Analysis of the pattern of passive case detection of leishmaniasis in two tertiary grade hospitals in Sri Lanka

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Leishmaniasis is caused by protozoan parasites belonging to genus Leishmania. Parasites are transmitted by the bite of an infected female sand fly. This is commonly a zoonotic disease but some forms are anthroponotic. Reservoir hosts are small mammals, dogs, etc. Major clinical forms are: cutaneous (CL), mucocutaneous (MCL) and visceral leishmaniasis (VL).

Leishmaniasis is mainly distributed in tropics and subtropics and it is endemic in 88 countries, out of which 72 are developing countries[1]. The estimated global prevalence is 12 million and 350 million people are at risk[1]. Annual case incidence is about 1.5 to 2 million worlwide[1].

Few imported cases of leishmaniasis were reported in Sri Lanka initially. An imported case of CL related to employment in a Middle-Eastern country was reported in 1990[2]. Chapman reported VL in a 17 year old English girl who had a stay of 5 weeks in Sri Lanka in 1973[3]. First autochthonous case of CL was reported in 1992[4]. This was a young male from Ambalantota and never been away from the country or to the Northern part of the country[4]. A few sporadic cases were reported since then. Since year 2000 increasing numbers of patients have been reported from many parts of the country and to date more than 2000 CL patients have been reported[5]. The causative organism of CL in Sri Lanka is *Leishmania donovani*, MON-37 which is very closely related to the strain causing visceral leishmaniasis in India[6,7]. Leishmaniasis has been declared a notifiable disease (group B) since September 2008[8]. Leishmaniasis has become a major health problem and now it is an established disease in the country.

Cutaneous leishmaniasis represents the main clinical form in Sri Lanka. However, a few cases of muco cutaneous and visceral leishmaniasis have been reported[9,10,11].

Main districts affected are Anuradhapura, Matara, Hambantota and Polonnaruwa. The number of CL patients detected at dermatology clinics is increasing steadily in all parts of the island. However, it is still considered under reported[12]. Therefore, the need arises to analyse the pattern of spread of leishmaniasis in a holistic manner to understand the disease burden and the level of control measures to be implemented to combat leishmaniasis within the country. This hospital based study aimed at analysis of increase in numbers and clinical features of the leishmaniasis cases reported over last four years at two dermatology clinics based in high transmission districts for CL in Sri Lanka.

Method and Results

A hospital based cross sectional analytical study was carried out at Teaching Hospital (TH) Anuradhapura and District General Hospital (DGH) Polonnaruwa. It included patients who presented with leishmaniasis to the skin clinic TH Anuradhapura from July 2007 to July 2011 and DGH Polonnaruwa from February 2008 to December 2011. These patients presented to the hospitals by themselves seeking treatment (passive case detection).

Anuradhapura is the largest district in the country with a low population density of 112 persons per km^2. The majority is rural population (92.7%) engaged in farming, while 7.1% urban and 0.1% estate according to the Department of Census and Statistics 2001 (www.statistics.gov.lk).

Diagnosis was made based on clinical grounds, slit skin smears and punch biopsy and histology. Diagnosis and treatment was carried out only in patients who gave their verbal informed consent. Ethical clearance was not sought as this was a prospective study which mainly analysed the routine history and examination findings needed for treatment and globally accepted routine diagnostic and treatment methods were carried out in the management.

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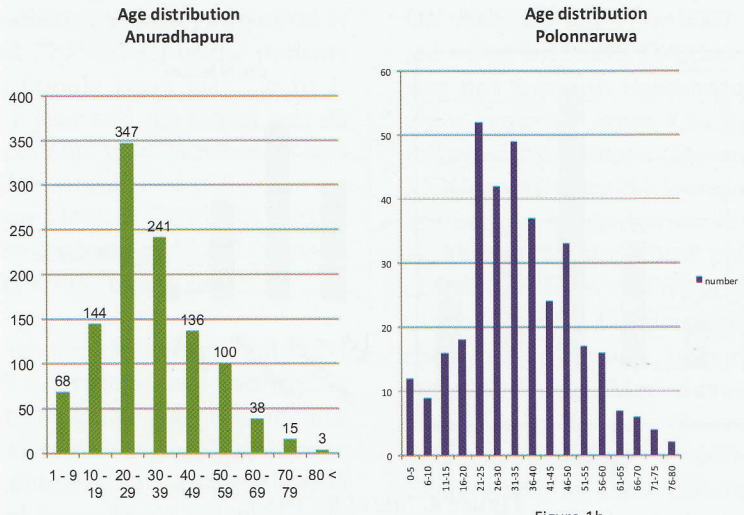

