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Emergence of cutaneous leishmaniasis in Polonnaruwa, Sri Lanka 2008–2011

Rohana Sandanayaka^{1*}, Indra Kahawita^{2*}, Ajith Gamage², Sisira Siribaddana³ and Suneth Agampodi⁴

¹ Regional Epidemiology Unit, Regional Director of Health Services Office, Polonnaruwa, Sri Lanka

² Dermatology Unit, General Hospital, Polonnaruwa, Sri Lanka

³ Department of Community Medicine, Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka, Saliyapura, Sri Lanka

⁴ Department of Medicine, Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka, Saliyapura, Sri Lanka

Abstract

OBJECTIVE To report cutaneous leishmaniasis (CL) in Polonnaruwa, Sri Lanka.

METHODS The study population included all patients with CL reported from Polonnaruwa district from January 2008 through April 2012. Data were collected in the dermatology unit of Polonnaruwa General Hospital and the regional epidemiology unit of Polonnaruwa.

RESULTS Four hundred and forty six patients with leishmaniasis were detected; clinical details were available for 362. Mean annual incidence of leishmaniasis between 2008 and 2012 in Polonnaruwa district was 26.2 per 100 000. The case incidence steadily increased during the study period. Case distribution by month peaked between August and November. Cases were geographically clustered in three administrative divisions with a mean annual incidence ranging from 94.7 to 54.1 per 100 000 population. Significantly more ($n = 294$, 65.9%) males than females were affected (χ^2 for goodness of fit = 48.4, $P < 0.001$). The commonest type of lesion was nodules ($n = 157$, 43.4%) followed by crust ($n = 116$, 32.0%). The majority of patients had lesions on upper limbs ($n = 144$, 39.8%) or the face ($n = 117$, 32.3%).

CONCLUSION Cutaneous leishmaniasis is increasing in Polonnaruwa, with clear spatial and temporal clustering. Sri Lanka needs more vigilant leishmaniasis surveillance.

keywords cutaneous leishmaniasis, epidemiology, clinical features, Sri Lanka, endemic

Introduction

Leishmaniasis is widespread: it affects four continents and is endemic in 88 tropical countries (WHO 2012). Poverty and unplanned urbanisation associated with deforestation, new water schemes and migration from non-endemic to endemic settlements have contributed to the epidemic of leishmaniasis (WHO 2002). Its true burden is uncertain due to its distribution in remote and poor areas. In Sri Lanka, leishmaniasis was an exotic disease before 1992. The first confirmed case of locally acquired CL in Sri Lanka was reported in 1992 (Athukorale *et al.* 1992). In 2003, *Leishmania donovani* zymodeme MON-37, which is a causative agent for visceral leishmaniasis (VL), was found to be the aetiological agent of the CL in Sri Lanka (Karunaweera *et al.* 2003). Since 1992, sporadic cases of CL were reported from many

areas with annual increase. The first locally acquired VL was reported from the district of Anuradhapura in North central province (NCP) in 2007, and two more cases of VL have been reported since (Abeygunasekara *et al.* 2007).

Disease distribution data before 2009 were mainly from individual studies based on passive case detection in two diagnostic laboratories in Sri Lanka (Nawaratna *et al.* 2007; Siriwardana *et al.* 2007). In 2009, leishmaniasis became notifiable. The number of cases reported in 2009 was 674, in 2010, it was 428, and in 2011, there were 930 cases. Five districts are highly endemic: Anuradhapura, Polonnaruwa, Hambantota, Matara and Kurunagala. Polonnaruwa has the highest incidence, but there are no published data on leishmaniasis in Polonnaruwa. We aimed to estimate the disease frequency based on multiple data sources, to describe clinico-epidemiological features and to map the spatial distribution of CL in the district.

*These authors contributed equally to the article.

