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Research Article

Testing the Effectiveness of Anti-Aging Cream Preparations with Snakefish Extract (Channa Striata)

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ABSTRACT

Background: Skin aging is caused by dry, rough, scaly, less elastic skin with wrinkles and fold lines. Snakehead fish extract has high antioxidant activity so it can be used as an active ingredient in *anti-aging cosmetics*. **Objective:** The aim of this research was to see the effectiveness of snakehead fish extract cream as *an anti-aging agent*. **Methods:** This research method includes formulating snakehead fish extract cream preparations with various concentrations including: 2.5% (F1), 5% (F2), 7.5% (F3), 10% (F4), evaluating the physical preparations in the form of: organoleptic test, homogeneity test, pH test, stability test, irritation test on volunteer skin, and *anti-aging effectiveness test* on volunteer skin for 4 weeks with 3 parameter tests, namely water content, pores and wrinkles. **Results:** The results of the study showed that there were changes that occurred in the volunteers as seen in the measurements of water content, pores and wrinkles on the volunteers' faces. A good increase in changes was found in the F4 formula (10%) in the wrinkle parameter test, namely 26.80%. The number of wrinkles in volunteers from some wrinkles to few wrinkles. The conclusion of this research shows that snakehead fish extract (*Channa striata*) can be formulated in the form of a homogeneous cream dosage with a pH of 5.8 – 6.7, and is stable when stored for 12 weeks at room temperature and does not cause skin irritation. **Conclusions:** There are differences in the results of each concentration of snakehead fish extract cream in influencing *anti-aging effectiveness*. The best concentration of 10% snakehead fish extract showed better results compared to other creams in reducing the number of wrinkles on volunteers' facial skin.

Keywords: Snakehead Fish Extract, Formula, Anti-Aging Cream.

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INTRODUCTION

The skin is a "blanket" that covers the surface of the body and has the main function of protecting it from various external disturbances and stimuli. This protective function occurs through a number of biological mechanisms, such as continuous formation of the horny layer (keratinization and shedding of dead cells), respiration and regulation of body temperature, production of sebum and sweat and formation of melanin pigment to protect the skin from the dangers of the sun's ultraviolet rays. , as touch and feel, as well as defense against external pressure and infection[1,2]

The aging process is a physiological process and occurs in all organs of the human body, including the skin. Various theories of the aging process have been put forward by experts, one of which is the free radical theory. Nowadays, the free radical theory is more widely believed to be a mechanism for the aging process. Free radicals are a group of elements in the body that have unpaired electrons so they are unstable and reactive[3,4]. Before having a partner, free radicals will continuously attack body cells in order to get their partner, including attacking normal body cells. As a result, cells will be damaged and aged and also accelerate the emergence of cancer. Various efforts to overcome aging skin are currently aimed at binding or breaking down free radicals. Ingredients that can neutralize free radicals are called antioxidants[5,6].

Free radicals are formed not only naturally through the body's biological systems, but also from the environment. External factors include ultraviolet rays from the sun between 10.00–15.00, cigarette and factory smoke pollution, motor vehicle emissions and alcohol consumption[7].

Snakehead fish contains the amino acids glutamine, cysteine, glycine, arginine, valine, isoleucine, tyrosine, alanine, aspartic acid which are precursors of the antioxidant glutathione (GSH). Snakehead fish is known as a food ingredient with a potential source of albumin[8,9]. Albumin can function as an antioxidant. Albumin has many Sulfhydryl Groups (-SH) which function as free radical scavengers so that they play a role in the process of cleaning and capturing ROS[10,11].

One form of cosmetic preparation that is often used is cream. Cream is a semi-solid preparation in the form of a thick emulsion containing not less than 60% water and is intended for external use[12,13,14].

METHOD

The tools used in this research were glassware, the materials used in this research were snakehead fish *(Channa striata) albumin extract* , stearic acid, cetyl alcohol, vaseline, liquid paraffin, isopropyl palmitate, glycerin, tritanolamine, methyl paraben, perfume, Distilled water is also an ingredient for testing the pH of preparations, namely an acidic pH buffer solution (4.01) and a neutral pH buffer solution (7.01) and 96% ethanol. The tools used are glassware, pH meter, skin analyzer, and others.

The research began by making anti-aging cream preparations using snakehead fish extract with

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concentrations of 2.5%, 5%, 7.5% and 10%. Next, an evaluation of the cream preparation was carried out, including: organoleptic test, homogeneity test, pH test, preparation stability test, irritation test. Then, an anti-aging cream effectiveness test was carried out by checking the water content (moisture), pore size and wrinkles. This research was carried out at the Chemistry Laboratory and Pharmacy Laboratory at Aufa Royhan University in Padangsidimpuan City.

