Journal of Health Management and Pharmacy Exploration
https://shmpublisher.com/index.php/johmpe
p-ISSN: 2985-4814
e-ISSN: 2985-5543

Test on the effectiveness of the utilization of binahong leaf extract (*Anredera cordifolia* (Ten.) Steenis) as an anti-aging cream

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Article Info

Article history:

Received August 08, 2024
Revised August 23, 2024
Accepted August 29, 2024

Keywords:

Binahong leaves
Flavonoids
Anti-aging
Skin analyzer EH-900U

ABSTRACT

Binahong leaves (*Anredera cordifolia* (Ten.) Steenis) contain flavonoids, essential oils, saponins, alkaloids and steroids/terpenoids. Antioxidant compounds derived from flavonoid function as protection for the skin from direct exposure to sunlight. This research was conducted to determine the stability and physical quality characteristics of the binahong leaf extract cream preparation and the effectiveness of binahong leaf extract as an anti-aging agent. Binahong leaf powder was extracted using the maceration method using 96% ethanol solvent. Formulations of binahong leaf ethanol extract is based on a concentration ratio of 3% (F1), 5% (F2) and 10% (F3). The resulting cream is of the vanishing cream (O/A) type. The irritation test was carried out on the back of a rabbit test animal which had first been shaved. Testing the effectiveness of anti-aging cream on the skin was experimental, by inducing UV-A light using light from the Exoterra® daylight basking spot and followed by skin analysis of anti-aging parameters (moisture, skin elasticity and percentage (%) of collagen) using the Skin tool Analyzer EH-900U. Analysis used the paired t-Test, one way ANOVA and Tukey test methods to examine the comparative effectiveness of treatments F1, F2 and F3 as anti-aging creams. The results of the research show that the average stability and physical quality of all anti-aging cream preparations of binahong leaf extract (*Anredera cordifolia* (Ten.) Steenis) have good results and fall within the established standard requirements. The concentration of binahong leaf extract which has the greatest influence on anti-aging effectiveness of F3 (10%), has the best effect compared to other formulas which is characterized by an increase in the parameters of moisture is 19,05%, elasticity is 27,17% and percent (%) collagen is 20,77%.

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DOI: https://doi.org/10.52465/johmpe.v2i2.445

1. Introduction

Binahong plant (*Anredera cordifolia* (Ten.) Steenis) is a herbal plant that is used empirically for traditional medicine. Binahong plants contain flavonoid compounds, essential oils, saponins, alkaloids and steroids/terpenoids. In *"262 Tumbuhan Obat dan Khasiatnya"* [1], it is stated that the content of compounds contained in binahong plants has many uses, namely as antibacterial, antiviral, anti-inflammatory, analgesic and as antioxidants. The content of flavonoid compounds, which is the largest group of phenol compounds, can be efficacious as antioxidants.

Antioxidants play a role in protecting the damage of body cells from free radicals. Free radicals are one of the causes of the skin aging process that comes from exposure to the sun's UV rays. The free radicals produced by UV rays will have an impact on oxidation photo reproduction and isomerization photos. The oxidation photoreaction occurs due to the release of Reactive Oxygen Species (ROS) such as hydrogen peroxide (H2O2), superoxide anions (O2) and hydroxyl radicals (OH) by chromophores that absorb these UV rays [2].

According to Fidrianny et al. [3] Binahong leaf ethanol extract is able to increase collagen production and has antioxidant activity to inhibit collagen degradation through inhibition of ROS formation (reactive oxygen species) in inducing Metalloproteinase matrix (MMP). Research by Ni Kadek et al. [4] showed that binahong leaf extract has very strong antioxidant power, with an IC50 value of 40.27 ppm. In another study, binahong plants (Anredera cordifolia) Included in plants that have good antioxidant activity and as a raw material for skin whitening cosmetics. Septyowardani and Parmadi [5] says that binahong leaf ethanol extract has an SPF value (Sun Protection Factor) which is high and can be formulated in the form of sunscreen cream preparations.

