the color of the resulting cream preparation is orange, has a characteristic smell of carrot extract with a soft texture. The test results can be seen in Table II.

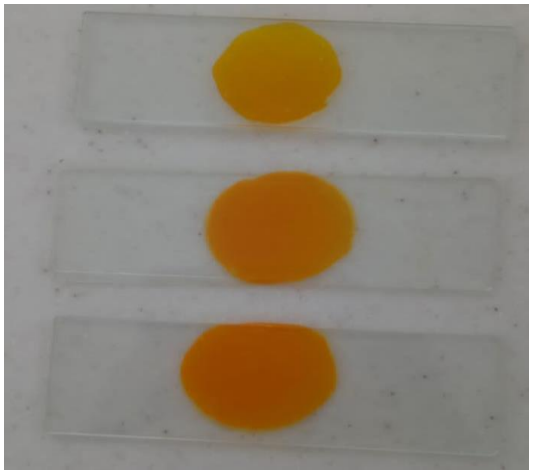

Figure 1. Homogeneity Test Results

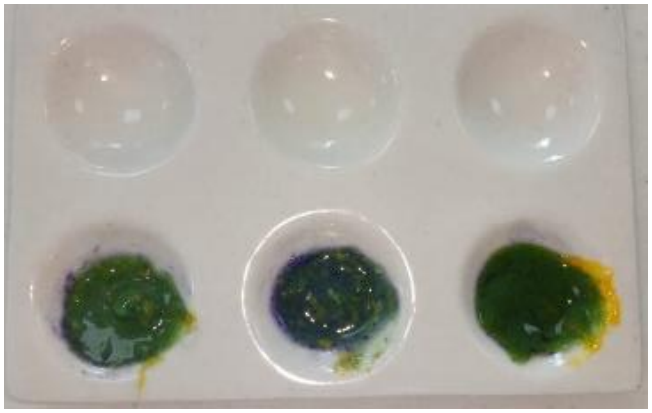

Figure 2. Cream Type Test Results

From the results of homogeneity testing by placing 0.2 g of cream preparation between glass objects then the preparation is observed and the preparation must show homogeneous and or no coarse grains are seen (Ida and Noer, 2012) the results obtained by the three homogeneous preparations are shown by the results of research that do not show the presence of particles in the preparation. The test results can be seen in Figure 1.

This test aims to determine the type of emulsion of the cream preparation made. This test is carried out by taking enough preparation then placed on a drop plate then added 1 drop of methylene blue indicator. If the blue color can be mixed evenly in the cream preparation, the cream is included in the oil in water type cream (M/A) (Saryanti et al., 2019). From the results of testing the type of cream from the three formulas, the results of oil in water (M/A) type cream preparations were obtained which were shown by the blue color results of methylene blue can be mixed evenly in the preparation. The results of the straining can be seen in Figure 2.

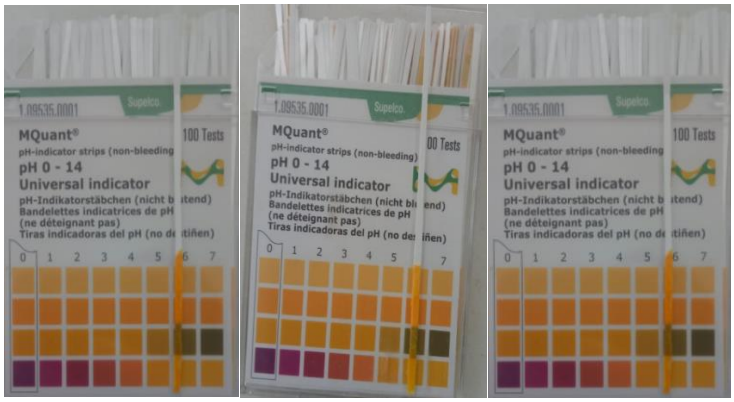

Figure 3. pH Test Results

This test aims to determine the safety of cream preparations when used on the skin so that it is safe and does not irritate the skin. With a good pH of cream preparations and in accordance with the pH of the skin is 4.5-6.5 (Edy et al., 2016). From the results of testing the pH of the three preparations, the pH of the preparation is 6, this shows that the pH of the three preparations is in accordance with the criteria**.**

Table 3. Dispersion test results

Burden	**Dispersion (cm)**		
	Formulation		
	I (7%)	**II (14%)**	**III (21%)**
0	3,6	3,6	4,3
50g	4,5	4,2	4,5
100g	5,2	5,3	5,2
150g	5,8	5,8	5,7
200g	6,5	6,2	6,2
Average	5,12	5,02	5,18
Bibliography	5-7 cm		
Conclusion	Meet	Meet	Meet

The criterion of a good spreadability diameter for topical preparations is about 5-7 cm (Astuti et al, 2010). From the results of dispersion testing in the three formulas, the average dispersion result is 5.12 in formula I (7%); 5.02 in formula II (14%) and 5.18 in formula III (21%), so it can be concluded that the dispersion power of the three preparations meets the criteria contained in the literature. The test results can be seen in Table III.

