

Márcio Neves Bóia<sup>I,II</sup>

Filipe Anibal Carvalho-Costa<sup>III</sup>

Fernando Campos Sodré<sup>IV</sup>

Beatriz Elena Porras-Pedroza<sup>V</sup>

Eduardo César Faria<sup>V</sup>

Gustavo Albino Pinto Magalhães<sup>II,V</sup>

Iran Mendonça da Silva<sup>V</sup>

# Tuberculosis and intestinal parasitism among indigenous people in the Brazilian Amazon region

---

## ABSTRACT

The objective of the survey was to estimate the frequencies of tuberculosis and intestinal parasitosis in indigenous communities at the locality of Iauareté, Northern Brazil, in 2001. This was a cross-sectional survey (n=333) aimed at obtaining demographic data and biological samples for sputum and feces examinations. Among the 43 individuals with respiratory symptoms, six presented alcohol/acid-fast bacilli in sputum. Intestinal parasitosis was significantly more frequent among the Hüpda population than among the Indians living in other districts (37.5% vs. 19.3% for *Ascaris lumbricoides*, 32.4% vs. 16.3% for *Trichuris trichiura*, 75% vs. 19.3% for hookworms, 75% vs. 35.4% for *Entamoeba histolytica/dispar* and 33.3% vs. 10.7% for *Giardia lamblia*). It is concluded that tuberculosis and intestinal parasitism are frequent in these communities, thus requiring control measures and better medical care.

**DESCRIPTORS:** Indigenous Population. Tuberculosis, epidemiology. Parasitic Diseases, epidemiology. Cross-Sectional Studies. Brazil.

---

## INTRODUCTION

Characterization of the health conditions among indigenous peoples in Brazil has proven to be a growing challenge. The processes of colonization and expansion of the economic frontiers, which are still in progress in the Brazilian Amazon region, has been accompanied by significant deterioration of the health conditions of the indigenous peoples, thereby leading to degrees of depopulation. Within the epidemiological profile of these processes, strong presence of infectious and parasitic diseases has historically been seen.<sup>4</sup>

In the upper and middle Negro River regions, located in the northwestern part of the Amazon region, around 90% of the population is indigenous. Around 35,000 people live in this area, distributed among 732 settlements and a few urban centers, such as the municipal seats of São Gabriel da Cachoeira and Santa Isabel do Rio Negro and the settlement of Iauareté (Northern Brazil). Ten indigenous ethnic groups are represented in the population of Iauareté, which comprises approximately 2,300 people: Tariana and Baniwa, belonging to the Arawak linguistic trunk; Tukano, Desana, Kubeo, Tuyuca, Pira-tapuya, Arapaso and Wanana, of the Eastern Tukano group; and Hüpda, of the Maku linguistic family. Among the settlement's districts, Fátima village presents differentiated characteristics, since the majority of its inhabitants are Indians of the Hüpda ethnic group.

The objective of the present study was to estimate the frequencies of tuberculosis and intestinal parasitosis among indigenous peoples.

<sup>I</sup> Laboratório de Doenças Parasitárias. Instituto Oswaldo Cruz (IOC). Fundação Oswaldo Cruz (Fiocruz). Rio de Janeiro, RJ, Brasil

<sup>II</sup> Departamento de Medicina Interna. Faculdade de Ciências Médicas. Universidade do Estado do Rio de Janeiro. Rio de Janeiro, RJ, Brasil

<sup>III</sup> Laboratório de Sistemática Bioquímica. IOC-Fiocruz. Rio de Janeiro, RJ, Brasil

<sup>IV</sup> Departamento de Patologia. Universidade Federal Fluminense. Rio de Janeiro, RJ, Brasil

<sup>V</sup> Curso de Pós-graduação em Medicina Tropical. Fiocruz. Rio de Janeiro, RJ, Brasil

### Correspondence:

Filipe Anibal Carvalho Costa  
Av. Brasil, 4.365  
Pav. Leônidas Deane, sala 308  
21045-900 Rio de Janeiro, RJ, Brasil  
E-mail: guaratiba@ioc.fiocruz.br

