

Anti-aging Activity of Cream Ethanol Extract of Ethyl Acetate Fraction of Purple Passion Fruit Peel (*Passiflora edulis Sims.*)

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Abstract: The purpose of this study was the anti-ageing activity test of ethanol extract cream ethyl acetate fraction of purple passion fruit peel. Purple passion fruit peel contains flavonoids that functions as antioxidants which has not been widely used as an anti-ageing ingredient. Creamy preparations are chosen because they have good skin penetration and are easily applied. The results showed that the ethyl acetate fraction of purple passion fruit peel ethanol extract can be formulated into a homogeneous cream with an oil-in-water emulsion type. pH 6.83-7.03, does not cause skin irritation and is stable in storage for 90 days room temperature. Ethanol extract cream of ethyl acetate fraction purple passion fruit peel 12.5% showed the best anti-ageing effectiveness with increasing water content by 95%, pore-shrinking by 63.84%, reducing stains by 60.85% and reducing wrinkles by 65.01%. This beneficial effect of flavonoids may be due to its antioxidant and anti-ageing properties.

1 INTRODUCTION

Aging is a natural process in human life. Aging closely related to various degenerative processes. The process of premature aging is characterized by the face usually seen wrinkle, dry and rough skin, patches of aging / pigmentation and skin elasticity decreases. In people who experience premature aging will be more susceptible to degenerative diseases (Moini H, 2002).

Sunlight is a major exogenous factor that can cause skin aging (photoaging), where excessive sun exposure can lead to various skin damage, because the photobiologic effects of UVA and UVB that cause free radicals will damage the structure of the skin and cause DNA damage and reduce the response immune. In addition, other external factors can increase free radicals such as x-rays, pollution, cigarettes, pesticides, smoking, alcoholic beverages, medicines and unbalanced nutrition and others (Ardhie, 2011).

Purple passion peel skin extract is antioxidant (Wong, at al., 2014). The purple passion fruit peel extract contains polyphenolic and flavanoid compounds (Ginting, at al., 2016). These antioxidants serve to prevent premature aging and maintain body vitality (Setiaji and Prayugo, 2006).

Based on the above points the authors are interested to conduct research on the formulation of anti-aging cream from ethanol extract of purple passion fruit ethyl acetate fraction (*Passiflora edulis sims*).

2 RESEARCH METHODS

2.1 Materials

The tools used: skin analyzer, porcelain mortar, stamfer, porcelain cup, glass tools, water bath, pH meter, and analytical balance. stearic acid, cetyl alcohol, vaseline, liquid paraffin, isopropyl palmitate, glycerine, triethanolamine, methyl paraben, perfume, distilled water, purple passion fruit peel extract (*Passiflora edulis sims*), methyl blue, acid pH buffer solution (pH 4.01), buffer solution of neutral pH (pH 7.01).

2.2 Formula

R/Stearic acid	15%
Cetyl alcohol	10%
Vaseline	10%

Mineral Oil		12%
Isopropyl palmitate		12%
Glycerin	5%	
Triethanolamine	1%	
Perfume		qs
Preservative		qs
Aquadest	ad	100%

The concentration of purple passion fruit peel extract used in the preparation of anti-aging cream is 2.5; 7.5; 10 and 12.5%

2.3 Procedure

Weighed material, separate the material into two groups: the oil phase and the water phase. The oil phase consists of stearic acid, cetyl alcohol, vaseline, paraffin, isopropyl palmitate melted on a water bath with a temperature of 70°C. The water phase comprising glycerin, triethanolamine and methyl paraben is dissolved in hot water that has been measured at a temperature of 70 ° C (mass II). Soaked mortar and pestle in hot water, then dry the mortar and pestle, insert the mass I into the mortar, then enter the mass II constant crushed to form a cream mass. After forming a mass of cream, added ethanol extract of purple passion fruit ethyl acetate fraction (*Passiflora edulis sims*), crushed homogenous. Added 3 drops of perfume, homogenized to form a mass of cream. The preparation was carried out in the same manner for all formulas with ethanol extract concentrations of different purple passion fruit ethyl fractions.

2.4 Inspection of Cream Preparations Homogeneity

As stated in Pharmacopoeia Indonesia (Ditjen POM., 1979).

2.5 Type of Emulsion

As stated in the Indonesian Cosmetics Formulary (Ditjen POM., 1985).