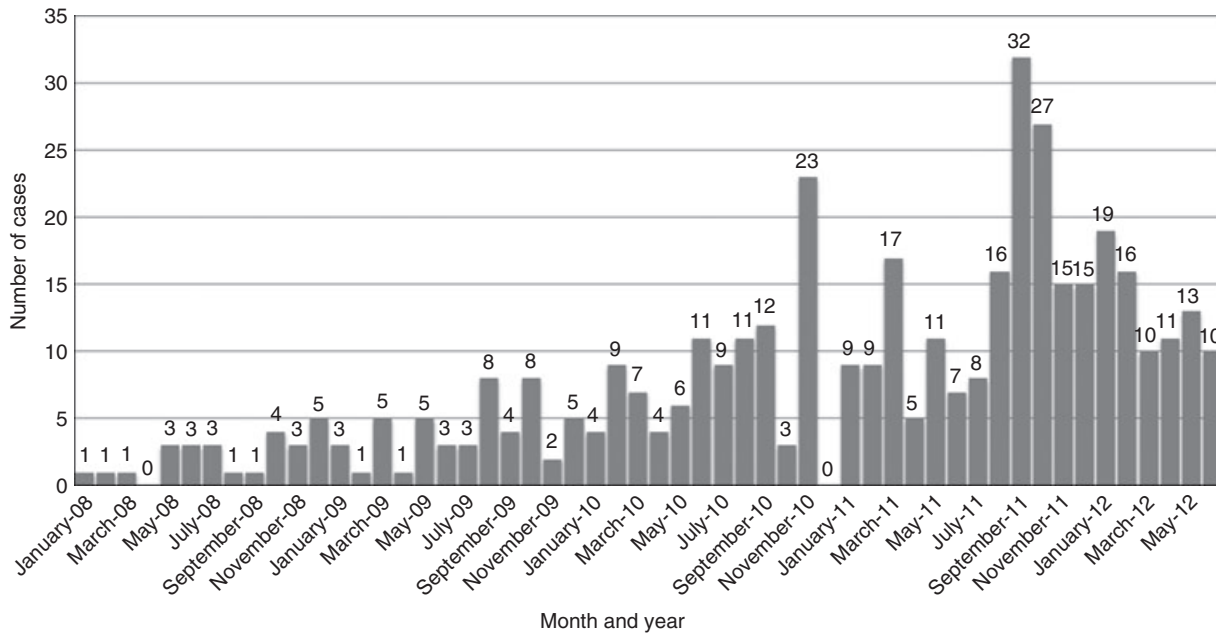


Figure 1 Leishmaniasis case detection, in Polonnaruwa district, Sri Lanka, from January 2008 to May 2012.

