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## STUDY OF A CUTANEOUS LEISHMANIASIS OUTBREAK IN GENERAL VEDIA, PROVINCE OF CHACO, 1996

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### SUMMARY

Between March and July 1996, a focalized epidemic outbreak of cutaneous leishmaniasis in General Vedia, province of Chaco, associated to the gallery forest of the Oro river was verified. The incidence rate in the area, which was 0-2/000 cases in preceding years, reached 8/000 cases in 1996. The risk of symptomatic infection was similar between sexes, but was different when analyzing the different age groups by sex, suggesting a greater relative importance of the peridomestic transmission for the females and of the transmission in the subtropical forest for the males. Specimens of *Lutzomyia intermedia*, a species already incriminated as a vector of Leishmaniasis in other provinces of northern Argentina, were captured and identified in the focus locality in May 1996. The possible causes of the outbreak related to the climatic variables and the vector abundance are analyzed and the results in the framework of possible preventive and control activities are discussed.

**KEYWORDS:** Leishmaniasis; *Lutzomyia intermedia*; Argentina.

### INTRODUCTION

The first record of leishmaniasis in Argentina is from 1917<sup>18,30</sup>. Since then, until the 80's, cutaneous leishmaniasis had characteristics of an endemic anthrozoosis, with a mean of 40-50 cases per year, mainly in workers related to forestry or in individuals in close contact with the primary forest. The endemic area includes three phytogeographic regions (Yungas, Chaco and Subtropical Amazonic Dominion)<sup>17</sup> and nine provinces: Salta, Jujuy, Tucumán, Catamarca, Formosa, Chaco, Santiago del Estero, Misiones and Corrientes<sup>20</sup>.

In the 1930 census of leishmaniasis there were no cases of cutaneous leishmaniasis registered in Chaco province<sup>2</sup>. Between 1984 and 1986, the first epidemic outbreak of the second half of the century was registered in Argentina, with the focus in Pichanal, Salta, and the etiological agent was identified as *Leishmania (Viannia) braziliensis*<sup>3,10,11,25,26,29</sup>. Outbreaks of smaller magnitude were registered in most of the provinces of the endemic area in subsequent years. The National Epidemiological Service (Bulletin) registered for Chaco a mean of 11.5 cases/year for 1954-1994 and 30, 41, 15 and 11 cases/year for 1995-1998, respectively.

In the endemic region, fifteen species of Phlebotominae, the subfamily of insects which includes the vectors of leishmaniasis, were captured until the present. In Chaco, until 1960, the identified species were *Lutzomyia intermedia sensu lato (s. l.)*<sup>14</sup>, *Lu. cortelezzi*, *Lu. shannoni* and *Lu. sordelli*<sup>1,4,19,20,21,23</sup>.

Of the 44 cases of cutaneous leishmaniasis registered in Chaco in 1996, 16 clustered in the locality of General Vedia, Department of Bermejo. In this study, the clinical-epidemiological results of this outbreak and the captures of Phlebotominae are presented. The conclusions are analyzed within the framework of possible strategies of vigilance and control, since in 1998, 1,243 cases of cutaneous leishmaniasis were registered in Argentina due to epidemic outbreaks in Salta and Misiones and, consequently, it is necessary to intensify the vigilance in all the endemic area.

### MATERIAL AND METHODS

**Description of the area** – General Vedia is a locality of the Department of Bermejo, placed at the Oro river shore, 170 km NW of Resistencia, capital of the province of Chaco (Fig. 1). The department is found in the humid subtropical phytogeographic region of the Amazonic dominion, in a flooded gallery forest environment of the Paraná basin. The population of General Vedia is 2,000 inhabitants, most of them dedicated to rural, forestry and public services.

**Diagnosis** – All patients were clinically diagnosed and the diagnosis was confirmed through observation of amastigotes in smears using material from the suspected lesion, following standardized procedures<sup>22</sup>. To all patients with confirmed leishmaniasis chemotherapy was administered, following international guidelines<sup>31</sup>.

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**Capture of Phlebotominae** – The insects were captured with a light trap on May 11 and 12, 1996 from 6 PM to 8 AM of the following day. The traps were placed 1.5 m above the ground, next to the cases and in the banana plantations found between the General Vedia Hospital and the Oro river (SL 26° 57', WL 58° 39') (Fig. 1). The insects were kept dry until their preparation and identification<sup>9,12,27,32</sup>.

