Clinico-dermatologic patterns of Paederus dermatitis in a teaching hospital, South India

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ABSTRACT

Background: Paederus dermatitis (PD) is a common skin condition occurring in South India caused due to contact with Rove beetle. It is often misdiagnosed due to wide difference in its presentation. The aim of this study was to describe the clinical, sociodemographic, and environmental condition of patient's presenting with PD. Methodology: A descriptive study was done among all patients diagnosed of PD at the Dermatology department of a teaching hospital in Trichy, South India, between January and December 2020. A detailed clinical history, examination of the lesion, and systemic examination was done. Patients were followed-up after 1 week to re-assess the lesion. A total of 117 cases were included in the final analysis. Results: The mean age of patients was 24.54 ± 11.8 years. Female were 51% with 84.6% residing in rural area. Majority of the cases presented between January and May. Presence of thick vegetation (85.5%) and sleeping with windows open (60.7%) were found to be the common risk factors. Most patients reported noticing the lesion in the morning with sudden onset associated with redness and tenderness with a bizarre pattern of lesion. Face, neck, and upper extremity were the most affected sites with burning sensation and itching, experienced by 82.1% and 76.1%, respectively. Ocular involvement with peri-orbital edema was seen among 17% of cases. Post-inflammatory pigmentation was present in 92.1% patients. Conclusion: PD present has a varying degree of skin lesions with absence of the typical linear pattern. Knowledge of its presentation is important to avoid misdiagnosis.

Keywords: Irritant dermatitis, Paederus dermatitis, Rove beetle

Introduction

Around 1.5 million species have been described to be living on Earth, among these, beetles constitutes 25%.[1] The most common groups of beetle causing dermatitis in humans belong to the family of Oedemeridae, Meloidae, and Staphylinidae. Pederous beetle (also called Rove beetles) is a subtype of Staphylinidae.[2] They differ from the other family of beetles due to the presence of pederin toxin over cantharidin.[3] Paederus dermatitis (PD) also known as dermatitis linearis, is a cutaneous condition caused by the toxins released by Rove beetles. The vesicant chemical in the body fluids of these insects causes an acute irritant contact dermatitis characterized by erythematous-vesicular lesions associated with burning sensation on exposed parts of the body. These insect can fly but prefer to crawl and exhibit phototaxis to fluorescent light, preferentially of long wavelength white light. They are 7–13 mm long and brightly colored with orange or red stripes on pronotum and basal abdominal segments are commonly mistaken for ants [Figure 1]. They have a characteristic habit of curling up their abdomen when they run or are disturbed. It has to be noted that the insect does not bite but the crushing...
of the insect causes the release of hemolymph which contains the toxin.\[4]\n
*Paederus* genus includes over 600 species which is found in all temperate and tropical continents.\[5]\n*Paederus melampus* is the commonest species found in India.\[6]\nOutbreaks have been reported all over the world with an uncertainty that it could be either due to increasing trend or a seasonal pattern. Due to wide variation in the occurrence and pattern of dermatitis due to Rove beetle, this study has been done to understand the clinical patterns of presentation and individual at risk of acquiring the lesion in our region which will guide primary care provider to consider PD as one of the differential diagnosis of erythematous-vesicular skin lesion of sudden onset.

## Methods

A descriptive study was done in the Dermatology department of a teaching hospital located in Trichy, South India, for one year between January and December 2020. All patients attending the Dermatology OPD during the study period with clinical diagnosis of PD made by the consultant based on the criteria, that is, any lesion on any part of the body with or without itching, with or without burning sensation of short duration of less than five days was included. Lesions of other known cause such as fungal infection, contact allergy, atopic dermatitis, and lesions with doubtful diagnosis were excluded. The study was done after obtaining the Institutional Ethics Clearance. Informed verbal and written consent was also obtained from all the study participants. A detailed sociodemographic and clinical history pertaining to onset of symptoms, contact with any insect, etc., was obtained and clinical examination of the lesion and systemic examination was done. Treatment given to patients was also documented. A total of 123 patients were suspected to have lesion due to Rove beetle, of which 6 cases was considered doubtful and after excluding we had a total of 117 cases for final analysis. Confirmed cases were asked to follow-up after 1 week for assessment of post inflammatory changes. Data analysis was done using IBM SPSS, Version 22.0 and results were expressed in frequency and percentage.