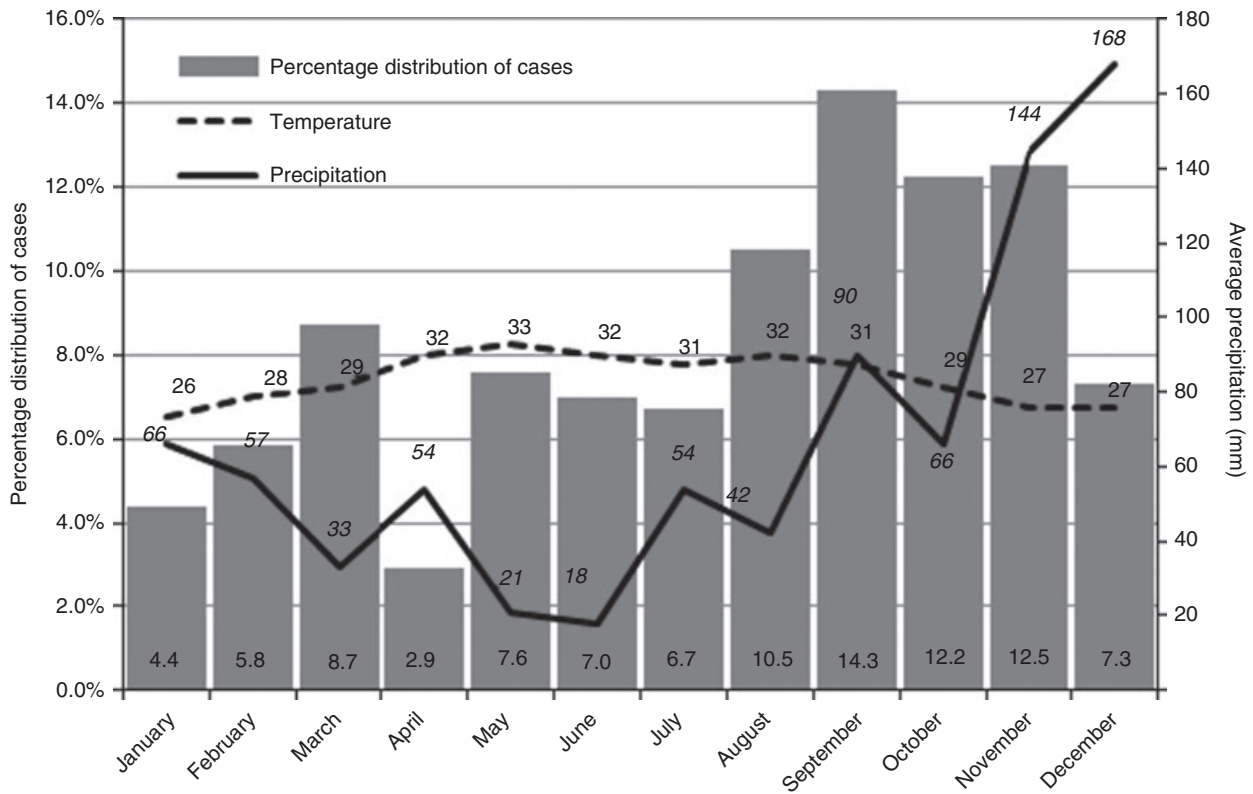


Figure 2 Percentage distribution of leishmaniasis cases by month during the period of January 2008–December 2011, in Polonnaruwa district with average temperature and rainfall data.

Methods

Polonnaruwa is one of the least populated districts in Sri Lanka with a population of just above 400 000. The area has an annual rainfall between 1200 and 1800 mm and a mean temperature of 28°–32 °C. The district has one large hospital: General Hospital Polonnaruwa (GHP), with an inpatient capacity of 627 and a network of small hospitals. Public health activities are carried out by community physicians in seven health divisions. GHP is the only hospital with a dermatology clinic in this district and any suspected case of leishmaniasis is referred to GHP and treated by the dermatologist.

The study sample included all recorded cases of leishmaniasis from January 2008 to July 2012 residing in Polonnaruwa district. These included cases reported to the regional epidemiologist of the Polonnaruwa district and all confirmed cases registered at the dermatology clinic of GHP. A confirmed case of leishmaniasis was defined as a clinically suspected case of leishmaniasis with microscopic examination of saline aspirate smears

or slit-skin smears of the lesions. Direct smears from the lesions were air-dried and stained with Giemsa's stain and screened for *Leishmania* amastigotes under a light microscope.

The surveillance reports were from the field investigations carried out by public health inspectors (PHI). These are based on reported cases, not only from Polonnaruwa, but also from all notifications from other districts on patients residing in Polonnaruwa. This approach of using two data sets was taken because we assumed that in isolation, the dermatology clinic register itself and the district surveillance data would be incomplete.

Two data sets were merged using demographic data. For merging, all entries were examined manually and entries that were included in only a single data set were included to determine the disease frequency; duplicate data were removed. However, analysis of clinical characteristics was restricted to a subset of patients registered in the dermatology clinic. Disease incidence was calculated as annual mean incidence using population data from census and statistics department.

