

## In – Vitro Technique to Study the Effect of Sunscreen Cream on the Hair Damage

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**Abstract:** The objective of the present study was to study the effect of sunscreen cream formulation on the damage of hair caused by UV radiation. Hair is one of the vital parts of the body and considered to be a necessary and important component of the overall appeal and beauty of human being. Sunscreen cream was formulated by using Benzophenone-3 and Octyl-methoxy cinnamate as an active ingredients. Evaluation of Sunscreen cream was performed by fluorescence quenching. In this method, Control (without sunscreen) and Test Samples (with sunscreen) of hair were prepared with Curcumin and Alcohol and exposed to short UV radiation in UV chamber. The 12 sets of approximately 100mg of hair sample in Petri dishes were prepared and labeled. Six Petri dishes (3 Control & 3 Test) were exposed to short wavelength of UV (280-340nm) for respective time span of 1hr, 2hrs and 3hrs, the distance fixed for exposure of hair sample was 20cm from UV lamp. Remaining six samples (3 Control & 3 Test) were exposed to natural sunlight with same time span. At the end of exposure regime, all samples were removed and evaluated for porosity. It has been observed that Control sample showed fluorescence strongly while test sample showed no fluorescence. Hair exposed to natural light led to formation of split strands when treated with 1N NaOH solution. However, hair coated sunscreen cream showed no splitting. Hair (Test) exposed to UV light, led to change in porosity as compared to hair applied with sunscreen cream at the same experimental conditions.

**Keywords:** *In Vitro*, Sunscreen Cream, Hair Damage.

### INTRODUCTION

Hair is one of the vital parts of the body and considered to be a necessary and important component of the overall appeal and beauty of human being. Hence, it is very essential to take proper care of hair. Till now we were aware of the hair problems caused by pollution, hard water, harsh chemicals etc. but there is one more reason to worry about and that is sun's UV radiation. When hair is exposed to UV radiation the hair cuticle undergoes external damages like chipping, extraction, erosion and also various internal

damages like increase in porosity, cysteine bond breakage, di-sulfide bond breakage etc.

### OBJECTIVE

The objective of the present study was to study the effect of sunscreen cream formulation on the damage of hair caused by UV radiation.

### EXPERIMENTAL MATERIAL & METHOD

#### Formulation of Sunscreen Cream

Sunscreen cream was formulated by using Benzophenone-3 and Octyl-methoxy cinnamate as active ingredients

**Table No 1:** Quantity of ingredients of formulation of sunscreen

Sr. No.	Ingredients	Quantity
1	Mineral Oil	8 ml
2	Bees Wax	5 gm
3	Stearic Acid	5 gm
4	Silicon oil	0.5 ml
5	Triethanol amine	1 gm
6	Octyl methoxy cinnamate	7 gm
7	Benzophenone-3	3 gm
8	Methyl Paraben	0.02 gm
9	Propyl Paraben	0.02 gm
10	Water	q.s

#### Fluorescence Quenching Method

In this, Control (without sunscreen) and Test samples (with sunscreen) were prepared with Curcumin and Alcohol and exposed to short UV radiation in UV chamber.

The 12 sets of approximately 100mg of hair sample in each Petri dish was prepared and labeled. Six Petri (3 Control & 3 Test) dishes were exposed to short wavelength of UV (280-340nm) for respective time span of 1hr, 2hrs and 3hrs, the distance fixed for exposure of hair sample was

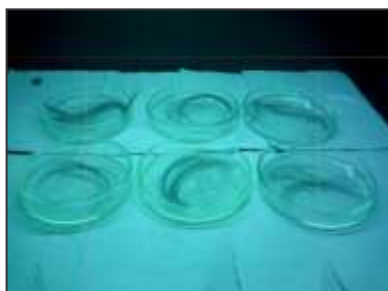
20cm from UV lamp. Remaining six samples (3 Control & 3 Test) were exposed to natural sunlight

with same time span. At the end of exposure regime, all samples were removed and evaluated.

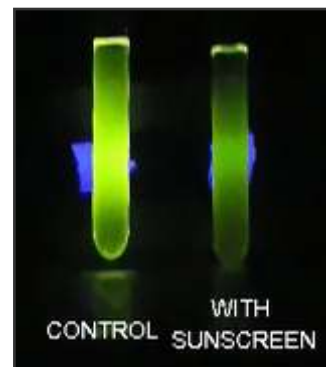
**OBSERVATION**



Hair exposed to Sunlight



Hair exposed to UV light



**Table No 1: Effect of UV Light on the Diameter of Hair**

CODE	0-5 MIN(mm)	0- 30 Min. (mm)	0 -60Min. (mm)
ESH (S)1	0.018	0.036	0.108
ESH (S)2	0.054	0.126	0.207
ESH (S)3	0.036	0.126	0.153
EH (S)1	0.045	0.144	0.180
EH (S)2	0.054	0.216	0.243
EH (S)3	0.018	0.129	0.180
ESH (N)1	0.045	0.054	0.126
ESH (N)2	0.018	0.063	0.072
ESH (N)3	0.009	0.063	0.126
EH (N)1	0.009	0.117	Spliting
EH (N)2	0.036	0.135	Spliting
EH (N)3	0.063	0.117	Spliting

- ESH- UV light exposed (Sunscreen applied),
- EH- UV light exposed (Without Sunscreen),
- ESH (N) - Natural Sunlight exposed (Sunscreen applied)
- EH (N) - Natural Sunlight exposed (Without Sunscreen)

**RESULT**

1. Control sample showed fluorescence strongly while test sample showed no fluorescence.
2. Hair exposed to natural light, led to formation of split strands when treated with 1N NaOH solution. However, hair coated sunscreen cream showed no splitting.
3. Hair exposed to UV light, led to change in porosity as compared to hair coated with sunscreen cream at the same experimental conditions.

**CONCLUSION**

Exposure to UV radiation causes damage to hair by increasing porosity.

Sunscreen containing active ingredient Benzophenone-3 and Octyl-methoxy cinnamate can offer protection to hair by absorbing UV radiation.

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