**Meteorological data** – Meteorological data were obtained from the National Meteorological Service (Bulletin), based in Resistencia.

**Data analysis** – The two-tailed Exact test of Fisher and the G test (R x C) were used, considering them as significant with associated probabilities < 0.01<sup>24</sup>.

## RESULTS

In the General Vedia Hospital, between March 13 and July 13, 1996, 16 cases of cutaneous leishmaniasis were diagnosed through clinical observation and parasitological confirmation (smears). The demographic characteristics of the cases are observed in Table 1. The distribution by sex was not significantly different, but the distribution by sex and age group was significantly different. The clinical manifestation in 14 cases was simple cutaneous leishmaniasis, 1 case showed multiple cutaneous leishmaniasis (3 ulcers) and a woman 79 year-old had a mucocutaneous manifestation, diagnosed in July, who was not considered in the analysis (see Discussion). The 14 cases which completed the therapeutic scheme healed without relapses and 2 cases with incomplete treatment had relapses which were appropriately and successfully treated. More than 85% of the cases at the moment of the infection lived inside the 400-500 m<sup>2</sup> of the inner city (Fig. 1). Only one case referred activities directly related to the surrounding forest; however, due to the proximity of the Oro river, all of them inhabited houses with forested peridomicile at the moment of the infection. The records of leishmaniasis cases in General Vedia in years preceding and following the outbreak and the months in which the infection was notified are shown in Table 2.

**Table 1**

American cutaneous leishmaniasis cases by age, sex and reporting day (n = 16), General Vedia outbreak, Chaco, Argentina, 1996

Age	No. Cases	
	Males	Females
0 - 14	1	2
15 - 60	8	2
+ 60	0	2
Total	9	6
Mean Age (SD)	35.4	(20.3)

Reporting Date	No. Cases
3/13	7
3/18 – 4/16	5
5/7 – 7/13	4

The collected insects corresponded in all cases to the species *Lutzomyia intermedia* s. l.; 12 specimens were collected at the Oro river shore and 8 in the General Vedia Hospital, with a prevalence of females of 87.5%. This species had already been the only one collected on the port of Las Palmas and in the Oro river before 1960<sup>4</sup>.



**Fig. 1** - General Vedia locality showing case and light trap localization. Upper left corner: Argentina, Province of Chaco in black. Upper right corner: Province of Chaco, Department of Bermejo in black.

**Table 2**

Tegumentary leishmaniasis cases reported in General Vedia, Province of Chaco, Argentina, from 1988 to 1997

Year	No.Cases	Reporting Month
1988	4	July, October and December
1989	2	March and October
1990	1	April
1991	2	August
1992	0	-
1993	2	June - July
1994	0	-
1995	0	-
1996	15	March to July
1997	1	March

**DISCUSSION**

The Province of Chaco is found in the historical endemic area of leishmaniasis. Since the outbreak which occurred in Salta in 1984 and the following increase in the reporting of cases, there were cases from the area of General Vedia, Puerto Bermejo, Las Palmas and Colonia Benítez (all in Chaco Province) in individuals who lived next to rivers and streams. The previous highest incidence rate reported in General Vedia was 0.2/100 inhabitants in 1988, which reached 0.8/100 inhabitants in 1996, constituting an epidemic focus and decreasing again in the following years to endemic levels.

The characteristics of the area, the proximity of the river and the gallery forest to the domiciles, as well as the attendance to the former for recreational or fishing activities imply that the whole population is potentially at risk. However, the significant differences in the distribution by age groups would correspond to a differential risk according to sex. In males, the cases concentrate in the ages of highest working activity, so that the effective contacts would occur according to the traditional way of transmission by entering into the forest<sup>33</sup>, as it was observed in the foci of Santa Catarina State, Brazil<sup>28</sup>. In females, the incidence is

Data of mean temperature and monthly accumulated precipitation for 1995, 1996 and 1997 and the means for 1961-1990 are shown in Fig. 2 and 3.

