Comparison Of Skin Hydration Levels Given Watermelon (Citrullus Lanatus) Fruit Extract Moisturizing Cream With Moisturizing Cream Supplemented With Saccharide Isomerates On Dry Skin Of Female Wistar Rats (Rattus Norvegicus)

Dinda Yuliasari[1], Yensuari[2], Rahmad Isnanta[3*]

[1,2,3] Master Study Program in Biomedical Sciences, Faculty of Medicine, Dentistry and Health Sciences, Prima Indonesia University, Medan, Indonesia
[*]Corresponding Author:
Email: rahmadisnata@unprimdn.ac.id

Abstract.

Starting early to care for your skin can prevent premature aging. Since the skin is the body's outermost organ, The skin protects interior organs from pollution, UV radiation, and disease-causing microbes. Research is needed to confirm and maximize topical plant treatment and skin health medication benefits. This study employs an experimental approach, testing the effects of a moisturizing cream formulated with either watermelon (Citrullus lanatus) extract or a control group of saccharide isomerates on the skin of 25 rats (Rattus norvegicus). The research results show watermelon extract can be used as a medicine since it contains antioxidants and moisturizes the skin. A higher dose of watermelon extract and saccharide isomerate includes more chemical components that hydrate skin. 30% watermelon extract cream with 5% saccharide isomerate improved dry skin more after UVB exposure.

Keywords: *Dry Skin, Watermelon, Moisturizing Cream and Saccharide Isomerates.*

I. INTRODUCTION

Specific individuals continue to dismiss skin care as unimportant. In addition, there is still a societal bias against males concerned about their skin health, although skin care and skin health are not traditionally associated with either sex. Both men and women need to take care of their skin to ensure it stays in good condition, absorbs nutrients, avoids issues, and stays clean [1]–[4].The skin is the body's outermost and biggest organ, making it vulnerable to infections like germs and dirt. Maintaining healthy skin is crucial since disregarding it can lead to more significant health issues like skin cancer [5], [6]. The stratum corneum, the epidermis' outermost layer, protects the skin from the environment. Corneocytes—nucleated keratinocytes in the last stages of differentiation—hydrate and retain water in the stratum corneum, preventing skin chapping [7], [8].Healthy skin requires a functioning stratum corneum [9]–[11]. Water stays in or on the stratum corneum using several natural processes to maintain its integrity. These systems include genuine moisturizing factor (NMF), primarily free of amino acids, PCA, urocanic acid, lactic acid, and urea. The NMF component is a powerful humectant that sucks water from the ambient into the corneocytes [11]. 'Bricks and mortar' of flattened corneocytes ('bricks') embedded in a lipid-enriched extracellular matrix ('mortar') form parallel stacks of flattened bilayers in the stratum corneum. Ceramides, free fatty acids, and cholesterol form this water-repellent flat bilayer, inhibiting water and electrolyte outflow and chemical, allergy, and microbial pathogen absorption.

Next, sebaceous glands generate sebum, which forms a skin membrane [12]–[14].Low environmental temperature, low humidity, chemical exposure, microorganism exposure, aging, psychological stress, atopic dermatitis, and eczema can all cause dry skin, a common condition [15], [16]. To avoid skin drying, promote and maintain skin hydrated. Hydrating the skin using moisturizing creams keeps it soft and supple. Dehydrated skin is more rigid, duller, and wrinkled and can cause dark circles. Dry skin affects all skin types, so finding the correct lotion and procedures to keep skin hydrated is crucial [16], [17]. Skincare routines often end with moisturizing, but effectively nourishing and hydrating the skin requires multiple steps. We can prevent skin dryness and improve water retention with the correct methods [1], [2], [16].Moisturizers protect dry skin and boost skin immunity. Moisturizer is still thought to provide water to

the skin, which is false. Moisturizers prevent or reduce skin water evaporation [2], [18], [19]. This hydrates the skin internally. Occlusives, humectants, and emollients are moisturizers. The stratum corneum's inherent compounds often match these substances. They're commonly employed alongside other materials that support each other. Saccharide isomerate, a natural plant extract, rapidly hydrates the skin. Saccharide isomerate keeps the skin barrier, protecting it from additional injury. Hydrating the skin with this extract reduces itching and inflammation.