Table 4. Adhesion Test Results

Formula	**Adhesion (seconds)**	Bibliography	Conclusion
I (7%)	5,82	>4 seconds	Meet
II (14%)	5,35		Meet
III (21%)	5,13		Meet

A good adhesion requirement for topical preparations is more than 4 seconds (Wibowo, et al. 2017). From the results of the adhesion test on the three formulas, a result of 5.82 seconds was obtained in formula I (7%); 5.35 seconds in formula II (14%); and 5.13 seconds in formula III (21%). So it can be concluded that

the adhesion of the three preparations has met the criteria stated in the literature. The test results can be seen in Table IV.

Cream Stability Test (Cycling Test)

The method used in the stability test of cream preparations is the cycling test method. Where this test is done by storing the cream at ± 4oC and then at ± 40oC for 24 hours (one cycle). This test was carried out for 6 cycles, where each cycle observed physical changes in cream that occurred including organoleptic, homogeneity, pH, dispersion and adhesion (Suryani et al., 2017).

The results of organoleptis testing preparations in formula I (7%) and formula II (14%) showed no change in color, aroma and texture during 6 storage cycles, it can be concluded that the organoleptis of formula I (7%) and formula II (14%) are stable, but in formula III (21%) in cycles 3, 4, 5, and 6 there is a change in texture to be more oily and a slightly rancid aroma so that it can be concluded that organoleptis preparations from formula III (21%) are not stable.

Testing the stability of the preparation is carried out pH test of the preparation, this aims to determine the change in ph of the preparation during the storage period. The results of pH testing of the three cream formulations showed no change in the pH of the three preparations showing pH 6 for 6 storage cycles so that it can be concluded that the pH of the three formulations has good stability.

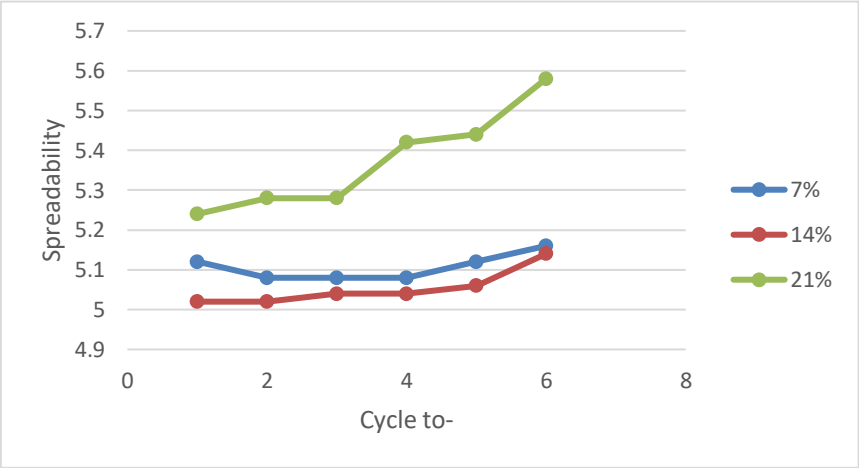

Figure 4. Spreadability Test

The test results of the dispersion of the three preparations during the cycling test have fluctuated, this shows that the storage temperature affects the distribution power of the preparations, but the dispersion of the three preparations still meets the dosage criteria listed in the literature, which is 5-7 cm (Astuti et al, 2010).

The measurement results were then analyzed using the IBM SPSS Statistics 22 application with the ANOVA one-way test. From the results of the dispersion test analysis in the normality test, the significancy value for each concentration group and storage cycle are all >0.05 so that it can be concluded that the data is normally distributed, it can be continued with the homogeneity test, a significancy value of 0.298>0.05 is obtained so that the data results are homogeneous. In the table of One Way Anova test results, a significancy value of 0.842 >0.05 was obtained in the One Way Anova test, the effect of storage cycles on dispersionso that it can be concluded that the storage cycle does not have a significant effect on the distribution power of the preparation in the table of One Way Anova test results obtained a significancy value of 0.000 <0.05 in the One Way Anova test the effect of Virgin Coconut Oil (VCO) concentration on the dispersion of preparations so that it can be concluded that the addition of Virgin Coconut Oil (VCO) concentration has a significant effect on the dispersion of preparations.

