

Cutaneous Leishmaniasis

Epidemiology

Pakistan

Epidemiology of cutaneous leishmaniasis in Larkana district of Sindh province with particular reference to phlebotomine sandflies

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Principal Investigator
Dr Birjees Mazher Kazi
Public Health Division
National Institute of Health
Islamabad, Pakistan
e-mail:
kazis@isb.paknet.com.pk

Abstract

As a result of cutaneous leishmaniasis outbreaks in Larkana and Dadu districts of Sindh Province during 2001–2002, a study was designed to assess the prevalence of the disease in two villages in Larkana district with particular reference to the population dynamics of phlebotomine sandflies in the area. A household survey was carried out in March 2002 immediately before the sandfly season, whereby household members were screened for scars and active lesions of cutaneous leishmaniasis and were interviewed regarding the determinants of infection. All suspected cases were clinically and microscopically confirmed. Entomological studies were carried out between January and October 2002.

Results The incidence of cutaneous leishmaniasis in the area was 36.44 per 1000 population. Out of a total of 89 residents in both villages infected with the disease, 78.65% had active lesions and 21.34% had scars. The lesions were typical of zoonotic cutaneous leishmaniasis: wet, large in size and mostly ulcerated. The mean size of the lesions was 2.8 centimetres.

A total of 1232 *Phlebotomus* sandflies were collected from the study villages. Two species were identified: *P. papatasi* (53.32%) and *P. (Paraphlebotomus) alexandri* (46.7%). *Phlebotomus* species were found from April through October. The peak activity of the dominant sandfly, *P. papatasi*, was in May. *P. alexandri* showed the same pattern of seasonal activity as *P. papatasi* except that the number of flies caught inside houses was slightly more than *P. papatasi*, and there was a second small peak in July, declining thereafter and coming to an end in October.

The proportions of *P. papatasi* and *P. alexandri* were significantly higher in light trap than sticky trap collections.

Conclusion Transmission of zoonotic cutaneous leishmaniasis in the Larkana district of Sindh province seems to occur mainly in rural settlements between mid-August and end September, and the only species involved in disease transmission is *P. papatasi*.

Background

In January 2002, an outbreak of zoonotic cutaneous leishmaniasis was reported from two districts (Larkana and Dadu) of Sindh province with an estimated 11 700 cases in both districts. This study was conducted in Taluka Warah in Larkana district, where the highest number of cases was reported during the outbreak in 2002. Previous records do not document any detailed study on phlebotomine sandflies in this region. The only study is that of Lewis (1967) [1] which lists the *Phlebotomus* and *Sergentomyia* species of Pakistan.

Materials and methods

The survey was conducted in March 2002, immediately before the sandfly season, in two selected villages of Larkana district: Gul Mohammad Tunio and Junani. The data collection form included information on the number of residents in each house, their sociodemographic characteristics, type of house construction, availability of electricity, domestic animals kept, number of patients with active lesions or scars due to cutaneous leishmaniasis, and size and duration of active lesions. All cases of cutaneous leishmaniasis recorded were clinically and microscopically confirmed.

Entomological studies were carried out between January and October 2002. These studies were undertaken to investigate the sandfly biology with particular reference to sandfly fauna, species composition, the seasonal and relative abundances of phlebotomine

Conclusions and implications of the study

■ Both sandfly species *P. papatasi* and *P. alexandri* collected from the study area are predominantly exophilic as the highest number of both species were caught outdoors.

■ Phlebotomine sandfly fauna from this area of Larkana district have been studied for the first time and shown to be strictly Mediterranean.

■ Transmission of zoonotic cutaneous leishmaniasis in the Larkana district of Sindh province seems to occur mainly in rural settlements between mid-August and end September, and the only species involved in disease transmission is *P. papatasi*.

sandflies, and natural infections. Three houses were randomly selected from each village. Outdoor and indoor sandflies were collected using CDC light traps and sticky paper traps. All sandflies belonging to genus *Phlebotomus* were identified for species and dissected for natural infection with *Leishmania* parasites in the field.