Saccharide isomerate moisturizes skin for 72 hours [20]. Watermelon includes numerous healthy nutrients. These chemicals protect the heart, aid urine output, and promote skin health. Watermelon quenches thirst and is antioxidant-rich. Due to its antioxidant content, watermelon neutralizes free radicals and decreases cell damage. The underutilized white layer of watermelon contains citrulline, a vital nutrient—skin benefits from citrulline, an antioxidant [21], [22]. Tropical watermelon contains sucrose, glucose, and fructose, which moisturize the skin. Watermelon contains antioxidant carotenoids like lycopene that protect the skin from free radicals. Dry skin is repaired with moisturizer. This treatment reduces Trans Epidermal Water Loss (TEWL) by establishing a thin, fat barrier on the skin and restoring suppleness [13], [23].To avoid dry skin, use the correct moisturizing moisturizer. Saccharide isomerate (SI) is not in all moisturizing creams [24], including watermelon extract, despite the data showing that SI supports skin care. Further research is needed to compare the use of SI-containing creams to promote skin moisture. Based on the background description. This research aims to conduct laboratory experimental research on the comparison of skin hydration levels given with watermelon (Citrullus lanatus) extract moisturizing cream with moisturizing cream added with saccharide isomerates on the dry skin of female Wistar rats (Rattus norvegicus).

II. METHODS

This laboratory experiment compared saccharide isomerates in moisturizing cream with watermelon (Citrullus lanatus) extract moisturizing cream given to dry female Wistar rats (Rattus norvegicus) to hydrate their skin. An experimental pre-and post-test design with a control group is used in this study [25]. The study employed healthy adult female Wistar rats (Rattus norvegicus) weighing 150-300 grams and 2-3 months old. Everything that will be seen is a research variable. Therefore, researchers must grasp their research variables because they are the things they must observe or quantify [26]. This study examined the independent variable (watermelon extract cream and watermelon extract cream with saccharide isomerate) and the dependent variable (rat skin moisture scores).

Test animals were acclimated for seven days at Medan State University's Faculty of Mathematics and Natural Sciences Animal House. Watermelon (Citrullus Lanatus) fruit extract cream follows. After seven days of acclimatization, mice were randomly separated into five groups for treatment. To evaluate if phytochemical substances may increase skin moisture in dry mouse skin, skin moisture was observed. Using SPSS, quantifiable data (independent variables) was examined for significance on the treatment group's effect (dependent variable).

III. RESULTS AND DISCUSSION

Result

Table 1. Watermelon Fruit Extract Phytochemical test results

Compound	Result	Note
Phenolic	Blackish green in color	+
Flavonoids	Orange in color	+
Saponin	Solution forms foam	+
Tanin	Green solution	+
Alkaloids	Red and yellow	+

Table 1 shows that the compounds or chemical substances contained in watermelon extract are phenolics, flavonoids, saponins, tannins, and alkaloids.

Table 2. Results of Measurement of Mouse Skin Humidity/Water Content

GROUP	Treatment	Skin moisture (%)		Increased skin moisture (%)
		Before	After	
K	1	27	30	10.00
	2	28	31	9.68
	3	28	32	12.50
	4	27	31	12.90
	5	27	30	10.00
Mean		27.40	30.80	11.02
SD		0.55	0.84	1.55
P1	1	28	32	12.50
	2	28	33	15.15
	3	29	34	14.71
	4	29	33	12.12
	5	28	31	9.68
Mean		28.40	32.60	12.83
SD		0.55	1.14	2.21
P2	1	29	34	14.71
	2	29	33	12.12
	3	28	33	15.15
	4	28	34	17.65
	5	28	32	12.50
Mean		28.40	33.20	14.43
SD		0.55	0.84	2.24
P3	1	29	33	12.12
	2	29	35	17.14
	3	29	34	14.71
	4	29	35	17.14
	5	28	34	17.65
MEAN		28.8	34.20	15.75
SD		0.45	0.84	2.33
P4	1	29	36	19.44
	2	29	35	17.14
	3	28	34	17.65
	4	28	35	20.00
	5	29	33	12.12
MEAN		28.60	34.60	17.27
SD		0.55	1.14	3.12

Note:

K: Negative control group (no treatment)