Temperature °C

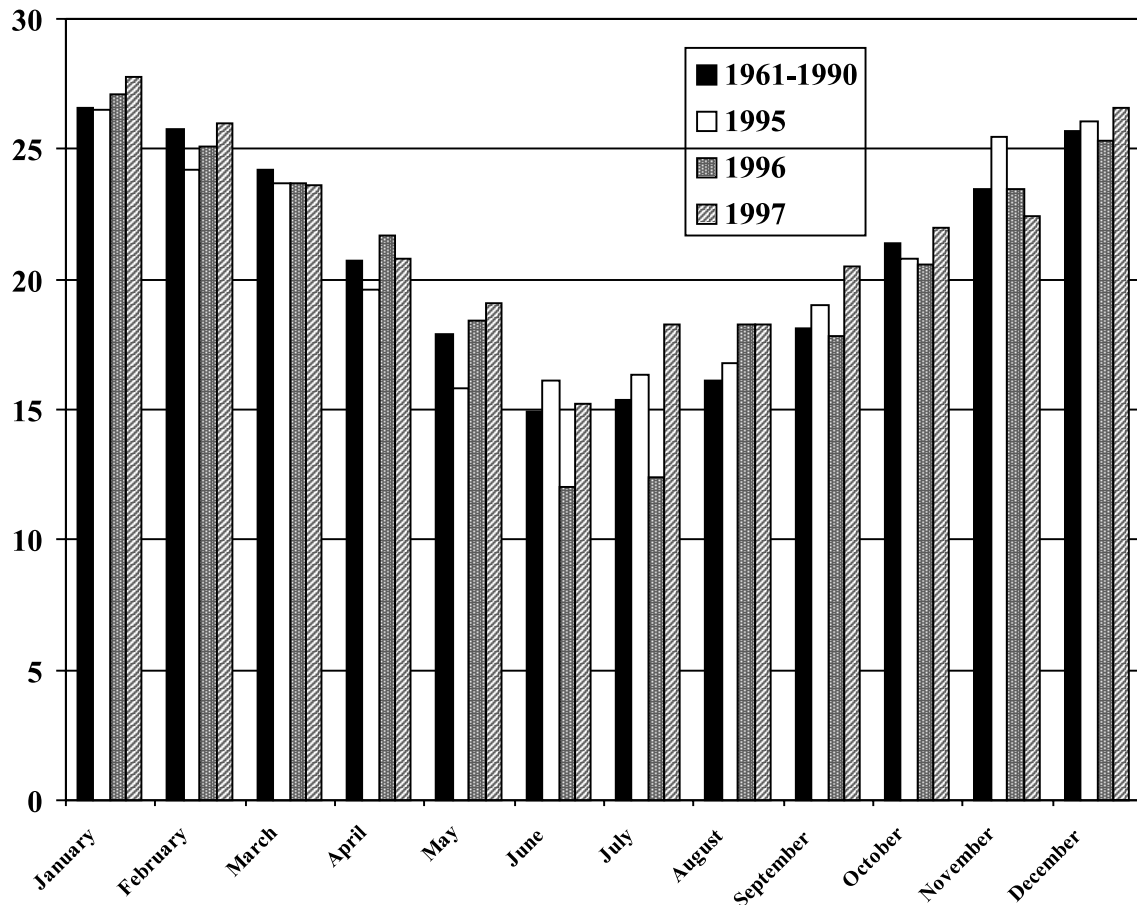


Fig. 2 - Temperature (°C) by month for the years 1961 to 1990, 1995, 1996, and 1997, Chaco Province, Argentina.

