Laboratory and Epidemiology Communications

Paragonimiasis Acquired by Eating Boar Meat: Current Status in Japan

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Communicated by Hiroshi Yoshikura

(Accepted March 12, 1999)

In the early 1950s, 3-500,000 patients carried the lung fluke (*Paragonimus spp.*) in Japan. The inhabitants of endemic areas had a custom of eating crabs, *Eriocheir japonicus* or *Geothelphusa dehaani*, the second intermediate hosts of the lung fluke. Human infection occurred mainly as an accidental transfer of the encysted larvae to the mouth through handling the crabs when preparing them for food. The prevalence of the infection has dramatically decreased with more thorough education, the use of effective drugs, and changes in eating habits. However, sporadic cases have been reported from the southern part of Kyushu since the middle 1970s. The infection was caused by eating raw boar meat. Wild boars in the endemic area harbored the larvae of *Paragonimus westermani* in their muscles, and they easily mature in the definitive host (1).

From April 1995 to March 1998, our laboratory received 205 sera samples and/or pleural effusions from symptomatic patients for immunoserological tests. A total of 32 cases were diagnosed as paragonimiasis; 23 cases were from Kyushu and 9 cases were from five prefectures in Honshu. The sero-diagnosis was done by ELISA and Ouchterloney's double diffusion test using *P. westermani* Chaffee antigen (2). According to the patients' clinical reports, 11 cases of 23 from Kyushu had ingested undercooked wild boar meat. Of the cases from Honshu only one was related to eating raw boar meat (Table 1).

The incidence of *Paragonimus spp.* in wild or domesticated boars was assessed. 100-200g of muscle taken from each boar were examined for larvae. One of 67 wild boars from Kyushu contained the larvae. Specimens from 8 domesticated and 9 wild boars from West Honshu were negative. Stool samples from 110 domesticated and 77 wild boars from these areas showed no presence of the eggs. A total of 106 serum samples were checked for the *Paragonimus* specific antibody by ELISA. Out of 59 sera collected from Kyushu, 44 (74.6%) showed positive. Out of 39 sera collected from West Honshu, 16 (41.0%) showed positive. The cut-off point between positive and

negative findings was determined on the basis of the mean+2SD of the OD values taken from domesticated boars (Fig. 1).

Boar hunters in Kyushu were considered at risk for boar-meat transmission of paragonimiasis. They were questioned about their custom of eating wild boar flesh. Twenty-nine out of 44 hunters (66%) replied that they had an experience of eating raw boar meat and three had experienced an episode of lung fluke infection. Interestingly, 38 hunters answered that they knew that they risked acquiring paragonimiasis by eating the raw meat.

According to Statistics of Birds and Animals (3), more than 60,000 wild boars are shot yearly in Japan and the meat is circulated in the food market. The presence of the flukes in the boar meat itself does not pose a public health problem provided the meat is cooked properly. Our present study warns against eating raw boar meat, especially in Kyushu.

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Table 1. Number of patients diagnosed as paragonimiasis in NIID (April 1995-March 1998)

District	Total	Source of infection		
		crab	boar meat	not known
Kyushu	23	6	11	6
Prefecture				
Fukuoka	6	3	1	2
Oita	6	0	5	1
Kumamoto	5	3	2	0
Miyazaki	2	0	2	3
Kagoshima	4	0	1	3
Honshu	9	8	1	0
Prefecture				
Yamaguchi	1	0	1	0
Wakayama	4	4	0	0
Nagano	1	1	0	0
Saitama	2	2	0	0
Tochigi	1	1	0	0

Fig. 1. OD values of ELISA using *P. westermani* antigen on serum samples of boars collected from Kyushu and West Honshu

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