Cream of leaf pare extract (Momordica caharantia l) 4% takes the improvement of effective melanin numbers with 4% hydrocuinon cream on marmut skin (Cavia porcellus) heart which uses uvb ultraviolet light

Mery Merysia*, Wimpie Pangkahila1,2

ABSTRACT

Introduction: Bitter melon leaves is one of the plants that can be used as an antioxidant and antimelanogenic. The active compounds in bitter melon leaves are flavonoids, phenolic acids, tannins and vitamin C. The purpose of this study was to determine the effectiveness of 4% pare (Momordica charantia) leaf extract cream with 4% hydroquinone cream in inhibiting the increase of melanin in marmot skin (Cavia porcellus) which was exposed to ultraviolet light B.

Method: This study used experimental study with a randomized post-test only control group design method. This study used 36 male guinea pigs (Cavia porcellus), local strains, 3 months of age with a body weight of 300-350g, divided into 2 groups, with 18 individuals each. The first group was received 4% hydroquinone cream and exposed to ultraviolet B while the second group received 4% bitter melon extract cream of leaf pare extract (Momordica caharantia) and also exposed to ultraviolet light B 3x a week with a total irradiation dose of 390 ml/cm2 for 2 weeks.

Results: The results showed that the control group (P0) had a mean number of melanin 0.98 ± 0.25% pixel and the treatment group (P1) had an average number of melanin 1.17 ± 0.34% pixels. The difference was analyzed by t-independent test and found to be insignificant (p = 0.06). Statistical analysis found no significant differences in the number of melanin between the control group and the treatment group (p = 0.06).

Conclusion: The results showed that the 4% ethanol extract of pare leaves (Momordica charantia) was as effective as hydroquinone cream in inhibiting the increase in the amount of melanin in the skin of male guinea pigs (Cavia porcellus) exposed to UVB rays.

Keywords: bitter melanin, melanin, UVB, skin, marmot extract

INTRODUCTION

Aging is a natural process that will be experienced by every human being. This aging process can be prevented due to its gradual nature. Changes to the skin can be affected by exposure to ultraviolet radiation. Because Indonesia is a tropical country, the sun shines throughout the year and could adversely affect skin health.1,2

One of the unwanted effects of UV radiation is epidermal layer changes. UV radiation is one of the environmental factors that cause skin aging1. The changes usually marked by skin discoloration, light brown spots start to appear until fertile blackish brown spots, dry skin which gradually lead to uneven skin tone.3,4,5 Ultimately, the hyperpigmentation might occur if the process occurs chronically. There are 2 signs of hyperpigmentation namely increase in the amount of melanin and thickening of the stratum corneum in the epidermis.6,7 The hyperpigmentation abnormalities that are commonly occur are melasma and lentigo which could reduce self-esteem and one’s appearance. These two abnormalities in the skin are signs of aging. Lentigo is a small, well-defined skin disorder in the form of a hyperpigmented macule. The histological findings include epidermal hyperplasia and an increase in the amount of melanin in the basal stratum. Melasma is an asymmetrical shaped skin disorder, bounded indistinctly, in the form of brown spots to grayish brown. Histological findings increase the amount of melanin in the epidermis to the dermis.8

An increase in the amount of melanin is triggered by UV radiation. Melanin is produced by melanocytes which can absorb UV light and prevent the formation of free radicals. The process of forming melanin is called melanogenesis. There are several factors involved in this process including ultraviolet radiation, age, inflammation of the skin, hormones, and drugs such as nonsteroidal antiinflammatory drugs (NSAIDs), diuretic drugs, antibiotics (tetracyclines, sulfonamides), oral contraceptives and Parkinson's drugs (Levodopa).9

Hydroquinone 4% is the standard therapy for hyperpigmentation. Topical use of hydroquinone in the long term can cause skin damage, one of
them, which is known as okronosis (mesh-like pigmentation). This has often happened due to the use of hydroquinone out of doctor’s supervision. Other side effects which may appear such as, redness, burning, irritant or allergic contact dermatitis, postinflammatory hyperpigmentation (HPI) and discoloration of the nails.10,11,12

Because of these side effects, the benefits of plants that contain natural ingredients that function as tyrosinase inhibitors are investigated, one of which is bitter melon leaves. Currently, only the fruits of this plant that commonly used, even though bitter melon leaves can also provide more benefits for skin health. Pare (Momordica charantia L.) is a plant that grows in the tropics, mostly in Asian region, the Amazon (South America), East Africa and the Caribbean.13

The highest phenolic compounds was found in pare leaves compared to other parts of the bitter melon plant13. Because the title of this study is related to the inhibition of the amount of melanin in the skin of guinea pigs exposed to UBV, the bitter melon leaves are used as natural ingredients. The active tyrosinase inhibitor compound in pare leaves is flavonoids. Pare leaf extract has antihyperpigmentation effect and the effect is better than other cream ingredients. One of the phytochemical contents of pare leaves which functions as an antioxidant is flavonoids. In addition there are also tannins, vitamin C and phenolic acids.13,14

