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CORRELATION BETWEEN CLINICAL AND HISTOPATHOLOGICAL PATTERNS IN PATIENTS WITH PHOTO DERMATOSES

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ABSTRACT

Background: Photodermatoses are a category of conditions arising from atypical skin responses to sun radiation. These include idiopathic photodermatoses , drug induced photodermatoses, DNA repair-defect photodermatoses, and photo-aggravated dermatoses. Their differential diagnosis is challenging; therefore, it is essential to correlate the clinical and histological results

Methods

An observational study was done among patients diagnosed clinically to have photodermatoses, who presented to Department of Dermatology, Trichy SRM Medical College Hospital and Research Centre to correlate clinical and histopathological findings. A total of 150 patients with clinically diagnosed photodermatoses were enrolled for the study. A semi-structured questionnaire was used to gather information. Detailed information about demographic details with the data regarding occupation, outdoor activity, dressing habits, symptoms, aggravating factors and associated medical conditions was observed and collected; the patient underwent a physical and cutaneous examination by a single dermatology resident to avoid inter-observer variation. The lesion was examined for the distribution, morphology, primary and secondary lesions. Skin biopsy was taken for the purpose of histopathological examination and a clinical photograph was also documented for all cases. Data were entered and analysed using SPSS statistical package IBM version 2.1.

Results

Participants were mostly between the ages of 18 and 30 (46%), with those between the ages of 31 and 40 (28%), coming in second. Of the sample, 54.66% (82 participants) were female, and 45.33% (68 participants) were male. 103 participants, or 68.66% of the total, reported engaging in outdoor activities frequently. Plaques were the most prevalent lesion shape among the patients with photodermatoses, occurring in 61.33% of cases, followed by papules (52%) and macules (24%). Among 150 cases of photodermatoses, polymorphous light eruption (PMLE) was the most prevalent clinical diagnosis, occurring in 87 (58%) of cases. Out of 87 cases of PMLE, 23 cases (26.43%), 43 (49.42%) and 21 cases (24.13%) were reported as acanthosis, spongiosis and exocytosis as a

histopathology findings. In PPD diagnosed 26 cases, orthokeratotic hyperkeratosis, hyergraulosis, acanthosis were observed among 10 (38.46%), 11 (42.3%) and 5 (19.23%) cases respectively. All the cases (15 cases) of DLE were showed orthokeratic hyperkeratosis.

Conclusion

This observational study compares various photodermatoses with corresponding histological findings. Women in their second to fourth decade of life are more commonly affected by photodermatoses. Micro-papular and papular lesions are the predominant clinical presentation. The diagnosis of photodermatoses is primarily clinical; however, histopathological examination is necessary in ambiguous cases to exclude other differential diagnoses.

Keywords: Photodermatoses, Papular Lesions, Histopathological Findings.

INTRODUCTION

Photodermatoses comprise group of dermatoses marked by the appearance of cutaneous lesions following exposure to UVB (280-315 nm), UVA II (315-340 nm), UVA I (340-400 nm), and/or visible light (400-760 nm). The ultraviolet (UV) spectrum (200–400 nm) includes UVA (320–400 nm), which is invisible to the human eye; UVB (290–320 nm), the most biologically active wavelengths reaching the Earth's surface and responsible for sun burns; and UVC (200–290 nm).[1,2]

Ultraviolet light induces and exacerbates numerous skin lesions and systemic disorders. The most common sites include the forehead, nose, malar regions, ear helices, upper chest (V area), lateral neck, extensor surfaces of the forearms, and the dorsal aspects of the hands and feet. The hairy regions such as the scalp and eyebrows are unaffected, and there is frequently normal skin adjacent to the hairline.[3] The effects on the skin are due to mediators, such as IL-1, IL-10, serotonin, histamine, and by-products of arachidonic acid metabolism, released by keratinocytes, mast cells, and other inflammatory cells. The immunological alterations are due to the effect on Langerhans cells, suppressor and other T cell subtypes, and the release of cytokines such as IL-1 and IL-6.[4]