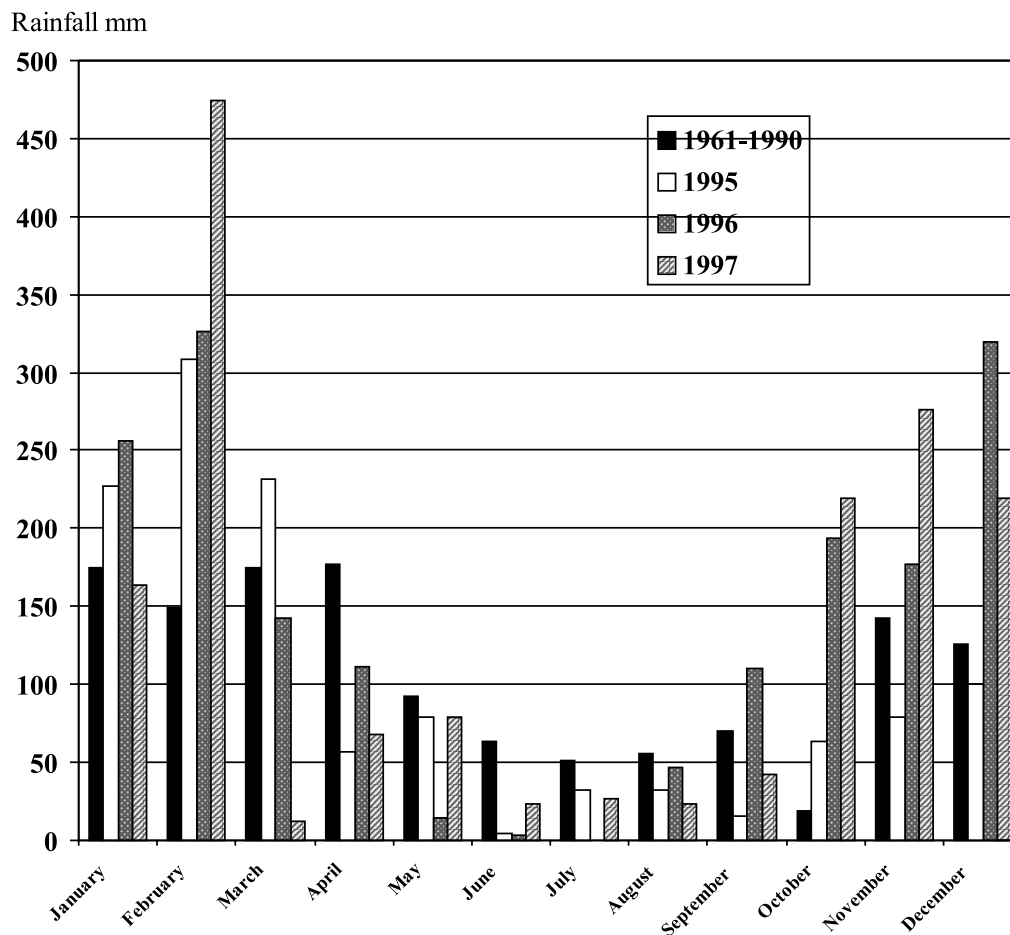


Fig. 3 - Rainfall (mm) by month for the years 1961 to 1990, 1995, 1996, and 1997, Chaco Province, Argentina.

equally shared among the aged groups, indicating a risk associated to domestic activities, with a transmission component in the peridomicile, probably underlying in the male incidence.

*Lutzomyia intermedia s. l.* has been the Phlebotominae incriminated as the vector of *Leishmania braziliensis* in the province of Salta, in the foci of Rio de Janeiro and São Paulo, Brazil, and has been the prevalent species in the foci studied until the present in Argentina<sup>5,6,7,8,13,20</sup>. This species is very well adapted to the environment modified by humans and presents peridomiciliary habits<sup>23</sup>. In Salta, *Lu. intermedia s. l.* or *Lu. neivai* according to the individuals studied by MARCONDES *et al.*<sup>15,16</sup>, showed dynamics with two annual peaks related to the summer rains, one of them in spring-summer and the other one in the fall, the latter being the one with a highest risk since it is constituted by a great proportion of females with eggs<sup>23</sup>. Extrapolating those data, the presence of this species and the proportion of captured females, even with a light trap, reinforces its incrimination as a potential vector also for the area in Chaco. The scarcity of phlebotomines captured is consistent with the time of the year in which the collection was carried out, since in winter they tend to disappear with the decrease of the minimum temperatures. On the other hand, due to the duration of the intrinsic cycle of *Leishmania* (1-2 months), it is usual that the outbreaks of cases are registered when

there is no more presence of the vector and the measures of antivector control have no more sense<sup>33</sup>. In the outbreak of General Vedia it is difficult to estimate the probable infection dates, since the lack of knowledge of the population and of information of the welfare system made the reporting to be more related with the flux of information than with the appearance of the lesions. Confirming this hypothesis, an accumulation of the initial cases with the same reporting date is observed. This fact is evidenced when in July's reports there is a case with a mucocutaneous presentation, a product of a previous cutaneous metastasis, diagnosed when the knowledge of the pathology in the community was spread. However, if we observe the notification dates in 1996 and preceding years, one could estimate, at least as a working hypothesis, a vector dynamics with two annual peaks for the area of Chaco, similar to the one analyzed in the literature.