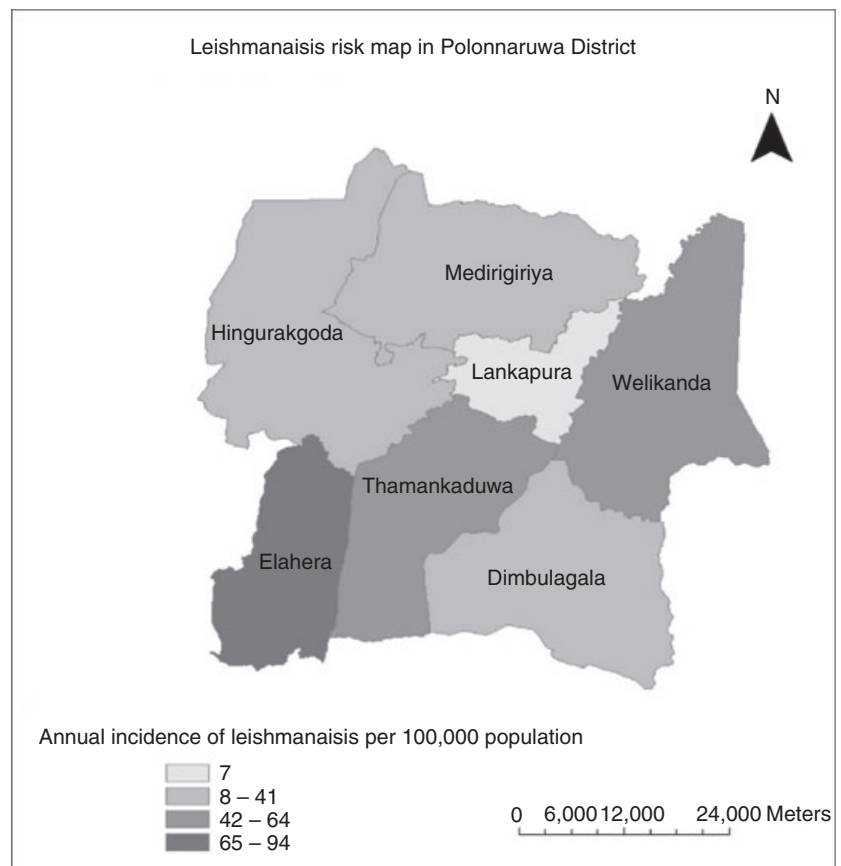


Figure 3 Leishmaniasis incidence in MOH areas in the Polonnaruwa district, Sri Lanka (based on 2011 data).

Results

After elimination of duplicate reports and non-residents of Polonnaruwa, a total of 446 confirmed cases of leishmaniasis were identified. Of these, details of 84 cases were not available with the dermatology clinic registry but reported only to the surveillance system from hospitals other than GHP. Of the 362 selected cases from the dermatology clinic, 157 (43.4%) were not reported to the surveillance system.

Mean annual incidence of leishmaniasis in the 2008–2012 periods in Polonnaruwa was 26.2 per 100 000 population. The number of cases reported for 2008, 2009,

2010 and 2011 was 24, 44, 93 and 171, respectively (Figure 1). During the first 7 months of 2012, 83 cases were reported. For 31 patients, the year of registration was missing.

The case distribution by month (as a percentage of total annual cases over a period of 3 years) peaks between August and November, showing a seasonal variation of CL incidence (Figure 2) with high incidence during dry and hot period before the beginning of north-east monsoon in Polonnaruwa.

The distribution of cases by MOH area shows high incidence in three MOH areas (Figure 3). Elahera, Welikanda and Thamnkaduwa MOH had mean annual incidences of

