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Herbal Approach in the Treatment of Polymorphous Light Eruption Through Topical Cream Formulation

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Abstract:

Polymorphous light eruption (PMLE) is the most common, idiopathic, acquired photodermatosis, characterized by abnormal, recurrent, and delayed reaction to sunlight. Polymorphous light eruption is common worldwide but the morphology, distribution, and pigmentary changes are unique in Indian skin which is discussed in this review. The prevalence of PMLE is around 10–20% in the general population. It commonly occurs in females between 20and 30 years of age. Herbal substances may work as adsorbents of the UV rays and antioxidants and potentially have few side effects. Many of them have shown the potential to protect from UV rays. Among the most studied herbal substances that have proven photoprotective activity are Polypodium leucotomos extract (PLE). Most of the Indians belong to type IV to type VI skin and pigmentary changes are commonly seen. The unique feature of PMLE in Indian skin is the pigmentary change which varies from hypopigmented to hyperpigmented lesions.

Keywords:
UV-rays, polypodium leucotomas extract, calendula, photoprotection, photodermatoses.

INTRODUCTION

Polymorphous Light Eruption (PMLE) is an immune-mediated skin disorder triggered by ultraviolet (UV) radiation, primarily UV-A (320-400 nm). It is commonly observed in fair-skinned individuals and are characterized as itchy, red papules, plaques or vesicles that appears a few hours to days after sun exposure. The exact pathogenesis involves UV-induced oxidative stress and subsequent immune system activation(1). Conventional treatments, including corticosteroids , sunscreens, and immunosuppressants, provide only symptomatic relief and are associated with side effects and long term use. Therefore, herbal therapy has gained importance due to its safety profile and ability to


address oxidative and inflammatory pathways(2).

Fig.no.1.1 Polymorphous Light Eruption

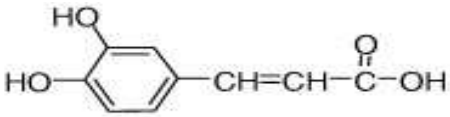
Polymorphous Light Eruption (PMLE) is the most prevalent immunologically mediated photo-dermatosis, characterized by a delayed hypersensitivity reaction to sunlight. PMLE predominantly affects females during their second to third decades of life and typically manifests as recurrent, pruritic, non-scarring lesions with distinct morphologies on sun-exposed areas of the body(3).

The term “polymorphous” signifies the variability of the condition's presentation among individuals, while “eruption” denotes the abrupt onset of the rash, which generally occurs within 30 minutes of ultraviolet (UV) light exposure. This condition is also commonly referred to as Sun Allergy or Sun Poisoning and represents the most frequent sun-induced dermatological issue stemming from an aberrant immune response to sunlight(4,5).

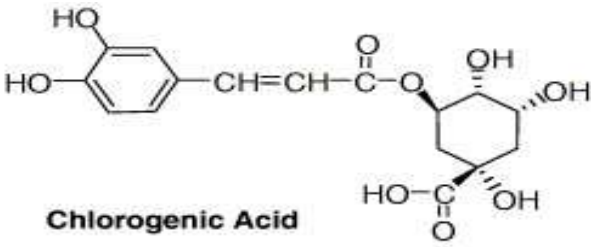
DRUG USED FOR MANAGEMENT OF POLYMORPHOUS LIGHT ERUPTION

1. Polypodium leucotomos extract : Polypodium leucotomos extract (PLE) is a naturally derived compound from a fern native to South America. PLE has been shown to have antioxidant and photoprotective properties. Several different preparations of PLE are commercially available(6,7).

Phytoconstituents - Cinnamic Acid Derivatives: Ferulic acid, p-coumaric acid, caffeic acid, and vanillic acid are abundant and potent antioxidants, absorbing UV photons and inhibiting lipid peroxidation. Caffeoylquinic Acids: Chlorogenic acid (3-caffeoylquinic acid) is another significant component with strong antioxidant capacity(8).