2.6 pH

Determination of pH of the preparation is done by using pH meter. The device was first calibrated by using a neutral pH buffer solution (pH 7.01) and an acid pH buffer solution (pH 4.01) until the apparatus showed the pH value. Then the electrode is washed with distilled water, then dried with tissue. The sample was prepared in 1% concentration which was weighed 1 gram of dosage and dissolved in 99 ml

distilled water. Then the electrode is immersed in the solution. Let the tool show the pH price to constant. The number indicated by pH meter is the pH of the preparation (Rawlins, 2002).

2.7 Stability

Cream formula was inserted into a plastic pot, stored at room temperature and measured stability parameters such as odor, color, and pH were evaluated for 12 weeks storage with observation every 2 weeks (National Health Surveillance Agency, 2005).

2.8 Viscosity

The viscosity of the cream preparation was determined by Viscometer Myr VR 3000.

Comparison of Dispersion Phase (PFD), divided into:

1. Low PFD a / m (m / a), if the PFD is smaller than 30%
2. PFD is a / m (m / a), if PFD 30-70%
3. High PFD a / m (m / a), if the PFD is greater than 74%

2.9 Anti-aging Activity

Anti-aging activity test using 18 volunteers and divided into 6 groups. All volunteers measured skin, measured early skin conditions include: water content, large pores, spot, wrinkles using a skin analyzer. After initial skin condition measurement, treatment begins with a cream smear evenly on the entire face, cream applied topically by the above-defined group, the application is done 2 times a day for 4 weeks. Skin condition changes were measured weekly for 4 weeks using a skin analyzer.

3 RESULTS AND DISCUSSION

3.1 Homogeneity

Homogeneity of anti-aging cream containing ethanolic extract of ethyl acetate fraction of purple passion fruit peel (*Passiflora edulis sims*) it was found that all cream preparations don't be found coarse grains. The results for homogeneity of blank cream, purple passion fruit peel extract cream 2.5%; 5%; 7.5%; 10% and 12.5%:

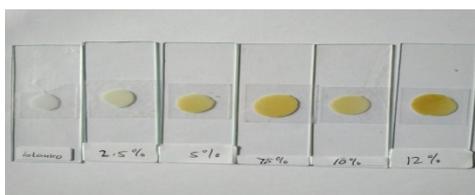


Figure 1: The results for homogeneity of blank cream; 2,5%; 5%; 7,5%; 10% and 12%.

3.2 Type of Emulsion

The determination of the emulsion type is done by staining the cream preparation by mixing the methyl blue into each of the created anti-aging creams, the methyl soluble blue when stirred, the type of emulsion in the cream preparation made is the type of oil-in-water emulsion.

Table 1: The result Solubility in methyl blue.

No	Formula	Solubility in methyl blue	
		Yes	No
1	F0	✓	–
2	F1	✓	–
3	F2	✓	–
4	F3	✓	–
5	F4	✓	–
6	F5	✓	–

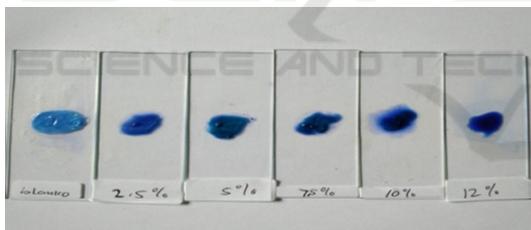


Figure 2: The results for homogeneity of blank cream; 2,5%; 5%; 7,5%; 10% and 12%.

3.3 Ph

Table 2: The result of pH.

F	Observation (Week)					
	0	1	2	3	4	12
0	7,67	7,50	7,20	7,03	7,10	7,10
1	7,30	7,23	7,03	7,07	7,17	7,03
2	7,43	7,33	7,17	7,30	7,27	7,03
3	7,20	7,30	7,27	7,17	7,10	7,10
4	7,13	7,20	7,17	7,07	7,10	7,03
5	6,7	6,87	6,83	6,77	6,77	6,83

The result of pH measurement of each formula shows that with increasing concentration of ethanol extract of purple passion fruit ethyl acetate fraction

(*Passiflora edulis sims*), the pH of the preparation is lower, but the change is still in standard pH requirement for cream preparation that is between pH 5-8 (Balsam, 1972).