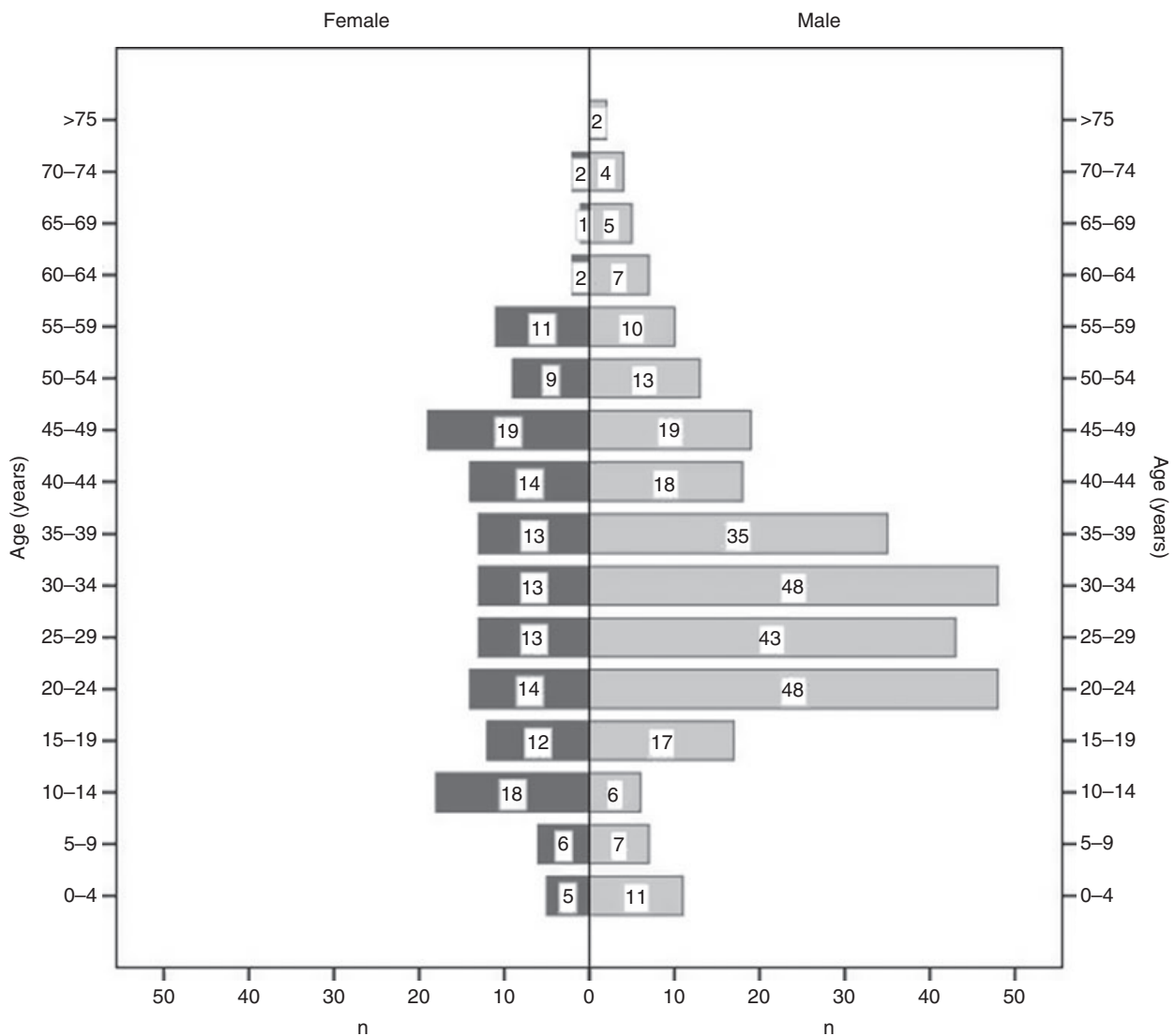


Figure 4 Age and sex distribution of leishmaniasis cases in Polonnaruwa, Sri Lanka ($n = 448$).

94.7, 64.6 and 54.1 per 100 000 population, whereas it was 8.0 per 100 000 population in Lankapura.

Mean age of the study sample was 33.6 years (SD 15.7 years). Male cases were significantly more common than female ones ($n = 294$, 65.9%, Chi-square for goodness of fit = 48.4, $P < 0.001$). This male predominance was solely due to the large number of affected males in the productive age group (Figure 4): among patients with CL aged 20–40 years, 75% were male.

Clinical details were available for 362 patients registered in the dermatology clinic of GHP. The median duration of lesions at the time of presentation to dermatology clinic was 4 months (Interquartile range 2–7) months. Of 362 patients, 10 (2.8%) had lesions in multiple sites. The majority had lesions on upper limbs ($n = 144$, 39.8%) or their face ($n = 117$, 32.3%) (Table 1). Two-third of the lesions were 1–3 cm in diameter. The commonest type of lesion was nodules ($n = 157$, 43.4%), followed by crust ($n = 116$, 32.0%).