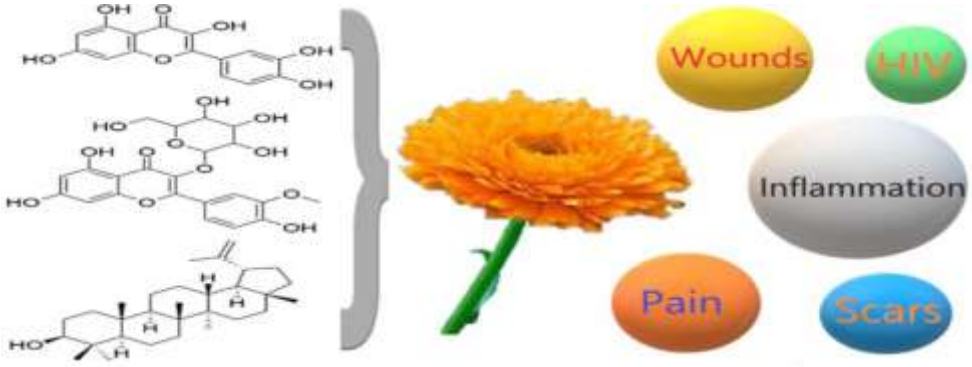
Caffeic Acid



Chlorogenic Acid

2. Calendula : Calendula is able to prevent oxidative stress, making it theoretically an ideal treatment for radiodermatitis. This is thought to be through the numerous polyphenols contained in its extract. Polyphenols have many potentially therapeutic roles as antioxidants on the skin(9,10).

Phytoconstituents -Flavonoids: Quercetin, rutin, narcissin, isorhamnetin, and kaempferol. Flavonoids are powerful antioxidants that help protect the skin from free radicals generated by UV radiation (oxidative stress)(11). They also have significant anti-inflammatory properties, which can help reduce the redness, swelling, and itching associated with PMLE flare-ups(12).



SAFETY PROFILE AND SIDE EFFECTS

A complete sun protection package includes sun protective clothing, sunscreen, and avoidance of the midday sun. Sun protection can also be affected by oral ingestion of certain compounds. polypodium leucotomos extract (PLE) has been shown to have photoprotective properties. Polypodium leucotomos is a fern native to South America that is widely recommended by dermatologists for its antioxidant and photoprotective properties(13). PLE does not act as a sunscreen, but has been shown to have some photoprotective efficacy. It works at both the molecular and cellular level to decrease UV-mediated cell apoptosis and necrosis. PLE inhibits the generation of Reactive Oxygen Species (ROS) as well as UV-induced AP1 and NF-κB. It also prevents damage to DNA and protects against endogenous antioxidant systems natural to the skin(14).

PHOTOTESTING

In an Indian study, phototesting of patients with PMLE showed that UVB rays were the most relevant wavelength. This increased sensitivity could be due to the geographical conditions, heat, and humidity in the subtropical climate. Photo-patch testing is not helpful indiagnosing PMLE(15).

PHOTOCHEMOTHERAPY

The frequency and severity of PMLE decreases with summer progression as a result of desensitization phenomenon called "hardening." This phenomenon is used in the treatment of PMLE. For mild cases, a self-conditioning programme by graduated exposure to sunlight is recommended. For severe cases, medically supervised conditioning is preferential(16). In Indian context, with increasing summer, the

hardening occurs as a natural phenomenon.The mechanism of induction of photoprotection is probably due to the following reasons:

a. induction of melanization
b. induction of epidermal thickening
c. UV induced immunomodulatory and anti-inflammatory Effects(17,18).

CONCLUSION

Polymorphous light eruption is a common disease with varied presentation in the Indian skin(19). Large scale studies are sparse in this largely neglected disease. It has to be differentiated from its close mimics and appropriately managed. A concord in management between the patient and treating physician is cornerstone for successfully overcoming this disease(20).

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