

ORIGINAL ARTICLE

An outbreak of *Paederus* dermatitis in a primary school, Terengganu, Malaysia

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Abstract

Outbreaks of *Paederus* dermatitis have been reported in several Asia-Pacific countries when rove beetles (genus *Paederus*) are accidentally brushed or crushed on the skin, releasing haemolymph pederin. An investigation was conducted in a school to ascertain the causative agent, establish the case definition, epidemiological characterisation of cases, entomological and environmental survey and data analysis. This outbreak occurred among 36 schoolchildren attending a night tuition class conducted by their teacher. Dermatitis developed within 24 hours in 33/37 (89.2%) cases with itchiness as the first presenting symptom in 87.9% of cases. Periorbital oedema and erythematous-vesicular plaques on the upper extremities were seen in 57.6% of cases, on the back (36.4%) and on the nape (24.2%). Signs and symptoms were present 12 hours after exposure in 66.7% of cases with burning sensation within four hours in 9.1%. Seven cases received out-patient treatment. Thirty cases (90.9%) recalled exposure to *Paederus fuscipes* with 28 (84.8%) cases admitting crushing or brushing the insects. (Relative risk = 2.2; 95%CI: 1.2; 4.2). The school with fluorescent lighting, was located next to paddy fields. *P. fuscipes* was easily found in the paddy fields and along the school corridors. This strongly supports it as the likely causative agent for the dermatitis. Boarding the ventilation panes and use of insect spray were successfully implemented to control the outbreak. Increased awareness of this condition is important to prevent misdiagnosis.

Keywords: *Paederus fuscipes*, contact dermatitis, rove beetle, Malaysia

INTRODUCTION

Paederus dermatitis (PD) is a self-limiting form of acute irritant contact dermatitis due to pederin released by rove beetles (genus *Paederus*, Family *Staphylinidae*, Order *Coleoptera*) when accidentally brushed or crushed on the skin. It commonly affects the exposed areas of the body. Washing the skin immediately with soap and water can prevent "linear" dermatitis or more severe symptoms.^{1,2} The acute vesicular lesions heal completely in 10-12 days, with a transitory post-inflammatory hyperchromic patch. In severe cases, it can cause neuralgia, arthralgia, fever and vomiting. Erythema may persist for months^{3,4} Invasion of *P. fuscipes* is a nuisance as severe cases can cause man-hours loss in productivity and school absentism.

Outbreaks of PD have been reported in several countries including Africa, South America, Turkey, Iran and Asia.^{2,5} A major outbreak

involving 2,000 cases of vesicular dermatitis was reported in Okinawa in 1966.⁶ An outbreak of acute vesicating dermatitis was noted among staff members on night shifts and some patients in the open wards of a suburban hospital in Sri Lanka.⁷ In Malaysia, cases were reported among 12 medical students who were residents of University Science of Malaysia hostels in Kelantan.⁸ Thousands of high rise flat dwellers and dormitory students were affected by a similar outbreak of dermatitis linearis in Penang in 2002.⁹ One hundred and fifty-six cases of *Paederus* dermatitis were also reported among patients attending a dermatology clinic in northern Iran from May to October 2001.²

P. fuscipes (Figure 1) has a very wide distribution ranging from Central Asia to Japan, Southeast Asia to Australia. It is prevalent in Malaysia and is commonly found in marshes, paddy fields and in school fields.^{6,7} Increased

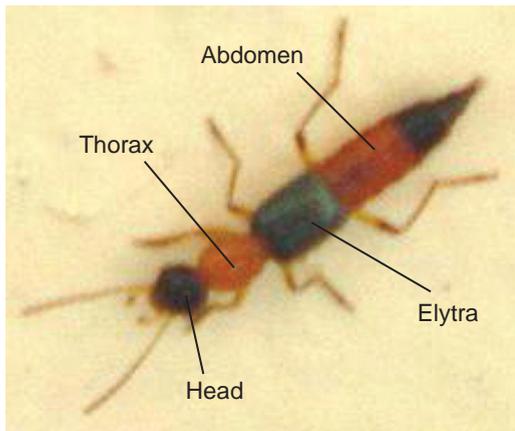


FIG. 1: *Paederus fuscipes* - rove beetle: Note the orange thorax and upper abdomen, and the black head, lower abdomen and elytra (wing coverings).

contact between people and beetles occur after rain showers or an exceptionally wet year.^{1,8-12} A rise in cases was also seen following cleaning of the fitness centre with water via fire hose in a military base in Pakistan.¹³ Adults are active in daylight but flights are restricted to nights as they are attracted to fluorescent lights.^{1,2}

An investigation was conducted on February 21st 2005 following an occurrence of skin disease among primary six students (12 years old) and the teacher conducting night tuition at the Padang Air National Primary School. The objective of the study was to determine the epidemiology of the dermatitis outbreak, to identify the causative agent and to recommend preventive measures.

