Clinical Profile and Management of Paederus Dermatitis: Insights from Teledermatology in a Tertiary Care Setting in Nepal

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Citation

Shrestha E, Basukala MS, Mishra A, Basnet A, Karn D, Tamang A. Clinical Profile and Management of Paederus Dermatitis: Insights from Teledermatology in a Tertiary Care Setting in Nepal. *Kathmandu Univ Med J.* **Online First.**

ABSTRACT

Background

Paederus dermatitis is a cutaneous reaction caused by the contact of rove beetles (Paederus species) on the skin. Common in tropical regions, including Nepal, this dermatitis poses a diagnostic challenge in remote areas where dermatological care is limited. Teledermatology, employing telecommunications for remote consultations, has shown promise in addressing these limitations, yet its effectiveness in diagnosing and managing Paederus dermatitis in Nepal has yet to be thoroughly explored.

Objective

To analyze the clinical profile and management outcomes of Paederus dermatitis through teledermatology at a tertiary care hospital in Nepal.

Method

A retrospective cross-sectional study was conducted on 54 patients diagnosed with Paederus dermatitis through teledermatology at Dhulikhel Hospital between June 2024 and August 2024. Statistical analysis was performed to evaluate associations with demographic and clinical factors.

Result

The study comprised 54 patients (59.26% males and 40.74% females) with a mean age of 28.4 ± 6.6 years. The most frequent symptoms included itching with a burning sensation (35.2%) and pain (24.1%). Linear erythematous plaques were observed in 42.6% of cases. Only 20.4% reported direct insect contact. Correlation analysis showed weak relationships between age, symptom duration, and lesion count. Multivariate regression indicated a baseline symptom duration of 2.7 days, with no significant association between age or lesion count and symptom duration.

Conclusion

Teledermatology is a valuable tool in diagnosing and managing Paederus dermatitis in rural Nepal, where direct access to dermatological care is limited. Future research should focus on expanding teledermatology's role in other dermatological conditions.

KEY WORDS

Dermatology, Paederus dermatitis, Pederin, Rural health, Teledermatology

INTRODUCTION

Paederus dermatitis (PD), is an irritant contact dermatitis caused by contact with the beetles of the genus Paederus.[1] It occurs after contact with a vesicant agent named paedrin contained in the body fluids of beetles.[1,2] It presents as a sudden onset erythematous, vesiculobullous, and sometimes kissing lesion often associated with a burning and stinging sensation on overexposed parts of the body.[1,3] It is commonly seen during or after the rainy season. It is prevalent in tropical and subtropical regions, including Nepal, where agricultural workers and individuals living in rural areas are frequently affected.[4] The challenge of diagnosing and managing Paederus dermatitis is compounded in regions with limited access to dermatological care, making timely and accurate diagnosis crucial to prevent complications.[5] The treatment includes gentle washing of the area and applying topical corticosteroids.[5]

Teledermatology, the application of telecommunication technologies to dermatological care, has emerged as a valuable tool in bridging the gap between patients and specialists, particularly in remote areas.[6] In Nepal, teledermatology has shown promise in improving access to dermatological services.[6]

Understanding the clinical profile of patients diagnosed through teledermatology and evaluating the outcomes of these consultations is essential for optimizing teledermatology practices. This study aims to address this gap by providing a comprehensive analysis of the clinical features and treatment outcomes of Paederus dermatitis cases diagnosed through teledermatology at Dhulikhel Hospital, a tertiary care center serving both urban and rural populations.

METHODS

This was a retrospective cross-sectional study. The study was conducted at the Dermatology Department of Dhulikhel Hospital, Kathmandu University Hospital, from June 2024 to August 2024. The sample consisted of 54 patients diagnosed with Paederus dermatitis through teledermatology consultations. A purposive sampling method was used, including all patients who met the criteria during the study period. Data were collected from patient records, including demographic details, lesion site, clinical presentation, and symptoms. Information on treatment approaches and outcomes was also extracted.

All cases included in the study were diagnosed and managed by dermatologists at Dhulikhel Hospital, including the principal investigator, through teledermatology platforms.

The Institutional Review Committee (IRC) of Kathmandu University School of Medical Sciences approved the study (Ref. No. 289/24). Written informed consent was waived as the study involved retrospective analysis of anonymized patient data, in accordance with institutional ethical guidelines.