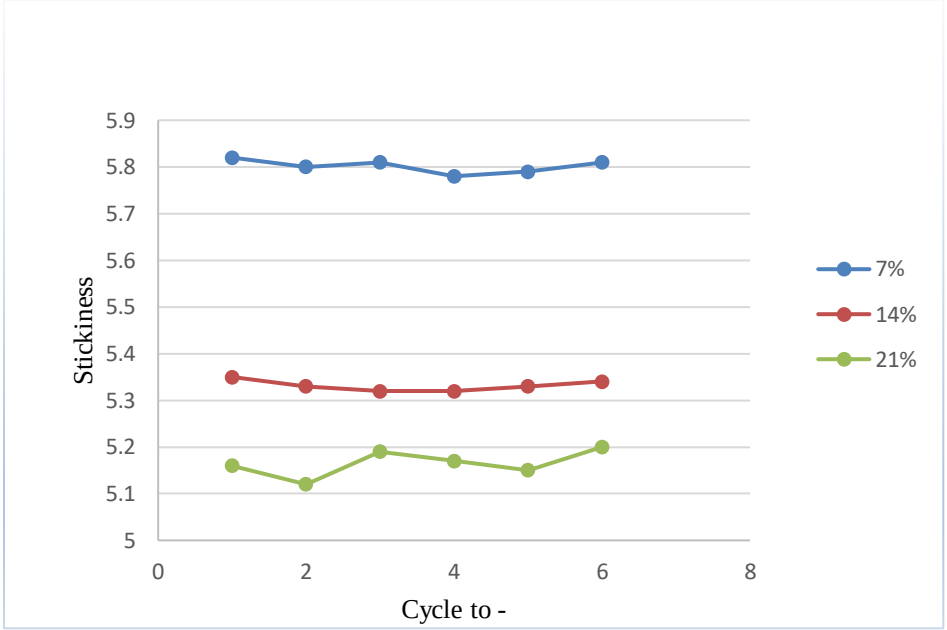

Figure 5. Stickiness Stability Test

The results of the adhesion of the three preparations during the cycling test have fluctuated, this shows that the storage temperature affects the adhesion of the preparation, but the adhesion of the three preparations still meets the dosage criteria listed in the literature, which is 2-300 seconds (Astuti et al, 2010).

The test results were then analyzed using the IBM SPSS Statistics 22 application with the ANOVA one-way test. Adhesion testing in the normality test obtained significancy values for each concentration group and storage cycles were all >0.05 so that it can be concluded that the data is normally distributed, it can be continued with the homogeneity test, a significancy value of 1.000 >0.05 is obtained so that the data results are homogeneous. In the table of One Way Anova test results, significancy values of 1,000 >0.05 were obtained in the One Way Anova test, the effect of storage cycles on dispersion so that it can be concluded that the storage cycle does not have a significant effect on the adhesion of preparations, in the table of One Way Anova test results, significancy values of 0.000 <0.05 were obtained in the One Way Anova test, the effect of Virgin Coconut Oil (VCO) concentration on the adhesion of preparations so it can be concluded that the addition of Virgin Coconut Oil (VCO) concentration has a significant effect on the adhesion of the preparation.

CONCLUSION

The addition of Virgin Coconut Oil (VCO) affects the stability of texture and odor in formula III (21%) and based on data analysis the addition of Virgin Coconut Oil (VCO) to carrot sunscreen cream (Daucus carota

L.) the higher the concentration, the wider the spreadability of the preparation and the decrease in adhesion of the preparation.

REFERENCES

Astuti I. Y., D. Hartanti, dan A. Aminiati. (2010). *Majalah Obat Tradisional*, 94-99.

Atmanto, D. (2019). *Effectiveness of utilizing VCO oil and castrol oil on natural creams for dry skin treatment due to environmental factors .4th annual science and engineering conference*.

Dr.Prasanth B, Amrutha Soman, Jobin Johnson, Parvathy S Narayanan, Amala P John. (2020). plants and phytoconstituents having sunscreen activity. *world journal of curent medical and pharmaceutical research*.

Edy Parwanto, Hardy Senjaya, Hosea Jaya Edy. (2016). FormulasiSalepAntibakteri Ekstrak Etanol Daun Tembelekan (*Lantana camara* L). *PHARMACON JurnalIlmiah Farmasi – UNSRAT Vol. 2 No. 03*, 104-107.

Ida, N., and Noer, S., F. (2012). Uji StabilitasFisik Gel Ekstrak Lidah Buaya (Aloe Vera L.). *Majalah Farmasi dan Farmakologi*, 79-84.

Maulina, I. d. (2011). uji stabilitasfisik dan aktivitasantioksidansediaankrim yang mengandungekstrakwortel (Daucus carota L.).

Radava R. Korać, Kapil M. Khambholja. (2011). Potential of herbs in skin protection from ultraviolet radiation.

Soebagio, B., Rusdiana, T dan Khairudin. (2007). Pembuatan Gel denganAqupec HV-505 dariekstrakumbibawangmerah (allium cepa L)sebagaiantioksidan.

Suryani, P. A. (2017). Formulasi dan Uji StabilitasSediaan Gel Ekstrak Terpurifikasi Daun Paliasa (Kleinhoviahospita L.) Yang BerefekAntioksidan. *JurnalImiah Farmasi, 6 (3)*, 157 – 16

Wibowo. S.A, Arif. B, Dwi. H. (2017). Formulasi dan Aktivitas Anti Jamur Sediaan Krim M/A Ekstrak EtanolBuahTakokak (Solanum torvum Swartz) terhadap Candida albicans. J. Riset Sains dan Teknologi (1)1.