RESULTS AND DISCUSSION

Homogeneity Test Results

Cream preparations with the addition of snakehead fish extract of 2.5%, 5%, 7.5% and 10% are white in color. DrwSkincare blank cream and comparison cream are also white. From the homogeneity test carried out on cream preparations with concentrations of 2.5%, 5%, 7.5% and 10%, all cream preparations are mixed evenly, there are no coarse grains on the glass object, so the cream preparation is said to be homogeneous [13,2]. The results of the homogeneity test can be seen in Figure 1.

Preparation pH Test Results

The results of determining the pH value of the cream preparation were obtained between 5.8 - 6.7. From the results of observing the pH value of the preparation when it was finished, it was found that the F0 cream: 6.7; F1 cream: 6.5; F2 cream: 6.4; F3 cream: 6.2; and F4 cream: 6.0, whereas after storage for 12 weeks there was a change in pH in each preparation, namely F0; 6.7; F1: 6.3; F2 cream: 6.2; F3 cream: 6.0; and F4 cream: 5.8, a slight decrease compared to the pH when finished. The pH test results can be seen in table 1.

In all cream formulations, it decreased but was still within normal skin pH limits, namely 4.5-6.5. If the pH of the cream is too alkaline it will cause scaly skin, while the pH is too acidic and can cause skin irritation[15]. Based on the data above, it can be seen that the more concentration of snakehead fish extract added to the cream preparation, the more the pH decreases. This is because the pH of the extract is acidic, namely 3.0 - 3.2.

Stability Test Results

The results of stability observations for 12 weeks were carried out by observing changes that occurred in the cream preparation starting from the dosage form, odor and color. Results can be seen in Table 2 below.

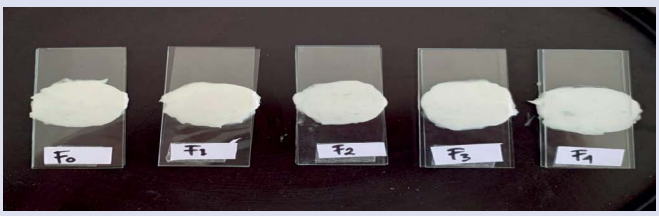

Figure 1. Cream Preparation Homogeneity Test Results.

Table 1. pH Measurement Data for Anti-Aging Cream Preparation of Snakehead Fish Extract After 12 Weeks of Storage.

No	Cream	pH Value for 12 Weeks				Average
		I	IV	VIII	XII	
1.	F0	6,7	6,7	6,7	6,7	6,7
2.	F1	6.5	6.5	6.4	6.3	6.4
3.	F2	6.4	6.4	6.3	6.2	6.3
4.	F3	6.2	6.2	6.1	6.0	6.1
5.	F4	6.0	5.9	5.8	5.8	5.9

Table 2. Observation data on the stability of blank cream, snakehead fish extract cream 2.5%, 5%, 7.5% and 10% when the preparation is finished and stored for 12 weeks.

Formulas	Observation											
	Done			1 week			4 weeks			12 weeks		
	x	y	z	x	y	z	x	y	z	x	y	z
F0	-	-	-	-	-	-	-	-	-	-	-	-
F1	-	-	-	-	-	-	-	-	-	-	-	-
F2	-	-	-	-	-	-	-	-	-	-	-	-
F3	-	-	-	-	-	-	-	-	-	-	-	-
F4	-	-	-	-	-	-	-	-	-	-	-	-

Table 3. Data on Irritation Cream Results for Volunteers for 12 Weeks.

No.	Irritation Reaction	Volunteer			
		1	4	8	12
1.	Erythema	0	0	0	0
2.	Edema	0	0	0	0

Based on the results of the data obtained, it shows that each cream preparation with a different formula concentration for 12 weeks gave good results, namely no change in color, odor or shape. This shows that the snakehead fish extract cream is stable in storage. The stability of the cream will affect the shelf life of the emulsion system. Good cream does not form layers and has a consistent consistency[15].

Irritation Test Results

The irritation test is intended to see the skin response after applying the preparation after 12 hours, where the reaction will be positive if an irritation reaction occurs on the skin, such as redness and itching[16] . The results of the irritation test showed that all volunteers gave negative results for the irritation reactions observed, namely erythema and edema.

The results of the irritation test on the skin of volunteers who were applied to thin skin such as behind the ears were left for 12 hours. Results can be seen in Table 3.