The skin lesions may be of varied morphology such as micro-papules, papules, plaques, with lesions that may be hypo-pigmented, erythematous or hyper-pigmented. The condition may be acute or chronic, symptoms including severe pruritus, localized edema, burning sensation, vesicle formation and even desquamation of the skin may be present.[5]

Photodermatoses may be divided into five primary classifications: 1) Idiopathic photodermatoses, comprising of polymorphic light eruption (PMLE), actinic prurigo, hydroa vacciniforme, chronic actinic dermatitis, and solar urticaria; 2) photodermatoses resulting from exogenous agents, including phototoxic and photoallergic reactions; 3) photodermatoses due to endogenous agents, primarily porphyrias; 4) photo-exacerbated dermatoses, as in certain autoimmune diseases, infectious conditions, and nutritional deficiencies; and 5) genodermatoses.[6]

Polymorphous light eruption (PMLE), the most common form of idiopathic photodermatoses and are usually seen in young and middle aged women. Lesions are primarily observed on the extensor surfaces of the forearms, however the lateral aspects and nape of the neck, along with other exposed regions, may also be affected. Lesions frequently exhibit pruritus and present diverse morphologies: eczematous, glossy pinpoint lichenoid, hypopigmented, macular, papular, vesicular, erythema multiforme, or plaque-like forms.[7]

A comprehensive history and clinical assessment are crucial for the former, with meticulous inquiries into the latent period between sun exposure and the emergence of lesions, as well as any seasonal and diurnal fluctuations. Dermoscopy is a noninvasive imaging procedure for the skin, utilizing a handheld instrument to visualize both surface and deeper structures, including colors and patterns in skin lesions that are frequently undetectable to the human eye. Nonetheless, dermoscopic findings must be connected with the clinical and histological attributes of lesions to substantiate it as a viable method or alternative to biopsy and to demonstrate it as a connection between microscopic and macroscopic aspects.[8,9] The morphology of the skin lesions and photo-patch testing may help in the diagnosis. Skin biopsies and laboratory tests, including antinuclear antibody (ANA) and porphyrin profiles, may be necessary to further validate the diagnosis.[10]

All individuals with photodermatoses must adhere to stringent photo-protection measures. In cases of photo-allergy, photo-toxicity, and severe photosensitivity, it is standard practice to avoid all identified allergens, photo-allergens, and photo-sensitizing medications. Broad-spectrum sunscreens should ideally be utilized only after confirming the absence of a sunscreen allergy. Topical steroids may be administered to the skin lesions, contingent upon the location and severity of involvement, and may be gradually reduced and discontinued dependent on the therapeutic response.[11,12]
Limited research exists in India about the diverse patterns of photodermatoses; therefore, this study aimed to evaluate the clinical manifestations and histological characteristics in patients with different photodermatoses.

OBJECTIVES

- To Correlate the clinical presentation and histopathological patterns in patients with various photodermatoses
- To describe the nature of occupation, outdoor activity and dressing habits among clinical findings of various photodermatoses.

MATERIAL AND METHODS

Study Design

The current observational study was conducted on patients clinically diagnosed with photodermatoses attending OPD in the department of Dermatology, SRM Medical College, Trichy for a period of twelve months.

Study Population

Patients clinically diagnosed with photodermatoses attending OPD, Department of Dermatology.

Inclusion Criteria

- Patients with age between 18-70 years.
- Both genders
- Patient diagnosed with photodermatoses.
- Treatment wash off period of 1 month.

Exclusion Criteria

- Patients with severe systemic illness.
- Pregnancy and lactating women.
- Participants not willing to give consent.

Sampling Technique

Convenient sampling.

