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COMPARING THE ANTI-AGING POTENTIAL OF CINNAMON CREAMS USING MACERATION AND PERCOLATION METHODS

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ABSTRACT

Human life is affected by aging. Some of the effects of aging is skin related, such as hydration, sebum production, and elasticity being the most common issues. Cinnamon, which quite well known for its beneficial properties, is gaining popularity as a natural skin care ingredient. We determined to analyze the potential of cinnamon extract in improving skin elasticity, sebum production and hydration in male white mice. We also will compare two extraction methods, maceration and percolation method, to determine their impacts on the effectiveness of cinnamon extract cream. Creams containing 10% cinnamon extract were prepared and applied to the skin of male white mice for a period of 4 weeks. Skin elasticity, sebum production levels and hydration were measured periodically using the EH-900 skin analyzer. After we apply the creams for 4 weeks, we found that the skin elasticity, sebum production, and also hydration had improved compared to the negative control group ($p < 0.05$). When we compared the two different methods, we found no notable differences suggesting that maceration and percolation methods are equally effective. We can conclude that cinnamon has the ability to improve the hydration, elasticity, and sebum production of skin when included in cream formulations. The choice between maceration and percolation methods did not affect the effectiveness of cinnamon extract in improving skin parameters. Cinnamon extract is a promising resource for anti-aging skincare products. The researcher suggests that more studies is done to explore the long-term and possible side effects.

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1. Introduction

Aging is an inevitable physiological process that all humans will suffer. Aging will make changes in anatomy and physiology, impacting social, economic, quality of life, and health aspects (Shai et al., 2009). A survey conducted by WHO in 2016 reported that human life expectancy has been on the rise due to an increase in the amount of elderly population worldwide, ranging from 10% to 22%, with the global population of older people growing from 800 million to 2 billion individuals. The elderly population in Asia and Southeast Asia accounts for 7% and 6% of the total demographics and predicted that the elderly population will further increase to 365.4 million individuals by 2030, leading to a rise in health issues associated with advanced age (Jin et al., 2015).

2. Literature Review

Skin hydration issues are prevalent among the elderly, impacting their quality of live. With advancing age, there is a sharp decline in barrier functions, including mechanical, immunological, and biochemical barriers, particularly in the stratum corneum layer (Fitzpatrick et al., 2008). Skin hydration in the stratum corneum is regulated by the natural moisturizing factor (NMF), skin lipids, and water channel proteins Aging leads to

reduced lipid production and resulting in decreased skin hydration levels and reduced quality of life due to persistent itching experienced by individuals (Robinson et al., 2010).

Cinnamon (Cinnamonum burmannii) belongs to the Lauraceae family, Cinnamonum genus, which have hundreds of species distributed across Asia and Australia. Cinnamonum burmanii is largely cultivated in Indonesia for its bark, branches, and leaves, which serve as spices and are important export goods. From a phytochemical perspective, cinnamon contains a lot of active agents with splendid benefits.

Cinnamon is a largely favored spice worldwide and is generally grown in tropical regions. High- performance liquid chromatography analysis of 50 grams of cinnamon revealed 3.11% content of eugenol, while gas chromatography- mass spectrometry analysis detected two major chemical composites in cinnamon cinnamaldehyde(90.24%) and coumarin(53.46%)(Journal of Chemistry, FMIPA, Mulawarman 2010). Cinnamon also contains vitamin C, which plays a vital part in guarding the skin from the dangerous effects of UV, preventing aging, and inhibiting melanin production (Trenggono, 2007).

The favorable factors of cinnamon make it a precious resource for skin care, forming a strong theoretical foundation for the creation of active component- based cinnamon cream to enhance skin hydration, sebum production, and skin elasticity. This experiment also tried to analyze the phytochemical composition of cinnamon extract. With this point of view, the researcher is eager to conduct an anti-aging experiment that contains cinnamon as the cream main composition.