3.4 Stability

Based on the results obtained, indicating that each of the formulas that have been observed for 90 days gives good results ie no change in color, odor and phase separation.

The stability of a pharmaceutical preparation can be seen from the presence or absence of discoloration and odor during storage. Such changes may occur if the ingredients contained in the preparation are oxidized. Emulsion preparations are said to be unstable if they are experiencing creaming and inversion.

3.5 Viscosity

The results cream formula has increased viscosity with increasing concentration of purple marker skin. Based on the dispersion phase (PFD) ratio, the purple markup skin cream extract here belongs to the moderate PFD ie the particles are still spherical and arranged regularly so there is still room for movement.

Table 3: The result of viscosity.

F	Rpm	Visk.	Temp.	Range
1	60	2370	27.3	10000
2	60	3010	27.2	10000
3	60	3190	27.4	10000
4	60	3460	27.3	10000
5	60	3463	27.4	10000
6	60	3462	27.4	10000

3.6 Anti-aging Activity

3.6.1 Increase Water Content

The results of the water content in Table show the initial conditions of skin water content of all groups of normal volunteers, the first week of treatment of water content conditions of the skin become more moist for treated skin with the formula 0, 1, 2, 3, 4, 5 (blanks and concentrations 2.5%; 5%; 7.5%; 10% and 12.5%). The best skin restoration is in a purple 12% purple skin cream crease because it can increase the water content better than other creams.

Table 4: The result of increase water content.

F	volunteer	Mouisture				
		0	I	II	III	IV
F0	1	22	24	27	29	30
	2	23	25	27	30	32
	3	23	24	26	28	29
		22,6	24,3	26,6	29	30,3
Mouisture increase 34,21 %						
F1	1	19	22	24	27	29
	2	20	22	25	28	30
	3	22	23	24	26	28
		20,3	22,3	24,3	27	29
Mouisture increase 42,85 %						
F2	1	19	23	25	29	31
	2	20	24	28	30	32
	3	17	20	25	28	30
		18,6	22,3	26	29	31
Mouisture increase 66,6 %						
F3	1	17	18	22	26	28
	2	13	14	19	24	27
	3	15	16	20	23	25
		15	16	20,3	24,3	26,6
Mouisture increase 77,3 %						
F4	1	17	17	22	27	30
	2	19	20	25	30	32
	3	13	15	20	25	32
		16,3	17,3	22,3	27,3	31,3
Mouisture increase 92,02 %						
F5	1	21	20	27	32	36
	2	18	19	25	33	40
	3	21	22	26	33	41
		20	20,3	26	32,6	39
Mouisture increase 95%						

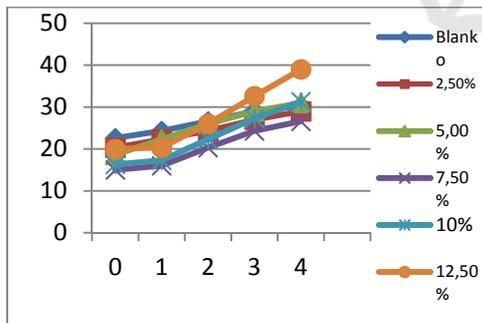


Figure 3: the graph of mouisture increase.

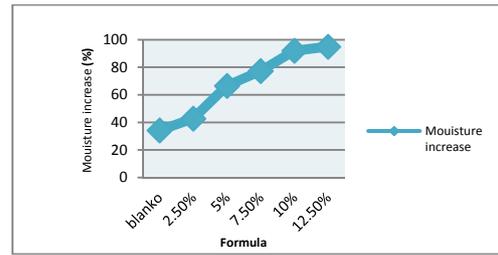


Figure 4: the graph of mouisture increase.

Flavonoids can increase extracellular collagen, which increases the moisture and elasticity of the skin (Reveny, 2016).

3.6.2 Pore

Table 5: The result of pore decrease.