Figure 1a

Figure 1b

Figure 1

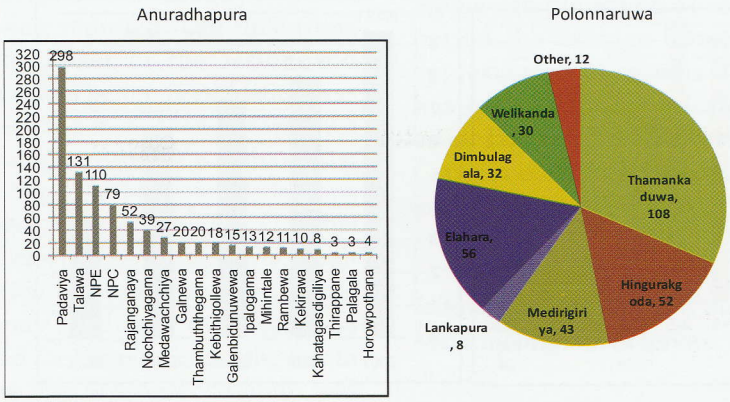

Figure 2a

Figure 2b

Figure 2. *Distribution within MOH areas.*

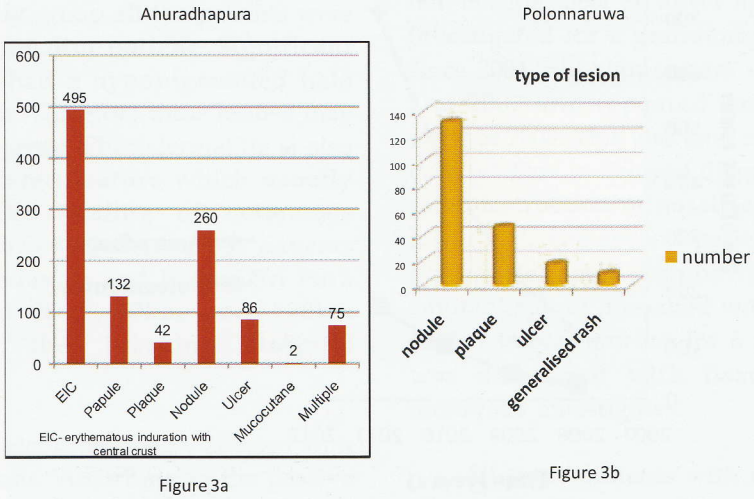

Figure 3a

Figure 3b

Figure 3. *Clinical type of the lesion.*

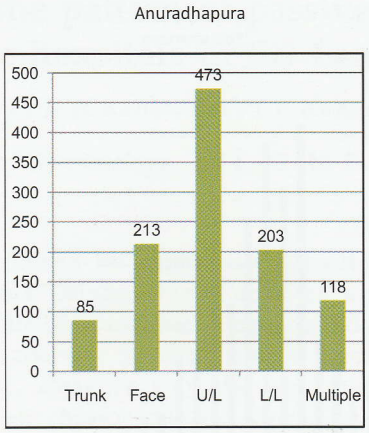

Figure 4a

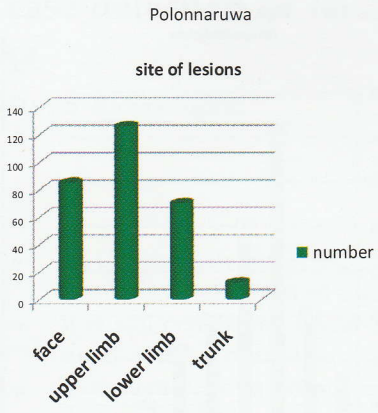

Figure 4b

Figure 4. *Site of the lesions.*

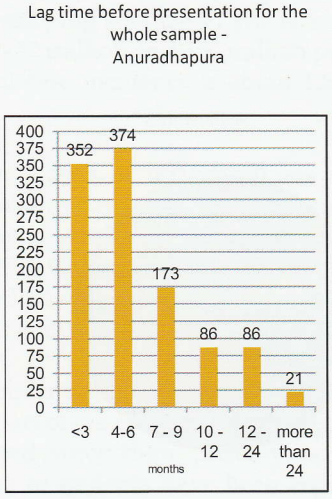

Figure 5a

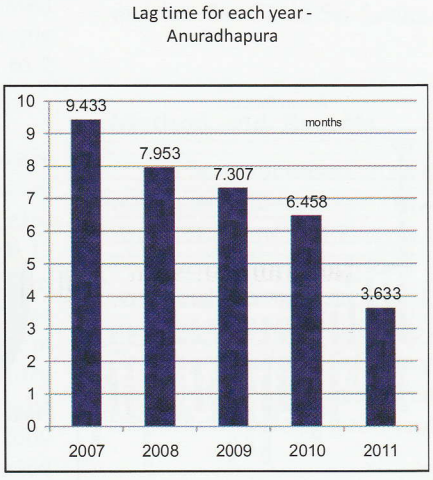

Figure 5b

Figure 5.