P1: Treatment group given 15% watermelon extract cream

P2: Treatment group given 30% watermelon extract cream

P3: Treatment group given 15% watermelon extract cream + 5% saccharide isomerate

P4: Treatment group given 30% watermelon extract cream + 5% saccharide isomerate

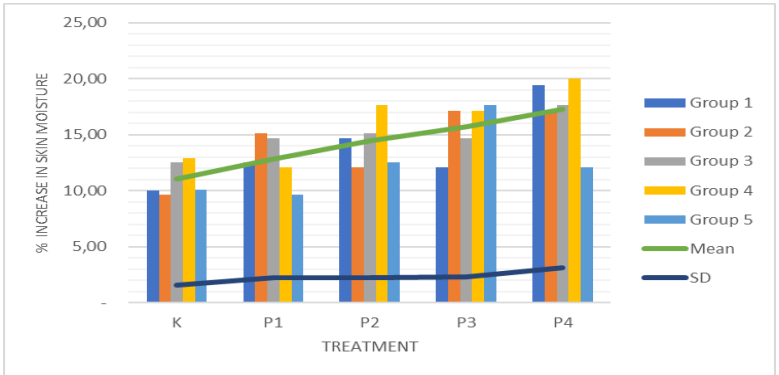

Fig 1. Percentage Increase in Skin Moisture

Measurements can be made using skin analysis: moisture/water content, sebum/oil content, smoothness, pores, blemishes, and folds or wrinkles. Skin measurements using a skin analyzer will automatically display the results in the form of numbers, and the numbers obtained will be automatically adjusted directly to the parameters that have been changed. In this way, the tool works. In this research, water content or humidity measurements were carried out using the moisture checker tool contained in the Aramo skin analyzer device. The measurement results can be seen in Table 2 and Graph 1, which show the percentage of water or moisture in the mice's skin after 14 days in each group.

Table 3. Normality Test Results

Group Extract Dose	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Negative Control (C-)	.344	5	.053	.784	5	.060
Treatment P1	.203	5	.200*	.933	5	.619
Treatment P2	.205	5	.200*	.930	5	.595
Treatment P3	.324	5	.092	.836	5	.154
Treatment P4	.283	5	.200*	.864	5	.242

*. This is a lower bound of the true significance

a. Lilliefors Significance Correction

Based on Table 3 above, a normality test was carried out using SPSS, and data was obtained showing that the control group was negative and all treatment groups, the percentage of skin moisture from day 1 to day 14, all showed significant values. Where the significance value (p) in the Shapiro-Wilk Test is the value that exceeds the standard margin of p>0.05, namely 0.060 for Group K, 0.619 for Group P1, 0.595 for Group P2, 0.154 for Group P3 and 0.242 for Group P4, so, based on the Shapiro-Wilk normality test, the data presented is normally distributed.

Table 4. Results of the ANOVA Test of Homogeneity of Variances

	Levene Statistical	df1	df2	Sig.
Base on Mean	.244	4	20	.910
Base on Median	.167	4	20	.953
Based on the Median and with the adjusted df	.167	4	16.433	.952
Based on trimmed mean	.221	4	20	.923

From Table 4, a test was carried out to see whether there was a difference in the percentage of moisture in the skin of mice from the five groups that underwent research or observation. Based on the data in the table in the "Sig" column. The p-value obtained (p-value) is 0.004. Thus, at the fundamental level = 0.05, Ho is rejected. Hence, the conclusion is that there is a significant difference in the average (mean) percentage of skin moisture in the five groups.

Table 5. Results of the ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	119.382	4	29.846	5.443	.004
Within Groups	109.658	20	5.483		
Total	229.040	24			

Table 6. Post Hoc Bonferroni Test Results

Test	Experimental Group (I)	Experimental Group (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Bonferroni	Negative Control (K-)	Treatment P1	-1.81600	1.48093	1.000	-6.4860	2.8540
		Treatment P2	-3.41900	1.48093	.322	-8.0800	1.2600
		Treatment P3	-4.73600*	1.48093	.045	-9.4060	-.0660
		Treatment P4	-6.25400*	1.48093	.004	-10.9240	-1.5840
	Extract Dosage 15% (P1)	Negative Control (K-)	1.81600	1.48093	1.000	-2.8540	6.4860
		Treatment P2	-1.59400	1.48093	1.000	-6.2640	3.0760
		Treatment P3	-2.92000	1.48093	.626	-7.5900	1.7500
		Treatment P4	-4.43800	1.48093	.071	-9.1080	.2320