The results of the irritation test showed that all volunteers gave negative results for the irritation reactions observed, namely erythema and edema. From the results of the irritation test, it can be concluded that the cream preparation made is good for use.

Aging Activity Test Results

Water Content *(moisture)*

Water content measurements are carried out using the *moisture checker tool* contained in the Aramo skin analyzer device. The measurement results in Table 4 and Figure 2 show that the facial skin water content of all groups of volunteers before using *anti-aging cream* was dehydrated (0-29). After using anti-aging cream for 4 weeks, all formulas experienced an increase in water content from dehydration to normal[4.17].

The percentage increase in water content in volunteers who used cream formulas F0, F1, F2, F3, F4 and F5 increased by 5.80%, 7.42%, 7.85%, 8.49%, 10.66%, 9.90%. Cream with formula F4 (10% snakehead fish extract cream) has a better percentage of increased water content.

After using anti-aging cream for 4 weeks, all formulas experienced an increase in water content from dehydration to normal. Graph of the results of measuring the water content (*moisture*) on the facial skin of volunteers in the blank group, snakehead fish extract cream 2.5%; 5%; 7.5%; 10% and comparison cream for 4 weeks in volunteers. The percentage increase in water content in volunteers who used cream formulas F0, F1, F2, F3, F4 and F5 increased by 5.80%, 7.42%, 7.85%,

Table 4. Data from measurements of water content (*moisture*) on volunteers' facial skin after using *anti - aging* cream for 4 weeks .

Cream	Volunteer	Percentage Water Content (%)					Increased water content (%)
		Initial Conditions	Treatment (Sunday)				
			I	II	III	IV	
F0	1	35	36	37	37	38	5.80%
	2	30	31	32	33	33	
	3	33	33	34	35	36	
	Average	32.67	33.3	34.3	35	35.7	
F1	1	33	33	34	35	36	7.42%
	2	30	30	31	31	33	
	3	30	33	33	34	35	
	Average	31	32	32.7	33.3	34.7	
F2	1	33	34	34	35	35	7.85%
	2	30	31	31	33	33	
	3	31	32	33	34	34	
	Average	31.33	32.3	32.7	34	34	
F3	1	33	33	32	32	31	8.49%
	2	30	30	30	29	29	
	3	30	29	29	29	28	
	Average	31	30.7	30.3	30	29.3	
F4	1	33	32	32	31	30	10.66%
	2	33	32	31	30	30	
	3	32	31	31	30	30	
	Average	32.67	31.7	31.3	30.3	30	
F5	1	35	35	35	36	36	9.90%
	2	32	33	34	35	35	
	3	33	35	36	36	37	
	Average	33.33	34.3	35	35.7	36	

Information :
F0 Cream: Cream base (blank)
F1 Cream: Snakehead fish extract concentration 2.5%
F2 Cream: Snakehead fish extract concentration 5%
F3 Cream: Snakehead fish extract concentration 7.5%
F4 Cream: Snakehead fish extract concentration 10%
F5 Cream: Anti- *aging cream* market product (DrwSkincare)

Table 5. Results of *pore* measurements on the skin from the initial condition and after treatment for 4 weeks.

Cream	Volunteer	Large Pore					Percent recovery
		Initial Conditions	Treatment (Sunday)				
			I	II	III	IV	
F0	1	49	48	48	47	47	2.94%
	2	42	41	41	41	41	
	3	49	49	48	48	48	
	Average	46.67	46	45.7	45.3	45.3	
F1	1	46	45	44	42	41	10.60%
	2	46	44	42	41	41	
	3	48	47	45	45	44	
	Average	46.67	45.3	43.7	42.7	42	
F2	1	48	46	45	44	43	9.56%
	2	42	41	40	40	39	
	3	45	43	42	41	40	
	Average	45	43.3	42.3	41.7	40.7	
F3	1	46	45	43	42	40	11.35%
	2	42	41	40	39	38	
	3	45	44	34	42	40	
	Average	44.33	44.33	44.33	41	39.3	
F4	1	49	48	47	46	43	11.51%
	2	47	46	45	44	43	
	3	44	42	41	39	38	
	Average	46.67	45.3	44.3	43	41.3	
F5	1	48	45	43	41	40	14.58%
	2	47	46	43	42	41	
	3	49	48	46	45	42	
	Average	48	46.3	44	42.7	41	

Description:
F0 Cream: Cream base (blank)
F1 Cream: Snakehead fish extract cream 2.5%
F2 Cream: Snakehead fish extract cream 5%
F3 Cream: Snakehead fish extract cream 7.5%
F4 Cream: Snakehead fish extract cream 10%

Parameters of measurement results:
0-19 : Small
20-39 : Several large
40-100 : Very large (Aramo, 2012)

Table 6. Results of measuring wrinkles on the skin from the initial condition and after treatment for 4 weeks.

