

**A Study in the Occurrence of Thyroid Dysfunction among Patients Presenting with Polymorphic Light Eruption (PLE)****R. Vishnu<sup>1</sup>, K. Gopalakrishnan<sup>2</sup>, K. Akila<sup>3</sup>**<sup>1</sup>Postgraduate, Department of Dermatology, Venereology and Leprology, Trichy SRM Medical College Hospital and Research Centre, Tiruchirappalli, Tamil Nadu, India.<sup>2</sup>Professor and Head of the Department of Dermatology, Venereology and Leprology, Trichy SRM Medical College Hospital and Research Centre, Tiruchirappalli, Tamil Nadu, India.<sup>3</sup>Associate Professor, Department of Dermatology, Venereology and Leprology, Trichy SRM Medical College Hospital and Research Centre, Tiruchirappalli, Tamil Nadu, India.

Received: 10-05-2024 / Revised: 20-05-2024 / Accepted: 11-07-2024

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Conflict of interest: Nil

**Abstract:****Background:** Polymorphic light eruption (PLE) is a skin condition caused by exposure to UV radiation, and its development is often associated with auto-immune processes. Thyroid dysfunction has been observed in people with sunlight-induced skin conditions such as melasma and polymorphic light eruption (PLE).**Aim:** (1) To assess the levels of TSH in patients who have polymorphic mild eruption. (2) To establish a relationship between autoimmune thyroiditis and polymorphic light eruptions by estimating anti-TPO antibodies**Methods:** The study comprised of 40 cases of PLE who attended our skin outpatient department. The clinical characteristics were documented, Thyroid-stimulating hormone (TSH), triiodothyronine (T3), tetraiodothyronine (T4) and anti-Tpo antibody levels were measured.**Results:** Mean (SD) age of the participants was 39.9 (14.8) years. 18 (45%) were male and 22 (55%) were female. Mean (SD) TSH levels were 3.15 (2.52). Mean (SD) anti TPO antibodies was 49.16 (107.6). 8 cases (20%) had increased TSH and 9 (22.5%) cases had increased anti TPO antibodies.**Conclusion:** Patients with PLE should undergo evaluation to determine if they have thyroid disorder, so that proper treatment can be given instead of only treating the discernible.**Keywords:** Polymorphic light eruption (PLE), Hypothyroidism, Anti-Tpo antibodies.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Polymorphic light eruption (PLE) is a skin condition caused by exposure to UV radiation, and its development is often associated with autoimmune processes. [1] This is a frequently occurring condition that typically impacts those living in regions with temperate climate. The condition manifests as a skin eruption following exposure to sun and artificial ultraviolet radiation (UVR), with symptoms typically lasting from a few hours to, in rare cases, a few days. The eruptions typically display symmetrical characteristics, ranging in colour from skin-coloured to erythematous. [1] They vary in form, appearing as papules, pustules, vesicles, or bullae. It frequently happens on the areas of the body that are exposed to the sun. Women are more frequently impacted than men, and this disorder typically presents as a delayed-type hypersensitivity response against naturally occurring skin photo-antigens. [2]

Additionally, there is a hereditary correlation, where family relatives of patients exhibit comparable primary symptoms. PLE, a prevalent photodermatosis, affects approximately 10-20% of indi-

viduals in western Europe and the USA. [3] While not a serious dermatological ailment, it typically hinders daily activities, primarily impacting individuals who work outside. [4] It is classified as an unknown photodermatosis, as the exact cause of its occurrence is yet not understood. [4] Some ideas propose that it may have autoimmune origins. In 1942, Epstein suggested the concept that a UV-induced neo-antigen may activate a delayed-type hypersensitivity reaction, suggesting the involvement of an immune-mediated mechanism. Thyroid dysfunction has been observed in people with sunlight-induced skin conditions such as melasma and polymorphic light eruption (PLE). [5] Thyroid disorders, especially hypothyroidism due to autoimmune thyroiditis is the most common endocrinal disease. Its prevalence varies between 3-10% in varied population, females being 5 to 8 times more affected than males. [6] Therefore, this study is carried out to assess the levels of TSH in patients who have polymorphic mild eruption and to establish a relationship between autoimmune thyroiditis and

polymorphic light eruptions by estimating anti-TPO antibodies.

