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THE EFFECT OF SINGLE GARLIC EXTRACT (ALLIUM SATIVUM) CREAM TO THE THICKNESS OF DERMIS OF THE MALE WISTAR RATS (RATTUS NORVEGICUS) SKIN THAT EXPOSED WITH RAY ULTRAVIOLET-B

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Abstract: **Exposure to UV-B rays is one of the causes of premature skin aging known as photoaging. Many sources state that the use of antioxidants can reduce the effects of aging caused by UV-B exposure. This research aims to study the effect of using garlic extract, which is rich in antioxidants, on the thickness of the skin of wistar rats that exposed to UV-B rays. This study used 30 male wistar rat samples weighing 150-200 grams, extending 3-4 months. The sample grouping is done randomly and divided into 6 different groups which are K1 (control group), K2 (cream based), K3 (sunblock), K4 (5% extract single garlic cream), K5 (10% extract single garlic cream), and K6 (20% extract single garlic cream) , where irradiation is given for 3x every week with the same total dose of 840 mJ/cm^2. The results showed a big difference between each group with means of K1 (966.182 µm), K2 (894.03 µm), K3 (900.16 µm), K4 (826.36 µm), K5 (784.12 µm), and K6 (757.83 µm). This shows that the administration of a single garlic cream extract (Allium sativum) is able to prevent thickening of the dermis of wistar rats that exposed to UV-B rays.**

Keywords: **photoaging, garlic extract, dermis thickness, UV-B light.**

I. INTRODUCTION

Aging is a natural body process that is sure to occur in all living things including humans. All parts of the body will experience the aging process, but the skin is a part of the body that clearly shows the aging process. Aging of the skin can be caused by internal factors or external factors. Photoaging is an early aging process on the skin due to chronic and repetitive exposure to ultraviolet (UV) light.[1] Skin damage due to photoaging can occur in the epidermis, dermis, or appendages / subcutaneous tissue of the skin, but the greatest changes are seen in the dermis layer. [2]

Normally this dermis layer consists of diverse cell shapes and conditions, but most consists of collagen and elastin fibers that are in the basic substance which is colloidal and composed of mucopolysaccharide gelatin. However, the photoaging process shows changes in cellular components and extracellular matrix with the disorganized accumulation of elastin and the loss of a lot of interstitial collagen.[2] Therefore, a single garlic extract rich in antioxidants can be used to prevent photoaging.

Thus the authors wish to conduct research to determine the effect of a single garlic extract cream on the thickness of the dermis in the skin of male wistar rats exposed to UV-B rays.

