

Notes on human cases of cystic echinococcosis in Peru

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Cystic echinococcosis (CE) is a high prevalent zoonosis in the central and southern Peruvian Andes. Serum samples (n50) from patients presenting presumptive clinical and radiological diagnosis of CE (group 1), were tested for antibodies against Echinococcus granulosus metacestode using Arc-5 double diffusion assay (DD5), immunoelectrophoresis (IEF), and immunoelectrotransfer blot (EITB) techniques. Serum samples (n18) from patients presenting other parasite infections (paragonomiasis, cysticercosis, and fascioliasis) or healthy blood donors (n15), were designated as control groups. The overall sensitivity of the tests was of 94% (DD5 and IEF tests) or 96% (EITB test). Only patients from group 1 were seropositive for CE. Polypeptides of 21, 31, and 48 kDa were considered positive for CE. Based on these results, this study demonstrates that CE also occurs in other coastal departments (Piura, Ancash, Ica, Arequipa, and Tacna) besides Lima.

Key words: *Echinococcus granulosus* - cystic echinococcosis - human cases - Peru

Cystic echinococcosis (CE) is a zoonotic helminthiasis of major public health importance in sheep-rearing area worldwide (Eckert & Deplazes 2004), due to its morbidity that causes economic impact and animal production losses (Arambulo III 1997, Lorca et al. 2003) and because the affected viscera are condemned at the slaughterhouses (Scala et al. 2006). In Latin America, CE occurs in the rural areas of Southern Brazil, Uruguay, Argentina, Chile, and Bolivia (Kamenetzky et al. 2002). Major endemic areas are located in the central and southern Peruvian Andes (Arambulo III 1997, Moro et al. 1994, 1997, 2004). Recently, a new transmission area was reported in the coastal region of Peru (Moro et al. 2004).

In this study, sera were tested for antibodies against *Echinococcus granulosus* metacestode in 50 individuals (29 females and 21 males), presenting presumptive clinical and radiological diagnosis for CE (group 1). The two controls groups were 18 serum samples from patients with other helminths (*Paragonimus* sp., *Cysticercus* sp., and *Fasciola* sp.) (group 2) and 15 serum samples from healthy individuals (group 3). Hydatid cyst fluid (HCF) was obtained from lung and liver fertile cysts of sheep from abattoirs in Lima. Sera were tested by Arc-5 double diffusion assay (DD5), immunoelectrophoresis (IEF), as previously described (Coltorti & Varela-Díaz 1978, Centro Panamericano de Zoonosis 1979) and immunoelectrotransfer blot technique (EITB), as reported (Tsang et al. 1983, Tsang 1987). For the DD5 test, a titer of 1:32 was considered as an anti-CE antigen (Centro Panamericano

de Zoonosis 1979). Demographic and clinical data were obtained from each individual. The patients were from the departments (Figure) located in the coastal area of Peru: Lima (n = 23), Ica (n = 4), Ancash (n = 1), Arequipa (n = 1), Piura (n = 1), and Tacna (n = 1) or in the Peruvian Andes: Pasco (n = 5), Cuzco (n = 3), Junin (n = 3), Apurímac (n = 1), Ayacucho, (n = 1), Cajamarca (n = 1), Huancavelica (n = 1), and San Martín (n = 1). The informed consent was obtained prior to subject enrollment.

Seropositivity for CE was only detected among serum samples from patients of group 1, and all patients who underwent surgery were seropositive. The overall sensitivity of the tests was of 94% (DD5 and IEF tests) or 96% (EITB test). The immunoblot assay revealed molecular masses of 21, 31, and 48 kDa bands, which are specific for the genus *Echinococcus* (Romani 1995). Demographic information and clinical data are summarized in the Table. Twenty-six (52%) patients presented pulmonary cystic echinococcosis, in 20 (40%) the cysts appeared in the liver, 3 (6%) had both the hepatic and the pulmonary form, whereas in one of the patients, the cysts were found in the brain. Most of seropositive individuals were public servants (20%), students (18%), housewives (18%), and teachers (18%). Among those with lower infection rates, three (6%) were farmers and gardeners (2%).