Discussion

Leishmaniasis has become the most important emerging infectious disease in the North-Central Province of Sri

Table 1 Clinical profile of lesions reported among 362 patients with leishmaniasis from Polonnaruwa

	<i>n</i>	%
Site†		
Upper limb	144	39.8
Face	117	32.3
Lower limb	83	22.9
Trunk	13	3.6
Other	12	3.3
Number of lesions		
One	268	74.0
Two	37	10.2
More than two	30	8.3
Data missing	27	7.5
Size (cm)*		
<1	64	17.7
1–3	236	65.2
>3	60	16.6
Data missing	2	0.6
Type‡		
Nodule	157	43.4
Crust	116	32.0
Plaque	51	14.9
Ulcer	18	5.0
Data missing	27	7.5

*Size of the largest lesion in patients with >1 lesion.

†Add up to more than 100% due to multiple sites in 10 patients.

‡Add up to more than 100% due to multiple lesions.

Lanka during the last 4 years; it is overtaking previously common public health problems such as malaria. Until 2009, dengue, dysentery, leptospirosis, viral hepatitis and food poisoning were the leading notifiable diseases reported to the regional epidemiologist from Polonnaruwa district (Epidemiological Unit 2009, 2010). Based on data presented in this paper, in 2011, leishmaniasis had become the second leading communicable disease after dengue with 171 reported cases.

We combined dermatology clinic data with district surveillance data to provide population based prevalence estimates of leishmaniasis in Polonnaruwa. We observed that 43.4% of the patients are not reported to the public health surveillance system and large number of cases reported to the system from other hospitals showing gaps in the data. Patients seeking care from the private sector may not have been reported to the surveillance system, and our estimate could be an underestimation of true disease incidence. This article is based on reported diseases based on Giemsa staining. We do not have species identification data and also the quality of the microscopic diagnosis is also unknown. This is a major limitation of this study, basically due to lack of routing species identification facilities in this set-up.

Male predominance and the high prevalence of disease among males in the productive age group may be due to occupational exposure. The main source of income in this area is agricultural work, which include Channa cultivation and paddy farming. In Hambanthota and Matara areas, the age distribution showed more cases among the younger age group (10–19 years) and no sex difference (Rajapaksa *et al.* 2007). In those areas, agriculture is not the main source of income and the outdoor exposure is more common among young children. However, more studies are needed on vector behaviour to identify probable indoor biting, to help control activities.

The observed gradual increase in cases numbers could be due to actual increase in cases, increase rate of detection or both. Because leishmaniasis was not even known to most practitioners before 2008, it was not routinely detected. A dermatologist was not available, and the disease notification system did not include CL as a notifiable disease prior to 2008. However, laboratory-based reports prior to 2008 show cases from Polonnaruwa, but not as many as this. Increased awareness among the general public and medical practitioners should directly contribute to increasing case numbers. However, numbers are still increasing 5 years after the establishment of surveillance and dermatology clinics, showing that there might be an actual increase in patient numbers. This needs urgent attention for several reasons. In Sri Lanka, leishmaniasis is caused by *L. donovani* (Karunaweera *et al.* 2003), the parasite responsible

for deadly visceral leishmaniasis in other countries. As described by Karunaweera (2009), we might be looking at 'a wolf in sheep's clothing'. Already fatal visceral (Abeygunasekara *et al.* 2007) and severe mucosal (Rajapaksa *et al.* 2005) leishmaniasis cases have been reported from Sri Lanka. Rising parasite abundance and probability to cause life-threatening VL may pose a public health threat in Sri Lanka. At present, the prevalence of CL is underestimated, and epidemiological investigations to identify modifiable determinants of disease transmission have not been carried out properly. Sri Lanka needs more vigilant leishmaniasis surveillance, and every possible effort must be made to stop VL becoming an endemic disease.

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Corresponding Author: Suneth Agampodi, Department of Community Medicine, Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka, Saliyapura, Sri Lanka. Tel.: +94252226252; Fax +94252234464; E-mail: sunethagampodi@yahoo.com