The flavonoid content in binahong leaves works as an antidote to free radicals to protect the proteins or amino acids that make up collagen and elastin. Referring to research conducted by Septyowardani and Parmadi [5], so the researcher conducted this study to develop the potential antioxidant activity of binahong leaves as a compound that can be used as a anti-aging.

2. Method

2. 1. Tools and Materials

The tools used in this study are a set of maceration tools, analytical scales, waterbaths, sterling bidwells, pH meters, viscometers, round glass, adhesion test equipment, EH-900U skin analyzer. The main ingredient used in this study is binahong leaf ethanol extrac.

2. 2. How It Works

2.2.1. Manufacture of Binahong Leaf Powder

The sorted binahong leaves are then cleaned using running water to remove the attached impurities. After being completely clean, binahong leaves are dried using an oven at a temperature of 40-45oC and dried in the sun. Next, the dried binahong leaves are mashed with a blender and sifted using a mesh sieve no 40 to obtain a powder with a uniform degree of fineness.

2.2.2. Characterization of Binahong Leaf Powder

The characterization of binahong leaf powder was carried out including the determination of the drying shrinkage of the powder which was carried out using the gravimetric method and the chemical content test on binahong leaf powder using a tube test. Chemical content tests on powders include tests for alkaloids, saponins, tannins and flavonoids.

2.2.3. Preparation of Binahong Leaf Ethanol Extract

The manufacture of binahong leaf extract uses the maceration method. The binahong leaf powder used is 800 g with a screening solution of 96% ethanol. Research on ethanol content can be found in many previous studies [6]. Extraction is carried out for 3 days to obtain maserat which is then concentrated to obtain a thick extract.

2.2.4. Characterization of Binahong Leaf Extract

Characterization of binahong leaf extract includes determination of moisture content in binahong leaf extract by distillation method using the sterling-bidwell method. A total of 10 g of extract is put into a round pumpkin and then add a saturated toluene solvent (100:10).

2.2.5. Phytochemical Screening of Binahong Leaf Extract

Conducted to determine the compounds contained in binahong leaf extract, phytochemical screening in binahong leaf extract includes flavonoids, alkaloids, saponins, tannins and steroids/terpenoids using a tube test [7].

2.2.6. Preparation of Creams

The formula used refers to research conducted by Amin et al [8].

Table 1. Cream formulation of binahong leaf extract

Material	Uses	K-	F1	F2	F3
Binahong leaf extract	Active ingredients	-	3%	5%	10%
Stearic acid	Emulsion	8 g	8 g	8 g	8 g
Cetyl alcohol	Emumlsi	2 g	2 g	2 g	2 g
Paraffin liquid	Emulgator	20 g	20 g	20 g	20 g
Propyl paraben	Preservatives	0.02 g	0.02 g	0.02 g	0.02 g
Methyl paraben		0.02 g	0.02 g	0.02 g	0.02 g
Glycerine	Humectants	10 g	10 g	10 g	10 g
Tween 80	Surfactants	2 g	2 g	2 g	2 g
TEA	Emulsion	1 g	1 g	1 g	1 g
Aquades ad	Solvent	100	100	100	100

Weigh the ingredients needed according to the formula. The thick extract of binahong leaves is first dissolved using Tween 80. The manufacture of the cream base is carried out by dividing the ingredients into two phases, namely the oil phase and the water phase.

The oil phase consists of steric acid, cetyl alcohol, paraffin liquid and propyl paraben which are melted in a waterbath at a temperature of 70oC. And the water phase consisting of glycerin, methyl paraben, Tween 80, TEA and aquades is melted on a waterbath at a temperature of 70°C. Then the water phase is added to the oil phase slowly while being manually stirred constantly in an counterclockwise manner until homogeneous. Then the homogeneous cream base is mixed little by little with the thick extract of binahong leaves that has been dissolved with Tween 80, grinded ad homogeneous [8].

2.2.7. Physical Quality Test

The physical quality test carried out on the preparation of binahong leaf ethanol extract cream includes organoleptic testing, homogeneity, pH, viscosity, spreadability, adhesion, cream type testing and preparation stability testing.