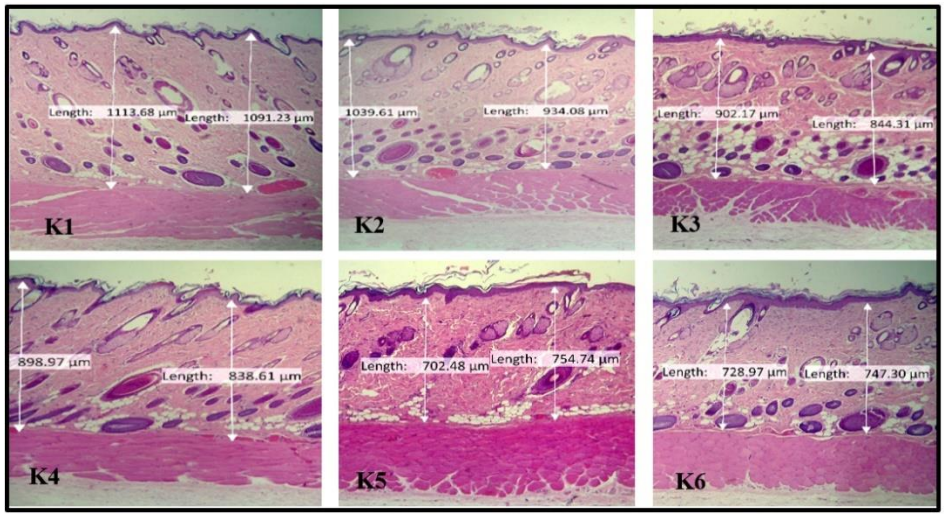
II. METHODOLOGY

This research is an experimental study using a post-test only control group design research design. The research material used in this study was 30 male wistar rats aged 3-4 months weighing 150-200 grams obtained from the Laboratory of Histology at Udayana University, a single garlic obtained from the Village of Pakisan, Kubutambah District, Buleleng Regency, Bali, stearic acid , triethanolaine, vaseline albumin, paraffin, distilled water, and nipagine as a base ingredient for cream. This research was conducted for 4 weeks. After making topical cream garlic extract divided into doses of 5%, 10%, and 20%, base cream, and sunscreen, topical cream is applied to the skin of mice that have met the criteria for inclusion, exclusion, and have their hair shaved in 1 location determined. After 4 weeks treatment with exposure to UV-B rays with the amount of 840 mJ / cm2 3 times a week and giving a single garlic extract cream to the treatment group, a biopsy will be performed on the skin of wistar rats that have been exposed to UV-B rays and the application of the cream topical. Furthermore, histological preparations will be observed under a microscope combined with an optical device and Image Raster software.

III. RESULT AND DISCUSSION

A. Result

In this study the thickness of the dermis was measured in a group of wistar rats exposed to UV-B rays with various groups applying cream. As shown in Figure 1, there are differences in thickness from group K1 to group K6. In the K1 group it appeared thicker than in the treatment group that was given garlic extract, namely K4, K5 and K6. Hyperplasia of the sebaceous glands was also seen in each group exposed to UV-B rays and hair follicles which might affect the thickness of each exposure group.



Figures 1. Histological features of the dermis in the control group and treatment group with 4 times magnification of microscope of light. K1 = control, K2 = base cream, K3 = sunblock, K4 = cream extract 5%, K5 = cream extract 10%, K6 = cream extract 20%

Then the statistical processing is carried out through four stages of analysis and testing which are described in four tables. Previous results of the dermis thickness data are recorded in Table 1. The results show that the K1 group had the thickest mean dermis among the other groups, which was 966,182 µm. Whereas the K6 group had the thinnest dermis mean of 757.83 µm. The results showed the results of normality tests that have been carried out using the Shapiro-Wilk test. The normality test results get p> 0.05 for all groups. This shows that all data from all groups are normally distributed. Then the results of the homogenity test on the six research groups using the Levene test. The results get a value of p> 0.05 which indicates that all data are homogeneous data. All data tested were normally distributed and homogeneous, so the testing was continued in the one-way ANOVA test to find out the significance of the different dermal thicknesses of rat skin between groups. One-way ANOVA test results also obtained a significance value of 0.001 which indicates a value of p <0.05. This value indicates a significant difference in the data on the average value of dermis thickness between each group. Then the test was continued by conducting the Post Hoc test in table 2. Table 2 shows that the mean thickness of

the dermis in male wistar rat skin between all groups compared to each other has a p value <0.05, meaning that there are significant differences in dermis thickness. But not at all between groups there are significant differences in value.

Table 1: Dermal Thickness Of Male Wistar Rats

Groups	N	Mean* ± SD	Minimum	Maximum
K1	5	966.182 ± 79,37	859.25	1073.18
K2	5	894.03 ± 76.40	809.00	1002.10
K3	5	900.16 ± 69.64	825.10	984.31
K4	5	826.36 ± 76.65	746.89	923.45
K5	5	784.12 ± 63.60	694.91	867.22
K6	5	757.83 ± 78.97	644.80	835.15

*: in units of μm

K1: control group, K2: cream based, K3: sunblock, K4: 5% of single garlic extract cream, K5: 10% of single garlic extract cream, K6: 20% of single garlic extract cream

