

A Study of Epidemiology and Clinico-Pathological Profile of Paederus Dermatitis in a Tertiary Care Hospital

Dr. K Lakshminarayana*

Associate Professor, Department of Dermatology, Venereology and Leprosy, Prathima Institute of Medical Sciences, Naganoor, Karimnagar, Telangana, India

***Corresponding author**

Dr. K Lakshminarayana

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Abstract: Paederus dermatitis is a type of irritant contact dermatitis caused by beetles of the Paederus species. The objectives of this study were to know the incidence, clinical varieties, histopathological changes, and microbiological findings. **Methods:** 100 patients of Paederus dermatitis were considered, a detailed history was taken and a general examination was done. Skin biopsy and skin swabs were taken from all the patients and findings were noted. Follow-up was done to know the prognosis of the patients. **Results:** The study showed that males were more frequently affected than females with a ratio of 3:2, most prevalent in the months of March and September. Itching and burning were common symptoms with the majority of the lesions appearing on uncovered areas of the body. The most common lesions seen were erythema, vesicles, and erosions. Different stages of the lesions showed different histopathological changes with epidermal necrosis, dermal edema, and lymphocytic infiltrate being most common. Hyperpigmentation was a common complication which could be avoided if treatment is taken in the early stages. **Conclusion:** Pruritus was the predominant complaint in the patients with burning sensation being present in almost equal numbers. Hyperpigmentation was the main complication which was long-standing if the patients did not initiate treatment in the early stages of the disease. Use of preventive measures against the beetles along with prompt treatment reduces the complications and improves the quality of life for the patient.

Keywords: Epidemiological and clinical study; Paederus Dermatitis; Tertiary care hospital.

INTRODUCTION

Paederus Dermatitis is also known as Dermatitis Linearis or Paedrous Dermatitis [1]. Paederus species beetles, which are the implicated organisms, are well known for causing dermatitis in man, which is commonly known as "Spider lick" [2]. Epidemics caused by *P. sabaeus* is called "bruleuses" in New Guinea [3], "skirt and blouse" in Southern Nigeria [4, 5] and in Uganda [6], "rove beetle dermatitis" in South West Africa or the "escaper" in several African countries, [7-9] Paederus dermatitis is a peculiar irritant contact dermatitis. Paederus dermatitis (rove beetle dermatitis) is a geographic seasonal vesiculobullous disorder. It occurs when beetles of the genus Paederus are crushed on the skin, releasing the hemolymph pederin [10]. The etiological insect of Paederus dermatitis belongs to the Family Staphylinidae and the genus Paederus. These are also called as rove beetles. Internationally, small rove beetles are troublesome in many tropical and subtropical regions. They frequent damp habitats and may be plentiful in irrigated crop fields. They usually fly after dark in hot, humid weather and are attracted to lights [11]. Their hemolymph contains indeed a very complex amide named pederin, secreted by an inner beetle symbiotic bacteria closely resembling *Pseudomonas aeruginosa*. This substance is

produced in the body of the female during oogenesis is transmitted to offspring in the egg (larva, pupa and imago male have that initial stock), while the symbiotic bacteria is also transmitted with the chorion [12]. It is often mislabeled as an insect bite reaction, but in fact, it is true dermatitis with close resemblances to irritant contact dermatitis. It is found to be endemic in and around Prathima Institute of Medical Sciences with a lot of medical students, nurses, and other working staff being affected by it. Hence we in the present study tried to study the prevalence of Paederus dermatitis in and around Nagunur area with particular emphasis on clinical and pathological features.

MATERIALS AND METHODS

This study is a cross-sectional study. Material for the present study consisted of 100 cases of clinically diagnosed Paederus dermatitis, who attended the Department of Dermatology, Venereology, and Leprosy in Prathima Institute of Medical Sciences, Nagunur, Karimnagar. Institutional ethical committee permission was obtained for the study. Written consent was obtained from all the participants of the study. The patients were selected at random irrespective of age, sex, and socioeconomic status. A detailed history was taken with reference to the mode of onset, duration of

symptoms, the progression of the disease, age of lesions at presentation, types of lesions, site and the extent of involvement. History of knowledge of contact with Paederus insects and history of similar episodes in the past was queried and recorded. History of identical lesions in neighbors was taken. In addition, the type of housing, the type of lighting used in the house, and the distance of the sleeping area from the source of lighting was enquired. Details regarding measures taken to prevent the invasion of homes by the Paederus insects such as the closing of windows and use of insecticides were noted. The presence of paddy fields and other agricultural areas around the area of residence was asked for and noted. Inclusion criteria: All patients presenting with lesions suggestive of primary irritant contact dermatitis of sudden onset without apparent contact with any other irritant substances. Lesions showing seasonal prevalence and clustering in incidence. Exclusion criteria: Primary irritant contact dermatitis due to other causes like marking nut dermatitis by comprehensive history taking, vesiculobullous disorders and doubtful cases of primary irritant contact dermatitis. Patients who were unwilling to get a biopsy done. Skin biopsy of the presenting lesions in all 100 patients were taken. After a thorough cleansing of the selected part with rectified spirit, the parts were infiltrated with two-percent xylocaine and a bit of skin involving the whole thickness was removed.