2.2.8. Irritation Test

Irritation testing of the cream preparation of binahong leaf ethanol extract was carried out on the skin of test rabbits. Test animals that have been quarantined and adapted for 1 week, then free of hair on the back of the test animal by shaving. Observations on test animals were carried out with a time span of 24 hours, 48 hours and 72 hours. What is observed in this test is when erythema and edema occur on the skin of the test animal. The assessment of this irritation test uses scoring from the draize method [9]. The irritation test was continued on the skin of 20 volunteers by applying the cream in the morning behind the ears for 10 minutes, then observed the reactions caused including redness or itching on the part where the cream was applied.

2.2.9. Anti-aging Cream Test.

The test was carried out on the skin of 20 volunteers aged 18 to 25 years, who had filled out a questionnaire and were willing to volunteer for this study. The anti-aging parameters on the skin of the volunteers that will be observed and measured in this study include 3 parameters, namely moisture, elasticity and percent (%) of collagen using the EH-900U skin analyzer tool. The skin that will be observed in the photo with an electronic-tonic microscope for the skin, then the photos and skin data are entered into a PC device for analysis which then the results of the skin analysis will be displayed on the PC screen. Observation and measurement of the volunteers' skin were carried out before being UV induced and given treatment, after being induced by UV light and before being treated and after 14 days of treatment [9].

3. Result and Discussion

3.1. Results of Making Binahong Leaf Powder

The powder yield obtained from the ratio of dry weight to wet weight was obtained percent of 6.92%.

3.2. Results of Physical Examination of Binahong Leaf Powder

3.2.1. Examination of Powder Organoleptits

It can be concluded that binahong leaf powder has a form in the form of a fine powder, green in color, a distinctive smell and has a patty taste. This result is in accordance with research conducted by [10] who said that binahong leaf powder organoleptis has a dark green fine powder texture with a distinctive smell and tastes bitter.

3.2.2. Determination of Powder Drying Shrinkage

Table 2. Results of determination of drying shrinkage of binahong leaf powder

Replication	Powder weight (g)	Yield (% w/b)
1	2	9,94
2	2	8,22
3	2	18,53
Average±Elementary		12.23±4.50

The average result of drying of binahong leaf powder is 12.23%, where the requirement for drying of binahong leaf powder according to the Ministry of Health is less than 10%. The factor that affects the spike in the drying yield of binahong leaf powder is the drying time that is too long, causing high yields.

3.3.3. Powder Chemical Content Test Results

Table 3. Results of chemical resistance test of binahong leaf powder

Compound	Identification results	Book	Result
Alkaloids	Blackish-brown deposits	Ministry of Health of the Republic of Indonesia, 1980	+
Saponins	Fixed foam formed	Ministry of Health of the Republic of Indonesia, 1980	+
Tannins	A blackish-blue color is formed	Literary *et al*, 2013	+
Flavonoids	Orange color formed	Ministry of Health of the Republic of Indonesia, 1979	+

Information:
(+) = positive results
(-) = negative result

3.3. Results of Maceration of Binahong Leaf Extract

The yield obtained by comparing the weight of the extracted extract produced with the weight of the powder used, so that the result obtained was 22.25%. The percentage of yield obtained is not less than 11.9%, the higher the yield obtained, the more efficient the extraction process is carried out.

3.4. Results of Determination of Water Content of Binahong Leaf Extract

Table 4. Results of determination of water content of binahong leaf extract

Replication	Sample weight (g)	Yield (mL)	Yield (% b/v)
1	10	0,5	5
2	10	0,4	4
3	10	0,8	8
Average±Elementary			5.6±1.69

The average result of the moisture content of binahong leaf extract in Table 7 is 5.6%, this result shows that the percentage of moisture content of the extract meets the requirements set by FHI, which is no more than 8.9%. The determination of moisture content is carried out to avoid contamination of the sample, if the moisture content obtained exceeds the set conditions, it can facilitate the growth of fungus/mold in the extract so that it can reduce the activity of the extract.