The historical data show that *Lu. intermedia s. l.*, as well as the parasites of the genus *Leishmania*, were already found in the area, although the incidence of human cases was occasional. The local responsables do not refer any change in the behaviour of the population or modification provoked in the environment which could justify the increase in the incidence. If we observe the meteorological data, extrapolating once more the knowledge acquired in Salta<sup>23</sup>, we find that

the peak in the population, after the winter quiescence of 1995, was favoured by three specific weather conditions: 1) Temperatures slightly higher than the mean from November 1995 to April 1996. 2) Rains lower than the mean in November-December 1995. 3) Intense rains in January-February 1996. These three elements have probably allowed an exceptional density of vector insects in the post-winter peak, by non-interrupted successive population cycles (without flooding of nursing areas), to concentrate them later at high forest sites when the summer rains came. These high sites are transformed in the places of highest risk due to the abundance and age of vector females, and when they coincide with human peridomiciles or other frequented sites they give place to the outbreaks. The interruption of the outbreak, as well as the low incidence of leishmaniasis registered in the following years, are also explained by the severe winter observed in the mean temperatures of 1996. This decrease in the means was due to low minimum temperatures, which would have decreased the size of the population peak of the spring of 1996 to its normal values, or even lower, by affecting individuals with highest reproductive potential or killing the quiescent forms.

In conclusion, in 1996, a focal epidemic outbreak of cutaneous leishmaniasis in General Vedia, associated to the gallery forest of the Oro river, was verified. The transmission would have occurred at a peridomiciliary level and also by entering into the subtropical forest. *Lutzomyia intermedia* s. l. would be the vector responsible for the outbreak. The early diagnosis and the appropriate treatment continue to be the control and preventive measures, as recommended by the World Health Organization, during endemic situations. For that reason, it is important to maintain the population informed, to do an active vigilance in the areas with history of outbreaks and to control the quality of the diagnosis with referential laboratories. This last point is at an instrumentation stage through the Argentine National Program of Leishmaniasis.

To follow the climatological variables and the developmental models will help to determine the sites and seasons of risk for the vigilance of epidemic situations. In this way, through the analysis of temperatures, rains and river volume, the welfare system could be alerted when a greater abundance of Phlebotominae is expected, before it occurs. The anti-vector interventions are at an experimental stage in the provinces of Salta and Misiones (unpublished data) and it is not recommended to carry out sprayings which are not adjusted to a strict controlled design. However, a capture scheme at sentinel sites, together with the meteorological study, could contribute to take the decisions of adequate measures of prevention and control of leishmaniasis. Examples of these activities could be the regulation of access to critical sites, the focal weed clearing, the vector targeted control measures in restricted areas, and the individual protection when carrying out risk activities according to the season and site.

## RESUMO

### Surto de leishmaniose cutânea em General Vedia, Província de Chaco, 1996

Entre março e julho de 1996, foi verificado um surto epidêmico focalizado de leishmaniose cutânea na localidade de Geral Vedia, província de Chaco, associado com a floresta de galeria do rio de Oro. A taxa de incidência na área que era 0-2/000 casos em anos anteriores, alcançou 8/000 casos em 1996. O risco de infecção sintomática era semelhante entre

sexos, mas era diferente quando foram analisados os grupos de idade diferentes segundo sexo, sugerindo maior importância relativa da transmissão na área peridoméstica nas mulheres e da transmissão na floresta subtropical nos homens. Espécimes de *Lutzomyia intermedia*, espécie já incriminada como vetor de Leishmaniose em outras províncias do norte da Argentina, foram capturadas e identificadas na localidade em maio de 1996. São analisadas as possíveis causas do surto relacionadas às variáveis climáticas e a abundância do vetor e os resultados são discutidas na estrutura de possíveis atividades de prevenção e controle.

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