Received: 5/28/2007

Revised: 1/28/2008

Approved: 6/16/2008

## METHODS

A cross-sectional study was conducted in the municipality of Iauareté in July 2001. To conduct a parasitological survey on feces, the sample size for the main municipal area was stipulated by estimating a prevalence of 50% and an acceptable error of 5%. By means of systematic random sampling, 54 of the 402 households in the main municipal area were selected and, from these, a total of 313 individuals were studied. Because of the small population of Fátima village, all its households were included (20 individuals). Sample collectors were supplied, to obtain feces samples for parasitological examination by means of the Coprotest® method (NL Diagnóstica, Brazil). No significant difference in age distribution was observed between Fátima village and the other districts.

Sputum was collected to investigate alcohol/acid-fast bacilli among all the individuals presenting respiratory symptoms who had been identified through a family conglomerate sampling process, or through an active search conducted previously by the non-governmental organization (NGO) *Saúde Sem Limites* ("Health Without Limits"), which was responsible for providing healthcare in the region. One examination was performed per individual.

The frequencies of intestinal parasitosis in Fátima village and the other villages in the main municipal area were compared by means of the chi-square test, using a significance level of 5%. Relative odds ratios (OR) and the respective 95% confidence intervals were calculated.

The study had been approved by the Research Ethics Committee of the Evandro Chagas Research Institute (IPEC-Fiocruz) and had been authorized by the National Indian Foundation (*Fundação Nacional do Índio*, FUNAI). All the inhabitants who participated were included after obtaining a free and informed consent statement from them.

## RESULTS

Six sputum tests to investigate alcohol/acid-fast bacilli were positive, among 43 individuals who were identified

as presenting respiratory symptoms. With regard to the characteristics of the sample of 333 people included in the parasitological survey, 22% (n=74) were up to five years old, 29% (n=98) were between six and 16 years old and 49% (n=161) were over 16 years old. Half of the families in the villages in the main municipal area did not have any income, and this proportion reached 100% among the Hüpdá of Fátima village. Among the inhabitants of Fátima village and the other villages in the main municipal area who were over 18 years of age, 35% and 5% were illiterate, respectively. Individuals belonging to the Tariana, Tukano and Pira-tapuya ethnic groups predominated in the main municipal area, accounting for 33%, 22% and 19%, respectively. Comparisons between the frequencies of intestinal parasitosis in Fátima village (n=20) and the other villages in the main municipal area (n=313) are presented in the Table. Significantly higher frequencies ( $p < 0.05$ ) of infection by *Ascaris lumbricoides*, *Trichuris trichiura*, hookworms, *Entamoeba histolytica/Entamoeba dispar* and *Giardia lamblia* were observed among the inhabitants of Fátima village.

## DISCUSSION

Infectious diseases have had a significant impact on the indigenous peoples of the Americas.<sup>4</sup> In a retrospective study on the hospital admission records in São Gabriel da Cachoeira between 1977 and 1990, Buchillet & Gazin<sup>1</sup> (1998) reported an annual mean of 23 tuberculosis cases. They speculated that the lack of any active search system might have meant that the frequency of tuberculosis in the upper Negro River area was estimated imperfectly.

The active search carried out in the present study showed the extent to which tuberculosis in this region may have been underestimated. Six individuals were positive for alcohol/acid-fast bacilli in the sputum test and, within a month, this caused a significant increase in the incidence of this disease in this locality. Tuberculosis is recognized to be a disease with high prevalence in this region, and it is a focus of priority interest among the local health authorities. However, the disease control programs have been handicapped by significant operational difficulties, including the isolation of the