Patients with a confirmed diagnosis of Paederus dermatitis via teledermatology were included in the study. Patients with incomplete records or non-teledermatology consultations were excluded.

Statistical analyses were performed using SPSS version 25. A p-value < 0.05 was considered statistically significant. Descriptive statistics were used for demographic and clinical data. The correlation between symptom duration, age, and number of lesions was assessed using Pearson's correlation coefficient, and multivariate regression analysis was used to evaluate predictors of symptom duration.

RESULTS

This study included 54 patients with Paederus dermatitis, with a mean age of 28.44 ± 6.6 years (range: 14 - 42 years) and a median age of 29 years [Table 1]. The mean symptom duration was 3.43 ± 1.59 days, with a median of 3 days, suggesting that most patients experienced relatively short-lived symptoms [Table 1]. Improvement after treatment occurred within an average of 5.98 ± 0.835 days [Table 1].

Table 1. Descriptive analysis of numerical variables

Variables	Mean	SD (±)	Min	50%	Max
Age (Years)	28.44	6.6	14	29	42
Number of lessions	1.722	0.898	1	1	4
Duration (Days)	3.43	1.58	1	3	7
Improvement after treatment (Days)	5.9814	0.835	5	6	7

Males comprised the majority of the sample (59.26%, n=32), while females accounted for 40.74% (n=22) [Fig. 1].

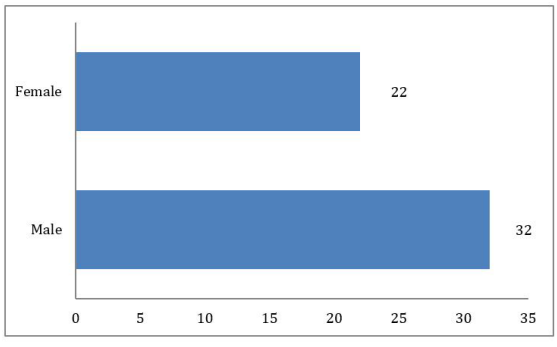

Figure 1. Gender distribution of participants

The patients in this study came from various regions, predominantly from Sindhuli (22.64%, n=12), followed by Hindi (9.43%, n=5), Bhaktapur (9.43%, n=5), Nuwakot (7.55%, n=4), and Pyuthan (7.55%, n=4) [Fig. 2]. Smaller numbers of patients were from Butwal, Ramechhap, and Manthali, each representing 5.66% of the sample (n=3).

Other locations such as Sindhupalchowk, Bahunepati, and Banepa had a representation of 3.77% (n=2) or less [Fig. 2].

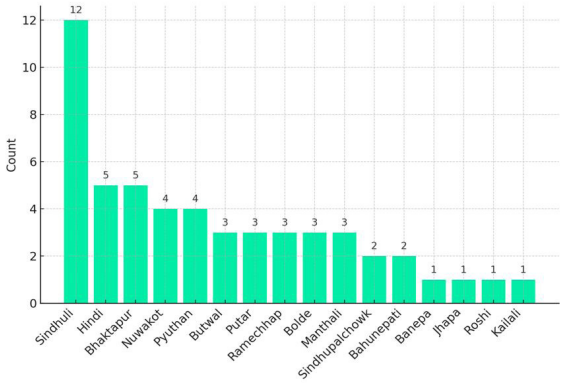

Figure 2. Address distribution of the participants

The occupation distribution was diverse, with students making up 20.37% (n=11), followed by farmers (16.67%, n=9), and homemakers (7.41%, n=4), and a diverse range of other occupations, including medical personnel, teachers, poultry farmers [Fig. 3].

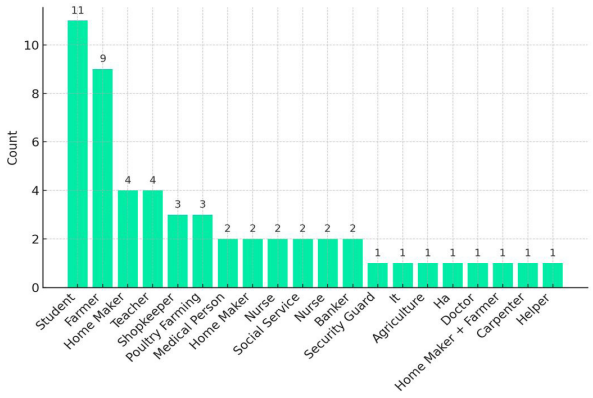

Figure 3. Occupation distribution of the participants

In terms of onset timing, symptoms predominantly began in the morning (53.7%), followed by the afternoon (29.6%) and evening (16.7%) [Table 2]. The most common symptoms were itching with a burning sensation (35.2%), followed by itching alone (27.8%), and pain with a burning sensation (24.1%) [Table 3].