Sample Size

The sample size was determined using the previous research published by Saraswat et al[13] using the common presentation of papules accounted for 68% with 8% of absolute precision and 95% confidence interval. The sample size is calculated by the formula.

$$\mathbf{N = Z^2_{1-\alpha/2} \times p \times (1 - p) / d^2}$$

$N = (1.96)^2 * 0.68 * (1 - 0.68) / (0.08)^2$

$N = 131$

With 10% non-responsive rate the total sample size is rounded off to 150

$Z1-\alpha/2$ - two tailed proabability for 95% confidence interval = 1.96

p (%) - prevalence of = 0.68

d (%) - precision or allowable error for = 0.08

Thus the total sample size required for the study is 150

Data Collection

An observational study was done among patients with photodermatoses , who presented to Department of Dermatology, Trichy SRM Medical College Hospital and Research Centre to correlate clinical and histopathological findings. A total of 150 patients with clinically diagnosed photodermatoses were enrolled for the study. The study was done for one year duration and purposive method was adopted for selection of participants.

The study was conducted after obtaining ethical clearance from the Trichy SRM Medical College Hospital and Research Center's Institutional Ethical Committee. After describing the study procedures, the patients were asked if they would consent to take part in the research. A semi-structured questionnaire was used to gather information. Detailed information about demographic details with the data regarding occupation, outdoor activity, dressing habits, symptoms, aggravating factors and associated medical conditions was observed and collected; the patient underwent a physical and cutaneous examination by a single dermatology resident to avoid inter-observer variation. The lesion was examined for the distribution, morphology, primary and secondary lesions. Skin biopsy was taken for the purpose of histopathological examination and a clinical photograph was also documented for all cases.

Data Analysis

Data were entered and analysed using SPSS statistical package IBM version 2.1. Clinical morphology of various skin lesions of Photodermatoses were presented as frequency and percentage values. The association between all the statistical tests, a two- sided probability of $p < 0.05$ was taken as statistically significant.

Ethical Issues

- Participants were informed about the study and informed consent was obtained
- This study was presented to Institutional Ethical Committee of SRM Medical College, Trichy.

RESULTS

This study was conducted among 150 patients who were diagnosed as photodermatoses. Table 1 shows the baseline characteristics of the participants. Participants were mostly between the ages of 18 and 30 (46%), with those between the ages of 31 and 40 (28%), coming in second. The age groups of 41–50 years (15.33%), 51–60 years (8%), and over 60 years (2.66%) had lower percentages. Of the sample, 54.66% (82 participants) were female, and 45.33% (68 participants) were male. 103 participants, or 68.66% of the total, reported engaging in outdoor activities frequently. The remaining individuals participated in outdoor activities either once a day (8%, 12 participants) or twice a day (23.33%, 35 participants). A small majority of participants (52.66%, 79 individuals) worked outdoors, while 47.33% (71 people) worked indoors.

Sl. No	Variables		Frequency	Proportion
1	Age	18 – 30 years	69	46%
		31 – 40 years	42	28%
		41 – 50 years	23	15.33%
		51 – 60 years	12	8%
		> 60 years	4	2.66%
2	Gender	Male	68	45.33%
		Female	82	54.66%
3	Nature of occupation	Indoor	71	47.33%
		Outdoor	79	52.66%
4	Outdoor activity	Frequently	103	68.66%
		Two times a day	35	23.33%
		Once a day	12	8%

5	Dressing habits	Long sleeved full length garments	67	44.66%
		Darker or brightly colored clothing	45	30%
		Loose fitting clothes	56	37.33%
		Wearing sunglasses	34	22.66%

Table 1: Baseline characteristics of the participants (n=150)

Table 2 shows the morphology of skin lesions among patients. Plaques were the most prevalent lesion shape among the patients with photodermatoses, occurring in 61.33% of cases, followed by papules (52%) and macules (24%). Indicating persistent inflammation and chronicity, scaling (30%), erythema (28.66%), and pigmentation (27.33%) were also commonly observed. Crusting (14%), lichenification (12.66%), and vesiculation (7.33%) were less frequent characteristics that were frequently linked to more severe or acute stages of the illness. Acute allergic reactions or DLE were represented in rare observations including urticarial wheals (1.33%), edema (2.66%), and discoid lesions (3.33%). These findings point to a broad range of skin lesion types, with scaling and plaques serving as important markers of long-term photodermatoses.

