

Original Research Article

Clinico-epidemiological profile and morphological patterns of an institutional outbreak of paederus dermatitis from North India: a descriptive study

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ABSTRACT

Background: Paederus dermatitis (PD) is an acute irritant contact dermatitis caused by pederin, a vesicant toxin in the hemolymph of beetles of the genus Paederus. Despite its occurrence across tropical India, published data from north India and documented institutional cluster outbreaks among young adults remain scarce.

Methods: A descriptive observational study was conducted at a tertiary care teaching hospital in Greater Noida, Uttar Pradesh, over 15 days in April 2026. All 106 patients clinically diagnosed with PD from a single university hostel campus were consecutively enrolled. Data on demographics, symptom onset, morphological patterns, sites of involvement, and risk factors were recorded using a structured proforma. Descriptive statistics- frequencies, percentages, mean and standard deviation were used for analysis.

Results: Of 106 patients (60 males, 46 females), the mean age was 20.27 ± 1.48 years (range 18-24). Mean duration of symptoms at presentation was 1.86 ± 0.74 days. The predominant symptoms were erythema (97.2%) and burning sensation (95.3%). Linear erythematous plaque was the most common morphological pattern (67.9%), followed by kissing lesions (38.7%), herpetiform lesions (38.7%), Nairobi eye variant (21.7%), and erythematous patch with central gray necrotic area (18.9%). The neck was the most frequently involved site (76.4%). Sleeping with windows open (69.8%) and proximity to campus vegetation (100%) were the predominant risk factors.

Conclusions: This study reports one of the first institutional cluster outbreaks of Paederus dermatitis from north India, occurring in April- a pre-monsoon season not previously highlighted for PD in this region. The diverse morphological spectrum, including herpetiform and kissing variants, highlighting the importance of clinical awareness to prevent misdiagnosis in hostel settings.

Keywords: Dermatitis linearis, Herpetiform lesions, Institutional outbreak, Irritant contact dermatitis, North India, Paederus dermatitis

INTRODUCTION

The association between beetles and cutaneous blistering has been recognized since antiquity, as documented by Castellani and Chalmers in 1919, who recorded its mention in the era of Archigenes, a contemporary of Celsus.¹ Paederus dermatitis (PD), also known as dermatitis linearis or rove beetle dermatitis, is an acute irritant contact dermatitis caused by pederin- a potent

amide vesicant toxin present in the hemolymph of beetles belonging to the genus Paederus, order Coleoptera, family Staphylinidae.² The beetle neither bites nor stings; instead, inadvertent crushing or brushing of the insect against skin releases pederin, triggering an acute inflammatory reaction.³ Pederin is produced not by the beetle itself but by its endosymbiont bacteria, Pseudomonas species, and is predominantly concentrated in female beetles.⁴

Globally, PD has been documented across tropical and subtropical regions including Australia, Malaysia, Sri Lanka, Nigeria, Kenya, Uganda, Brazil, Venezuela, Iran, and India.⁵ In India, *Paederus melampus* is the most commonly implicated species.⁶ However, the existing Indian literature on PD originates predominantly from southern and eastern states- Tamil Nadu, Karnataka, Andhra Pradesh, and Odisha, with very limited reports from north India.^{7,8} Published series consistently describe seasonal clustering during June-September, coinciding with the monsoon season, when beetle phototaxis towards fluorescent lighting peaks.⁹

PD is frequently misdiagnosed owing to its morphologically diverse clinical presentations, which can closely mimic herpes zoster, herpes simplex, bullous impetigo, phytophotodermatitis, and allergic contact dermatitis.¹⁰ The clinical spectrum encompasses linear erythematous plaques, erythematous patches with central gray necrotic areas, kissing or mirror-image lesions, burnt appearance, herpetiform vesicles, pustular forms, and the Nairobi eye variant involving periorbital skin.^{3,7} University hostels with shared dormitory spaces, open windows, fluorescent lighting, and proximity to campus vegetation constitute an ecological setting particularly conducive to nocturnal human-beetle contact, yet institutional cluster outbreaks among young adults in North India have not previously been described in dermatological literature.

