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Epidemiological aspects of human cutaneous leishmaniasis in French Guiana

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Abstract

A follow-up study of 219 patients infected with parasitologically confirmed cutaneous leishmaniasis in French Guiana was made between 1981 and 1987. Cutaneous leishmaniasis appeared to be common in young male adults entering the forest for professional activities (84·2% of the cases). The lesions were generally of the classical ulcerative type. They were limited to the skin and preferentially located on the legs and forearms (20·7% and 19·8% respectively). Most of the cases (86·6%) represented primary infections, but 6·8% had a recurrent lesion at the site of an old, previously cured lesion.

Introduction

Cutaneous leishmaniasis is a nosological entity well known amongst the primitive populations of French Guiana who have a specific name for the disease in their own language: for Amerindians, 'kalasapau' in Wayapi and 'yatuwe' in Palikur (GRENAND *et al.*, 1987), and for Bush Negroes, 'tatajasa' in Saramaka and 'buchijasi' in Boni and Njuka (Sauvain, personal communication). It was also known as a hazard of forest life during the historical period of the gold rush and was named 'pian bois' by the Creole population.

The first parasitologically confirmed case was described in 1943 by FLOCH (1954) and the parasite described as *Leishmania tropica guyanensis*. Cases of the disease have been regularly recorded in the *Rapports d'activité de l'Institut Pasteur de la Guyane française et du Territoire de l'Inini*. Between 1943 and 1951, 83 cases were diagnosed in the country, half of them parasitologically confirmed. Since 1977, the number of cases diagnosed has increased significantly and the disease has become a public health problem among sections of the population entering the forest.

A joint epidemiological investigation was begun in 1978 by the Institut Pasteur de la Guyane française and the Centre ORSTOM of Cayenne. The natural hosts of *L. braziliensis guyanensis* were quickly identified (LE PONT & PAJOT, 1980; GENTILE *et al.*, 1981) and the presence in French Guiana of a second *Leishmania* species, *L. mexicana amazonensis*, was also established (DEDET *et al.*, 1985). Several aspects of the sandfly ecology (LE PONT & PAJOT, 1980; PAJOT *et al.*, 1988; GEOFFROY *et al.*, 1986) as well as of the conditions of transmission (LE PONT & PAJOT, 1981; CHIPPAUX *et al.*, 1984; ALEXANDRE *et al.*, 1987) have already been investigated.

During the course of a 6 year investigation (1981–1987), we had the opportunity of following up numerous patients with cutaneous leishmaniasis lesions. Our findings on the epidemiological aspects of the human disease in French Guiana are presented below.

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Materials and Methods

During 1981–1987, 219 patients with parasitologically confirmed leishmaniasis were examined and subjected to a variety of clinical, biological and epidemiological observations. The following information was noted: (i) social status: age, sex, ethnic group, profession and activity causing the patient to enter the forest; (ii) clinical data: number, localization and clinical type of the lesions, clinical status of the patient; (iii) biological data: mean diameter of amastigotes on smears, inoculations into culture medium and hamster foot; (iv) epidemiological data: date of appearance of the first lesion and geographical site where infection occurred.

A retrospective investigation was also carried out by examination of the local dispensary files (1954–1982) and by checking the diagnostic registers of the Institut Pasteur de la Guyane française and of the Service de Dermato-vénéréologie of the Jean Martial hospital of Cayenne (1979–1986).

The human population figures for French Guiana were taken from records of the Institut National de la Statistique et d'études économiques, Cayenne: the national census of 1982 and estimated values for other years.

Results

Social status of the patients

Most of our sample of 219 patients were young adults (mean age 27·8 ± 9·2 years, range 15–56). Most were male (97·7%).

The main ethnic groups found to be infected were indigenous Amerindians and Creoles as well as immigrant H'mongs. Caribbean Creoles, and Europeans. The comparative frequencies observed with respect to ethnic origins are clearly related to geographical proximity to health care facilities and to the social importance attributed to the disease within each group. Most of our patients belonged to the European (45·7%) and the Creole populations (50·4%) living in the urban centres of the coast where medical facilities are good. In contrast, traditional tribes living along the rivers were scarcely represented in our investigation: only 2·0% of patients were Amerindians and none were Bush Negroes.