3.5. Results of Phytochemical Screening of Binahong Leaf Extract

Table 5. Results of phytochemical screening of binahong leaf extract

Compound	Identification results	Book	Result
Flavonoids	Formed red-brown color	Surbakti *et al*, 2018	+
Alkaloids	White precipitate (*mayer*) Red-orange deposits (*dragendorff*) Chocolate precipitate (*wagner*)	Surbakti *et al*, 2018	+
Saponins	1 cm high stable foam	Surbakti *et al*, 2018	+
Tannins	A blackish-blue color is formed	Surbakti *et al*, 2018	+
Steroids/Terpenoids	Red color (terpenoids) formed	Surbakti *et al*, 2018	+

Information:
(+) = positive results
(-) = negative result

3.6. Results of The Formula of Bianahong Leaf Ethanol Extract Cream

Binahong leaf extract cream

3.7. Results of The Physical Quality Test of The Cream

3.7.1. Results of Organoleptic Tests

Table 6. Organoleptus test results

Formula	Test results			
	Shape	Color	Smell	Consistency
K-	Semi-solid	Milk white	Distinctive	Thick
F1 3%	Semi-solid	Light green	Typical binahong leaf extract	Thick
F2 5%	Semi-solid	Dark green	Typical binahong leaf extract	Thick
F3 10%	Semi-solid	Blackish green	Typical binahong leaf extract	Thick

The organoleptic examination that can be observed in Table 6 is the observation of no changes in the shape, color, odor and consistency of the preparation. These results show that the preparation of binahong leaf ethanol extract cream (Anredera cordifolia (Name.) Steenis) can maintain stability during storage time. The difference in cream color is caused by the use of 3 different concentrations so that the higher the concentration of the extract used, the more concentrated the cream color produced.

3.7.2. Homogeneity Test Results

Table 7. Homogeneity test results

Formula	Result
K-	Homogeneous
F1 3%	Homogeneous

F2 5%	Homogeneous
F3 10%	Homogeneous

The test results in Table 7 are homogeneous. The results obtained show that the boundaries of the cream preparation manufacturing process are good, all ingredients can be mixed evenly and there are no coarse grains on the glass Object Glass So that the cream can be declared homogeneous and it is believed that the ingredients used will be evenly distributed throughout and are expected to make a big difference.

3.7.3. pH Test Results

Table 8. pH test results

Formula	Average pH ± SD results	
	Day 1st	Day 30st
K-	6.64 ± 0.05	5 ± 0.81
F1 3%	6.53 ± 0.22	5 ± 0.81
F2 5%	6.45 ± 0.21	5 ± 0.81
F3 10%	6.53 ± 0.16	6 ± 0.81

pH value of binahong leaf ethanol extract cream preparation (Anredera cordifolia (Name.) Steenis) on the 1st to 30th day has met the ideal pH value of topical preparations, which is 4.5-6.6 [9]. This result can be categorized as a neutral pH because it is in a range of approximately 6, thus proving that the cream made is suitable for use on the skin because it will not make the skin rash, irritated or dry. The pH test was carried out on the 1st day using a pH meter while on the 30th day the test used a pH stick, so there was a slight difference in the acquisition of cream pH result data. There are several factors that can affect the results of pH testing, one of which is the room temperature and the time the pH test is carried out on each cream preparation.

The decrease in pH value on the 30th day is caused by the release of ions such as hydrogen in the cream preparation, causing hydrogen ionization in the composition of the cream and causing the pH of the cream to decrease.