Table 2. Frequency of participants by onset

Onset	Frequency (%)
Morning	29 (53.7)
Afternoon	16 (29.6)
Evening	9 (16.7)

Table 3. Frequency of participants by symptoms

Symptoms	Frequency (%)
Itching + Burning sensation	19 (35.2)
Itching	15 (27.8)
Pain+ Burning sensation	13 (24.1)
Burning sensation	6 (11.1)
Itching + Burning sensation + Pain	1 (1.9)

The face was the most commonly affected body site, accounting for (27.77%, n=15) of cases. Other frequently affected areas included the neck (25.93%, n=14), upper limb (11.11%, n=8), lower limb (14.81% n=8), inframammary area (7.4 %, n=4), shoulders (5.55%, n=3), chest (5.55%, n=3), n= Abdomen (1.9%, n=1) [Figure 4], [Figure 6-14].

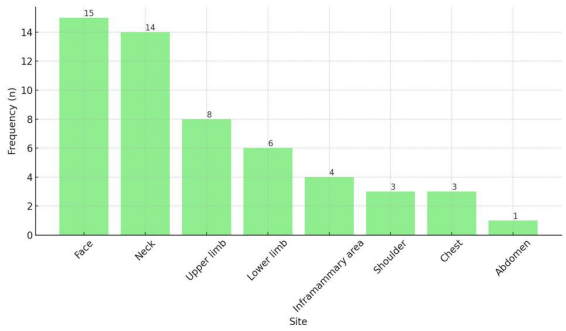

Figure 4. Site of lesion distribution of the participants

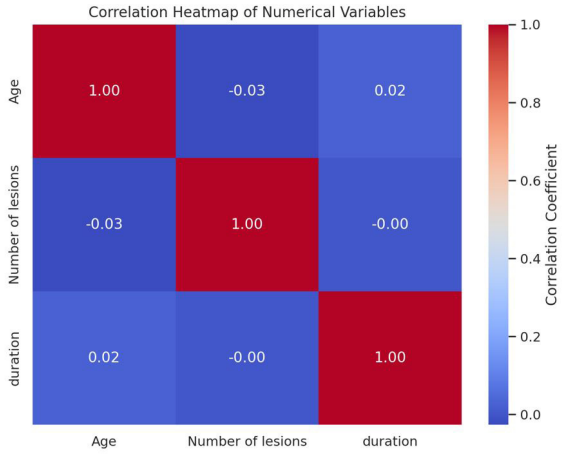

Figure 5. Heat map showing the correlation matrix between age, symptom duration, and number of lesions. Although no strong correlation was observed, the pattern confirms independence among the studied variables.

Figure 6. Well-demarcated erythematous plaques with areas of crusting and superficial erosion on the left cheek of a 14 years male

Figure 7. Linear plaque with mild overlying vesicles with surrounding erythema on the extensor surface of the left elbow in a 15 years male, showing the inflammatory response typical of Paederus dermatitis.

The most frequent rash type was a linear reddish plaque (42.6%), followed by annular reddish plaques (35.2%) and reddish plaques with vesicles (9.3%) [Table 4]. Linear and annular reddish plaques, as well as ill-defined reddish plaques with vesicles, were less common [Table 4].

Table 4. Frequency of participants by type of lesion

Rashes	Frequency (%)
Linear reddish plaque	23 (42.6)
Annular reddish Plaque	19 (35.2)
Reddish plaques with vesicles	5 (9.3)
Linear and annular reddish plaques	3 (5.6)
Ill-defined reddish plaque with vesicle	3 (5.6)
Multiple erosions	1 (1.9)

Only 20.37% of participants reported a history of contact with an insect, with the majority (79.63%) denying any known contact [Table 5]. The majority of patients (94.44%, n=51) were treated with topical steroids alone, while a small proportion (5.56%, n=3) required a combination of oral and topical steroids [Table 6].