In all cases, leishmaniasis infection resulted from penetration into the forest for professional (84·2%) or leisure activities (15·8%). No infection was observed in patients who lived exclusively in the urban agglomerations of the coast without ever going into the forest. Most of our patients were soldiers (64·6%). This can be explained by the fact that health care is free and leishmaniasis is a notifiable disease in the army.

The activity at the origin of the infection was mainly military jungle raids (Table 1).

Clinical and biological status

Two hundred and eleven patients presented a total of 707 lesions. The mean number of lesions per patient was 3·64 (range 1–19) (Table 2).

All the lesions were limited to the skin, without any mucous involvement.

As we have previously shown (DEDET *et al.*, 1987), the distribution of lesions on the body depends on the form of dress, the lesions being located on unclothed areas. In our sample, the distribution of the lesions is illustrated in Fig 1; legs and forearms were the most affected parts of the body, with 20·7% and 19·8% of the lesions respectively.

The most common clinical type was the ulcerative lesion (92·1%). The ulcer was covered by a scab in 30·9% of cases and surrounded by small peripheral papulae in 19·8%. Other types of lesion were occasionally observed: nodular (3·3%), dry squamous (1·3%), papulous (2·6%) or budding (0·6%). In 30·2% of cases, subcutaneous lymphangitic extension from the lesion occurred and a lymph node was presented in the draining area in 18·2% of cases.

One hundred and ninety-one patients (86·6%) were infected by *Leishmania* for the first time (primary infection). 15 (6·8%) exhibited recurrence at the site of an old lesion which had been previously cured, and 13 (5·9%) had a second leishmanial infection (lesion(s) appearing at new sites in patients who had already been cured of previous, confirmed, leishmaniasis).

In the primary infections, the duration of the infection at the time of examination was generally short (mean 4·5 ± 2·6 weeks, range 1–40).

It was very rare to observe spontaneous evolution of lesions, as almost all the patients were treated. However, one case was observed for 30 months without treatment.

In the relapses, the reappearance of an active lesion at the site of a previously cured one occurred after a mean interval of 7·3 months (range 2 months–3 years).

Table 1. Activities leading to forest penetration and leishmaniasis infection in 183 patients

Activities	Numbers[a]
Military jungle raid	104 (56·8)
Mining and gold-digging	8 (4·4)
Scientific research	7 (3·8)
Forest exploitation	1 (0·5)
Forest settlement	11 (6·0)
Road-building	23 (12·6)
Hunting	27 (14·7)
Tourism	2 (1·1)

[a] Numbers in parentheses are percentages.

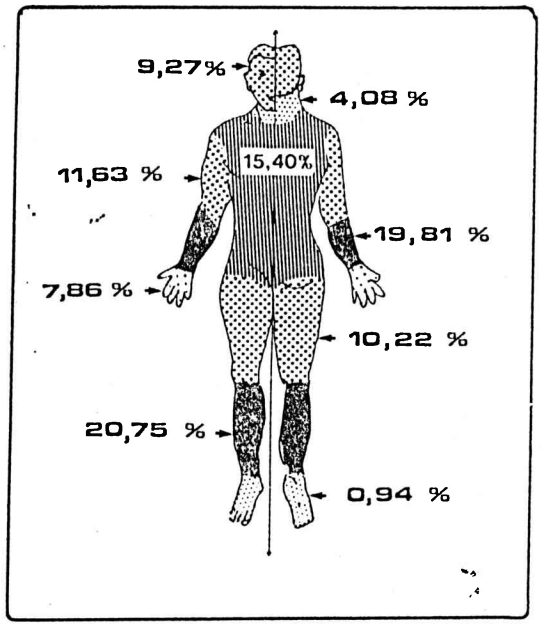

Fig. 1. Distribution on the body of 636 lesions on 201 patients examined between 1981 and 1987 in French Guiana.

The lesions were generally rich in parasites, which were easily discernible on smears. The mean diameter of amastigotes was 3·62 μm in 34 cases of confirmed *L. braziliensis guyanensis* infection, and 4·22 μm in 3 proven cases due to *L. mexicana amazonensis*.