### Materials and Methods

**Study Design and Population:** This cross sectional study was done in the department of dermatology in academic tertiary care private institute from July 2023 to April 2024. The study included 40 cases of PLE who attended the skin outpatient department. Following the acquisition of informed consent from the patients, an examination of thyroid functions was conducted. The study received approval from the institutional review board and ethical committee. The participants were included in the study based on their clinical diagnosis of PLE. Pregnant individuals, patients taking any drugs causing thyroid dysfunction (amiodarone, lithium, iodine) were not included in the study.

**Outcomes and Measures:** Applying the inclusion-exclusion criteria, a total of 40 cases and were selected for a research of thyroid function tests across all participants. A comprehensive medical history was obtained, including information about the lesion's appearance, location, associated symptoms, and previous therapy, as well as any symptoms related to thyroid disease. This was followed by a thorough clinical examination to assess the appearance, location, and size of the skin lesion, and to determine the individual's Fitzpatrick skin type. The thyroid gland was clinically examined using Lewinski's five-point scale, as outlined in a specifically constructed proforma. Thyroid function tests and anti-TPO antibodies were taken by collecting a blood sample from each subject. The results were documented in a pre-established proforma for the purpose of analyzing and interpreting the data.

**Statistical Analysis:** The data analysis will be conducted using the IBM version 26.0 of the SPSS software. Continuous variables will undergo statistical tests to assess their adherence to normalcy

assumptions. Descriptive statistics, including the mean, standard deviation, and range, will be computed. The categorical data will be displayed in the form of frequency and percentage values. Univariate and multivariable logistic regression analysis will be conducted to evaluate the important variables for the disease outcome. The unadjusted and adjusted odds ratio, together with their 95% confidence limits, will be displayed. A significance level of  $p < 0.05$  will be used for all statistical tests to determine statistical significance.

### Results

**Study Recruitment:** A total of 40 cases who consented for the study were included and analysed.

**Demographic Characteristics:** Among the total of 40 participants, 18 (45%) were male and 22 (55%) were female. The mean (SD) age of the participants was 39.9 (14.8) years, as most individuals in this age group are often exposed to sunlight due to their occupations. 10 (25%) of the patients were in the age group of 21 to 30 years, 11 (27.5%) were in the age group of 31 to 40 years and 9 (22.5%) were in the age group of 51 to 60 years. The demographic characteristics of the participants are presented in table 1. The main symptom in patients was itching. 30 (75%) of the lesions were present in upper limb, 4 (10%) in back, 4 (10%) in face and 2 (5%) in nape of neck. 1 (2.5%) had Fitzpatrick skin type IV, 17 (42.5%) had type V and 22 (55%) had type VI.

**Thyroid Function Test:** The thyroid function tests are given in table 2. In cases, the mean (SD) TSH levels were 3.15 (2.52). Mean (SD) anti TPO antibodies was 49.16 (107.6). 8 cases (20%) had increased TSH and 9 (22.5%) cases had increased anti TPO antibodies. Among them, 5 patients had increased TSH and anti-TPO antibodies and 4 patients had only increased anti-TPO antibodies. 1 (2.5%) patient had low TSH.

**Table 1: Demographic features of cases**

S No.	Value	Case
1	Age; mean (SD)	39.9 (14.8)
2	Sex; M:F	18:22
3	Symptoms - itching	100%
4	Duration (days)	42 (47)
5	H/O atopy	0%
6	Aggravating factor	
	Nil	5 (12.5%)
	Sunlight	34 (85%)
	Heat in kitchen	1 (2.5%)
7	Family history	0%
8	Fitzpatrick skin type	
	IV	1 (2.5%)
	V	17 (42.5%)
	VI	22 (55%)

