*Original Article*

# Effect of Photoprotective Cream of Mangosteen Pericarp Extract (Garcinia Mongostana L) Against 8-OHdG After UVB Exposure On Albino Mice

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## Abstract

**Objective:** This study aims to determine the effect of the application of mangosteen pericarp extract cream (*Garcinia Mangostana L*) on levels of 8-OHdG on the skin of mice after exposure to UVB.

**Method**: The study use a pure animal experimental research design with control group. The criteria for inclution were species Swiss albino mice, aged 6 – 9 weeks, weight 20-30 g, female gender and healthy.. The samples that met the criteria were divided into 5 groups : UVB, Base Cream plus UVB, 3 groups mangosteen pericarp extract cream with different concentration UVB radiation in mice using a 311 nm narrowband UVB (Dermalight 1000) with the power 450 mJ/cm three times a week for 4 week. Elisa examination was carried out before and after the experiment.

**Result:** This study used 25 mice albino selected randomly and were divided into 5 treatment group consisting of 5 group : UVB alone, UVB with base cream, UVB with mangosten pericarp extract cream with concentration of 1 %, 3 % and 5 %. The Comperative test levels of 8-OhdG between each group with Post Hoc test and found It was concluded that the decrease in OhdG was greatest in group 2 followed by groups 5, 4, 3, and 1 (control group), respectively.

**Conclution:** The ELISA levels of 8-OHdG was found that there are significant difference as between the various treatment groups (p>0,05). However, the increasing concentration of mangosten pericarp extract cream showed decreased level of 8-OHdG.

***Keywords****: Mangosteen Pericarp Extract, 8 OHdG, Mice Skin, Ultraviolet B*

## Introduction

Chronic reactions from sun exposure to ultraviolet rays can cause skin texture disorders, premature aging (photoaging) and skin cancer[1].Damage caused by UV rays can be seen both clinically, histologically, in anatomical pathology and functionally. Exposure to UV radiation from sunlight causes skin damage through several mechanisms, including the formation of burn cells, triggering an inflammatory immune response, the formation of thymine dimers. and collagenase production (Matrix Metaloproteinase).

The damage that occurs due to ultraviolet B is more in the damage to the cell DNA which is the

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chromophore. Much UVB rays are absorbed into the epidermis and penetrate the dermal papillae. Symptoms of damage caused by UVB absorption to the epidermis are erythema. The wavelength from ultraviolet that is most effective in causing erythema is 250-290 nm and the effect of erythema decreases with increasing wavelength[3].

Reaction with carbonyl groups and double carbon in area adjacent pyrimidine, lead the specific photoproducts formation such as cyclobutene pyrimidine dimers (CPDS), dan 6-4 pyrimidone photoproducts (6-4 PP) is a product of mutations in epidermal cells mutation in epidermal cell followed cancer formation[3]. At the high concentration, ROS can act as a mediator basis of structural cell damage, proteins and nucleic acid known as "oxidative stress". ROS mediated oxidative stress which resulted in damage to the DNA with the formation of 8-hydroxy-2-deoxyguanosine (8-OHdG), which is one major products of oxidative damage and mutagenic lot to detection. 8-OHdG is one of the major oxidative modified DNA base product, which was first reported by Kasai et al to be formed on interaction hydrocyl radical (OH-) and singlet oxygen photodynamic action with DNA[4.] To prevent the cellular damage associated with oxidative stress.

That is important to maintain the balance of oxidants with antioxidants, such as the mangosteen fruit (Garcinia mangostana L). especially the use of the fruit skin. Mangosteen pericarp oxidies clear resin that is rich in xanthone. Mangostin is a major Xanthone derivate and is present is mangosteen. In the mangosteen pericarp extract is found Xantghone content of 95 % beside it also contains isoflavonoid, tannins and flavonoid[5,6.] The mangosteen pericarp extrct similar to antioxidant have anti inflammatory- active[7].