## Results

The mean age of patients presenting with PD was 24.54 ± 11.8 years. The youngest patient was three years of age while the oldest 82 years. More female (51%) than male were affected and most of the cases were residents of rural than urban area [Table 1]. Most of the patients presented between January and May, with the peak cases seen during the month of April (22.2%) followed by February (17.9%) and March (17.1%). During the month of December, no cases were reported [Figure 2].

Common risk factors contributing to the occurrences of PD were presence of vegetation (85.5%) and history of sleeping with windows open (60.7%). Only 34.2% patients gave history of contact with the insect [Table 2]. Most of the patients noticed the lesion in the morning (87.2%) after getting up from sleep. Redness, sudden onset of symptoms and tenderness was experienced by more than 90% of patients [Table 3]. Most common site of lesion was face and neck (61.5%) followed by upper limb (33.3%). Regional lymph node swelling and ocular involvement was seen among 17% of cases [Table 4]. Erythematous (100%) and plaque (79.5%) lesion were most common while bullae and oozing lesion was seen only among 9.4% cases. Bizzare pattern was seen among 30.8% and

### Table 1: Sociodemographic details of patients diagnosed with Paederus dermatitis (n=117)

| Variable                  | Frequency (%) |
|---------------------------|---------------|
| Age group (years)         |               |
| <15                       | 7 (6.0)       |
| 15-30                     | 82 (70.1)     |
| 31-45                     | 19 (16.2)     |
| >45                       | 9 (7.7)       |
| Gender                    |               |
| Female                    | 68 (58.1)     |
| Male                      | 49 (41.9)     |
| Residence                 |               |
| Rural                     | 99 (84.6)     |
| Urban                     | 18 (15.4)     |
| Socioeconomic status      |               |
| Upper                     | 28 (23.9)     |
| Middle                    | 59 (50.4)     |
| Lower                     | 30 (25.6)     |

### Table 2: Presence of risk factors contributing to Paederus dermatitis (n=117)

| Risk factors                        | Frequency (%) |
|-------------------------------------|---------------|
| Vegetation around residence         | 100 (85.5)    |
| Sleeping with open windows          | 71 (60.7)     |
| Sleeping on floor                   | 53 (45.2)     |
| Bite or contact with insect         | 40 (34.2)     |
| Sleeping with lights open           | 37 (31.6)     |
| Similar symptoms among household    | 32 (27.4)     |
| Similar episode in past             | 25 (21.4)     |

![Figure 1: Paederus insect with orange and black stripes](image-url)
linear among 23.1%. [Figures 3, 4, 5 and 6] Post-inflammatory pigmentary changes were seen among 92.1% patients [Table 5].

In the present study, topical steroids were given to 51.3% and oral steroids were needed in 22.2%. Around 58% patients with secondary bacterial infection needing antibiotics. Non-steroidal anti-inflammatory were needed in around 30% of patients complaining of severe pain.