The identification of the species responsible for the lesions was carried out by isoenzyme characterization in 91 patients. *L. braziliensis guyanensis* was the most common species, being responsible for 88 of the cases, and *L. m. amazonensis* was found in only 3 cases, as reported in detail by DESJEUX & DEDET (1989).

Epidemiological findings

The yearly registration of cases between 1979 and 1986, correlated with human population figures, showed a remarkably constant annual incidence of around 2·3 per 1000 inhabitants (range 1·9–2·7 per 1000), with an exceptionally low rate in 1985 of 1·3 per 1000.

The geographical distribution of the sites of infection, when it was possible to identify them (147 out of 219 cases), showed a spread over the whole territory, with a higher density of cases in an area located within the 3500 mm isohyet (Fig. 2). But this area is also that most regularly visited, due to its proximity to the main town, Cayenne.

Cutaneous leishmaniasis appears in French Guiana as a seasonal disease. The monthly registration of

Table 2. Distribution of the number of lesions per patient

	Number of lesions per patient[a]							
	1	2	3	4	5	6–10	>10	Total
Number of lesions	86 (40·8)	39 (18·5)	20 (9·5)	16 (7·5)	13 (6·2)	26 (12·3)	11 (5·2)	707

[a] Numbers in parentheses are percentages.

diagnosed cases showed an increase in the period November–May in the 2 samples examined (Fig. 3) and the same time sequence was also apparent in our studied sample.

By checking the monthly distribution of the 177 cases for which we were able to obtain the precise date of appearance of the first lesion, and allowing 4 weeks for the incubation period, we were able to determine