## Materials and Methods

The study use a pure animal experimental research design with control group. It was conducted in microbiology laboratoryof Hasanuddin University, Makassar, from July to August 2020, after obtaining the approval from ethics commite of Health Research

The samples were 25 mice that meet criteria. The criteria for inclution were species Swiss albino mice, aged 6 – 9 weeks, weight 20-30 g, female gender and healthy. Exclution criteria were the mice were sick and dying during the study. The samples that met the criteria were divided into 5 groups : UVB, Base Cream plus UVB, 3 groups mangosteen pericarp extract cream with different concentration. Mangosteen pericarp extract with a concentration 1 %, 3 %, and 5 % was made in the laboratory Pharmacognosy phytochemical , Politeknik Pharmacy. UVB radiation in mice using a 311 nm narrowband UVB (Dermalight 1000) with the power 450 mJ/cm three times a week for 4 week.

Elisa examination was carried out before and after the experiment. For Elisa measure, the first 100 ul of each standard or sample was added and then immediately added 100 ul Biotinylateddetection antibody. Incubatiom for 90 min at 37 ºC anda washed 2 times. After 100 uL enzyme conjugate wass added and incubated for 30 min at 37 ºC and wash 3 times. Add 100 uL substrate reagents, incubation 30 mi at a temperature 37ºC and wash five times. Add 100 uL colour reagent and stop abrution and immediately read at 450 nm, then the calculation result. The data were statically anlyzed using

SPSS.

## Result

This study used 25 mice albino selected randomly and were divided into 5 treatment group consisting of 5 group : UVB alone, UVB with base cream, UVB with mangosten pericarp extract cream wit concentration of 1 %, 3 % and 5 %. From the result of the ELISA levels of 8-OHdG was found that there are significant difference as between the various treatment groups (p>0,05) as evidence by ANOVA (Table 1).However, the increasing concentration of mangosten pericarp extract cream showed decreased level of 8-OHdG. The level of 8-OHdG highest in UVb control group and lowest in mangosten pericarp extract cream 5 % groups.

**Table 1 The comparison of the 8OHdG difference value in each treatment group (ANOVA)**

| Difference (ohdG) | Sum of squares | Df | Mean square | F | Sign |
|---|---|---|---|---|---|
| Between groups | 13367.126 | 4 | 3341.781 | 39,946 | 0.000 |
| Within group | 1673.151 | 20 | 83.658 | | |
| Total | 1540.277 | 24 | | | |

Comperative test the levels of 8-OhdG between each group with Post Hoc test and found It was concluded that the decrease in OhdG was greatest in group 2 followed by groups 5, 4, 3, and 1 (control group), respectively.

**Table 2. Comparison of the levels of 8-OhdG among treatment groups**

| (I) Group | (J) Group | Mean Difference (I-J) | P |
|---|---|---|---|
| UVB | BC +UVB | 53.98160* | .000 |
| | Mangosteen1 % UVB | 3.05840 | .603 |
| | Mangosteen 3 % UVB | 36.78540* | .000 |
| | Mangosteen 5 % UVB | 50.78980* | .000 |
| BC +UVB | UVB | -53.98160* | .000 |
| | Mangosteen1 % UVB | -50.92320* | .000 |
| | Mangosteen 3 % UVB | -17.19620* | .008 |
| | Mangosteen 5 % UVB | -3.19180 | .587 |
| Mangosteen 1% UVB | UVB | -3.05840 | .603 |
| | BC + UVB | 50.92320* | .000 |
| | Mangosteen 3% UVB | 33.72700* | .000 |
| | Mangosteen 5 % UVB | 47.73140* | .000 |
| Mangosteen 3 % UVB | UVB | -36.78540* | .000 |
| | BC + UVB | 17.19620* | .008 |
| | Mangoosten 1% UVB | -33.72700* | .000 |
| | Mangosteen 5% UVB | 14.00440* | .025 |
| Mangosteen 5 % UVB | UVB | -50.78980* | .000 |
| | BC + UVB | 3.19180 | .587 |
| | Mangosteen 1% UVB | -47.73140* | .000 |
| | Mangosteen 3% UVB | -14.00440* | .025 |