3. Method

The type of research conducted was pre-test post-test control group design experimental research. The non-experimental research included determination of phytochemical composition of cinnamon, extraction, preparation and organoleptic test of anti-aging cream preparations using cinnamon extract at concentrations of 10% with two different extraction methods which are ma seration method and percolation method. The experimental research done included testing the anti-aging cream capability in affecting conditions of the rats' skin. The research variables used are as follows: Independent variable (cinnamon extract cream with maseration method, cinnamon extract cream with percolation method, cream without cinnamon extract, ponds anti-aging cream as positive control and no intervention as negative control).
Dependent variable (hydration, hidration and elasticity percentage) and controlled variable (sex of rat, food and drink of rat, back area of rat smeared with cream and time also duration of cream application). The time of the research was carried out from July 2023 – September 2023. This research was done at the Ellio Rat Laboratory, Medan. The sample in this study was rat (*Rattus novergicus*) obtained from the Rat laboratory. The rat that was used had 150-180 grams weight, 11-12 weeks. The sample size used in this study was 25 white rats. We use federer formula to determine the sample size. Of the 25 rats, we divided them into 5 test groups, each of which consisted of 5 white rats. Making cinnamon extract is done by maceration and percolation using 96% ethanol solvent. Then do the determination tests of phytochemical compositions of cinnamon.

4. Results and Discussion

4.1 Phytochemical and Organoleptic Screening

Phytochemical screenings are used in experiments to see whether the object contains antioxidant potential. In this experiment the cinnamon extract was obtained from maceration and percolation method. Organoleptic test shows that the cream has brownish color, homogenous and have specific to cinnamon scent.

Table 1. Results of Phytochemical Screening of Ethanol Extract of Cinnamon

Result of Phytochemical screening	
Flavonoid	+
Alkaloid	+
Saponin	+
Tanin	+
Terpenoid	+

4.2 Anti-Aging Activity Test Results

The anti-aging effectiveness test was divided into 5 groups: the negative control group (without intervention), base cream without extract, 10% extract cream with maceration method, 10% extract cream with percolation method and the positive control group (ponds cream)

Using skin analyser, measure the skin elasticity, production of sebum and hydration of the skin of the rats. Determination of anti-aging activity begins by measuring skin condition before treatment, this aim is to see

whether there is a change in the skin condition of male rat after basting using blank cream, maceration and percolation method cinnamon cream, ponds cream and skin condition without intervention.

Table 2. Anti-Aging Activity of Negative Control Group

Hydration/Week					***Sebum/Week***					***Elasticity/Week***				
W0	*W1*	*W2*	*W3*	*W4*	*W0*	*W1*	*W2*	*W3*	*W4*	*W0*	*W1*	*W2*	*W3*	*W4*
18	19	19	19	19	1	1	1	2	2	31	37	37	37	37
15	15	15	15	15	1	1	2	2	2	30	35	35	35	36
17	18	18	18	18	1	3	3	3	3	30	35	35	35	35
10	10	10	13	13	2	2	2	2	2	32	35	35	35	35
17	17	17	18	18	2	2	2	2	2	33	34	34	37	37

4.3 Negative Control Group (Without Intervention)

From this table we can see that there is a slight increase in hydration from W0 (15.4) to W4 (16.6), sebum/week also increased from W0 (1.4) to W4 (2.2), and elasticity/week increase from W0 (31.2) to W4 (36). In the negative control group (without intervention), although not very notable when compared to other group, there was a slight increase in each parameter of hydration, sebum production, and elasticity during the observation period. This may be caused by the nutrition or good environm ent the rat receives during experiment

Table 3. Anti-Aging Activity of Cream 0% Group

Hydration/Week					***Sebum/Week***					***Elasticity/Week***			
W0	*W1*	*W2*	*W3*	*W4*	*W0*	*W1*	*W2*	*W3*	*W4*	*W0*	*W1*	*W2*	*W3*
19	24	26	26	27	1	2	3	3	4	31	40	41	41
20	21	21	24	24	1	2	3	3	3	35	41	43	44
21	22	22	22	23	2	3	3	3	3	35	43	45	45
20	21	21	22	22	3	4	4	4	4	35	40	46	46
21	23	24	25	27	2	3	3	3	3	36	40	45	45
20,2	22,2	22,8	23,8	24,6	1,8	2,8	3,2	3,2	3,4	34,4	40,8	44	44,2

4.4 0 % Cream

In this group, we can see the differences in hydration/week which increase from W0 (20.2) to W4 (24.6), sebum/week which increase from W0 (1.8) to W4 (3.4) and also elasticity/week which shows increase from W0 (34.4) toW4(44.6) We can see that in this group, there was more notable increase in each parameter when compared to the negative control group. We can assume that this increase was due to the components in the cream base which may improve the condition of the rats' skin or maybe there are some external influencing factors.