Bitter melon extract contains flavonoids as competitive inhibitor compounds of the tyrosinase enzyme through a mechanism of inhibition of melanogenesis through the microphthalmia-associated transcription factor (MITF) pathway.12,13,14 In addition to flavonoids, vitamin C is also important in preventing the formation of ROS caused by sunlight. Another function of vitamin C is converting melanin into a form of reduction and prevents the formation of melanin by converting DOPAquinone to DOPA. Thus, the active compounds contained in bitter melon leaves are very beneficial for skin health. Pare leaf extract (Momordica charantia L) has tyrosinase inhibitor properties and prevents melanogenesis. Tanin is an antioxidant and also has the ability as a tyrosinase inhibitor so that the biosynthetic process of melanin can be inhibited and the increase in melanin production does not occur after exposure to UBV rays. Phenolic acid is an aromatic hydrocarbon with weak acidic properties. The mechanism works directly on the skin through toxicity to proteins, cell membranes and enzyme inactivation.15

**MATERIAL AND METHOD**

Bitter melon leaves used in this study came from Sibomboing bitter plantations which are located on the street of the binoculars in Pekanbaru. The extraction process was carried out with 96% ethanol at the Pharmacy Laboratory at Udayana University. Phytochemical examination was carried out at the Analytical Laboratory of Bukit Jimbaran Campus, Udayana University and the Faculty of Agricultural Technology Laboratory Service Unit, Bukit Jimbaran Campus, Udayana University.

The cream used is 4% hydroquinone cream Melanox Forte brand produced by PT. SDM (Surya Dermato Medika) while the pare leaf extract cream is a cream consisting of stearic acid, adeps lanae, liquid paraffin, triethanolamine and nipagin mixed with ethanol extract of 4% pare leaves.

The experimental animals in this study were male guinea pigs (Cavia porcellus), aged 3 months, weight 300-350 grams as many as 36 birds, then divided into 2 groups, the positive control group and the treatment group each 18 guinea pigs. The positive control group was given 4% hydroquinone cream and exposed to UBV rays 3 times a week for 2 weeks while the treatment group was given a pare leaf extract cream and exposed to UBV rays 3 times a week for 2 weeks. The total exposure to UBV rays is 390 mJ / cm2 for each group. After the last irradiation, the guinea pig is left for 48 hours then anesthetics are carried out with excess doses of ketamine (100 mg / kgBB) intra peritoneally. After that, the histology preparation was made by biopsy of guinea pig skin tissue and Masson-Fontana staining was performed for examination of the amount of melanin.

**RESULT**

Histological staining with Masson-Fontana of the positive control group (4% hydroquinone cream), found less melanin in the basal layer (black arrow) compared to treatment group (4% bitter melon extract cream).

The comparative analysis of the amount of melanin was compared and the mean of the control group given 4% hydroquinone cream and the mean treatment group given 4% pare (Momordica charantia) leaf extract cream was topically tested by the t-independent test showed in Table 1.

According to Table 1, the average number of melanin in the control group (4% hydroquinone cream) was 0.98 ± 0.25 while in the treatment group...
Figure 1. A. Positive control group (4% hydroquinone cream) showed fewer hyperpigmented lesions as indicated by black arrows. B. the treatment group (4% bitter melon extract cream) showed more hyperpigmented lesions as indicated by black arrows.

Table 1. T-test analysis of melanin concentration between control and treatment group

<table>
<thead>
<tr>
<th>Kelompok Subjek</th>
<th>n</th>
<th>Rerata Jumlah Melanin</th>
<th>SB</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kontrol</td>
<td>18</td>
<td>0,98</td>
<td>0,25</td>
<td>-1,92</td>
<td>0,06</td>
</tr>
<tr>
<td>Perlakuan</td>
<td>18</td>
<td>1,17</td>
<td>0,34</td>
<td></td>
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</tbody>
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Figure 2. The comparison of the average number of melanin between Positive Control Groups and the Treatment Group

it was 1.17 ± 0.34. Independent t-test showed value t = -1.92 and p = 0.06. This means that the two groups had similar average number of melanin and not statistically significant (p> 0.05).

Figure 2 shows that there is actually a difference in the amount of melanin that is not significant between the positive control group and the treatment group. The positive control group was the group that received 4% hydroquinone cream while the treatment group was the group with 4% pare leaf extract cream.

DISCUSSION

The results showed that the bitter melon extract cream could reduce the amount of melanin caused by UVB exposure as effective as 4% hydroquinone cream. Bitter melon leaves contain polyphenol compounds including tannins, flavonoids, vitamin C and phenolic acids. Flavonoids can prevent the formation of free radicals in two ways including reducing free radicals directly and activating the synthesis of endogenous antioxidants through the Nuclear factor-E2-related factor 2 (Nrf2) pathway. Besides that, flavonoids can also act as an inhibitor of melanogenesis. Vitamin C as an antioxidant prevent the formation of free radicals by donating electrons. In addition, vitamin C also acts as depigmentation by binding to copper ions in tyrosinase and inhibiting tyrosinase. Tanin works as an antioxidant by suppressing the formation of free radicals and increasing the ratio of glutathione to oxidized glutathione. Tanin is also a tyrosinase inhibitor by preventing biosynthesis of melanin after exposure to UVB light. Phenolic acid decreases α-MSH by reducing the expression of tyrosinase, TRP1 and TRP2 through emphasis on MITF activity.

CONCLUSION

The 4% pare (Momordica charantia) leaf extract cream has same effectiveness as 4% hydroquinone cream in inhibiting the increase of melanin in guinea pigs (Cavia porcellus) exposed to UVB rays.

REFERENCE