For- mula	volunteer	Pore				
		0	Application (week)			
			I	II	III	IV
F0	1	34	34	36	36	36
	2	40	40	38	38	38
	3	35	37	37	38	40
		36,6	37	37	37,3	38
Pore decrease 8,38 %						
F1	1	42	40	40	40	39
	2	32	32	29	28	27
	3	29	27	24	26	24
		34,3	33	31	31,3	30
Pore decrease 13,33%						
F2	1	36	35	32	28	25
	2	28	24	22	21	15
	3	40	38	35	30	27
		34,6	32,3	29,6	26,3	22,3
Pore decrease 36,49%						
F3	1	40	39	34	30	29
	2	39	35	32	28	24
	3	35	31	26	24	19
		38	35	30,6	27,3	24
Pore decrease 37,22%						
F4	1	39	32	30	28	24
	2	32	25	23	14	11
	3	31	27	23	20	18
		34	28	25,3	20,6	17,6
Pore decrease 48,67%						
F5	1	31	25	20	17	11
	2	36	28	23	17	13
	3	38	32	23	17	14
		35	28,3	22	17	12,6
Pore decrease 63,84S%						

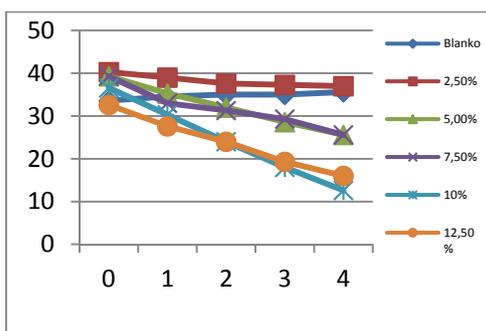


Figure 5: the graph of pore decrease.

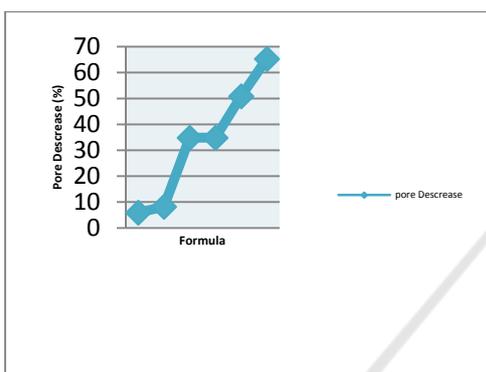


Figure 6: the graph of pore decrease.

In volunteers using cream with formula F4 (12.5%) had a higher pore increase than the formula F0, F1, F2, F3, and F5.

Spot

The results of the measurements can be seen in the Table:

Table 6: The result of spot decrease.

Formu- la	volunteer	Spot				
		0	Application (week)			
			I	II	III	IV
F0	1	32	31	31	30	30
	2	27	26	28	26	26
	3	32	32	32	33	34
		30,3	29,6	30,3	29,6	30
Spot decrease 5.4 %						
F1	1	25	25	27	28	31
	2	35	34	32	32	29
	3	31	29	32	29	27
		30,3	29,3	30,3	29,6	29,3
Spot decrease 18.01 %						
	1	38	35	34	31	29
	2	33	30	27	26	23
	3	48	45	43	35	28
		39,6	36,6	34,6	30,6	26,6

Spot decrease 31.88%						
F3	1	37	36	34	29	25
	2	32	31	27	25	18
	3	40	36	33	27	21
		36.3	34.3	31.3	27	21.3
Spot decrease 41.89 %						
F4	1	32	27	24	20	17
	2	33	30	28	20	18
	3	30	28	21	16	13
		31.6	28.3	24.3	18	16
Spot decrease 49.37 %						
F5	1	37	30	27	21	13
	2	37	33	27	20	14
	3	36	33	28	21	16
		36.6	33	27.3	20.3	14.3
Spot decrease 60.85 %						

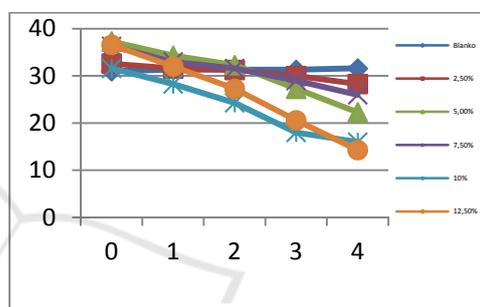


Figure 7: the graph of spot decrease.

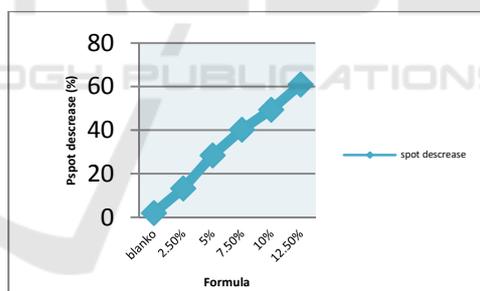


Figure 8: the graph of spot decrease.