A correlation analysis was conducted to assess the linear relationships between symptom duration, age, and number of lesions. The correlation matrix heat map [Figure 5] presents the strength and direction of these relationships. The correlation analysis showed very weak relationships among these variables, as indicated by correlation coefficients close to zero: 0.078 between duration and age, 0.040 between duration and number of lesions, and -0.026 between age and number of lesions [Fig. 5-14]. These low values suggest that age and lesion count are largely independent of symptom duration, with minimal shared variance. This finding aligns with the regression analysis results, which also indicated that neither age nor

Table 5. Frequency of Participants by History of Contact with Insects

History of Contact with Insects	Frequency (%)
Yes	11(20.37)
No	43 (79.63)

Table 6. Frequency of Participants by Treatment

Treatment	Frequency (%)
Topical steroid	51 (94.44)
Combination of oral and topical steroids	3 (5.56)

Figure 8. Multiple linear fluid filled lesions on the right flank of a male patient

Figure 9. Multiple erythematous linear plaques with superficial erosions distributed on the anterior chest. These lesions exhibit the hallmark "whiplash-like" pattern of Paederus dermatitis

Figure 10. Few well defined erythemataous plaques with central necrosis on the upper back

Figure 11. Typical "kissing lesions" of Paederus dermatitis involving the posterior aspect of knee, showing well-demarcated erythematous plaques with overlying vesicles

Figure 12. Paederus dermatitis on the flexor surface of the arm showing erythematous plaques with vesicular changes and superficial erosions

Figure 13. Erythematous plaque on the posterior shoulder of a patient, demonstrating multiple scattered erythematous papules and pustules

Figure 14. Erythematous macules and plaques with indistinct borders located on the lateral aspect of the neck.

does lesion count significantly predict symptom duration, suggesting that other factors may play a more substantial role in determining the progression of symptoms in patients with Paederus dermatitis.

Multivariate regression analysis was performed with symptom duration as the dependent variable and age and number of lesions as independent variables. The regression model revealed that neither age (p = 0.564) nor lesion count (p = 0.744) had a statistically significant effect on symptom duration. The intercept was significant (p = 0.019), indicating a baseline symptom duration of 2.73 days [Table 7].

Table 7. Ordinary Least Square (OLS) Regression Results for Symptom Duration

Variable	Coefficient	Std. Error	t - Statistic	p-Value	95% Confidence Interval
Age	0.0201	0.035	0.580	0.564	-0.05–0.09
Number of Lesions	0.0829	0.252	0.329	0.744	-0.42–0.59

DISCUSSIONS

Paederus dermatitis (PD) is a self–limited, irritant contact dermatitis caused by exposure to hemolymph from beetles of the genus Paederus, commonly referred to as rove beetles, of the order Coleoptera, under subfamilies Staphylinidae, Meloidae, and Oedemeridae. These insects are not venomous or parasitic; rather, they contain a potent toxin, named paederin. Paederin is produced not by the beetles themselves, but by endosymbiotic Pseudomonas bacteria within Paederus beetles.[7] Paederin, which is present in the hemolymph of the Paederus beetle, is released when the insect is crushed onto the skin as a result of the reflex of brushing it away.[8]

It affects people of any sex, all ages and races. It occurs predominantly in tropical and subtropical regions. The southern parts of Europe and Asia and other continents at lower latitudes have been the primary locations for outbreak reports, and outbreaks often follow the monsoon season when beetles migrate from their natural habitat to human dwellings, attracted by artificial lighting.[4,9,10] This aligns with our findings, where the majority of patients presented during or shortly after the rainy season, with over half reporting symptom onset in the early morning, suggesting nocturnal beetle activity. Consistent with previous literature, the condition affected individuals irrespective of gender or age, though young males engaged in outdoor work were slightly more represented in our cohort.[4, 11] When the beetles are crushed reflexively while sleeping or changing positions, they come into contact with the toxic hemolymph, which causes them to awaken in the middle of the night with an unexplained lesion.[4,9]

It usually presents as linear erythematous plaques with overlying papulovesicular eruptions. Other variants are localized pustular dermatitis, generalized lesions, and kissing lesions.[12] A particular notable manifestation is "Nairobi Eye-periorbital or ocular involvement that can present with keratoconjunctivitis. Although rare, it is a serious complication reported in PD literature. It may be associated with symptoms like itch, pain and burning sensation.[13,14]