Cream	Volunteer	Wrinkles					Percent Recovery
		Initial Conditions	Treatment (Sunday)				
			I	II	III	IV	
F0	1	26	26	26	25	25	4.06%
	2	25	25	24	24	24	
	3	25	24	24	24	24	
	Average	25.33	25	24.5	24.3	24.3	
F1	1	26	25	25	24	23	11.54%
	2	29	28	28	27	26	
	3	23	22	21	21	20	
	Average	26	25	24.7	24	23	
F2	1	29	28	26	25	25	16.34%
	2	28	27	26	24	23	
	3	28	26	25	25	23	
	Average	28.33	27	25.7	24.7	23.7	
F3	1	23	22	21	20	18	23.14%
	2	22	21	20	19	18	
	3	28	27	24	22	20	
	Average	24.33	23.33	21.7	20.3	18.7	
F4	1	27	24	23	22	21	26.80%
	2	25	22	20	19	17	
	3	23	21	20	19	17	
	Average	25	22.3	21	20	18.3	
F5	1	28	25	23	22	21	21.72%
	2	30	28	26	24	23	
	3	29	28	26	25	24	
	Average	29	27	25	23.7	22.7	

Description:
Cream F0: Cream base (blank)
F1 Cream: Snakehead fish extract cream 2.5%
F2 Cream: Snakehead fish extract cream 5%
F3 Cream: Snakehead fish extract cream 7.5%
F4 Cream: Snakehead fish extract cream 10%
F5 Cream: Anti- *aging cream* market product

Parameters of measurement results:
0-19 : Does not wrinkle
20-39 : Wrinkles
40-100 : Severe wrinkles
(Aramo, 2012)

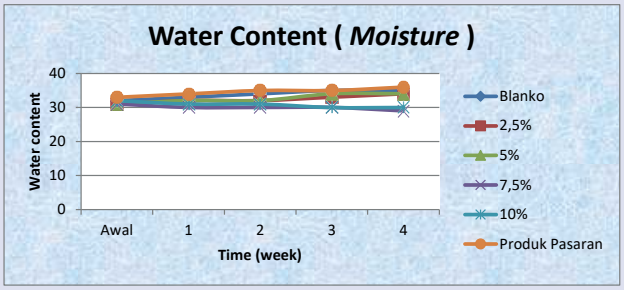

Figure 2. Graph of the results of measuring the water content (*moisture*) on the facial skin of volunteers in the blank group, snakehead fish extract cream 2.5%, 5%, 7.5%, 10% and comparison cream (Drwskincare) for 4 weeks.

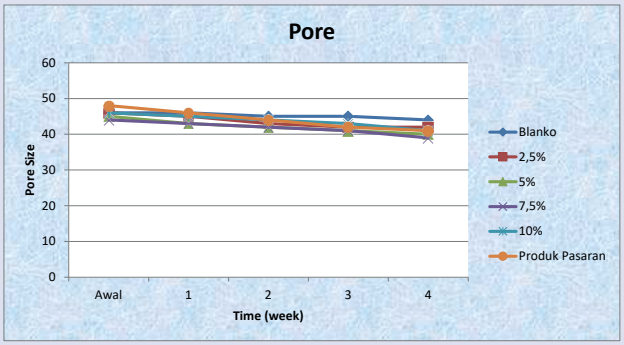

Figure 3. Graph of Pore Measurement Results *on* the Facial Skin of Blank Group Volunteers, Snakehead Fish Extract Cream 2.5%, 5%, 7.5%, 10% and Comparative Cream (Drwskincare) for 4 Weeks.

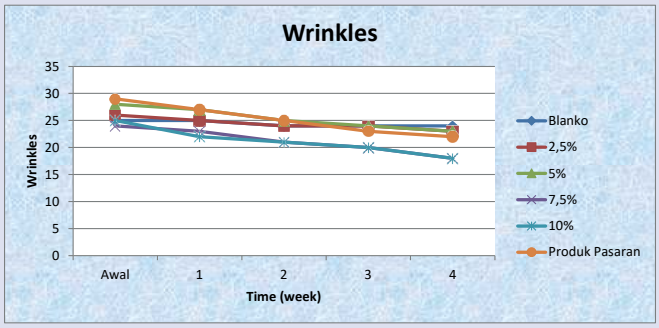

Figure 4. Graph of Wrinkle Measurement Results *on* the Facial Skin of Blank Group Volunteers, Snakehead Fish Extract Cream 2.5%, 5%, 7.5%, 10% and Comparative Cream (Drwskincare) for 4 Weeks.