3.7.4. Viscosity Test Results

Table 9. Viscosity test results

Formula	Average viscosity (cP) result ± SD	
	Day 1st	Day 30st
K-	47,533 ± 12.19	44,733 ± 16.80
F1 3%	27,533 ± 11.89	26.066 ± 11.08
F2 5%	32,700 ± 6.56	29,666 ± 8.95
F3 10%	32,566 ± 6.28	30,600 ± 6.22

The viscosity results that can be seen in table 9 show that the addition of the extract causes an increase in viscosity, this is because the active substance used is in the form of a thick extract so that it has sticky characteristics, but with storage for 30 days at room temperature, the viscosity actually decreases. The viscosity results obtained in the preparation of the cream of ethanol extract of binahong leaves (Anredera cordifolia (Ten.) Steenis) has met the requirements for a good cream viscosity range ranging from 2000-50,000 cP [11]. The factor that affects the difference in viscosity values on the 1st day viscosity test is the temperature of the time space when the test is carried out. The reduced

viscosity value at the time of storage can be caused by inappropriate cream capacity conditions such as inadequate closure of the cream container and environmental conditions so that it is suspected to be the cause of the decrease in the viscosity of the cream.

3.7.5. Spread Power Test Results

Table 10. Spread test results

Time	Load (grams)	Average result of diameter (cm) ± SD			
		K-	F1 3%	F2 5%	F3 10%
Day 1st	0	3.4 ± 0.08	3.8 ± 0.04	3.9 ± 0.08	3.7 ± 0.13
	50	3.7 ± 0.09	4.4 ± 0.12	4.3 ± 0.16	4.7 ± 0.14
	150	4.2 ± 0.04	4.9 ± 0.04	4.9 ± 0.12	5.3 ± 0.13
Day 30st	0	3.5 ± 0.09	4.1 ± 0.05	4.3 ± 0.17	3.8 ± 0.19
	50	3.9 ± 0.09	4.5 ± 0.12	4.6 ± 0.13	4.4 ± 0.12
	150	4.4 ± 0.08	5.2 ± 0.05	5.1 ± 0.8	5.1 ± 0.32

The results of the spreadability test in table 10, show that all cream formulas have a relatively increased spreadability with the addition of load, and all cream formulas have met the requirements of good spreadability, which is evenly distributed with a diameter of 5 to 7 cm. The difference in the results obtained in each cream spread test is due to the difference in the weighing of the cream that will be carried out the spread test.

These results also show that the increase in dispersion is also influenced by the addition of extracts, because the increase in the number of extracts causes the preparation to become thicker and produce a smaller spread. The shrinkage during the 30-day storage period can also be an important factor in the thickening of the preparation so that it causes a decrease in spreadability, but the liquid comes out of the cream base when there is cheating during the 30-day storage period so that the preparation seems to have a larger spread.

3.7.6. Adhesion Test Results

Table 11. Adhesion test results

Formula	Average results of adhesion ± elementary school	
	Day 1st	Day 30st
K-	1.70 ± 0.15	1.53 ± 0.11
F1 3%	1.41 ± 0.06	1.18 ± 0.13
F2 5%	1.52 ± 0.05	1.16 ± 0.07
F3 10%	1.53 ± 0.07	1.19 ± 0.07

The results of the adhesion test in Table 11, show that all cream formulas have good adhesion and are in accordance with the standard of good topical preparation adhesion time, which can stick for more than 1 second. The increase in the adhesion ability of the cream is closely related to the addition of the extract concentration, the more the concentration of the extract is used, the thicker the cream will also be produced and will make the cream sticker. Shrinkage that occurs during the 30-day storage period can be caused by the release of liquid from the cream base when there is clamping, so that the cream preparation experiences a decrease in viscosity and seems to have a decrease in adhesion.

3.7.7. Cream Type Test Results

Table 12. Cream type test results

Formula	Test results
K-	Blue color dispersed throughout the cream
F1 3%	Blue color dispersed throughout the cream
F2 5%	Blue color dispersed throughout the cream
F3 10%	Blue color dispersed throughout the cream

The results of the cream type test that has been carried out can be seen in table 12 that each formula made has a type of oil cream in water (M/A). This is evidenced by the preparation of the cream that is homogeneously dispersed in the dye Methyl Blue. The advantage of type cream preparations (M/A) is that they are easier to clean with water, evaporation and increase the concentration of the preparation so that it is expected that cream preparations applied to the skin can easily absorb into the skin tissue and cause maximum effects when applied to the skin.

