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## Research Article

### FIRST OUTBREAK OF PAEDERUS DERMATITIS AT AIZAWL, MIZORAM; NORTH-EAST INDIA, EPIDEMIOLOGICAL AND ENTOMOLOGICAL SURVEILLANCE AND OBSERVATION REPORT

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#### ABSTRACT

There was a report of skin disease outbreak and emergence of unfamiliar insects at Hunthar locality, the western part of Aizawl City, Mizoram, North-east India. Epidemiological and entomological studies with house-to-house survey were conducted. Of the 259 confirmed cases, 123(47.49%) were males while 136(52.51%) were females. Maximum number of cases (14.28%) were in the age group of 21-25 years. Most of the patients have contacted sites in their exposed areas affecting face 145(34.19%), neck 91(21.46%) and arms 55 (12.97%). The first case was recorded on 23<sup>rd</sup> October 2015 and the last case was recorded on 30<sup>th</sup> November 2015. The outbreak had a peak period from 8<sup>th</sup> November, 2015 to 18<sup>th</sup> November, 2015 and cases during the peak period constituted 206(79.53% of the total cases). Maximum number of cases were recorded on 10<sup>th</sup> November 2015 (38 cases =14.67%). The causative organism was identified as a Rove beetle, a coleopteran under family Staphylinidae, Genus *Paederus* and Species *melampus*.

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#### INTRODUCTION

Under the phylum arthropoda, the coleopteran beetles are well-known as a causative organism for blistering and eruption of skin which is known as beetle skin dermatitis. There are more than 2,80,000 species of beetles which are responsible for causing skin dermatitis (Nair and Nair 2001). Beetles from three families Meloidae, Oedemeridae and Staphylinidae are noted to cause vesicant (blistering) lesions (Christmas *et al*, 1987). Blister beetle (Meloidae) and Rove beetle (Staphylinidae sp. *paederus*) are endemic in South east Asia (Nair and Nair, 2001). Rove beetles are the largest in the family with over 26000 species worldwide (Christmas *et al*, 1987). They cause irritant reaction from powerful irritant (vesicant) contained in their body fluid or allergic contact dermatitis (Nair and Nair, 2001).

Blister beetle is common in Africa, America and Europe. Rove beetle has a very wide distribution and are mostly found in tropical areas of the Orient, Africa, South America and Australia (Shatin, 1979). There are many reports of Rove beetle dermatitis in India (Handa *et al*, 1985; Kalla and Ashish, 1997; Bhargava and Gupta, 1982; Ravi, 2000; Apratim and Sheno, 2001; Sujit and Kaushik, 1997), and abroad (Kamaladas *et al*, 1997; Banny *et al*, 2000; Claborn *et al*, 1999). Prior to this

outbreak, there was a report of beetle dermatitis from Manipur from Northeastern States of India (Nandakishore *et al*, 2008).

**Study area and population:** Aizawl, the capital of Mizoram, India is a hilly city lying between 23.36°N and 92.8°E and has a temperature range from 20 - 30° C in summer and 11 -21° C in winter. It receives 215cm of rainfall annually and features a humid subtropical climate but very rainy and relative humidity is 46%. According to 2011 census, Aizawl has a population of 2,93,416 (Geographical information of Aizawl, 2013).

This study was conducted to operate public health actions in order to control and prevent further spread of the beetle dermatitis in the outbreak and to identify the causative organism.

#### MATERIALS AND METHODS

On 15<sup>th</sup> November 2015, there was a report from the President of the Hunthar Local Council of Aizawl city, the capital of Mizoram, North-east India, to the Director of Health Services regarding the emergence of a particular insect and a type of dermatitis affecting many people in the area co-incidentally. In this connection, State Nodal Officer and Entomologist from Integrated Disease Surveillance programme (IDSP),

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Directorate of Health Services, were detailed to investigate the situation and related issues. The epidemiological and entomological investigation was started on the same day. The affected patients and Local Council members were questioned about the probable mode of transmission of the dermatitis and the possible agents. All the patients assumed that this emerging unfamiliar insect might be the agent of the said dermatitis. Insect specimens were taken for further observation and they were identified by trained entomologist with the consultation of Scientists and Senior Entomologists from National centre for disease control (NCDC) Delhi, India.