MATERIALS AND METHODS

Case review was conducted among schoolchildren attending night tuition at the school and their teacher. Investigation included face to face interview of cases using a structured questionnaire to collect socio-demographic data and presenting symptoms, physical examination of cases, home visits to cases and neighbouring villagers, interviews with the school authorities and the attending doctor. Cases were defined as all who were present at the school's night tuition class on the February 16th 2005 and developed skin rashes. Environmental assessment was conducted in the school, surrounding village and the paddy fields. Entomology investigation was carried out using light traps installed within the school compound. Insects collected from the nearby paddy fields, in the affected classroom and along the corridor were dried, mounted

and sent to the Institute for Medical Research, Kuala Lumpur for identification by the medical entomologist. The data was analysed using Epi-Info 3.3.2.

RESULTS

On the February 16th 2005, 36/38 primary six class students attended night tuition class conducted by a teacher. Of these, 19 (52.8%) were females and 17 (47.2%) males. All were 12 years of age. Thirty-two (88.9%) students had signs and symptoms (s/s) of contact dermatitis following exposure to the suspected beetles. The 41-year-old teacher was also affected. The attack rate was 89.2% (33/37).

Students and teachers not involved with the night tuition including two primary six students who were absent on that day were not affected.

Of 33 cases of dermatitis, 30 (90.9%) recalled being exposed to rove beetles on that particular night and 28 (84.8%) had brushed or crushed the insects. Those who brushed/crushed the insects were 2.2 times more likely to develop dermatitis (95% CI: 1.2; 4.2) ($p < 0.0001$, Fisher exact test).

All cases developed s/s of contact dermatitis within 24 hours of exposure to insect, 22 (66.7%) had s/s after 12 hours and 9.1% had burning sensation within four hours. (Table 1) (Figures 2 and 3).

Seven cases (21.2%) received out-patient treatment with two students not attending school for one week because of periorbital oedema. The others did not seek any treatment. Those receiving treatment were given analgesic, antihistamines and corticosteroid cream to apply on the affected areas.

Paddy harvesting in the neighbourhood started one week prior to the outbreak and on the morning in the paddy field facing the affected classroom. The classroom was brightly lighted by fluorescent lights. It had ventilation panes above the louvered windows which were opened during the night session. All the cases were found in this room.

The occupant of a traditional house situated about ten metres from the paddy field complained of nocturnal beetle 'invasion' during the present harvesting season. This house lighted by fluorescent lights, has ventilation panes over the windows and doors. Some windows had multiple louvers with missing panes.

TABLE 1: Presenting signs and symptoms of Paederus dermatitis (n = 33)

Signs / Symptoms	Number of cases	%
Itchiness	29	87.9
Burning sensation	19	57.6
Periorbital oedema	19	57.6
Erythematous plaques with vesicles on extremities	19	57.6
Erythematous plaques with vesicles on back	12	36.4
Erythematous plaques with vesicles on nape	8	24.2
Erythematous plaques with vesicles on pinna	5	15.2
Erythematous plaques with vesicles on abdomen	2	6.1



FIG. 2: Linear dermatitis - right knee

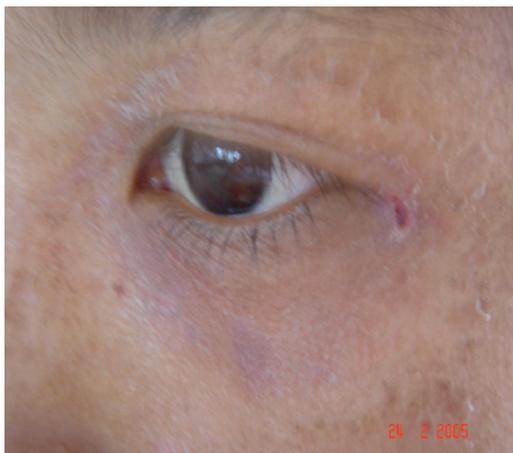


FIG. 3: Desquamation - left periorbital region

Of the six occupants in the house, all except the father had rashes similar to the schoolchildren and history of contact with *P. fuscipes*. None sought treatment and recovered within one to two weeks. The mother had residual pigmentation on

the face. The father was away during the beetle 'invasion'.

Occupants of four other houses without ventilation panes located about 50-100 metres from the paddy fields did not encounter any invasion of *P. fuscipes*. All windows and doors were shut by dusk.

Insects collected from the light trap, classroom wall and floor, and along the corridor include cicadas, stink bugs, moths, beetles and bees. No *P. fuscipes* was caught in the light trap as incandescent light was used. It was collected from the stalk of the harvested paddy plants, the wall of the classroom and along the corridors.

P. fuscipes is the most likely causative agent for this episode as beetles (order *Coleoptera*) from the *Staphylinidae* family and Genus *Paederus* are known to cause irritant contact dermatitis.