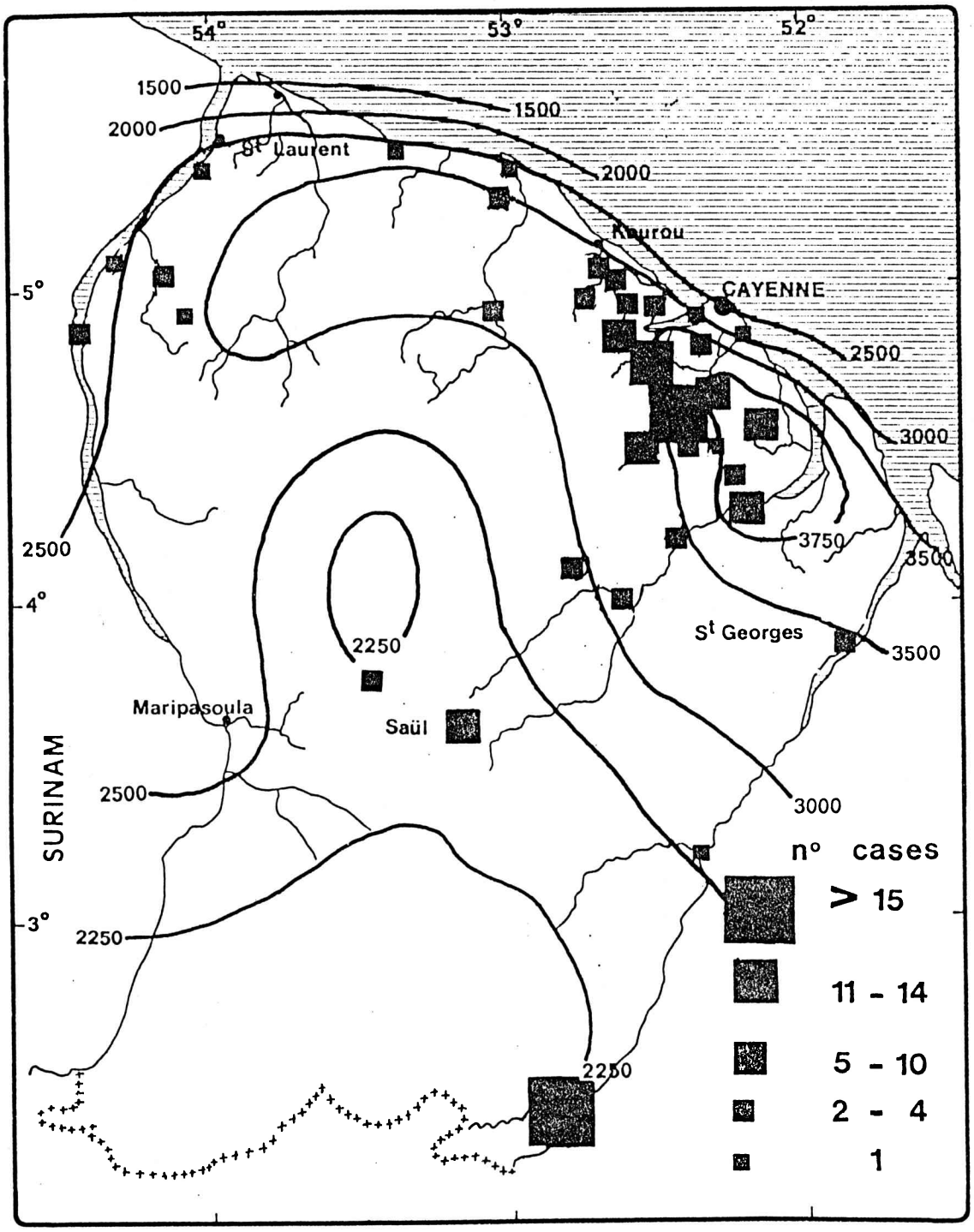

Fig. 2. Geographical distribution of the sites of infection of 147 cases of cutaneous leishmaniasis in French Guiana; isohyets (mm annual rainfall) are shown.

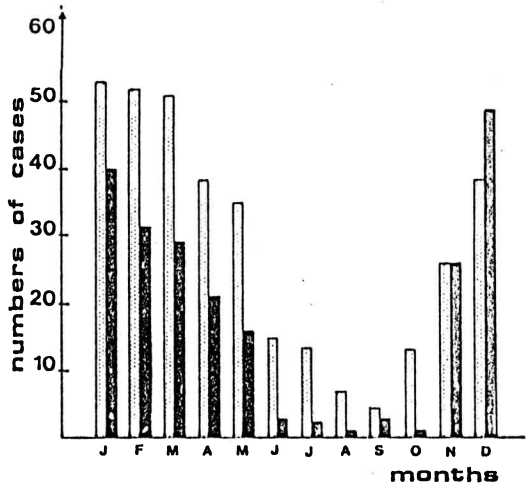

Fig. 3. Monthly incidence of cutaneous leishmaniasis cases (i) between 1954 and 1982, in the dispensaries of five areas of French Guiana (total number of cases 354; stippled dotted bars), and (ii) between 1981 and 1987, at the Institut Pasteur de Guyane française (total number of cases 222; solid bars).

the month of infection. Expressed per year and correlated with the corresponding rainfall figures (Fig. 4), these data show that transmission in French Guiana occurs mainly in periods of low rainfall and does not occur during months of high rainfall. The high-risk season is the end of the dry season, i.e. the months of October to December. A second possible transmission period occurs, to a lesser extent, during February and March, corresponding to the brief dry season in March.

Discussion

Cutaneous leishmaniasis due to *L. braziliensis guyanensis* is a wild zoonosis endemic in silvatic areas of the northern part of the Amazonian basin, from the Guianas to Pará State of Brazil (LAINSON & SHAW, 1973).

French Guiana is an ideal place to study this disease, due to its remarkably high prevalence there and the good medical facilities which ensure diagnosis of most of the cases.

Cutaneous leishmaniasis appears to be common in French Guiana (mean annual incidence of 2·3 per 1000), predominantly affecting young male adults entering the forest for professional reasons. It appears