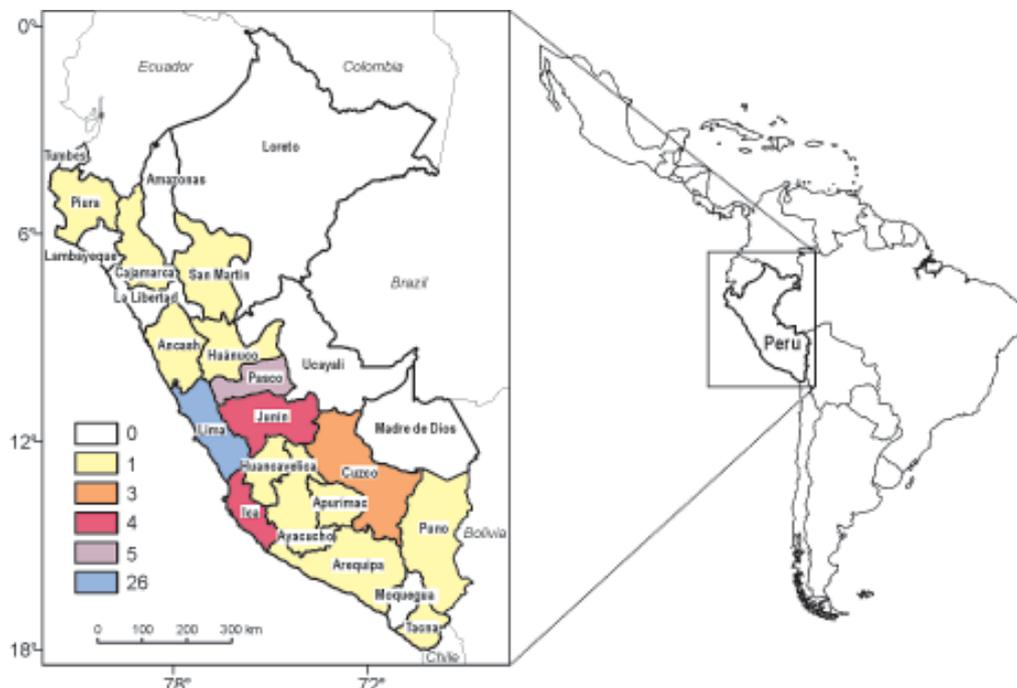
In despite of the importance of the enzyme-linked immunoelectrotransfer blot for the diagnosis of CE due to its high sensitivity, this study confirmed that the DD5 test is also useful due to its easy performance, low cost, and high specificity (Verastegui et al. 1992). The topography of Peru is highly varied, ranging from narrow coastal desert to high altitude sierra to Amazonian basin jungle, with gradations of intervening climatic zones (Moro et al. 2004). Consequently, the epidemiology of cystic echinococcosis varies among endemic areas. In the present study, about half of the number of cases (23-46%) is from

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Geographic distribution of the 50 cystic echinococcosis cases within Peru. Each color represents the total number of cases within provinces.

Lima, thus confirming high rates in this province (Moro et al. 1999). Among the remaining cases, 27 (54%) were from departments other than Lima, in which five were from coastal cities (Piura, Ancash, Ica, Arequipa, and Tacna). The first coastal autochthonous cases of CE were recently reported in Chincha, a city located south of Lima (Moro et al. 2004). In contrast to general findings that CE transmission enrolls agricultural and farming activities, in this study most seropositive patients were teachers, students, housewives, workmen, and civil servants. Earlier epidemiological studies of cases carried out in urban Lima also demonstrated that none derived from farmers, cattle raisers or slaughters (Alarcón et al. 1992). The human migration process has health implication influencing the pattern of transmission into a new environment. Cystic echinococcosis is classified as rural disease, but its occurrence in urban areas has become significant due to the introduction of *E. granulosus*-infected dogs brought by migrating populations coming from endemic areas. An earlier survey demonstrated that the prevalence of canine infection ranges 3.42% in Lima (Arambulo III 1997). Probably, other epidemiological risk factors as cohabiting with a great number of infected-dogs during the first years of life and using undrinkable water should also be stressed (Larrieu et al. 2004). The present results confirm that the cystic echinococcosis is a common infection in Peru; it seems that transmission also occurs in other coastal cities than Lima and Chincha.

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TABLE
Demographic and clinical features from 50 echinococcosis-infected individuals from Peru

	n/N	(%)
Male	21/50	42
Female	29/50	58
Age (years)		
≤ 10	2/50	4
11-20	4/50	8
21-40	24/50	48
41-60	14/50	28
> 60	6/50	12
Clinical feature		
Hepatic	20/50	43
Pulmonary	26/50	49
Hepatic and pulmonary	3/50	6
Brain	1/50	2
Occupation		
Public servant	10/50	20
Student	9/50	18
Housewife	9/50	18
Teacher	6/50	12
Operators	3/50	6
Farmer	3/50	6
Secretary	2/50	4
Musician	1/50	2
Policeman	1/50	2
Seamstress	1/50	2
Nursing clerk	1/50	2
Gardener	1/50	2
Cook	1/50	2
Nurse	1/50	2
Counter	1/50	2

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