Test	Experimental Group (I)	Experimental Group (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
	Extract Dosage 30% (P2)	Negative Control (K-)	3.41000	1.48093	.322	-1.2600	8.0800
		Treatment P1	1.59400	1.48093	1.000	-5.9960	3.3440
		Treatment P3	-1.32600	1.48093	1.000	-7.5140	1.8260
		Treatment P4	-2.84400	1.48093	.692	-7.5140	1.8260
	Extract Dosage 15% + 5% Saccharide I (P3)	Negative Control (K-)	4.73600*	1.48093	.626	.0660	9.4060
		Treatment P1	2.92000	1.48093	.626	-1.7500	7.5900
		Treatment P2	1.32600	1.48093	1.000	-3.3440	5.9960
		Treatment P4	-1.51800	1.48093	1.000	-6.1880	3.1520
	Extract Dosage 30% + 5% Saccharide I (P4)	Negative Control (K-)	6.25400*	1.48093	.004	1.5840	10.9240
		Treatment P1	4.43800	1.48093	.071	-.2320	9.1080
		Treatment P2	2.84400	1.48093	.692	-1.8260	7.5140
		Treatment P3	1.51800	1.48093	1.000	-3.1520	6.1880

From the results of further tests using the Bonferroni Post Hoc Test (Table 6), a comparison of group I and group J shows that the comparison between all groups indicates that there is a difference in the average percentage of moisture in the skin of mice between the negative control group (K) and the P3 treatment group and treatment group P4, and vice versa, which is marked with an asterisk "*."

Discussion

Unprotected exposure to ultraviolet radiation significantly contributes to extrinsic aging, also known as photoaging, which involves changes in structure and function that can be avoided. Direct DNA damage and inflammation caused by UVB light are the primary causes of photoaging. Because UVB rays can pass through the epidermis and upper dermis, they lead to further collagen degradation and the generation of elastotic materials in the skin, in addition to causing conventional aging mechanisms [27]–[29].In this investigation, researchers used a skin analyzer to track the moisture levels of mice's skin as a percentage. This study used watermelon plants to collect their extract. By blending fresh simplicia into a pulp and straining it, you can make a concentrated watermelon extract. A thick quote was made by evaporating watermelon juice at a temperature of 80°C in a water bath.Next, the preparation of watermelon (Citrullus lanatus) extract moisturizing cream is made by: The oil phase, namely stearic acid and glyceryl monostearate, is melted at a temperature of 70°C. Methyl paraben and propyl paraben are dissolved in propylene glycol. The water phase, triethanolamine, glycerin, and propylene glycol, is heated at 70°C. The oil and water phases are mixed into a hot mortar and then crushed to form a creamy mass. The thick watermelon extract is added slowly to the cream base that has been created and then stirred until homogeneous.The saccharide isomerate boost comes from commercially available liquids. There are four different types of watermelon extract cream: one with a 15% concentration, another with a 30% concentration, a third with a 15% concentration and 5% saccharide isomerate, and a fourth with a 30% concentration and 5% saccharide isomerate.

The phytochemical test revealed the presence of phenolics, flavonoids, saponins, tannins, and alkaloids in the watermelon extract. After reacting with iron (III) chloride, phenolics have a distinctive dark green hue. After responding with concentrated HCL, flavonoids show up with an orange tint, characteristic of flavonoid molecules. Once the foam appears, add 10 minutes of Saponin and then set it aside. After that, I responded with 1-3 drops of 1% HCl, but the mixture remained frothy. When Tannin is exposed to FeCl3, it turns a vivid blue color. After dissolving the extract in HCl, the presence of alkaloids is indicated by the formation of a yellowish-red precipitate. Two or three drops of Dragendorff's reagent (a potassium bismuth iodide solution) and two or three drops of Mayer's reagent (a potassium mercury iodide solution) are added to the section and a yellow deposit forms.Female white mice were employed in the experiments because they are docile and have human-like physiology and anatomy. Twenty-five mice were used, five in each of five different groups. The mice were allowed to acclimate for a week before treatment. We categorized and labeled each rat as follows: group K served as the sham control, group P1 received 15% watermelon extract cream, group P2 received 30% watermelon extract cream, group P3 received 15% watermelon extract cream% and 5% saccharide isomerate was added, and group P4 received 30% watermelon extract cream and

5% saccharide isomerate was added.Using a skin analyzer, we compared the moisture levels in the skin of mice in each group. The Shapiro-Wilk test's significance value for each group was more significant than 0.05, as shown by the preceding analysis; hence, parametric tests were carried out in the statistical analysis—one-way ANOVA at the p0.05 threshold of significance.