DISCUSSION

Paederus dermatitis is an entomological model of irritant contact dermatitis. The presenting s/s in this study are similar to that of *Paederus* dermatitis where the onset of burning sensation is followed by erythematous plaques with vesicles appearing 12 - 36 hours later. The diagnostic clue in this outbreak of dermatitis is the presence of linear lesions among the cases. Periorbital dermatitis is also common. Residual hyperpigmentation, persisting for several weeks can be a cosmetic problem.

There was increased contact with human as paddy harvesting and subsequent burning of the fields coincided with the night tuition class. *P. fuscipes* are active from 9 - 10pm which relates well with the timing of the night tuition (8 - 10pm) and switching on lights in the classroom and along the school corridor.^{1,2,14} Lights, ventilation

panes, open windows and doors facilitate entry of these insects into the house and classroom.

There were no previous incidents both in the village and the school. It was noted that there was more rainfall in February 2005 (1.8mm - 32.6mm on three consecutive days) as compared to February 2004 (0.2mm - 3mm).¹⁵ This could explain the 'invasion' of beetles into the house as increased human-beetle contact can occur after rain showers.^{1,8-12}

Preventing human-beetle contact is the primary method of preventing PD. This was achieved through educating the students and teachers to recognise *Paederus* beetle, avoid handling or crushing the insect and washing skin areas that were in contact with it with soap and water. The beetle population was reduced by closing the classroom doors and windows and fixing screens to the ventilation panes. The school compound was cleared of excess vegetation as the beetles are known to inhabit these areas. As these insects are sensitive to insecticides, thermal fogging using permethrin derivatives was done in the classroom and around the school compound. Residual spraying on the walls of the building and ceiling areas around the lights was also carried out. The teachers were advised to use aerosol insecticide spray if they detect any *P. fuscipes*.^{1,3,6-9}

Awareness of this condition can prevent misdiagnosis as the differential diagnosis includes Herpes simplex, Herpes zoster, liquid burns or acute allergic or irritant contact dermatitis.

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REFERENCES

- Schofield S. The tale of the *Paederus* Beetle. http://www.forces.gc.ca/health/information/health_promotion/Engraph/BeetleJuice_e.asp accessed on 23.03.2005
- Zagari O, Asadi AK, Fathalikhani F, Panahi M. *Paederus* dermatitis in northern Iran: a report of 156 cases. *Int J Dermatol* 2003;42:608-12
- Schofield S. Beware of Bug Blood. *The Maple*. 2003;15.
- Borroni G, Brazzelli V, Rosso R, Pavan M. *Paederus fuscipes* dermatitis. A histopathological study. *Am J Dermatopathol* 1991;13(5):467-74
- Sendur N, Şavk E, Karaman G. *Paederus* dermatitis: A report of 46 cases in Aydin, Turkey. *Dermatology* 1999;199(4):353-5
- Armstrong RK, Winfield JL. *Paederus fuscipes* dermatitis: an epidemic on Okinawa. *Am J Trop Med Hyg.* 1969;18:147-50.
- Kamaladasa SD, Perera WDH, Weeratunge L. An outbreak of *paederus* dermatitis in a suburban hospital in Sri Lanka. *Int J Dermatol.* 1997;36(1):34-6
- Mokhtar N, Singh R, Ghazali W. *Paederus* dermatitis among medical students in USM, Kelantan. *Med J Malaysia* 1993;48(4):403-6
- News Article: Rove Beetle* (01/01/2002) INFORMATION ON ROVE BEETLE Majlis Perbandaran Seberang Perai <http://www.mpsp.gov.my/includes/Article.asp?ID=116&Context=2002&Lan=1> accessed on 23.03.2005
- Frank JH, Thomas MC. Rove Beetles of the World, Staphylinidae (Insecta: Coleoptera: Staphylinidae) EENY-114 Institute of Food and Agriculture Sciences University of Florida
- Frank JH, Kanamitsu K. *Paederus sensu lato*: Natural history and medical importance. *J Med Entomol* 1987;24:155-91
- Morsy TA, Arafa MA, Younis TA, Mahmoud IA. Studies on *Paederus alfieri* Koch (Coleoptera: Staphylinidae) with special reference to the medical importance. *J Egypt Soc Parasitol* 1996;26(2):337-51
- Dursteler BB, Nyquist RA. Outbreak of Rove Beetle (Staphylinid) pustular contact dermatitis in Pakistan among deployed U.S. Personnel. *Mil Med* 2004;169(1):57-60
- Nikbaktzadeh MR. Identification and bioecology of *Paederus* beetles (Col: Staphylinidae) causing linear dermatitis in central and western parts of Fars province. [MSc Thesis] Tarbiat Modarres University, Iran 1998.
- Meteorology Department Malaysia, Climatological and hydrological division. Weather data February 2004 - February 2005.