3.7.8. Cream Stability Test Results

Table 13. Stability test results

Formula	Day 1			Day 30		
	Cold temperatures	Room temperature	Hot temperature	Cold temperatures	Room temperature	Hot temperature
K-	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Smells rancid
F1 3%	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Smells rancid, the separation phase
F2 5%	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Smells rancid, the separation phase
F3 10%	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Smells rancid, the separation phase

Organoleptical observations on the 1st to 30st day carried out at cold temperature and room temperature were obtained test results at cold temperatures, respectively, there were no significant changes in the cream preparation, including color, odor, texture and consistency of the preparation. At room temperature, the cream preparation also did not change including the color, smell, texture and consistency of the preparation, while at the hot temperature the cream preparation experienced significant changes where the observation results showed that the cream preparation stored at hot temperature experienced a change in color to become more concentrated, the smell of the preparation became rancid, the texture of the preparation became a little thinner and phase separation occurred. The results of this organoleptic observation show that cream preparations stored at hot temperatures are significantly unstable compared to cream preparations stored at cold and room temperature, this is influenced by extreme heat generated from direct sunlight which can damage the stability of the ingredients and active substances used in

cream preparations so that it causes an increase in acidity and decreases antioxidant activity in cream preparations [12].

3.8 Results of Irritation Test of Cream Preparations

The principle of irritation testing is the application of formulation products on the skin of test animals whose hair is first shaved and then scored from skin reactions (erythema and edema). The degree of irritation was assessed at 24-hour, 48-hour and 72-hour time intervals after application of the test preparation on the backs of test animals. This test is carried out to assess and evaluate the characteristics of test preparations when exposed to the skin (BPOM, 2014). Observation of irritation that occurs in the skin of test animals and volunteer skin physiologically uses scoring from the Draize method.

The test results showed that there was no irritation caused by the use of the cream preparation on the back skin of the test animals observed at 24 hours, 48 hours and 72 hours time intervals, and the cream preparation also did not cause irritation to the skin of the volunteers after being applied to the back of the volunteers' ears for 10 minutes.

3.9 Results of The Effectiveness Test of Anti-Aging Cream of Binahong Leaf Extract

The test of the anti-aging cream began by measuring the initial condition of the skin and after using the cream for 14 days using the EH-900U skin analyzer against three parameters, namely moisture, elasticity and percent (%) collagen.

Table 14. Moisture content results

Formula	Average skin moisture level		
	Initial conditions	Day 14 use	Increased moisture content (%)
K-	53.00 ± 4.83	60.50 ±5.44	12.40 ± 0.06
F1 3%	52.25 ± 13.07	53.00 ± 4.83	10.42 ± 0.26
F2 5%	39.25 ± 2.98	46.50 ± 3.87	15.59 ± 0.02
F3 10%	46.75 ± 3.50	57.75 ± 5.56	19.05 ± 0.05
K+	50.25 ± 3.77	59.00 ± 8.98	14.83 ± 0.09

Notification : There is no significant difference between the formulas

The results of the observation of humidity parameters showed that F3 experienced the highest increase, which was 19.05%. This is influenced by the increase in the amount of extract concentration by 10%, thus causing an increase in the content of flavonoids which have an important role in maintaining skin moisture.

Table 15. Elasticity level results

Formula	Average skin elasticity level		
	Initial conditions	Day 14 use	Increase in elasticity (%)
K-	35.25 ± 9.60	49.25 ± 4.78	28.43 ± 0.25
F1 3%	37.75 ± 8.18	40.25 ± 8.93	6.21 ± 0.13
F2 5%	37.75 ± 6.13	46.25 ± 2.75	18.38 ± 0.12
F3 10%	33.50 ± 4.20	46.00 ± 9.05	27.17 ± 0.08
K+	31.75 ± 5.37	47.50 ± 5.91	33.16 ± 0.20

Notification : There is no significant difference between the formulas

The results of the observation of elasticity parameters showed that among the three formula concentrations, F3 showed the highest percentage increase in elasticity level of 27.17%.