The clinical manifestation of PD is distinctive but may be misdiagnosed due to its similarity to other dermatoses, such as herpes zoster, contact dermatitis, or phytophotodermatitis.[15-17] The hallmark lesions linear, erythematous plaques, sometimes accompanied by vesicles or "kissing" lesions are the result of mechanical crushing of the beetle against the skin, transferring paederin. Our study showed that the most common symptoms were itching and burning sensations (35.2%), followed by pain (24.1%), and clinical examination frequently revealed linear erythematous plaques (42.6%). These clinical patterns are in agreement with those previously reported by Mammino and KC et al. who similarly documented erythematous linear plaques and associated sensory symptoms as characteristic features of Paederus dermatitis.[1,4]

In our study, approximately 53% of patients reported symptom onset in the morning upon waking, suggesting nocturnal contact with the beetle. Similarly, Zargari et al. reported that 87% of patients noticed lesions in the morning, supporting the likelihood of nighttime exposure.[9]

Management of PD is largely symptomatic. Immediate washing of the affected area with soap and water can reduce toxin absorption. Topical corticosteroids are the mainstay treatment, and oral steroids are reserved for severe or extensive cases. In our study, 94.4% of patients responded well to topical steroids alone, while only around 5.6% of patients required a combination of oral and topical steroids. This finding corroborates existing studies suggesting the condition is generally mild and self-limiting.[5,8,17]

Despite its benign nature, PD may have significant psychosocial implications, especially when lesions occur on visible areas like the face. Scarring and post-inflammatory hyperpigmentation may occur, leading to cosmetic concerns, especially among younger individuals. This aspect of disease burden remains underreported and should be explored further.[18]

This study's distinctive asset is its incorporation of teledermatology for diagnosing and managing PD. In Nepal, similar to numerous developing nations, geographic and infrastructural obstacles restrict access to specialist care, especially in rural areas. Teledermatology has proven effective in expanding access to dermatologic care without compromising diagnostic accuracy, especially in remote and underserved areas.[19,20] Teledermatology, especially store-and-forward methods, can fill this gap by enabling clinicians to diagnose remotely using high-

quality images and patient histories. All patients in our cohort received their diagnosis through teleconsultation. The clinical images were sent to us and a diagnosis was made based on history and clinical picture. The observed high accuracy and patient satisfaction reflect findings from worldwide reviews regarding teledermatology's usefulness in rural dermatological care.[21,22] Smartphone-based teleconsultation has been shown to be feasible and effective in Nepalese settings, reinforcing the viability of remote dermatological diagnosis in resource-limited environments.[23]

There were various limitations to our study. Generalizability may be impacted by the small sample size and retrospective design. Because there was no collaboration from entomologists and no specimens were collected, it was not possible to identify beetles at the species level. Moreover, the quality of clinical photographs varied because of the different devices used in rural health posts, which could affect diagnostic accuracy. The study, notwithstanding its limitations, offers important insights into a condition that is not well-documented in Nepal and highlights the promise of teledermatology in settings with limited resources.

Future research should focus on collecting prospective data using standardized imaging protocols and fostering collaboration among dermatologists, entomologists, and public health experts. Moreover, examining awareness campaigns and environmental control measures in high-risk areas could provide preventive advantages. Measures aimed at public health, like cutting down on white light usage, employing fine-mesh window screens, and providing community-focused insect education, could lessen the incidence.[24,25]

CONCLUSION

This study provides valuable insights into the clinical profile, symptomatology, and management of Paederus dermatitis in patients diagnosed via teledermatology at Dhulikhel Hospital. It highlights the condition's prevalence among younger adults, the predominance of male patients, and its self-limiting nature, with most symptoms resolving within a week. The study also identifies characteristic clinical features such as linear erythematous plaques, predominantly on the lower limbs, and a notable lack of reported insect contact in most cases.