House to house survey was conducted in each house where cases are reported in the affected area to find out the possible agent for the transmission of the disease. Questionnaires were prepared and used to record the data of every patient. 259 confirmed cases of Paederus dermatitis was recorded from 164 households surveyed during the study. The study was started on 15<sup>th</sup> November 2015 and continuous surveillance, vigilance and monitoring were implemented in the outbreak and two weeks further after the completion of the outbreak.

## RESULTS

In this Rove beetle dermatitis outbreak, there were 259 confirmed cases recorded, out of which there were 136 females (52.51%) and 123 males (47.49%) and there was no predilection of sexes. The youngest patient recorded was 2 months baby and eldest was 70yrs. Age group of 21-25 has maximum number of cases, having 37 positive cases (14.28%) children and younger age groups are more affected while older age groups are least affected as seen in the table 1. Most patient noticed dermatitis in the morning time just after they wakeup from their sleep which clearly indicates that they contracted the dermatitis during their sleep.

**Table 1** Case distribution by age-group and sex

Age Group	No. of Positive (%)	Male (%)	Female (%)
0-5	36 (13.89%)	22	14
6-10	23 (8.88%)	20	3
11-15	28 (10.81%)	15	7
16-20	23 (8.88%)	9	12
21-25	37 (14.28%)	14	25
26-30	20 (7.72%)	7	14
31-35	14 (5.40%)	4	10
36-40	21 (8.10%)	5	17
41-45	8 (3.08%)	6	7
46-50	13 (5.01%)	5	8
51-55	15 (5.79%)	8	6
56-60	5 (1.93%)	2	3
61-65	9 (3.47%)	4	5
66-Above	7 (2.70%)	2	5
Total	259	123 (47.49%)	136 (52.51%)

Eldest-70 yrsold      Youngest - 2 Months old

**Table 2** Distribution by affected sites in the body

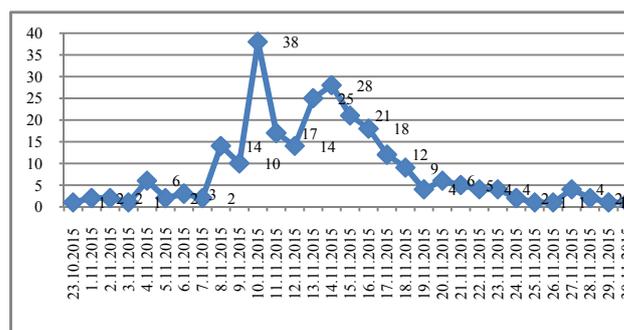
Body parts	Number of Patient	Percentage
Face	145	34.19%
Neck	91	21.46%
Arms	55	12.97%
Trunk	41	9.66%
Legs	29	6.83%
Axilla	26	6.13%
groin	18	4.24%
Buttock	11	2.59%
Other Parts	8	1.88%
Total	424	

Face was the most commonly affected part of the body as observed in 145(34.19%) patients. It was also evident that the exposed parts of the body are more affected and least affected are those unexposed sites of the body. Table 2. shows the number of affected sites(lesions) with rove beetle dermatitis in the body of patients. The number of patient according to affected sites (424) are more in number than the actual number of patient (259) because a single patient were having multiple contacted sites in his/her body (figures 3,4).

**Table 3** Date-wise distribution of cases

Date of onset of dermatitis	Number of patient
23.10.2015	1
1.11.2015	2
2.11.2015	2
3.11.2015	1
4.11.2015	6
5.11.2015	2
6.11.2015	3
7.11.2015	2
8.11.2015	14
9.11.2015	10
10.11.2015	38
11.11.2015	17
12.11.2015	14
13.11.2015	25
14.11.2015	28
15.11.2015	21
16.11.2015	18
17.11.2015	12
18.11.2015	9
19.11.2015	4
20.11.2015	6
21.11.2015	5
22.11.2015	4
23.11.2015	4
24.11.2015	2
25.11.2015	1
26.11.2015	1
27.11.2015	4
28.11.2015	2
29.11.2015	1
30.11.2015	1
Total	259

As shown in table 3, the first case of Rove beetle dermatitis was recorded on 23<sup>rd</sup> October 2015, but no cases were further recorded during this month. Cases was then continuously recorded from 1<sup>st</sup> November 2015 to 30<sup>th</sup> November 2015 and the peak of cases were observed during 8<sup>th</sup> November to 18<sup>th</sup> November 2015 (10 days) and no further cases were reported beyond 30<sup>th</sup> November 2015. Maximum number of cases was recorded on 10<sup>th</sup> November 2015 with 38 positive cases consisting of 14.67% ( Graph 1).