## Discussion

8 OHdG is the best biomarker to determine DNA demage and measuring the levels of 8-OHdG is used an evaluation of the oxidative stress. This is due to the formation of 8-OHdG were trigged by UV on the skin indicates high levels in the epidermis 7 days after exposure. Reported 8-OHdG induced by UV in skin mice removal obtained slowly and remained at high levels in the epidermis 7 days after exposure[6]. One of the defenses against oxidative damage, human cells are equipped with various anti-oxidants which work through various mechanisms. In addition to primary anti-oxidants, secondary antioxidants can also be used which function to capture compounds and prevent chain reactions. Xanton is one of the secondary anti-oxidants, where we know mangosteen peel exudes yellow resin which is rich in xanton[8,9].extracting mangosteen peel found a content of 95% xanthone, besides that it also contained isoflavones, tannins and flavonoids[11].

The biochemical composition of mangosteen rind extract has been reported to contain flavonoids which play an important role in warding off free radicals, and xanthones which have various medical properties such as antibacterial, anti-fungal and anti-inflammatory. Of all the xanthones that have been identified, α mangosteen is the xanthones with the highest levels isolated from mangosteen pericarp.[9,10,12] The antioxidant molecules of the skin of mangosteens are very strong as catchers of free radicals (radical scavenging)[13].

Researches that have been conducted in Makassar using UVB and mice as experimental animals[4]. who reported the results of research on topical cacao extracts on albino mice that showed UVB exposure of 343 mJ / cm² 3 times a week caused epidermal hyperplasia14. The reports results of a study that showed UVB exposure of 450 mJ / cm² to albino mice affected the expression of 8-OHdG and PCNA[15].

In this study, from the result of the ELISA levels of 8-OHdG was found that there are significant difference as between the various treatment groups (p>0,05) as evidence. Then do the post hoc test and found no significant difference as between UVB base cream with UVB mangosteen pericarp extract 5 %. The base cream used is a cream without anti-oxidants which should not have a very protective effect on the skin. The addition of mangosteen peel extract to the base cream is expected to provide a stronger effect. It is necessary to further explore the content of the base cream which provides a protective effect. But of the three concentrations of mangosteen peel extract at a concentration of 5%, the reduction in 8-OHdG levels was greater with a mean (-) 54.13 ± 11,659 while at a concentration of 3% on a mean (-) 40.13 ± 11.060 and a concentration of 1% on the mean (-) 6.40 ± 2,834.

Theresearch about the effect of mangosteen pericarp extract cream with levels of 10% and 20% providing a protective effect on the skin after UVB exposure even though the base cream also provides a strong protective effect because it contains Titanium oxide[5,8.13]. research on the protective effect of cocoa extract on 8-OHdG levels after being exposed to 7,12 Dimfthylbenz (a) Antracene and 12-O-Tetradecanoylphorbol -13- Acetate gave results with a low concentration of 200 ppm of cocoa protection against DMBA / TPA[16]. A study conducted a solution of mangosteen pericarp extract with a concentration of 95% showed significant differences in MMP-1 and the amount of collagen in the dermis[18,14,16].

## Conclution

The result of the ELISA levels of 8-OHdG was found that there are significant difference as between the various treatment groups (p>0,05). However, the increasing concentration of mangosten pericarp extract cream showed decreased level of 8-OHdG.

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**Conflict Of Interest**- None of the authors has competing interests

**Ethical Clearance**- This research was approved by the Research Ethics Commission of the Faculty of Medicine, Hasanuddin University Makassar, (No. 551/ H4.8.4.5.31/PP36/2019), and all research subjects give written informed

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