■ Main study findings

A total of 89 cutaneous leishmaniasis cases were detected in the two study villages (35 in Gul Mohammad Tunio and 54 in Junani). The number of cases was estimated to be 36.44 per 1000 population in both villages. However, the number of cases per 1000 population was significantly higher in Gul Mohammad Tunio (51.23/1000) than in Junani (30.85/1000). Males were more commonly infected (56.6%) than females (41.1%). Out of 89 residents of both villages infected with cutaneous leishmaniasis, 70 (78.65%) had active lesions and 19 (21.34%) had scars.

Fifty-five percent (55%) of the cases had single lesions, 23.59% had 2 lesions and 21.34% had 3 or more lesions on different body parts. Most lesions were on the legs (30.34%), followed by feet (23.6%), arms (18%) and face (17.98%). Other body parts with fewer active lesions included the neck, back of the palm, fingers and ears. The lesions were typically wet, large in size and mostly ulcerated. Such lesions are typical of zoonotic cutaneous leishmaniasis. The mean size of the lesions was 2.8 centimetres.

A total of 1232 (1072 in light trap and 160 in sticky trap collections) *Phlebotomus* sandfly species were collected from the study villages between January and October 2002. Two species were caught: *P. papatasi* (53.32%) and *P. (Paraphlebotomus) alexandri* (46.7%).

Phlebotomus species were found from April to October. The peak activity period of the dominant sandfly, *P. papatasi*, was in May inside houses when the average temperature is between 30 °C and 35 °C and mean relative humidity is above 50%. There was a sharp decline in activity in June when the average temperature is above 40 °C. Activity started to increase again in July, with a second peak in August, and thereafter slowly declined. The number of sandflies caught outdoors was significantly higher than indoors, indicating that the fly is highly exophilic and may be exophagic. Since blood meal analysis could not be done, the extent of zoophilia and anthrophilia could not be ascertained. *P. alexandri* displayed the same pattern of seasonal activity as *P. papatasi*, except that the number of flies caught inside houses was slightly more and there was a second small peak in activity in July, declining thereafter and almost coming to an end in October.

The proportions of *P. papatasi* and *P. alexandri*

were significantly higher in light trap than sticky trap collections. However, the flies caught from sticky papers placed in rodent burrows showed the highest activity of *P. papatasi* in March, May, June and August, in contrast to the catches made in CDC light traps when the peak activity was in May. *P. alexandri* showed peak activity in May, June and August.

All *Phlebotomus* sandflies collected in CDC light traps, both indoors and outdoors, during August, September and October were dissected for natural infection with leishmania promastigotes. These months were chosen because the highest number of parous flies are found when the density is decreasing. A total of 400 female *P. papatasi* and *P. alexandri* were dissected but none were found to be naturally infected. Based on the fact that the vector of zoonotic cutaneous leishmaniasis is only *P. papatasi*, except in a few areas where *P. salehi* has also been found to be naturally infected, it is assumed that *P. papatasi* is the most probable vector in the transmission of the disease in this area.

Further studies are required to determine the blood meals of *Phlebotomus* species to understand their host preferences, and to establish natural infections in wild-caught flies. Study of rodents is also needed in order to confirm the reservoir of infection.

■ Conclusions and recommendations

Based on the results of this study, the transmission of zoonotic cutaneous leishmaniasis in the Larkana district of Sindh province seems to occur mainly in rural settlements. The seasonal changes in sandfly population suggest that the disease is transmitted between mid-August and end September when the sandfly population is declining and maximum parous flies are found. Since *P. papatasi* is mainly exophilic as well as exophagic, humans are at maximum risk outdoors. As most people in these villages sleep outdoors, the likelihood is that transmission takes place outdoors. Although no naturally infected *P. papatasi* was found during the study, on the basis of circumstantial evidence, *P. papatasi* can be considered the only species involved in disease transmission in this area.

■ References

[1] Lewis DJ. The Phlebotomine sandflies of West Pakistan (Diptera: Psychodidae). *Bulletin of the British Museum (Natural History)*, 1967, 19:1–57.