After 4 weeks of anti-aging cream, spot spot measurements on the volunteers experienced spot reduction. Formula F4 is better at reducing spot on face compared with formula F0, F1, F2, F3 and F5.

Flavonoids have an effect as a competitive inhibitor that inhibits the enzyme tyrosinase that converts tyrosine into DOPA and Dopakuinon, thereby inhibiting the amount of increase of the melanocytes and melanin in the cell. Flavonoids also have antioxidant effects that serve to protect the skin from free radicals (Reveny, 2016).

3.6.3 Wrinkle

Wrinkle measurements were made using the moisture checker tool contained in the Aramo skin analyzer device. The results of the measurements contained in Table 4.6 show the initial conditions of wrinkles in all volunteer groups. The best skin restoration is in a 12% purple marker skin cream preparation because it reduces the amount of wrinkles better than the other creams.

Flavanoid as an antioxidant that is by inhibiting the increase in levels of MMP-1 (Matrix Metaloproteinase-1), which will lead to an increase in the amount of collagen. Flavanoids inhibit and prevent skin damage by free radicals caused by UV rays on the skin, by binding to single oxygen and inhibiting lipid peroxidation. With the occurrence of these obstacles MMP-1 synthesis will decrease and the collagen degradation process is inhibited so that the skin is protected from the aging process from UVB exposure (Reveny, 2016).

Table 7: The result of wrinkle decrease.

Formula	volunteer	Wrinkle				
		0	Application (week)			
			I	II	III	IV
F0	1	31	30	30	30	30
	2	32	31	32	32	32
	3	28	27	26	25	25
		30.3	29.3	29.3	29	29
	Wrinkle decrease 4.29%					
F1	1	31	31	30	29	29
	2	31	30	30	30	28
	3	29	27	28	26	24
		30.3	29.3	29.3	27.6	26.6
	Wrinkle decrease 12.2%					
F2	1	36	35	33	30	29
	2	39	37	31	29	27
	3	35	33	29	25	20
		36.6	35	31	28	25.3
	Wrinkle decrease 30.87%					
F3	1	33	31	29	24	19
	2	36	32	29	22	17
	3	33	28	24	21	19
		34	30.3	27.3	22.3	18.3
	Wrinkle decrease 46.17%					
F4	1	31	25	21	17	14
	2	35	29	27	21	17
	3	25	22	17	12	8
		32	27	22.6	19	16
	Wrinkle decrease 50 %					
F5	1	31	24	17	12	11
	2	32	28	22	19	12
	3	34	25	24	16	11
		32.3	25.6	21	15.6	11.3

Wrinkle decrease 65.01%

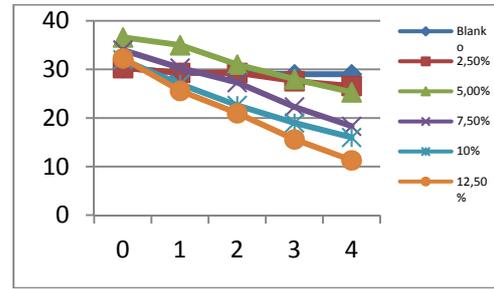


Figure 9: the graph of wrinkle decrease.

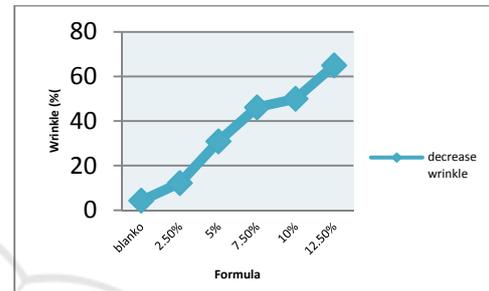


Figure 10: the graph of wrinkle decrease.

4 CONCLUSIONS

Purple passion fruit peel extracts can be formulated in homogeneous cream preparations with an oil-in-water emulsion type, pH 6.7-7.67; does not cause skin irritation and is stable in storage for 90 days at room temperature. 12.5% is the best anti-aging effectiveness makes the water content increase from dehydration to normal, diameter of pores from several large to normal, also reduces of spots from many spots to normal and for wrinkles initialed wrinkles become non-wrinkles.

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