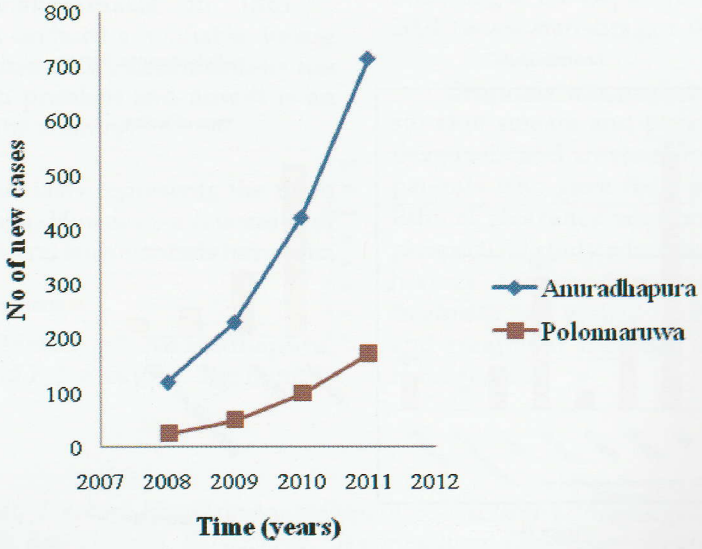

Figure 6. *Case incidence of CL.*

There were 1092 patients for the 4 year period at TH Anuradhapura and 72.7% (794) of the patients were males. Male to female ratio was 2.6 to 1. Youngest patient was 1 year and the oldest was 88 years. Majority of the patients were between 20 and 40 years (figure 1a). Most number of patients were reported from Padaviya Medical Officer of Health (MOH) area followed by Thalawa and NPE (Nuwara gampalatha East) MOH areas (figure 2a).

The commonest type of the lesion detected at TH Anuradhapura was the erythematous induration with a central crust. Nodule was the second commonest and ulcers were rare (figure 3a). Majority (778 patients) of the patients had a single lesion whereas 38 patients had more than 5 lesions. Upper limbs were commonly affected followed by face and lower limbs (figure 4a). About 8% of the patients had photodermatitis. Initially most of the patients were members of the armed forces who worked in North-Central and North provinces in the country and now more civilians are being reported. Lag time (time interval between the onset of the lesion and presenting to the skin clinic) before presentation was ranged between 2 weeks and more than 5 years. Two thirds of the patients sought treatment within the first 6 months (figure 5a). Patients with lesions particularly on the nose, lips, ears and around the mouth and eyes (vital sites) present quite early. Mean duration of presentation has reduced over the last few years and this may be due to the awareness programmes conducted for the public and the health care personnel (figure 5b). Seasonal variation was not detected in our study.

Number of patients has dramatically increased over the last few years (Jan - Dec 2008 – 120, Jan - Dec 2009 – 230, Jan - Dec 2010 – 422, Jan - Dec 2011 – 714 (figure 6). In this study group all the patients were sinhalese except 1 muslim patient. Significant number of patients had a hypopigmented halo around the skin lesion. Therefore these lesions may mimic tuberculoid leprosy. Photodermatitis is also an important associated feature which usually disappears with the healing of cutaneous leishmaniasis. Significant number of our patients (27.2%) was from Padaviya and Padavi Sri Pura which are situated from 90km and 120km respectively from the Teaching Hospital Anuradhapura.

Polonnaruwa district is also badly affected with cutaneous leishmaniasis. According to the passive case detection data available at DGH Polonnaruwa, the number of cases almost doubled every year (Feb - Dec 2008: 24, Jan - Dec 2009: 49, Jan - Dec 2010: 99, Jan - Dec 2011: 173) (figure 6). A seasonal pattern was not found in Polonnaruwa either. Most cases were reported from Thamankaduwa (108) area followed by Elahara (56) and Hingurakgoda (52) MOH areas (figure 2b). Increasing numbers of patients are being reported from rehabilitation camps in Welikanda. Most of these patients are former LTTE cadres who seem to have acquired the disease while in the Vavuniya District. Elahera MOH area became the second most prevalent area in 2011. Attanakadawala, Madudamana and Kottapitiya are identified as the new pockets in this study. These data may not reflect the actual disease burden in the Elahera area as some patients are being treated at Dambulla and Matale hospitals. Majority of the patients reported to DGH Polonnaruwa were in between 20 and 40 years with a mean age of 34.21 years (figure 1b). Sixty four percent of the patients were males. The average duration of lesions for the whole sample was 6.44 months. During 2008/09 period the average duration of the lesions was approximately 11 months. The lag time for reporting has improved dramatically probably due to the awareness programmes carried out in the district. Commonest clinical type was the nodule, and ulcers were rare (figure 3b).