A disposable 4 mm punch biopsy needle was used. A specimen was taken from the edge of the involved skin and was fixed in an aqueous solution of 35% w/v formalin and was submitted for histopathology studies at The Department of Pathology, Prathima Medical College, Nagunur, Karimnagar. Stained histopathological slides were studied under a light microscope using both low power objective and high power objective to find out the changes in the epidermis, dermis, and hypodermis. Skin scraping, blister fluid, or pus from the lesions was collected and sent for microbiological examination. All the samples were processed and then were incubated in Brain Heart infusion broth. The samples were observed at the end of a 1st day and the 3rd day for any growth. Complete blood count with hemoglobin percentage, erythrocyte sedimentation rate and urine for albumin, sugar, and microscopy were undertaken. Patients are followed up till 6 months to observe for the long-term complications of Paederus dermatitis.

RESULTS

One hundred patient clinically diagnosed and untreated cases of Paederus dermatitis were studied. These patients belong to both sex and were between the ages of 5 years and 80 years. Out of the 100 cases, 60 patients were Male and 40 patients were Female. Male to Female ratio was 3:2

Table-1: Age wise distribution of the patients in the study

Age group (in years)	Number of patients (%)
0 - 5	1
6-10	1
11-15	6
16-20	19
21-25	34
26-30	15
31-35	8
36-40	3
41-45	7
46-50	1
51-55	4
>55	1
Total	100

The maximum number of cases was seen in the months of March and September. The clustering of the cases around the particular months is depicted in Chart 4 above. The highest number of cases was seen distributed in two time periods; March to May and August to October. These 6 months of the year constituted up to 88% of all cases indicating the breeding seasons of the insect. Few scattered cases were seen in other months of the year as well constituting the remaining 12% of cases.

Itching and burning were the main symptoms in the patients in all stages of the disease. The itching was the most common symptom, present in 62 patients followed by burning in 60 patients. A few patients had both a burning and itching sensation. The patients experienced burning sensation especially after contact with clothing or any other material and after excessive sweating. 7 out of all the patients did not suffer from any itching or burning sensation presenting only with skin lesions.

Table-2: Distribution of cases based on an area of residence

Village/Location Name	Number of patients (%)
Prathima Institute of Medical Sciences	45
Nagunur	21
Jubilee Nagar	12
Elbotharam	12
Chamanapally	10
Total	100

Table-3: Site of lesion in patients

Site of Lesion	Male (n=60)	Female (n=40)	Total (%)
Head	13 (21.6%)	11 (70%)	24
Neck	32 (53.3%)	28 (70%)	60
Trunk	20 (33.3%)	9 (22.5%)	29
Upper limbs	31 (51.6%)	17 (42.5%)	48
Lower limbs	7 (11.6%)	1 (2.5%)	8

As the etiopathogenesis of the disease requires contact of the insect with naked skin, the disease was most prevalent in the exposed areas of the body. The

commonly affected area was the neck followed by upper limbs. Lower limbs were least affected.

Table 4: Distribution of lesions in various stages

Type of Lesion	Early (n=50)	Intermediate (n=40)	Late (n=10)
Papule	12 (24%)	5 (12.5%)	1 (10%)
Plaque	14 (28%)	16 (40%)	4 (40%)
Erythema	44 (88%)	29 (72.5%)	8 (80%)
Vesicle	28 (56%)	18 (45%)	4 (40%)
Pustule	17 (34%)	15(37.5%)	0 (0%)
Erosion	15 (30%)	20 (50%)	2 (20%)
Scab	3 (6%)	21 (52.5%)	10 (100%)

In the 100 cases that were biopsied, epidermal necrosis (in 94 cases) was the most common epidermal change that was observed histopathologically followed by neutrophilic infiltration (in 72 cases). The most common change in the dermis was dermal edema (in 87 cases) followed by perivascular lymphocytic infiltration (in 78 cases). The most common changes in an early lesion were epidermal necrosis and dermal edema. Spongiosis and perivascular infiltration were the commonest changes seen in the intermediate lesions. Among the late lesions, neutrophilic infiltration and perivascular and interstitial infiltration of lymphocytes were significant changes. All the 100 cases were studied for microbiology and skin smears/ vesicle fluid/ pus was sent for culture and sensitivity. *Pseudomonas* was cultured only in 3 patients with *Staphylococcus* spp. and *Streptococcus* spp. seen occasionally. No growth was seen from the skin smears in 89 patients.