Table 16. Collagen percent (%) results

Formula	Average skin collagen content (%)		
	Initial conditions	Day 14 use	Increase in collagen levels (%)
K-	26.00 ± 2.00	28.50 ± 6.35	8.77 ± 0.19
F1 3%	35.75 ± 8.38	38.25 ± 8.05	6.54 ± 0.14
F2 5%	29.00 ± 6.16	35.25 ± 8.18	17.73 ± 0.12
F3 10%	25.75 ± 1.86	32.50 ± 4.50	20.77 ± 0.11
K+	28.50 ± 4.04	41.25 ± 4.78	30.91 ± 0.15

Notification : There is no significant difference between the formulas

Observations made after the surface of the probandus skin induced by UV light experienced a decrease in elasticity and skin collagen levels, this is in accordance with research conducted by Kintoko and Pratama [13] which explained that this condition is influenced by UV radiation which is able to increase the regulation of protein activator 1 and the expression of matrix metalloproteinase (MMP) in dermal fibroblasts, which then induces the process of collagen degradation [14], [13]. The results of the observation of the percentage (%) collagen content parameter showed that among the three variations in the concentration of the preparation formula, the highest increase occurred in F3 by 20.77%.

According to research conducted by Fan et al. [15] said that flavonoids have appropriate anti-aging activity. Anti-aging flavonoids are divided into serolytic flavonoids, seromorphic flavonoids and anti-aging activities. The anti-aging activity obtained from routine flavonoids in the flavonol subclass is a natural glycoside compound that has shown a wide range of anti-aging effects, for which routine administration reduces the expression of ROS (reactive oxygen species) and is the most powerful radical cleaner. Based on the research of Souhoka et al. [16] in vitro tests conducted on human dermal fibrioblast cultures, binahong leaf ethanol extract works by inhibiting collagenase and elastase, lowering the regulation of protein expression and messanger MMP-1 RNA (mRNA) and increase pro-collagen production to address wrinkles and other signs of aging [13]. The test of anti-aging cream of binahong leaf extract against the parameters of moisture, elasticity and percent (%) of collagen that can be observed in each table showed that formula 3 had the highest average value among the three variations in concentration of other formulations, data on the increase of anti-aging parameters Statistical analysis was carried out and the results obtained showed that there was no significant difference ($P < 0.05$) in the variation in the concentration of the cream formula. This is a weakness because the tests carried out on the initial condition of probable skin that have not been treated and analyzed with the EH-900U skin analyzer tool on each anti-aging paramater obtained significant data ($p < 0.05$), this is due to different conditions and health categories of probable skin. The results obtained are biased so that it needs to be controlled for the grouping of probandus skin health categories before being given treatment. In addition to the weakness in the analysis of the initial condition of the proband skin, the anti-aging cream test conducted for 14 days obtained quite good results characterized by an increase in moisture, elasticity and percent (%) of skin collagen. Research conducted by [17] stated that binahong leaf extract can be formulated as an anti-aging agent and the highest

concentration (0.5%) shows the best anti-aging effect, it is in accordance with the results obtained in this study that F3 with a concentration of 10% can provide results in increasing anti-aging parametersthe best and highest. The results obtained in this study have not been maximized due to the very short testing time, according to research by Putri and Suhartinah [9] stated that the best testing time to determine the effectiveness of anti-aging preparations is 30 days with observations made every week. In this test, the researcher conducted research for only 14 days so that the results obtained were not optimal.

4. Conclusion

Based on the results of the research that has been carried out, it can be concluded that the ethanol extract of binahong leaves (*Anredera cordifolia* (Ten.) Steenis) can be made into anti-aging cream preparations that have good physical quality characteristics and stability of the preparation and meet the requirements standards. Anti-aging cream preparations of binahong leaf ethanol extract have the potential as an anti-aging effect on the skin and formula 3 (10%) has the best effect as an anti-aging.

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