**Graph 1** Number of cases of Rove beetle dermatitis cases against time



Figures 1-2 Rove beetle (*Paederus melampus*)

The insects collected in the survey were identified as a Coleopteran Rove beetle under Staphylinidae family and its scientific name is *Paederus melampus*. The head, elytra (this structure covers the wings and first three abdominal segments) and tip of the abdominal segments are metallic dark green in colour and other portion of the body is reddish in colour. The length of the beetle is 7-10mm and width is about 0.5mm (figures 1,2).



Figures 3-4 Paederus dermatitis (Fig.3= Trunk region, Fig.4= thigh of 2 months baby)

## DISCUSSION

In the year 1912, Da Silva from Brazil first described that the coleopteran beetle *Paederus* as a causative organism of skin dermatitis (John, 1984). And in the year 1955 Lehman *et al* described the blister beetle dermatitis. There are reports of paederus dermatitis in india from Punjab (Handa *et al*, 1985; Kalla and Ashish, 1997), Rajasthan (Bhargava and Gupta, 1982), South India (Ravi, 2000; Apratim and Shenoi, 2001), Eastern India (Sujit and Kaushik, 1997), and Manipur (Nandakishore *et al*, 2008). There was neither a report of cases of beetle dermatitis in Mizoram prior to this outbreak nor

notice of the presence of the causative beetle, paederus in the area and paederus beetle was unfamiliar to the public. It was a convincingly evident that this paederus beetle might migrated from the neighbouring State, Manipur, North-eastern states of India having a report of cases of paederus dermatitis from the year 2001 (Nandakishore *et al*, 2008). After this 2015 paederus dermatitis outbreak at Hunthar, Aizawl, no further cases of paederus dermatitis were reported.

There are more than 30 species of paederus which can cause paederus dermatitis in India, reports have indicated that *Paederus melampus* as the the most common in India (Singh and Yousuf, 2007). *P.fuscipes*, *P.irritants*, *P.sabaeus*, and *P.himalayicus* are also identified (Nair and Nair, 2001), and *Paederus semipurpureus* was identified from Manipur (Nandakishore *et al*, 2008). The species identified from Aizawl, Mizoram is *Paederus melampus*.

The clinical appearances of paederus dermatitis is very similar to Herpes simplex, herpes zooster, liquid burns, acute allergic or irritant contact dermatitis from different causes. Linear appearance of the lesions and presence of kissing lesions are very characteristic. Histopathological and epidemiological features help in making correct diagnosis (John, 1984; Singh and Yousuf, 2007).

In addition to burning of stubble in the paddy fields and jhums, climatic change have a vital role in the outbreak of rove beetle dermatitis. When the rainy season start the immediate variation of temperature and humidity are observed, this could be a possible reason for the invasion of rove beetles into homes and increase the chances of human infection (Schofield, 2007; Mokhtar *et al*, 1993; Morsy *et al*, 1996). Moreover the use of bright lights at night and the increased of high rise apartment are also enhance a chance of Rove beetle dermatitis outbreaks (News articles, Information on rove beetle, 2002).

There was a report that on the night of 9<sup>th</sup> November 2015, there was a wake in a residence of outbreak locality, several people consisted of males and females attended this overnight wake programme, almost all the people attended this wake contacted rove beetle dermatitis. This might be due to:

1. The electric light that was switched on overnight could attract the rove beetle and
2. The carrion of dead person and other insects gathering in the electric light could attract them as rove beetles are scavengers and predators.

## CONCLUSION

The Paederus dermatitis outbreak affected 259 people of a confined particular area within one month period. Although paederus dermatitis is not associated with mortality of the patient, this outbreak which is associated with morbidity has an impact on the local economy. From the study it was observed that awareness to the mass regarding the causative organism and the clinical appearances of the Rove beetle dermatitis is the most important factor for the control and preventive measures of the dermatitis.

## Recommendation

The following points of recommendations were delivered to the public of outbreak area for their awareness on rove beetle for the control and prevention of the dermatitis.

1. The Rove beetle should not be crushed or touched with bare hands.
2. All the doors and windows should be closed at dusk as Rove beetles are nocturnal and are strongly attracted by the electric light.
3. Uses of Bed nets while sleeping would be effective.
4. Uses of insect repellants and insecticides is recommended.
5. Killing and clearing of the insect is also recommended.
6. Cleaning and clearing of vegetation around the house is recommended as this insect rest in this area during daytime.
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