The parametric study of variance showed a significance level of 0.004. There are considerable disparities between several groups, and the value is statistically significant (p0.05). Using the Bonferroni test, the statistical analysis was continued.The Bonferroni post hoc difference test found that the proportion of moist skin was lowest in the negative control group (K). There was a statistically significant difference (p0.05) between the negative control group (K) and groups P3 and P4. The average rate of skin wetness in the control group (K) was 30.80%, while the average rise in humidity was 11.02%. The average of these percentages is below that of P1, P2, P3, and P4. This is because members of the control group were not provided with any cream and instead were subjected to direct exposure to UVB rays. Thus, the rise in humidity or water content was the least in the negative control group.Groups P1 and P2 treated with watermelon extract cream and groups P3 and P4 treated with watermelon extract cream plus 5% saccharide isomerate showed statistically significant improvements in skin moisture, with average percentages of 12.83%, 14.43%, 15.75%, and 17.27%, respectively, compared to the negative control group (K).When mice were exposed to UVB light, which causes the skin to dry, the results showed a substantial influence on increasing moisture in the skin of the mice in groups P1, P2, P3, and P4, but not in the negative control group. Watermelon extract doses of 15% and 30% in the cream recipe, respectively, had a significant impact on this phenomenon. After that, adding 5% saccharide isomerates helped both P3 (extract dose of 15%) and P4 (extract quantity of 30%) groups. Therefore, the difference in skin moisture density between P1, P2, P3, and P4 becomes more noticeable as watermelon extract and saccharide isomerate increase in the cream formulation.

This occurs due to the antioxidant and anti-inflammatory properties of the flavonoid and polyphenol components in watermelon extract cream. This is consistent with findings from studies researchers that collagen degeneration can be halted and damaged skin layers can be repaired with the help of anti-inflammatory and anti-oxidative molecules like flavonoids, polyphenols, carotenoids, vitamins C and E, and natural extracts [5], [15], [17], [30].Equally beneficial was the addition of 5% saccharide isomerates in conjunction with watermelon extract. The highest concentration of watermelon extract combined with 5% saccharide isomerate produced the highest moisture content. Saccharide isomerate prevents dryness and injury to the skin by hydrating the skin and forming a water vapor reservoir that lasts up to 72 hours. The end effect is skin that looks and feels renewed and rejuvenated. This is consistent with the findings of other researchers who found that saccharide isomerate can bind to the skin under neutral pH conditions, making it an ideal partner for other moisturizers that are also effective in controlling skin moisture by binding to the amino acid groups contained in Keratin in the stratum corneum [24], [31]–[33].This study's findings may be affected because fewer animals were employed as models than in similar research; just 25 white mice, or five mice/group, were used. Large sample sizes affect research because they reduce the likelihood of making incorrect generalizations based on an insufficient sample size [25], [34].

IV. CONCLUSION

The conclusion is based on a 14-day study comparing the efficacy of a moisturizing cream containing watermelon (Citrullus lanatus) extract versus a moisturizing cream containing saccharide isomerates on the dry skin of female Wistar rats (Rattus norvegicus). Performed, it was discovered that the section included phytochemicals like phenolics, flavonoids, saponins, tannins, and alkaloids. In conclusion, watermelon extract contains phytochemicals that can be employed as therapeutic substances due to their ability to improve skin hydration and their content of antioxidant molecules.The average percentage of moisture in the skin of mice in the negative control group (K) was significantly different from the dry skin of mice in the P1, P2, P3, and P4 treatment groups following exposure to UVB light, according to the study's findings. This is because no applications of cream containing active compounds that can aid the process of raising skin moisture were made to the negative control group (K).

The results of this study showed that compared to the group given 15% watermelon extract cream with 5% saccharide isomerate, the group given 30% watermelon extract cream with 5% saccharide isomerate. The group given only 15% and 30% watermelon extract cream had a more significant effect on improving the dry skin of mice after exposure to UVB light. This is because more chemical components help increase hydration or moisture in mouse skin when a higher dose of watermelon extract is coupled with saccharide isomerate.Additional research is needed utilizing a treatment preparation containing a higher concentration or dose of watermelon extract and comparing it to the positive control group (for instance, those who were given bioplacenton). Watermelon fruit extract has been studied for its potential to increase the hydration or moisture of dry skin following exposure to UVB rays, so it is essential to compare the results of this study with those of other studies to draw conclusions and make recommendations for future research.

V. ACKNOWLEDGMENTS

The author would like to thank the Faculty of Medicine, Dentistry and Health Sciences, Prima Indonesia University, for supporting this project, the head of the Animal House Center, the Faculty of Mathematics and Natural Sciences, Medan State University, and the supervisor. We also thank the research partners for their valuable advice.

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