The present study was undertaken to characterize the clinico-epidemiological and morphological profile of an institutional outbreak of PD affecting university hostel students in Noida, Uttar Pradesh, with the aim of expanding the geographic documentation of PD into the north Indian context and alerting clinicians to its occurrence outside the traditionally reported southern Indian belt.

METHODS

Study design and setting

This descriptive observational study was conducted at the outpatient department of the department of dermatology, venereology and leprosy of Noida Institute of Medical Sciences Hospital in Greater Noida, Uttar Pradesh, India, over a period of 15 days in April 2026.

Written informed consent was obtained from all participants prior to enrolment. Patient anonymity was maintained throughout. All clinical photographs were obtained following specific written photographic consent.

Participants

All patients residing in university hostels who presented to the dermatology OPD during the study period with a clinical diagnosis of PD were consecutively enrolled. The clinical diagnosis was based on sudden onset of

erythematous, vesicular, or crusted lesions on exposed body areas with or without burning or itching, following a characteristic nocturnal exposure pattern, as assessed by a consultant dermatologist. Patients with lesions attributable to other confirmed causes- herpes zoster, herpes simplex, bullous impetigo, fungal infections, allergic contact dermatitis, phytophotodermatitis, or atopic dermatitis and those who declined consent were excluded.

Data collection

A structured, pre-tested, semi-structured proforma was used to record: patient demographics; symptom onset timing; prior awareness of insect contact; duration of lesions at presentation; presenting symptoms; morphological patterns of lesions; anatomical sites of involvement; and risk factors (proximity to vegetation, sleeping with windows open, sleeping with lights on). All patients underwent thorough cutaneous examination by a consultant. Clinical photographs were documented (using Samsung Galaxy S23 phone). *Paederus* beetles captured from hostel premises were photographed, though formal entomological species identification was not performed.

Statistical analysis

Data analyzed using IBM SPSS Statistics version 23. Descriptive statistics were used throughout: categorical variables were reported as frequencies (n) and percentages (%); continuous variables were reported as mean±standard deviation (SD) with range. As individual patients could exhibit more than one morphological pattern or site of involvement simultaneously, the sum of category counts exceeds the total sample size in some tables; percentages in such tables represent the proportion of total patients (n=106).

RESULTS

A total of 106 patients with a clinical diagnosis of *Paederus* dermatitis were enrolled during the 15-day outbreak period in April 2026. All patients were students residing in university hostels- a semi-urban campus in Greater Noida, Uttar Pradesh. Cases originated from both boys and girls hostels on the same campus.

Demographic and epidemiological profile

Of 106 patients, 60 (56.6%) were male and 46 (43.4%) were female. The mean age was 20.27±1.48 years (range: 18-24 years). The mean duration of symptoms at presentation was 1.86±0.74 days (range: 1-3 days). The majority of patients- 88 (83.0%) noticed their lesions upon waking in the morning; the remaining 18 (17.0%) reported onset during sleep itself. Only 20 (18.9%) patients had any prior awareness of insect contact. All 106 patients (100%) resided in proximity to campus vegetation. Sleeping with windows open was reported by 74 (69.8%) patients, and sleeping with lights on by 10

(9.4%) patients. The demographic and epidemiological data are summarized in Table 1.

Table 1: Demographic and epidemiological characteristics of patients with *Paederus dermatitis* (n=106).

Variables	N	%
Sex		
Male	60	56.6
Female	46	43.4
Age (years)	Mean 20.27±1.48 (range 18-24)	
Duration of symptoms at presentation (days)	Mean 1.86±0.74 (range 1-3)	
Onset of lesions		
Upon waking from sleep	88	83.0
During sleep (noticed at night)	18	17.0
History of insect contact awareness	20	18.9
Risk factors		
Proximity to campus vegetation	106	100.0
Sleeping with windows open	74	69.8
Sleeping with lights on	10	9.4

Presenting symptoms

The most frequently reported symptom was redness or erythema in 103 patients (97.2%), followed by burning sensation in 101 (95.3%) and blistering in 97 (91.5%). Itching was reported in 39 (36.8%), pain in 32 (30.2%), and swelling or edema in 12 (11.3%) patients (Table 2).