**Discussion**

The present study was conducted in a medical college located in a rural area in Trichy district with suburban population within 5 km. The climatic condition is dry throughout the year with no major change in temperature between summer and winter. The temperature is usually high (30–32°C) with the warmest months from April to June which is followed by mild to moderate rainfall till November. Paddy, pulses, and groundnut cultivation is very common among the rural area. These conditions are highly suitable for the breeding of paederus insects.[8]

In our study, 85% patients reported presence of vegetation, 45% slept on floor and 32% with lights on. A study done in Manipal[13] among 100 patients attending OPD with PD, only 59% had dense vegetation around their surroundings and 17% slept with light on while 89% slept on floor. Though use of artificial light, sleeping on floor, and presence of vegetation around the residential area are important risk factors for PD, its absence cannot exclude the diagnosis. Use of protective clothing and repellents are found to be protective factors from contact with insect.[14]

About 34% patients gave history of contact with insect while another study done in Egypt[11] only 14% were aware of any insect crawling. Around 87% patients had noticed the lesion in the morning or waking up, thus indicating contact with the insect at night. Similar finding have also been reported among students in hostel[15] and attending night tuition[10] in Malaysia. Thus diagnosis of PD based only on contact with insect is not possible and clinicians should be aware of the clinical presentations and risk factors. Primarily these insects reside in cultivation area such a paddy field but during the night they fly to the residential premises due to their phototaxis behavior and affect humans. A study has documented that bright light of 1,200 lux and higher floor building (levels 2 and 3) are preferred by these insect over low light and ground floor.[16]

Face and neck was the most common site reported in our study followed by upper extremity and trunk, similar to a studies done in India.[13,17-19] Other countries also reported[7,8,15,19] Severe pain, redness, and
itching were the most common presenting symptoms similar to other studies.\textsuperscript{[13,18]} Ocular involvement (periorbital dermatitis) also known as “Nairobi eye” has wide varying proportion among different studies.\textsuperscript{[19]} It was documented among 17% patients in our study, while in others\textsuperscript{[19]} it was less than 7%. But a study from Malaysia documented 57% cases of PD with ocular edema.\textsuperscript{[10]} Ocular symptoms can prompt patients to visit ophthalmologist leading to misdiagnosis of periocular infections or preseptal cellulitis causing unnecessary use of systemic antibiotics.\textsuperscript{[20]} Thus, family physician encountering such patients in OPD should enquire regarding the surrounding environment such as thick vegetation to determine the accurate diagnosis and avoid unnecessary referral to ophthalmologist.

Table 5: Morphological type and distribution pattern of lesion seen among patients diagnosed of Paederus dermatitis ($n=117$)

| Lesion characteristic                          | Frequency (%) |
|-----------------------------------------------|---------------|
| **Morphology of lesion**                      |               |
| Erythema                                      | 117 (100%)    |
| Plaque                                        | 93 (79.5)     |
| Kissing lesion                                | 47 (40.2)     |
| Excoriations                                  | 46 (39.3)     |
| Vesicle                                       | 43 (36.8)     |
| Pustule                                       | 37 (31.6)     |
| Crusting                                      | 34 (29.1)     |
| Ulceration                                    | 27 (23.1)     |
| Papule                                        | 23 (19.7)     |
| Macule                                        | 16 (13.7)     |
| Bullae                                        | 11 (9.4)      |
| Oozing                                        | 11 (9.4)      |
| Post-inflammatory changes*                    | 94 (92.1)     |
| **Pattern of distribution**                   |               |
| Bizarre                                       | 36 (30.8)     |
| Linear                                        | 27 (23.1)     |
| Mixed                                         | 27 (23.1)     |
| Herpetiform                                   | 17 (14.5)     |
| Annular                                       | 10 (8.5)      |

*\textsuperscript{n}=102, since 15 patients were lost to follow-up

Most common morphological presentation of the lesion was erythema (100%) and plaque (80%), while post-inflammatory pigmentation after one week was seen among 92.1% cases similar to other studies.\textsuperscript{[17,18]} Burning sensation was experienced among 82% cases in our study while in other studies have reported 57%,\textsuperscript{[10]} 66%,\textsuperscript{[7]} 93%,\textsuperscript{[18]} and 100%.\textsuperscript{[16,17]} Thus, absence of burning sensation does not exclude diagnosis of PD. Most common pattern of distribution of the lesion from previous studies was linear or whiplash pattern\textsuperscript{[17,18]} but in our case bizarre pattern was prevalent similar to a study done in Turkey\textsuperscript{[7]} and Iran.\textsuperscript{[8]} Kissing lesion occurs when there is apposition of damaged skin to other intact area such as flexure of elbow or axilla or adjacent surface of thighs.\textsuperscript{[6,21]} In our study, around 40% had kissing lesion while a study in Egypt has reported 13%.\textsuperscript{[11]}