Upper limbs were the commonest affected site followed by the face and the lower limbs (figure 4b). Majority of the skin lesions were between 1 and 3 cm in size.

Two patients with mucocutaneous leishmaniasis were reported to TH Anuradhapura in the recent past; first one was a 41-year old male farmer from Eppawala (Thalawa MOH) who presented with a non-healing ulcer on lower lip and was extensively investigated for a granulomatous mid line lesion since 2001. Slit skin smears were negative in 2006 and 2007 and repeated smear was positive in October 2008. This was later confirmed by PCR and culture[9]. Due to delayed diagnosis he was left with total destruction of nasal septum, phintrum and lower lip[9]. The second patient was a 55-year old postmaster from Rambewa MOH (15km from Anuradhapura) presented with a non-healing ulcer on left buccal mucosa for 6 months duration. He was diagnosed with tissue biopsy showing numerous amastigotes.

All three patients with endogenous VL were reported to TH Anuradhapura at some stage of the illness. The first locally acquired case of visceral

leishmaniasis was reported from Anuradhapura[11]. The patient was a 36-year old female from Thalwa[11], the second patient a 45-year old male from Thambuththegama (data obtained from the Medical Unit TH Anuradhapura) and the 3rd case, a 57 year old civil soldier from Vavuniya[10]. All three patients were diagnosed with liver biopsy. However, a positive bone marrow culture could be established only in the 3rd patient[10]. None of the patients had any cutaneous lesions. The first and third patients had recovered fully with intravenous sodium stibogluconate treatment[11,10] while the 2nd died before treatment was initiated (information obtained from the Medical Unit TH Anuradhapura).

Discussion and Conclusions

The recent emergence of human leishmaniasis has led to the urgent need for increased vigilance, disease surveillance, and further studies on epidemiology and transmission dynamics[5]. It is not clear that the disease transmission dynamics are similar throughout the country and differ between the various eco-epidemiological settings in the country[5]. It was reported that in the Northern parts of the country, disease acquired in forests and shrubs whereas in southern parts it is mainly peri-domestic[5]. Regarding seasonal variation one study showed that the transmission of *L. donovani* in Sri Lanka is perennial but peaks during the monsoon season as the biting activity of the sandfly vectors peaks[13]. Another study has shown that there are no seasonal variation[14] revealing different findings. In our study the seasonal variation was compared for the figures obtained for the years 2010 and 2011 only. Therefore, to confirm this finding we need to continue the study for several years.

A population genetic study showed that significant differences in allele and haplotype distribution at the TNF locus among the main ethnic groups, with Sinhalese differing significantly from Tamils and Moors[15]. This current prospective analytical study too showed the presence of CL mainly among the Sinhalese ethnic group in the Anuradhapura district. The difference in clothing, cultural and social behavior may partly explain our observation. Therefore, more detailed population genetic and epidemiological studies are needed to determine the presence of ethnic susceptibility to CL among different ethnic groups in Sri Lanka.

Long lag period is probably due to the lack of knowledge and awareness among the general public and more importantly the primary care doctors. Although there are local hospitals, diagnostic and treatment measures specific for leishmaniasis is not available in these centres. The specific anti-leishmaniasis treatment measures; sodium stibo gluconate and cryotherapy are available in only few hospitals throughout the country. Most of the patients are from remote areas and they are from low socio-economic background (data not shown). They have to undergo many hardships to travel long distances to access treatment.

True burden of the disease is not known yet and it is believed to be much higher in numbers than the reported figures (Ministry of Health, Sri Lanka). Therefore, it is difficult to plan out the control programmes. If the present parasite strain changes into more virulent form/s by mutations more devastating consequences can be expected in future. Potentially fatal type VL can become endemic. It is possible that this is an existing under-diagnosed disease here in this country. Locally acquired visceral leishmaniasis needs to be considered and excluded in patients with hepatosplenomegaly in Sri Lanka.

Furthermore, vector, reservoir host and disease transmission pattern in Sri Lanka has not been understood properly to date. In conclusion establishment of a national control programme with national figures is mandatory for the control of leishmaniasis in Sri Lanka. Education of the public and healthcare personnel too is important and measures should be taken to control the vector. Unless these actions are implemented urgently spread of this potentially fatal disease is unavoidable in near future.

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