Table 2: Presenting symptoms in patients with *Paederus dermatitis* (n=106).*

Symptoms	N	%
Redness/erythema	103	97.2
Burning sensation	101	95.3
Blistering	97	91.5
Itching	39	36.8
Pain	32	30.2
Swelling/edema	12	11.3

*Multiple symptoms recorded per patient; percentages reflect proportion of total patients (n=106).

Morphological patterns

Multiple morphological patterns were observed simultaneously in many patients. The most prevalent pattern was the linear erythematous plaque, present in 72 (67.9%) patients (Figure 1). This was followed by kissing lesions in 41 (38.7%) (Figure 2) and herpetiform lesions in 41 (38.7%) (Figure 3). Post-inflammatory hyperpigmentation was noted in 25 (23.6%). The Nairobi eye variant- periorbital erythema with or without keratoconjunctivitis was documented in 23 (21.7%) patients (Figure 4).

Table 3: Morphological patterns of lesions in *Paederus dermatitis* (n=106).*

Morphological patterns	N	%
Linear erythematous plaque	72	67.9
Kissing/mirror-image lesion	41	38.7
Herpetiform lesion	41	38.7
Post-inflammatory hyperpigmentation	25	23.6
Nairobi eye (periorbital involvement)	23	21.7
Erythematous patch with central gray necrotic area	20	18.9
Burnt appearance	13	12.3
Pustular pattern	11	10.4

*Patients may have more than one morphological pattern simultaneously; percentages reflect proportion of total patients (n=106).



Figure 1 (A-D): Linear erythematous plaque with vesicles.



Figure 2 (A-D): Kissing lesions at the elbow flexures.

Erythematous patches with a central gray necrotic area were present in 20 (18.9%) (Figure 5), burnt appearance in 13 (12.3%) (Figure 6), and a pustular pattern in 11 (10.4%) patients (Figure 7). All morphological data are presented in Table 3.



Figure 3: Herpetiform pattern of Paederus dermatitis showing grouped vesicles in a quasi-dermatomal arrangement over the neck(A-B) and pustules (C).



Figure 4: Nairobi eye variant: A) periorbital erythema and edema involving the upper eyelid with a small erosion at the medial canthus; B) erythematous plaque with superficial erosion and crusting over the upper eyelid and periorbital skin; C) resolving periorbital erythema with post-inflammatory hyperpigmentation of the upper eyelid.



Figure 5: Erythematous plaque with central gray necrotic area.



Figure 6: Burnt appearance pattern.



Figure 7: Paederus (rove) beetle captured from the hostel premises.

Sites of involvement

The neck was the most frequently affected anatomical site, involved in 81 (76.4%) patients. Upper limbs were affected in 41 (38.7%), lower limbs in 23 (21.7%), and the face and periorbital region in 20 (18.9%) patients. The trunk (chest or back) was the least commonly involved site, noted in 11 (10.4%) patients.

DISCUSSION

The present study describes a cluster outbreak of Paederus dermatitis affecting 106 university hostel students over 15 days in April in Noida, Uttar Pradesh. To the best of our knowledge, this constitutes one of the first detailed institutional outbreak reports of PD from north India, contributing important geographic and seasonal data to the existing literature, which has hitherto been concentrated in southern and eastern Indian states.⁷⁻⁹

The mean age of 20.27 ± 1.48 years reflects the exclusively young-adult hostel population. Male predominance (56.6%) in our study aligns with reports by Srihari et al (65% males, n=37, Mysuru) and Inbamani et al (60% males, n=10, Trichy).^{7,11} Conversely, Reddy et al (n=80, Andhra Pradesh) and Palaniappan et al (Puducherry) observed female predominance, suggesting that gender distribution in PD is context-specific and influenced by differential exposure within a particular setting rather than a consistent biological predilection.^{8,12}

One of the most significant observations of this study is the occurrence of the outbreak in April, the pre-monsoon, hot season in north India in contrast to the June-September monsoon-season clustering consistently reported in South Indian literature.^{7,9,11} This seasonal divergence may reflect the specific micro-ecology of the University campus: dense campus vegetation retaining soil moisture provides suitable beetle habitats even in pre-monsoon months, and warm nights promote phototactic movement of beetles indoors. This suggests that the seasonal window for PD in north India may extend into pre-monsoon months, with important implications for clinician awareness in this region.