Table 2: Advanced Test Of Dermal Thickness of MaleWistar Rats

Groups	Average Difference	P	Interpretation
K1 and K2	72.14	0.138	Non-significant
K1 and K3	66.01	0,173	Non-significant
K1 and K4	139.81	0,007	Significant
K1 and K5	182.05	0,001	Significant
K1 and K6	208.35	0,000	Significant
K2 and K3	-6.126	0.897	Non-significant
K2 and K4	67.67	0.163	Non-significant
K2 and K5	109.91	0.028	Significant
K2 and K6	136.20	0.008	Significant
K3 and K4	73.79	0.126	Non-significant
K3 and K5	116.03	0.020	Significant
K3 and K6	142.33	0.005	Significant
K4 and K5	42.24	0.378	Non-significant
K4 and K6	68.53	0.158	Non-significant
K5 and K6	26.29	0.581	Non-significant

p<0,05 = significant; p>0,05 = non-significant

B. Discussion

The K1 group (control) did not show any significant difference with the K2 group (cream base), with a significance value of 72.14. Similarly, the comparison between the K1 (control) and K3 (sunblock) groups also showed no significant results, with a value of 66.01. So that through this study showed that the administration of a cream based and sun block cannot prevent the thickening of the dermis due to significant UV-B exposure.

Based on the analysis results, there are differences in the effectiveness of treatment of each group. This shows that the administration of a single garlic extract cream with a concentration of 5% - 20% is able to give effect to the thickness of the dermis exposed to UV-B rays. Then between the K1 group (control) with the K2 group (cream based) and the K3 group (sunblock) did not show any significant difference, which means that the administration of cream based and did not make a significant difference to the thickness of the dermis of the skin. The K4 group (5% extract cream) did not show any significant difference with the other 4 groups (K2, K3, K5, and K6) other than K1 which showed significant results. Whereas in the K5 and K6 groups, there were significant values for the K1, K2, and K3 groups but did not show any significant difference between the treatment groups given a single garlic extract cream. So from this study it was found that the administration of a single garlic extract cream was able to effectively prevent the thickening of the dermis due to UV-B exposure compared to the administration of a cream based that is a cream without extracts or sunblock.

Based on research conducted by Helfrich YR in 2008[2], UV exposure can increase the thickness of the dermis-epidermis layer by 10-30% and provide a significant aging effect on the skin. The effectiveness of using a single garlic extract cream is better than the use of sunblock. So that means that a single garlic extract cream has the potential to equal the effectiveness and quality of sunblock and / or better. Based on the above results, there were also no significant differences in the results of the K1 (control) and K2 (cream based) groups. This shows that the basic ingredients of the cream do not provide an effective preventive effect on the thickness of the dermis exposed to UV-B light. In this study extracts from single garlic were used which had high levels of antioxidant compounds compared to compound garlic.[3] These antioxidant compounds were able to neutralize free radical compounds formed by UV-B exposure. One of the antioxidants contained in garlic is the allicin compound which is derived from allicin namely dialyl sulfide, dialyl disulfide, and dialyl trisulfide can increase the activity of peroxide glutation. This activity is able to counteract the effects of oxidative stress and damage to the skin's extracellular matrix, resulting in changes to the dermal collagen and elastin.[3]

The weakness in this study is that it is not certain what compounds in a single garlic have a role in neutralizing free radicals due to exposure to UV-B rays. In addition, the results of this study have not been able to ascertain whether the effect of giving this single garlic extract cream has a role to protect the dermis due to photoaging or to provide a therapeutic effect on aging skin due to UV-B exposure. But in the results of this study it appears that a single garlic extract cream has a role to prevent thickening due to UV-B exposure.

IV. CONCLUSION

It can be concluded that by giving a single garlic extract cream is able to effectively prevent the thickening of the dermis due to UV-B exposure compared to cream based or sunblock. Thus, the authors conclude that a single garlic extract cream has a chance as a substance that can prevent thickening of the dermis or skin damage due to exposure to UV-B rays.

Researcher's suggestion for future research is to conduct research on the original potential of a single garlic extract in order to know its role in preventing photoaging and knowing side effects in humans.

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