Sl. No	Variables	Frequency	Proportion
1	Macules	36	24%
2	Papules	78	52%
3	Plaques	92	61.33%
4	Discoid lesions	5	3.33%
5	Erythema	43	28.66%
6	Edema	4	2.66%
7	Urticarial wheals	2	1.33%
8	Vesiculation	11	7.33%
9	Crusting	21	14%
10	Lichenification	19	12.66%
11	Scaling	45	30%
12	Pigmentation	41	27.33%

Table 2: Morphology of skin lesions among participants

Figure 1 shows the presentation of various photodermatoses among 150 participants enrolled in this study. Among 150 cases of photodermatoses, polymorphous light eruption (PMLE) was the most prevalent clinical diagnosis, occurring in 87 (58%) of cases. The next two conditions with moderate prevalence were Discoid Lupus Erythematosus (DLE) at 15 (10%) and Pigmented Purpuric Dermatosis (PPD) at 26 (17.30%). Systemic Lupus Erythematosus (SLE) was observed at 5 (3.33%), whereas Actinic Lichen Planus (ALP) was less common at 6 (4%), Photodermatitis due to Drugs (PDR) at 7 (4.66%), and Chronic Actinic Dermatitis (CAD) and Solar Urticaria (SU) at 2 (1.33%).

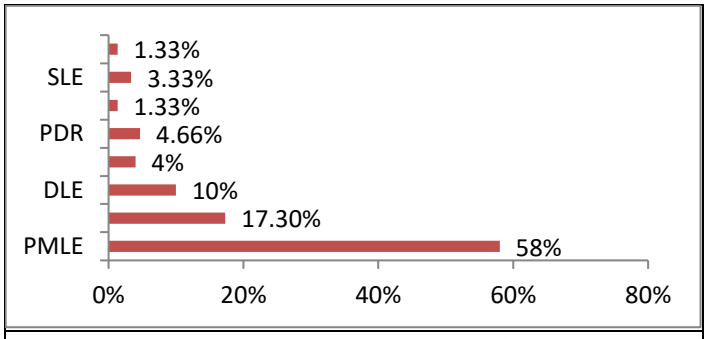

Figure 1: Presentation of photodermatoses

The histopathology findings were assessed for various photodermatoses. Out of 87 cases of PMLE, 23 cases (26.43%), 43 (49.42%) and 21 cases (24.13%) were reported as acanthosis, spongiosis and exocytosis as a histopathology findings. In PPD diagnosed 26 cases, orthokeratotic hyperkeratosis, hyergraulosis, acanthosis were observed among 10 (38.46%), 11 (42.3%) and 5 (19.23%) cases

respectively. All the cases (15 cases) of DLE were showed orthokeratic hyperkeratosis. Out of clinically diagnosed six cases of ALP showed that, five of them reported to be hypergranulosis and only case showed pigment incontinence. Two cases f CAD also orthokeratotic hyperkeratosis. Although three cases of SLE showed pigment incontinence, two cases reported with irregular acanthosis. Two cases of SU reported with normal epidermis.

Figure 2: Multiple erythematous indurated plaques on face (anterior aspect) in Chronic actinic dermatitis

Figure 3: Erythematous indurated plaques on face (lateral aspect) in Chronic Actinic Dermatitis

