

Short Report

Serological survey of toxoplasmosis in the Santa Cruz region of Bolivia

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Toxoplasmosis is a worldwide infection, most prevalent in regions with a hot, humid climate (FELDMAN & MILLER, 1956). To our knowledge, no data are available about the epidemiology of toxoplasmosis in Bolivia. The aim of our study was to evaluate the prevalence of anti-*Toxoplasma* antibodies in the Santa Cruz region, south-eastern Bolivia.

Between November and December 1987 we collected 446 serological samples in Camiri, Boyuibe, and Javillo, 3 localities with different socioeconomic and ethnic characteristics.

or who had presented to out-patient clinics of the Camiri hospital, hospital staff (Camiri and Boyuibe), elementary and middle school students (Camiri and Boyuibe), and almost the entire population of Javillo. Ten ml blood samples were taken from each subject. The sera were stored at -20°C , transported to Italy in dry ice and then tested by enzyme-linked immunosorbent assay (Toxonostika IgG, Organon Teknika, Boxtel, Holland) according to the manufacturer's instructions. The chi-squared test was performed to evaluate the significance of differences observed.

328 (73.5%) subjects (109 males, i.e. 78.4% of the total males in the study, and 219 females, 71.3% of the total females in the study) gave positive results for anti-*Toxoplasma* antibodies (Table); the difference was not statistically significant ($P>0.10$). 73.2% of the Camiri group and 80.9% of the Boyuibe group were seropositive (Table); this difference also was not statistically significant ($0.05<P<0.10$). In Javillo, 58.3% of the subjects were seropositive; the difference between the data for Camiri and Boyuibe was statistically significant ($P<0.001$), as was the difference in prevalence of seropositivity between the various age groups ($P<0.001$).

The resident population of this area presented a very high prevalence of antibodies to *Toxoplasma gondii*, as has been found in other parts of the world (FELDMAN & MILLER, 1956).

The cultural and socioeconomic conditions made it

Table. Prevalence of *Toxoplasma gondii* antibodies in the region of Santa Cruz by age, sex and locality

Age (years)	Male		Female		Total	
	No. tested	No. positive (%)	No. tested	No. positive (%)	No. tested	No. positive (%)
1-5	9	5 (55.5)	14	6 (42.9)	23	11 (47.8)
6-10	31	16 (51.6)	55	28 (50.9)	86	44 (51.2)
11-20	66	57 (86.4)	153	113 (73.9)	219	170 (77.6)
21-40	24	22 (91.7)	67	56 (83.6)	91	78 (85.7)
>40	9	9 (100)	18	16 (88.9)	27	25 (92.6)
Locality						
Camiri	28	22 (78.6)	151	109 (72.2)	179	131 (73.2)
Boyuibe	74	64 (86.5)	109	84 (77.1)	183	148 (80.9)
Javillo	37	23 (62.2)	47	26 (55.3)	84	49 (58.3)
Total	139	109 (78.4)	307	219 (71.3)	446	328 (73.5)

Camiri, a city with approximately 25 000 inhabitants at an altitude of 800 m, is the 'petroleum capital' of Bolivia. The population includes a privileged group, employees of the Bolivian National Petroleum Agency (YPFB) and their dependents. Boyuibe (altitude 900 m) is a town of about 2500 inhabitants approximately 3 h by road south of Camiri. This very poor town has no infrastructure, not even a potable water supply or sewerage system. Javillo is a very small community of about 110 persons completely isolated in the jungle north-east of Camiri. It is situated at an altitude of about 1500 m and is difficult to reach even by 4-wheel drive vehicles. The entire population is ethnically pure Guarani.

The study population consisted of 446 persons, 139 males and 307 females, including subjects in hospital

impossible to establish what percentage of the seropositive subjects had experienced clinical toxoplasmosis. Information from the Camiri hospital indicates that the incidence of acute toxoplasmosis was very low. Congenital toxoplasmosis appears to be practically unknown in this part of south-eastern Bolivia, perhaps due to the precocious onset of infection; infection during pregnancy is a rare event.

The biggest question is why *Toxoplasma* infection is so common in this area. The consumption of raw or insufficiently cooked meat from infected animals is an important source of human infection (DESMONTS *et al.*, 1965; PARADISI *et al.*, 1985). However, in Bolivia both beef and pork are well cooked. Javillo had a lower prevalence of infection than the other 2 localities we studied, but we could not find an explanation for this; for economic reasons, less meat is consumed by the people in Javillo than in Camiri and Boyuibe, but the cooking times are similar in all three areas.

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The common finding of infection in the early age groups and the presence of cats in all 3 localities make one presume that, as elsewhere, cats are responsible for the diffusion of the infection. However, cats are not numerous in this or any other part of Bolivia. Also, Javillo is completely surrounded by jungle inhabited by various wild animals including jaguars (*Felis yagouaroundi*) and ocelots (*F. pardalis*), which have been shown to excrete *Toxoplasma* oocysts in their faeces. The high incidence of infection in the 1–10 year olds leads us to believe that children contaminate their hands with infected soil while playing and then put their dirty hands in their mouths or on food. Furthermore, in south-eastern Bolivia the warm, humid climate certainly favours the persistence of oocysts on the ground (GIBSON & COLEMAN, 1958; FRENKEL *et al.*, 1975). Such a route of transmission would explain the similar incidences of seropositivity between males and females and between subjects belonging to different racial groups.

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