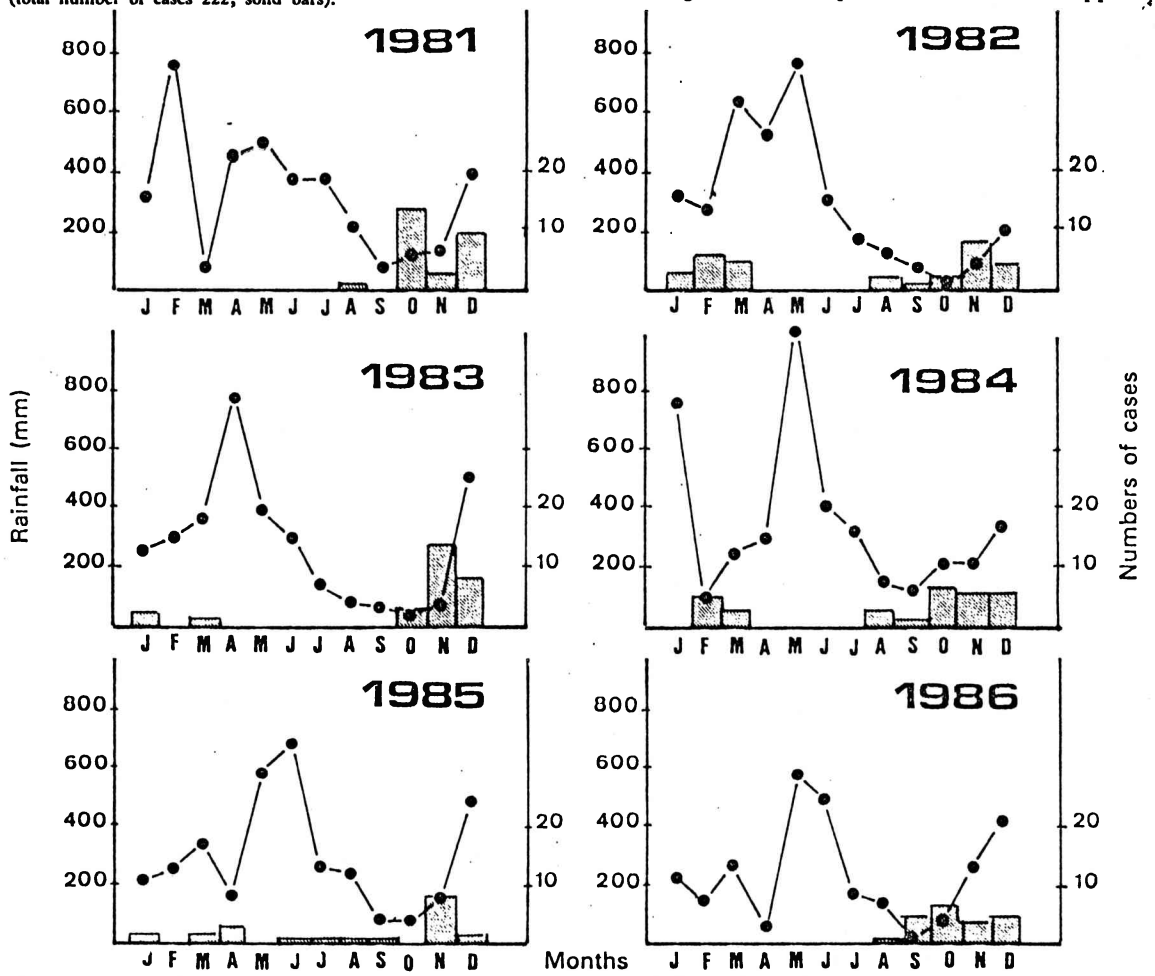

Fig. 4. Monthly distribution of 177 cases of infection with leishmaniasis observed in French Guiana, between 1981 and 1986, correlated with the rainfall. (Rainfall figures obtained from the monthly statements of the Service de la Météorologie Nationale, Cayenne).

as a seasonal disease with transmission periods during low rainfall months (October to December). This agrees with previous entomological observations which showed a peak of *Lutzomyia umbratilis* populations at ground level during November (LE PONT & PAJOT, 1980) and a high level of infectious bites from *Lutzomyia umbratilis* females during November and December (PAJOT *et al.*, 1986). If at all possible, entering the forest should be avoided between October and December.

The lesions observed were limited to the skin without any mucous involvement. *L. b. guyanensis* was a species responsible for 96·7% of the infections and *L. m. amazonensis* for only 3·3%.

The lesions were generally of the classical ulcerative type, but other clinical types were occasionally found. The 3 cases attributable to *L. m. amazonensis* were all of the ulcerative type without nodular dissemination and all were cured by antileishmanial agents.

Recurrence at the site of a previously cured lesion occurred in 6·8% of cases. True second infections were occasionally observed, probably due to infection by a different species, for, as stated by LAINSON (1988), there is no immunological cross-reaction between the species of the *L. mexicana* and *L. braziliensis* complexes.

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