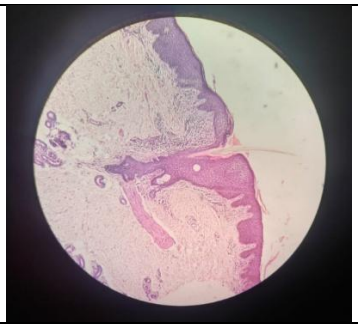

Figure 4: Histopathology showing hyperkeratosis and irregular acanthosis

DISCUSSION

Demographics and Outdoor Engagement

The majority of our cohort (74%), which was made up of young individuals between the ages of 18 and 40, had a high frequency of exposure to the outdoors (68.7%), and a mean female-to-male ratio

of almost 1.2:1. This demographic distribution correlates with findings by Oakley and Ramsey et al.,[14] who determined that PMLE predominantly affects females aged 20–40, attributable to increased intermittent sun exposure and potential hormonal impacts, such as estrogen modulation. Oakley et al. observed that PMLE is "more prevalent in Northern Europe (15%) than in Australasia (5%), yet it impacts all skin types."

A study conducted by Dimple Chopra et al.[15] revealed a female-to-male ratio of 1.04:0.96, with a mean age of 41.5 years, consistent with our findings. The Indian review by Merin et al. similarly indicated a female predominance in the second and third decades, attributing this phenomenon to heightened UV exposure during domestic and agricultural tasks, which is similar to findings of our study .[16] Another study by Khaitan B et al[9] indicated that the majority of participants were 48 females and 24 males, with a mean age of 29.2±10.4 years (ranging from 12 to 65 years), which is comparable to our study findings.

Lesion Morphology

In our investigation, plaques were the predominant lesion form (61.3%), succeeded by papules (52%) and macules (24%). This polymorphic appearance resembled the findings of Prasad et al.,[17] who identified plaques and papules as the predominant lesions. Our findings are similar with those of Bedi et al. and Wadhwani et al., indicating that the multiphasic papular variation, specifically micropapular PMLE, has been notably described in Fitzpatrick skin types IV–VI. These variations manifest as clustered pinpoint hypo-pigmented papules, mostly on the forearms and infrequently on the face. Our histo-pathologic findings in PMLE notably corroborated this presentation, reinforcing the clinical-dermoscopic link.[18,19]

Clinical Diagnosis and Histopathological Correlations

In our study, PMLE was the predominant diagnosis, comprising 58% of patients, followed by Pigmented Purpuric Dermatosis (PPD) at 17.3%, and Discoid Lupus Erythematosus (DLE) at 10%. Our histological examination of PMLE revealed spongiosis in 49%, acanthosis in 26%, and exocytosis in 24%-characteristic features of PMLE lesions evolving from early spongiotic dermatitis to more chronic hyperplastic variants.

In a study conducted in Chennai, Pullabatla et al. observed same trends, noting that PMLE is prominent, characterized by spongiosis and lymphocyte infiltration in early lesions and hyperkeratosis in older plaques which is in consistent with our study report.[20]

Dimple Chopra et al. also discovered that PMLE was the most common clinical diagnosis, occurring in 97% of cases. The increased incidence of PMLE in the current study may be attributed to the agriculture-based occupation of this region in India, where the populace engages in prolonged outdoor labor, hence increasing their exposure to photodermatoses, which aligns with our study findings.

Another study by Sharma et al[21] similarly indicated that PM LE was more prevalent in females (61%) than in males (39%). The most prevalent lesion was the papule, followed by plaques; nonetheless, the majority of patients exhibited a mixed presentation of multiple lesions. The most often affected place was the neck, followed by the upper limbs. Histopathological findings were largely non-diagnostic; most slides exhibited spongiosis, parakeratosis, and edema of the papillary dermis which is also comparable to our study report.

LIMITATIONS

The research was performed in a single hospital with a limited sample size. The findings may not accurately reflect the entire community.

CONCLUSION

This observational study links different photodermatoses with corresponding histological findings. Young females in their second to fourth decade of life are more commonly affected by photodermatoses. Micro-papular and papular lesions are the most common lesions . The diagnosis

of photodermatoses is primarily clinical; however, histopathological examination is necessary in ambiguous cases to exclude other differential diagnoses.

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Conflict of interest: Nil

Ethical approval: The study received authorization from the Institutional Ethics Committee.

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