The clinical appearance of PD may be confused with herpetic simplex, herpes zoster, liquid burns, acute allergic or irritant contact dermatitis, enderian dermatitis, cantharidin dermatitis, phytophotodermatitis, blister beetle dermatitis, bullous impetigo, dermatitis artefacta, millipede dermatitis, and so on.\textsuperscript{[7,16,21]}
In such situation, probability of PD can be made using the following criteria: (i) acute onset eruption with itching or burning sensation (commonly presenting as night burn), (ii) linear or streaky pattern of dermatitis with or without kissing lesions, and (iii) history of contact with Paederus beetle or patient from an endemic region.\(^{[21,22]}\)

For early and correct diagnosis, the clinicians should be aware of this condition. Treatment is similar to that of acute irritant dermatitis. In patients who present immediately after contact, the affected area should be washed with soap water.\(^{[13]}\) Tincture iodine can be applied topically to neutralize toxin. Oral antihistamines may be given. Soothing agents such as camphor, topical anaesthetics (lidocaine, benzocaine) have been used for temporary relief of itching and burning sensation. For patients who present after the onset of skin lesions, topical steroids with/without an antibiotic are effective.\(^{[23]}\) Several studies have shown that topical corticosteroids are effective in alleviating symptoms and swelling.\(^{[10]}\) Systemic steroids are reserved for rare severe cases. With appropriate treatment, lesions usually resolve in a few days to a week, depending on severity.\(^{[23]}\) In our study, about 51.3% patients were prescribed topical steroids. Oral or topical antibiotics were used for patients (57.3%) for the prevention and treatment of secondary bacterial infection. Oral Non-steroidal anti-inflammatory drugs (NSAIDs) were prescribed for around 29.9% of patients. Oral steroids were used in about one fifth (22.2%) of patients. The main indications for oral steroids in our study were multiple lesions on the face, severely inflamed lesions on any part of the body, peri-orbital dermatitis, patients who do not respond to topical steroids, and non-steroidal anti-inflammatory agents.

There are a few limitations in our study. Firstly, diagnosis of the condition was based on patient history and clinical assessment and not by histopathology. Secondly, species identification of the insect was not done. Thirdly, gram staining of pustules should have ideally been done to confirm the presence of secondary bacterial infection. Lastly, the study was done during the lockdown period of coronavirus disease 2019 (COVID-19) pandemic which might have affected the health seeking behavior of the patients and not depicting the true occurrence of cases.

**Conclusion**

PD is a common skin disease encountered in our setting with varied form of clinical presentation with lack of history on contact with the insect. Most patients reported to have thick vegetation surrounding their residence and sleeping with windows open. Though the disease is self-limiting, it causes immense discomfort to individual which can be easily prevented by increased awareness of this condition. The long-term effect of the PD is post-inflammatory pigmentation which was reported in some cases even after 1 year. We recommend further research to understand the duration and prevention of this hyperpigmentation that can have aesthetic implication especially among young females.

**Key Points**

- PD is a common cause of acute contact irritant dermatitis encountered in individual residing near cultivation area or thick vegetation.
- Erythematous skin lesion with pain and sudden onset should include PD as a differential diagnosis.
- History of contact with Paederus insect is not always present since the contact occurs at night when the patients are asleep.

**Take home message**

The present study did not show any particular seasonal trend in the occurrence of PD. Thus detailed history regarding the onset of lesion, environmental surrounding, sleeping habits and clinical examination of the lesion is necessary for diagnosis.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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