The predominance of lesion onset upon waking (83.0%), with most patients unaware of any insect contact (81.1%),

is consistent across all published series and reflects the silent nocturnal activity of *Paederus* beetles, which crawl across exposed skin during sleep and are crushed by reflexive movement.^{3,5} This diagnostic challenge makes clinical pattern recognition the cornerstone of PD diagnosis.

Redness (97.2%) and burning sensation (95.3%) were the dominant presenting symptoms. The high blistering rate of 91.5% in our series exceeds the 66.6% reported by Tamilselvan et al. and the 20% reported by Inbamani et al, possibly reflecting earlier presentation during the peak vesicular phase (mean symptom duration 1.86 days) or a higher toxin load per patient in this concentrated hostel outbreak.^{11,13}

The linear erythematous plaque remained the most common morphological pattern (67.9%), confirming its status as the hallmark of PD, attributed to the linear smearing of pederin as the beetle is crushed across the skin surface.^{3,7,8} Kissing lesions were notably frequent in our series (38.7%), exceeding figures of 13.3% by Tamilselvan et al. and 20% by Inbamani et al.^{11,13} This may reflect sleeping postures among hostel students, where prolonged skin-to-skin apposition at the neck, axilla, and elbow flexure facilitates toxin transfer to opposing skin surfaces.

The herpetiform pattern (38.7%) was identified with greater frequency than in most prior Indian series and merits particular attention, as grouped vesicles are a recognized trigger for injudicial antiviral prescriptions.^{10,14} A careful history emphasizing nocturnal onset, absence of prodromal pain, clustering among hostel contacts, and the absence of systemic symptoms should guide the clinician towards PD rather than herpetic infection.

The Nairobi eye variant was documented in 21.7% of our patients, higher than most previously published Indian series.^{7,13} This variant arises from periorbital toxin transfer via contaminated hands and can result in severe keratoconjunctivitis and, rarely, permanent visual impairment, necessitating prompt ophthalmological referral.⁶

The neck was the predominant site of involvement (76.4%), differing from the facial predominance reported in South Indian series by Inbamani et al (40%) and Srihari et al.^{7,13} In a hostel setting, the neck is the most consistently exposed area during sleep, making it the primary site of nocturnal beetle contact. Upper-limb involvement (38.7%) likely reflects beetle exposure during nighttime reading or study under fluorescent desk lamps, a common student habit.

All patients resided in proximity to campus vegetation - an established prerequisite for *Paederus* beetle habitats, which favour moist soil and leaf litter.^{5,9} Sleeping with windows open (69.8%) was the most prevalent and most

actionable modifiable risk factor, directly facilitating nocturnal entry of phototactic beetles. Notably, only 9.4% reported sleeping with indoor lights on, suggesting that ambient corridor or street lighting filtering through open windows is sufficient to attract these insects indoors, a practical finding for public health messaging.

The rapid accumulation of 106 cases within 15 days from a single institution highlights the outbreak potential of PD in congregate living settings. Hostel administrations should be advised to install window mesh screens, minimize indoor lighting during sleep hours, and educate students on appropriate beetle management specifically, blowing insects off the skin rather than crushing them and on hand-washing after any contact to prevent autoinoculation.

This study has several limitations. Formal species identification of captured beetles was not performed due to non-availability of an entomologist. Histopathological examination was not carried out. The study was limited to a single institution over a short outbreak period and may not represent the full epidemiological spectrum of PD across north India. A control group was not enrolled, which limits formal risk factor analysis

CONCLUSION

This study documents one of the first institutional cluster outbreaks of *Paederus* dermatitis from north India, occurring in April- a season not previously associated with PD in this geographic region. The diverse morphological spectrum including herpetiform lesions, kissing lesions, and the Nairobi eye variant, combined with neck predominance, reflects unique features of the hostel environment and adds clinically relevant data to the existing literature. Increased clinical awareness of PD in North India and implementation of targeted preventive measures in hostel settings are the principal contributions of this study to the field.

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