**Table 2: Thyroid function test of cases**

S. No.	Value	Case
1	TSH	3.15 (2.52)
2	T3 ng/ml	1.04 (0.27)
3	T4 $\mu$ g/dl	8.38 (1.55)
4	Anti TPO antibodies IU/ml	49.16 (107.6)
5	Increased TSH	8 (20%)
6	Normal TSH	32 (80%)
7	Increased anti TPO antibody	9 (22.5%)
8	Normal anti TPO antibody	31 (77.5%)

**Figure 1: PLE lesions in nape of neck****Figure 2: PLE lesions in dorsum of hand****Discussion**

PLE has been found to be associated with various disorders. A considerable proportion of individuals with PLE experience contact or photocontact allergic reactions, primarily to skincare items and sunscreens. [7] Positive patch as well as photopatch testing have been observed in up to 75% of cases in certain studies. PLE sufferers have been found to have a propensity for developing autoimmune illnesses, specifically thyroid disease. [8] Hasan et al.

discovered at least one autoimmune condition in 15% of the 94 patients they studied. [9]

Polymorphic light eruption is characterized by a delayed beginning and an atypical response to sunlight that resolves without leaving scars. Due to its diverse range of morphological forms, it is commonly known as polymorphism. [10] It typically begins before the age of 30. PLE is more likely to occur in those with Fitzpatrick skin types I, while those with skin types IV or higher have the lowest

risk of acquiring this condition. The histopathological findings shows: (1) the infiltrating cells are mainly T-lymphocytes mostly CD4+ in the early lesions and CD8+ later; (2) Langerhans cells and dermal macrophages are also seen [11]

In our study, females exhibited a somewhat greater prevalence than males, with 55% of participants being female and 45% being male. The prevalence rates were determined to be 10% in the USA, 0.56% in India, 15% in the Kingdom of England, and 5% in Australia. [12]

In our study, 14 (35%) were farmers and 7 (17.5%) were housewives. Farmers had a higher prevalence of the disease due to their substantial engagement in outdoor activities. Multiple studies have shown a higher occurrence of this phenomenon among housewives, primarily as a result of engaging in domestic tasks that frequently expose them to sunshine. [13]

Our study revealed that hypothyroidism was present in around 20% of the cases. Previous study by Hasan et al. found that 8% of the persons had hypothyroidism or non-toxic goiter, which were likely caused by autoimmune factors. [9] In 2017, Sharma et al. discovered that around 18% of the PLE cases and 5% of the controls had overt hypothyroidism, while 6% of the cases and 1% of the controls had subclinical hypothyroidism. [14] According to a study conducted by Seetharam et al., around 25.9% of the PLE cases had both hypothyroidism and polymorphic light eruption, while only 7.5% of the control group had hypothyroidism. [6] The study undertaken by Chadha et al. demonstrated a parallel correlation between polymorphic light eruption and thyroid, substantiating that it was not a coincidental discovery. [15] A 2014 study by Sharma et al. found increased TSH in 24% cases and 6% controls. [16] In contrast to our findings, Mishra et al. found high TSH in 93.3% of patients. [17]

In our study, elevated levels of anti TPO antibodies were observed in 22.5% of the cases. Previous study by Hasan et al. showed 11.7% patients having autoimmune thyroiditis.<sup>9</sup> Another study by Seetharam et al. showed 25.9% patients having anti-TPO antibodies.<sup>6</sup>

#### The Limitation of the Study

The limitation of this study is its small sample size. This relationship between the TSH, anti TPO antibody and PLE must be subjected to additional evaluation by including a larger sample size of PLE patients. This is necessary in order to provide further evidence and determine if the observed positive correlation is due to autoimmune dysfunction or has a causal relationship.

#### Conclusion

The skin serves as a crucial diagnostic tool for identifying internal organ illnesses, such as thyroid abnormalities. Given the correlation between PLE and thyroid disorders, it is advisable to routinely evaluate patients with these skin illnesses for thyroid issues. It is crucial to identify the endocrinopathy in order to provide patients with proper treatment instead of only treating the symptoms.

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