8.49%, 10.66%, 9.90%. Cream with formula F4 (10% snakehead fish extract cream) has a better percentage of increased water content.

In snakehead fish extract albumin there is collagen which can bind water to maintain skin elasticity. Collagen works to moisturize dry skin, by repairing the skin *barrier* , maintaining and increasing water content, reducing *transepidermal water loss* (TEWL), restoring *lipid capacity. barrier* to attract, retain and distribute water, and maintain skin integrity[10]. Albumin extract can give a moist impression because albumin is water soluble. Egg white albumin is considered to hydrate (*soothe*) the skin. This moist impression is also due to the hydrophilic nature of carrageenan in retaining water[18,19].

The results of the data were analyzed using the non-parametric Mann-Whitney Test. The results of statistical analysis from water content measurements showed that there was a significant difference between 10% snakehead fish extract cream and market product cream ($p< 0.05$) at week 1, week 2, week 3, week 4.

Pore Size *(pore)*

The measurement results can be seen in table 5 and Figure 3 which shows that the facial skin pores of all groups of volunteers before using *anti-aging cream* were in the pore size category[20,23]

From the results of the measurement graph, it can be concluded that, the skin pore size of all groups of volunteers in the initial condition was very large. After 4 weeks of treatment, the results of the pore size measurement were smaller than the initial condition.

According to Muliyawan and Suriana, (2013), pores can enlarge if exposed to too hot sunlight, increasing temperature causes collagen to be damaged at the same time, causing a decrease in the elasticity of the pore canal walls and enlargement of the pores, so that the buildup of dead skin cells (dirt) can occur. triggers acne and affects pore size, resulting in enlarged skin pores[20,21,22].

The results of the data were analyzed using the non-parametric Mann-Whitney Test. The results of statistical analysis from water content measurements showed that there was no significant difference ($p> 0.05$) between formulas after using *anti-aging cream* every week for 4 weeks. The results of statistical analysis showed that there was no significant difference ($p> 0.05$) between 10% snakehead fish extract cream and market products at week 1, week 2, week 3, week 4.

Wrinkles

Wrinkle measurement results using a skin analyzer device with a 10 times magnification lens with a blue sensor light. The measurement results can be seen in Table 6 and Figure 3 which shows that the facial skin of all groups of volunteers before using anti-aging cream was wrinkled[20-23].

The results of the graph measuring wrinkles in volunteers who used the F4 formula cream experienced a reduction, namely from wrinkles to no wrinkles. Formula F4 is better at reducing wrinkles on the skin compared to formulas F0, F1, F2, F3, and F5. This shows that the more extract content in the cream preparation, the greater its role in reducing the number of wrinkles on the skin[22].

The collagen contained in snakehead fish extract is able to enter the skin layers and form a continuous colloid system on the surface of the skin layers, thereby providing a smooth and soft feeling to the skin, by increasing collagen neosynthesis in the papillary dermis of the skin. The production of collagen peptides in the skin is increased by fibroblast stimulation[11].

The results of the data were analyzed using the non-parametric Mann-Whitney Test. The results of statistical analysis of wrinkle measurements showed that there was a significant difference ($p< 0.05$) between 10% snakehead fish extract cream and market product cream at week 1.

Aging is mostly caused by solar radiation. UV A and B in sunlight induce the formation of *Reactive Oxygen Species* (ROS) in the skin and result in oxidative stress if the amount of ROS exceeds the ability of antioxidant defenses in skin cells. Skin *aging* is characterized by the appearance of skin that is dry, thin, inelastic, wrinkled due to the breakdown of collagen and damage to collagen synthesis, the death of skin cells is not accompanied by the formation of new skin, uneven skin color, hyperpigmentation, hypopigmentation and the worst is skin cancer[23].

The main treatment to prevent skin *aging* due to oxidative stress is the use of sun protection products, while the secondary treatment is the use of products containing antioxidants. Antioxidants are used to prevent skin aging and are not *the gold standard for skin aging* therapy . Antioxidant intake is obtained orally or topically by rubbing it on the skin[3].

CONCLUSIONS

Based on the research that has been carried out, the author concludes that snakehead fish extract can be formulated into o/w type cream preparations. Research also shows that differences in cream concentration affect anti-aging effectiveness, with a cream concentration of 10% showing better results in reducing wrinkles.

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