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Effect of UV radiation in the antiviligo therapy by piperine topical formulation

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Abstract

Vitiligo also known as Leukoderma is caused by the loss of pigment, resulting in irregular pale patches of skin. Vitiligo develops patches of de-pigmented skin appearing on extremities. A team of scientists at King's College London have discovered that Piperine and its synthetic derivatives can stimulate pigmentation in the skin. The present study evaluates the pharmacological response of repigmentation to a herbal topical formulation incorporated with piperine with and without UV radiation using New Zealand strain rabbits. Although the group deprived of UV radiation took more time for repigmentation, the pattern was more homogenous.

Keywords: Vitiligo, melanocytes, UV radiation, herbal cream, evaluation.

INTRODUCTION

About 0.5 to 1 percent of the world's population, or as many as 65 million people, have Vitiligo[1]. Most develop vitiligo before their fortieth birthday! The disorder affects both sexes and all races equally. However, it is more noticeable in people with dark skin[2].

Vitiligo seems to be somewhat more common in people with certain autoimmune diseases. These include hyperthyroidism, adrenocortical insufficiency, alopecia areata and pernicious anemia. In the past two decades, research on the role that melanocytes play in Vitiligo has greatly increased. A variety of technical advances, such as gene mapping and cloning have permitted relatively rapid advances in knowledge of melanocytes at the cellular and molecular levels.

People who develop Vitiligo usually first notice white patches (Depigmentation) on their skin. These patches are more commonly found on sun-exposed areas of the body, including the hands, feet, arms, face, and lips. Other common areas where these white patches appear are the armpits and groin, and around the mouth, eyes, nostrils, navel, genitals, and rectal areas. In addition to white patches on the skin, people with Vitiligo may have premature graying of the scalp hair,

eyelashes, eyebrows, and beard. People with dark skin may notice a loss of color inside their mouths.

Systemic phototherapy induces cosmetically satisfactory repigmentation in up to 70% of patients with early or localized disease.

Narrow-band UV-B phototherapy is widely used and produces good clinical results. Narrow-band fluorescent tubes with an emission spectrum of 310-315 nm and a maximum wavelength of 311 nm are used. Treatment frequency is 2-3 times weekly, but never on consecutive days. This treatment can be safely used in children, pregnant women, and lactating women. Short-term adverse effects include pruritus and xerosis. Several studies have demonstrated the effectiveness of narrow-band UV-B therapy as monotherapy[3].

Groundbreaking new research in the British Journal of Dermatology has revealed that black pepper could provide a new treatment for the skin disease Vitiligo. Current treatments include corticosteroids applied to the skin, and phototherapy using UV radiation (UVR) to re-pigment the skin[4-5]. Both, however, carry possible long-term side effects and are not always effective. In particular, less than a quarter of patients respond successfully to corticosteroids, while UVR causes a re-pigmentation that is spotted and patchy and in the long-term could lead to a higher risk of skin cancer. But now a team of scientists at King's College London have discovered that Piperine the compound that gives black pepper its spicy, pungent flavour and its synthetic derivatives can stimulate pigmentation in the skin[6].

MATERIALS AND METHODS

Piperine was extracted, purified and recrystallised in our lab. Beeswax, Lanolin and Stearic acid were obtained from S D fine-chem Ltd(Mumbai) and Triethanolamine Lab company(Hyderabad). 4-Hydroxyanisole was procured from Hychem laboratories. All reagents used in this work is of high quality analytical grade.

Process development of topical herbal cream

Beeswax (12.5 g), Lanolin (2 g) and Stearic acid (2.5 g) were taken in one beaker. In another beaker, Piperine as API (1 %) was dissolved in ethanol by sonication and introduced into glycerine (6.25 ml), water (7.26 ml), triethanolamine (0.437 g). Both the beakers were maintained at 60°C and all the ingredients were melted. Then oily phase is added to aqueous phase and stirred continuously. As the temperature goes down peppermint oil was added and mixed well until required consistency was obtained[7-8].

Irritancy

Patch test was carried out by applying cream on their ear pinna and dorsal surface to check for the redness or edema of skin. An area (1sq.cm) on the dorsal surface of the shaved rabbit was marked. The cream was applied to the specified area and time was noted. Irritancy, erythema and edema, was checked if any for regular intervals upto 24 hrs and reported[9].

Penetration

Penetration of topical formulations was performed on (n=3) after testing for irritancy on rabbits[10]. A specific amount of the drug (1g) was spread evenly on the dorsal surface of rabbits. After 12 hrs the topical preparation was scraped off and made sure that there is no left

over. The quantity scraped off was weighed and subtracted from the initial quantity. The difference is assured to be penetrated and reported.

Preparation of animals A protocol hard copy in triplicate was submitted to the institutional animal ethical committee and got approval (code no.2/IAEC).The animals were conditioned to the normal diurnal and nocturnal rhythms. The animals were fed with leafy vegetables and water ad libitum. The average weight of rabbits was 2.5kgs.

Three groups of adult rabbits (Average weight 2.5kgs) (New Zealand strain rabbits) were selected containing 6 animals each. All animals were subjected to depigmentation by using 4-hydroxyanisole ointment. Animals were separated into three groups G1, G2 and G3. G1 group of animals under control, G2 for the group of animals were cream was applied and exposed to UV Radiation (Ultraviolet source lamp 15W, Sankyo Denki, Japan) and G3 for the animals were applied cream alone[11-13].

RESULTS AND DISCUSSION

Pharmacological evaluation of the cream was performed to prove the anti Vitiligo efficacy by using adult New Zealand OB Brown rabbits[14-18]. Depigmentation of the animals was successfully carried out. All animals in each group were defoliated and followed by depigmentation by 35 days. Repigmentation was carried out by applying only cream for G2. G3 was subjected to Cream and UV therapy. The group which was subjected to the topical cream therapy was found to commence repigmentation within 59 days.



G1(control)



G2



G3

Figure 1. Rabbits before depigmentation



G1(control)



G2



G3

Figure 2. Rabbits during repigmentation



G1 (control)



G2 (59th day)

G3 (50th day)

**Figure 3. Rabbits after repigmentation
(G2- piperine cream, G3- UV radiation + piperine cream)**

CONCLUSION

It is proved that the formulated topical piperine cream was effective in the repigmentation. In UV therapy the repigmentation was faster but was found to be patchy pigmentation. When the repigmentation was performed only with the cream the rate was found to be slow but homogenous. Therefore it can be concluded that the topical treatment can be facilitated even without UV radiation.

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