Table 4. Anti-Aging Activity of 10% Extract with Maceration Method Cream

Hydration/Week					***Sebum/Week***					***Elasticity/Week***				
W0	*W1*	*W2*	*W3*	*W4*	*W0*	*W1*	*W2*	*W3*	*W4*	*W0*	*W1*	*W2*	*W3*	*W4*
22	27	33	35	39	1	2	4	4	4	37	48	49	49	59
23	26	35	37	38	2	3	4	5	5	33	48	49	55	59
20	28	34	37	43	3	4	4	5	6	38	44	50	53	55
22	26	33	34	42	2	3	4	4	5	37	44	47	49	55
24	28	36	38	40	3	4	4	4	5	38	45	50	57	65
22,2	27	34,2	36,2	40,4	2,2	3,2	4	4,4	5	36,6	45,8	49	52,6	58,6

4.5 10% Extract with Maceration Method Cream

In this group, we can see some significant increases including the hydration/week increase from W0 (22.2) to W4 (40.4) , production of sebum from W0 (2.2) to W4 (5) per week, and also, elasticity/week increase from W0 (36.6) to W4 (58.6). We analyze that the 10% cream with maceration method greatly improved skin elasticity, sebum production, and hydration. This group demonstrated very great improvement across all measured parameters when compared to the negative control group and the 0% cream group. We can conclude

that the concentration and maceration technique we used in this cream could be highly effective in enhancing skin health.

Table 5. Anti-Aging Activity of 10% Extract with Percolation Method Cream

Hydration/Week					***Sebum/Week***					***Elasticity/Week***				
W0	*W1*	*W2*	*W3*	*W4*	*W0*	*W1*	*W2*	*W3*	*W4*	*W0*	*W1*	*W2*	*W3*	*W4*
22	27	33	35	39	1	2	4	4	4	37	48	49	49	59
23	26	35	37	38	2	3	4	5	5	33	48	49	55	59
20	28	34	37	43	3	4	4	5	6	38	44	50	53	55
22	26	33	34	42	2	3	4	4	5	37	44	47	49	55
24	28	36	38	40	3	4	4	4	5	38	45	50	57	65
22,2	27	34,2	36,2	40,4	2,2	3,2	4	4,4	5	36,6	45,8	49	52,6	58,6

4.6 10% Extract with Percolation Method Cream

In this group, we can see some significant increases including the hydration/week increase from W0 (22.2) to W4 (40.4), production of sebum from W0 (2.2) to W4 (5) per week, and also, elasticity/week increase from W0 (36.6) to W4 (58.6). When we compare the data from maceration and percolation method, we cannot find notable differences. In this view, we can conclude that both methods are both significantly increase the hydration, sebum and elasticity of the rats' skin

Table 6. Anti-Aging Activity of Ponds Cream (Positive Control)

Hydration/Week					***Sebum/Week***					***Elasticity/Week***				
W0	*W1*	*W2*	*W3*	*W4*	*W0*	*W1*	*W2*	*W3*	*W4*	*W0*	*W1*	*W2*	*W3*	*W4*
22	33	35	39	46	2	3	5	7	8	36	49	59	64	70
25	29	34	39	45	2	3	6	8	9	35	48	57	65	69
22	30	35	38	44	2	3	5	7	8	36	49	58	64	66
23	35	36	38	46	2	3	5	8	9	37	44	58	64	72
24	30	33	38	44	2	3	4	8	9	39	50	57	68	72
23,2	31,4	34,6	38,4	45	2	3	5	7,6	8,6	36,6	48	57,8	65	69,8

4.7 Ponds Anti-Aging Cream (Positive Control)

In this group, we can see very significant increases including the hydration/week increase from W0 (23.2) to W4 (45), production of sebum from W0 (2) to W4 (8.6), and also, elasticity/week increase from W0 (36.6) to W4 (69.8). This group showed the best result from all the groups that we observed. We may conclude that this group contains the best combination of components or formula to improve the hydration, production of sebum, and elasticity of the skin.

5. Conclusion

After 4 weeks, when compared to negative control group, we found that the cinnamon extract cream greatly improves skin conditions which include sebum production, skin elasticity and also skin hydration ($p<0.05$). Also, when we compare maceration and percolation method, we cannot find notable differences, which mean that both methods are equally effective. The final results of this study support the main theory that cinnamon has the potential to improve hydration, elasticity and sebum production when used as ingredient in skin cream formulation. More studies are suggested to be done to determine the long-term or any possible side effects.

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