REFERENCES

1. Mammino JJ. Paederus dermatitis: an outbreak on a medical mission boat in the Amazon. *J Clin Aesthet Dermatol*. 2011;4:44-6.
2. Gyeltshen K, Sangye N, Tenzin KC, Dorji T. Clinical description and treatment outcomes of Paederus dermatitis in Phuentsholing, Bhutan in 2021: A cross-sectional study. *Skin Health Dis.* 2023;3:e223.
3. Nicholls DS, Christmas TI, Greig DE. Oedemerid blister beetle dermatosis: a review. *J Am Acad Dermatol.* 1990;22:815-9.
4. KC S, Mishra A, KC D, Karn D. Nairobi eye: A clinico-epidemiological study from a tertiary care center of central Nepal. *J Lumbini Med Coll*. 2020;8:190-4.
5. Singh G, Yousuf Ali S. Paederus dermatitis. *Indian J Dermatol Venereol Leprol*. 2007 Jan-Feb; 73(1): 13-5. doi: 10.4103/0378-6323.30644. PMID: 17314440.
6. Paudel V. The increasing scope of teledermatology in Nepal. *J Nepal Med Assoc.* 2020;58:1100-2.
7. Tamilselvan B, Shanmugam S, Shakthi P. A case series of Paederus dermatitis: Understanding its varied and diverse clinical presentations. *Cureus*. 2024;16:e54148.
8. Karthikeyan K, Kumar A. Paederus dermatitis. *Indian J Dermatol Venereol Leprol.* 2017;83:424-31.
9. Zargari O, Kimyai-Asadi A, Fathalikhani F, Panahi M. Paederus dermatitis in northern Iran: a report of 156 cases. *Int J Dermatol*. 2003 Aug;42(8):608-12. doi: 10.1046/j.1365-4362.2003.01771.x. PMID: 12890103.
10. Gnanaraj P, Venugopal V, Mozhi MK, Pandurangan CN. An outbreak of Paederus dermatitis in a suburban hospital. *Indian J Dermatol*. 2007;52:199–202.
11. Gnanaraj P. Paederus dermatitis. In: Valia RG, Valia AR, editors. IADVL Textbook of Dermatology. 3rd ed. Mumbai: Bhalani; 2008. p. 1151-2.
12. Félix Caviedes C, Chamorro Gaón Y, Freire P. Paederus Dermatitis, a disease not to forget. *Rev Fac Cien Med Univ Nac Cordoba.* 2024;81:627-35.
13. Vijayasankar P, Gopinath H, Karthikeyan K. Kissing lesions in Paederus dermatitis. *Am J Trop Med Hyg.* 2019;101:5.
14. Úraga PE, Briones CMC, Silva MML. Paederus dermatitis: a review of the clinical picture and description of its dermoscopic patterns. *Med Cutan Iber Lat Am*. 2019;47(2):92-102.
15. Mittal H, Kaur S, Garg B, Sood N, Gupta SK, Kaur S. A study of clinicopathologic spectrum of vesicobullous disorders. *Int J Res Dermatol.* 2017;3(3): 355-64.
16. Bolognia JL, Schaffer JV, Cerroni L. Dermatology. 4th ed. Philadelphia: Elsevier Saunders; 2018.
17. Weller R, Hunter JAA, Savin JA. Clinical Dermatology. 4th ed. Oxford: Wiley-Blackwell; 2008.
18. Vaishampayan SS, Suthar K. Clinical review of paederus dermatitis. *Int J Dermatol*. 2013;52:1123-8.
19. Basnet R, Paudel R. Psychosocial burden in dermatology patients: A Nepalese perspective. *Nepal Med Coll J*. 2022;24(1):56-60.
20. Thomas DR. Teledermatology: Delivering quality dermatology care. *Int J Dermatol.* 2018;57(9):e175-82.
21. Mahato B, Shrestha A, Shah R. Teledermatology in rural Nepal: A case-based review. *Nepal J Dermatol Venereol Leprol*. 2021;19(2):34-8.
22. Hsiao JL, Hing E, Ashkin E. The state of teledermatology in the United States. *J Am Acad Dermatol*. 2021;85(3):803-8.
23. Yadav N, Giri S, Baral K. Smartphone-based teleconsultation in dermatology: A feasibility study from Nepal. *Telemed J E Health.* 2023;29(3):220-5.
24. Singh K, Pradhan S. Community-based vector control strategies. *J Nepal Health Res Counc*. 2020;18(2):243-6.
25. Saleh MA, Abdelgadir H, Alzain M. Environmental measures in controlling Paederus dermatitis outbreaks: a case-control study. *BMC Public Health*. 2023;23:1241.