**Table.** Frequency of intestinal parasitosis. Iauareté settlement, Northern Brazil, 2001.

Species	Villages within main municipal area (n=313)	Fátima village (n=20)	p	OR (95% CI)
<i>Ascaris lumbricoides</i>	47 (19.3)	9 (37.5)	0.04	2.50 (1.03;6.06)
<i>Trichuris trichiura</i>	53 (16.3)	11 (32.4)	0.02	2.45 (1.12;5.33)
Hookworms	47 (19.3)	18 (75)	<0.001	12.51 (4.7;33.24)
<i>Entamoeba histolytica/dispar</i>	86 (35.4)	18 (75)	<0.001	5.47 (2.09;14.31)
<i>Giardia lamblia</i>	26 (10.7)	8 (33.3)	0.001	4.17 (1.62;10.69)

populations and the low adherence to treatment, which is also related to cultural characteristics. Among the individuals included in the present study, the BCG vaccination had been completed for 64% of the children under five years of age and for only 21% of individuals over 16 years of age. In a recent review, Coimbra Jr. & Basta<sup>3</sup> (2007) suggested that the tuberculosis incidence rates among indigenous peoples might be up to ten times greater than in the general population of Brazil. The indigenous people of the Amazon region have a disproportionately high risk of becoming ill and dying because of this disease.

With regard to intestinal parasitosis, we observed that the situation was most unfavorable for the Hüpda people. Infections due to *A. lumbricoides*, *T. trichiura*, hookworms, *E. histolytica*/*E. dispar* and *G. lamblia* were significantly more frequent among the inhabitants of Fátima village, which suggests that there was a greater degree of environmental contamination by infecting forms. These results were compatible with the data on the sample characteristics, which suggested that the socioeconomic situation of the Hüpda people was more unfavorable. However, we recognize that relative odds ratios may overestimate the results in cross-sectional study designs.

High frequencies of infection due to intestinal parasites have been observed in South American indigenous peoples, as reported by Santos et al<sup>5</sup> (1995) among the Xavante people of Mato Grosso (Central-West Brazil) and by Carme et al<sup>2</sup> (2002) among the Wayampi people of French Guiana.

The present study was conducted among indigenous peoples undergoing an urbanization process, which limits the possibilities for comparison with the prevalences observed among communities living in isolated villages, which are subject to different socio-environmental scenarios.

The spreading of diseases due to poverty and the degradation of living conditions results from the processes of urbanization and agglomeration of populations in the region. These processes have been taking place without planning for the provision of basic healthcare services.

In conclusion, tuberculosis and intestinal parasitosis are frequent conditions in Iauareté. The system of Special Indigenous Sanitary Districts has sought to attain an effective model for primary healthcare that is adapted to the region. In this respect, many challenges have been presented, given the particular features of this region. Among the main difficulties faced are the lack of infrastructure for attending to isolated communities, high expenditure on fuel (the journey from Iauareté to São Gabriel da Cachoeira takes 12 hours in a motorboat) and difficulties in obtaining human resources. The system relies on participation by indigenous health agents, belonging to these communities. Improvement of the healthcare model, emphasizing preventive actions, health education and community participation, conducted by the local health authorities, including NGOs and municipal administrators, needs to be pursued with the aim of achieving better healthcare for the indigenous peoples living in Iauareté.

## REFERENCES

1. Buchillet D, Gazin P. A situação da tuberculose na população indígena do Alto Rio Negro (Estado do Amazonas, Brasil). *Cad Saude Publica*. 1998;14(1):181-5. DOI: 10.1590/S0102-311X1998000100026
2. Carme B, Motard A, Bau P, Day C, Aznar C, Moreau B. Intestinal parasitoses among Wayampi Indians from French Guiana. *Parasite*. 2002;9(2):167-74.
3. Coimbra Jr CE, Basta PC. The burden of tuberculosis in indigenous peoples in Amazonia, Brazil. *Trans R Soc Trop Med Hyg*. 2007;101(7):635-6. DOI: 10.1016/j.trstmh.2007.03.013
4. Ribeiro D. Convívio e contaminação. Efeitos dissociativos da depopulação provocada por epidemias em grupos indígenas. *Sociologia*. 1956;18(1):3-50.
5. Santos RV, Coimbra Jr CE, Flowers NM, Silva JP. Intestinal parasitism in the Xavante Indians, central Brazil. *Rev Inst Med Trop Sao Paulo*. 1995;37(2):15-8. DOI: 10.1590/S0036-46651995000200009