DISCUSSION

Paederus dermatitis is although present worldwide including many parts of India is restricted to multiple small pockets of endemic areas. The area of this study is one such endemic area and comprises of a rural setting with a high degree of agricultural activity. Depending on the stage of the lesions, various types of clinical patterns are seen including erythema, papules, plaques, vesicle, pustules, erosions, and scabs. The

lesions generally heal within 2-3 weeks with residual hyperpigmentation which is the main complication. According to this study, the youngest patient was 5 years old and the oldest was 80 years old. The age group of 21-25 years showed the highest incidence among all age groups followed by the age group of 16-20. Majority of the cases were clustered in the range of 16-30 years. The age groups such as infants, children below 10 years, and older people above 60 years slept in more protected areas. In a study by Gnanaraj *et al.*, [13] the affected age group was 6 months to 75 years with the most number of cases being recorded between 13 and 33 years. Hashish *et al.*, [14] in a study found that the age ranged from 9 to 52 years. Canan *et al.*, [15] reported the average age to be 26 years. In the present study, males were more affected than females. Out of the 100 patients in the study, 60 were males and 40 were females. The ratio was 3:2 and may be a result of the tendency of males to sleep in open areas with minimal clothing. Females whose clothing patterns left a reduced area of the skin exposed to the environment and insects were affected at a lesser rate. Qadir *et al.*, [16] in his study found that males constituted 86% and females 14%. In a study by Hashish *et al.*, [14] 75% of the cases were males. The observation based on this study was that the incidence of *Paederus* dermatitis was seen in a bimodal pattern. There were two peaks in incidence of the disease per year in the months of April

and September, each contributing to 27 % of the total cases. Major clustering of cases was seen in the months of March to May and August to October. This type of seasonal variation in the incidence has been attributed to the breeding patterns of the insects and the relation of the insect population to rainfall. A report from Kolkatta by Coondoo and Nandy [17] indicated two spikes in the incidence in April and November. Padhi *et al.*, [18] report the maximum incidence to be in the months of March to July. Nasir *et al.*, [19] showed in their study that the maximum population of the insects was seen in the months of July to August and also in April. The main symptoms that were exhibited by the patients in this study were itching and burning. The itching was seen in 62% of patients and burning in 60% of cases. Both itching and burning were seen in 28 patients. As the etiological agent of the disease, paederin is a strong alkaloid, it causes an irritant contact reaction on the skin. As a result, the symptomatology of the disease is similar to that of irritant contact dermatitis with itching and burning sensation being the main complaints. Kamaladasa *et al.*, [20] reported similarly high percentages of patients suffering from burning (82%) and itching (90%). In the current study, neck (60%) and upper limbs (48%) were affected in the majority of the cases. The other areas affected were the trunk (29%), head (24%), and the least commonly affected part was the lower limbs (8%). The neck and upper limbs were affected more because these are more accessible to insects. Ali *et al.*, [21] in a study noted results comparable to the present study with the highest incidence of lesions on the upper extremity (40%), followed by neck (36%), trunk (32%), face (27%), periorbital areas (17.4%), and legs (3.1%). The results of this study were in conjunction with those of Guillen Z [22] reported similar changes such as vacuolization of the epidermis, neutrophilic infiltration, and dermal edema in early lesions and epithelial necrosis, perivascular lymphocytic infiltrate in intermediate lesions. According to Singh *et al.*, [23] the similar histopathological picture is seen in all the stages of Paederus dermatitis. Zargari *et al.*, [24] studied histopathology of the lesions and his findings corroborated by the findings of this study. Various studies implicated the role of a symbiotic bacterium in the production of paederin in the coelomic fluids of the insects. Other studies have indicated that the bacteria might be a species of the gram-negative *Pseudomonas* through genetic studies and other advanced gene clustering techniques. *Pseudomonas spp* was isolated only in 3 patients with *Staphylococcal spp* (in 6 cases) and *Streptococcus spp* (in 2 cases) with 89 culture reports being sterile. This indicated that either the *Pseudomonas* in the coelomic fluid of the insect was not being transmitted onto the skin or the species is unable to thrive and multiply on the skin surface. All the cases of Paederus dermatitis were treated in the lines of irritant contact dermatitis. Topical therapy of a combination formulation of corticosteroid and antibiotic was instituted for all patients of Paederus dermatitis.

Potent corticosteroids like Clobetasol and Halobetasol were used in patients who had lesions on the body. Patients who suffered from post-inflammatory hyperpigmentation were treated with Kojic acid which showed good improvement. Haddad *et al.*, [25] and Dagoberto [26] Kumar *et al.*, [27] suggested the use of corticosteroid creams and adding systemic antibiotics to treat the secondary infection.

CONCLUSION

The maximum incidence of Paederus Dermatitis was seen in the age group of 21-25 years. Seasonal prevalence was highest in the months of March and September. Pruritus was the predominant complaint in the patients with burning sensation being present in almost equal numbers. Hyperpigmentation was the main complication which was long-standing if the patients did not initiate treatment in the early stages of the disease. Use of preventive measures against the beetles along with prompt treatment reduces the complications and improves the quality of life for the patient.

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