CURRENT STATUS OF FOOD-BORNE PARASITIC ZOONOSES IN JAPAN

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Abstract. Epidemiological data on food-borne parasitic zoonoses in Japan is obscure because of the lack of legislated registration system for the incidence of such diseases. Attempts were made to draw rough estimates of the current status of food-borne parasitic diseases in Japan by gathering the annual incidence of each diseases by literal survey and personal communications. In addition, parasitic diseases referred to and diagnosed in the Department of Parasitology, Miyazaki Medical College during 1999 were analyzed for the causative agents and the route of infection.

INTRODUCTION

Japan is considered as an exceptional country in terms of successful control of parasitic diseases. For example, malaria, filariasis and schistosomiasis were completely eradicated and soil-transmitted parasitic diseases were also almost completely eradicated within recent 50 years. Such drastic changes brought about misunderstanding among not only lay people but also medical professionals that ***all*** parasitic diseases have practically disappeared in Japan. However, this is merely an illusion because various parasites are still surviving in Japan, or imported from foreign countries everyday (Maruyama *et al,* 1996). Current parasitic diseases in Japan can be classified into five groups based on clinical aspects: 1) food-borne parasitic diseases, 2) zoonoses mainly transmitted from companion animals, 3) imported tropical diseases, 4) sexually transmitted diseases, and 5) opportunistic infections (Kojima, 1993). Among these, food-borne parasitic zoonoses are the most difficult to deal with, because Japanese people will never give up eating raw sea-foods, freshwater fishes or even game meat as traditional dishes of "Sushi" and "Sashimi" with "Soy sauce"; the most important "3S" favoring the transmission of food-borne parasitic diseases in Japan (Nawa, 1998). In this article, we will make a brief overview of the current status of food-borne parasitic zoonoses in Japan. In addition, we will provide detailed data of the parasitic disease cases referred to and diagnosed in our laboratory during 1999. Special emphasis will be placed on the possible economic losses caused by misdiagnosis of parasitic diseases.

OVERVIEW OF FOOD-BORNE PARASITIC DISEASES IN JAPAN

Japanese people consume large amounts of marine fishes, crustaceans and shell fishes as "Sushi" and "Sashimi" with "Soy sauce", thus anisakiasis is a representative food-borne parasitic zoonosis. Because a majority of anisakiasis patients are usually discovered and the worms removed by endoscopy at the local gastroenterology clinics, the exact number of patients remains unclear. Roughly >1,000 cases/year are found in Japan (Kagei, personal communication). *Diphylobothrium latum* infection acquired by eating salmon flesh is also common and the incidence is estimated to be >100 cases/year in northern Japan (Kamiya, personal communication). Now diphylobothriasis has spread nationwide aided by the development of chilled transport system. *Diplogonoporus grandis* infection has been sporadically seen among residents of the coastal areas of western Japan. Creeping disease due to *Spirurina* Type X larvae after eating small schintillant squids has recently emerged (>50 cases/year) mainly in the metropolitan areas (Akao, personal communication).

Freshwater fishes and wild animals also served as "Sushi" or "Sashimi". *Metagonimus yokogawai* eggs are frequently found by stool examination in Japan. The prevalence of metagonimiasis among the residents near big rivers is 10-15% and the major source of infection is a Japanese sweet fish "Ayu", *Plecoglossus altivelis*. *Gnathostoma doloresi* infection after eating brooktrouts is sporadically seen in Shikoku and Kyushu. Paragonimiasis is endemic in western Japan, especially in southern Kyushu. Though freshwater crabs are the important intermediate hosts, >70% of the recent cases (30-50 cases/year) were infected by eating "Sashimi" of wild boar meat (Uchiyama *et al*, 1999; Nawa, 2000).

Many middle-aged Japanese men eat chicken/beef liver as "Sashimi" with the traditional belief that it has a tonic effect. Chicken/beef liver is an important source of infection with *Toxocara canis* and *Ascaris suum*

which cause VLM. About half of "Yakitori" bars/ restaurants were found to serve "Sashimi" of animal livers. VLM due to ascarid parasites in Japan is, therefore, mainly a disease of adults. "Sashimi" of poisonous snakes is also believed to have tonic effects. Snakes are important paratenic hosts of *G. doloresi* and *Spirometra erinaceieuropaei* which cause infection in humans.

Popularization of organic cultivation of vegetables using animal excreta raised the risk of zoonotic parasitoses. By seroepidemiological survey, 20-30% of residents in pig farming areas were *A. suum*-antibody-positive (Nawa, unpublished data). VLM patients were concentrated in these areas (Maruyama *et al*, 1996). Few cases of *Fasciola* infection have been found in cattle farming areas (Nawa, unpublished data). *Angiostrongylus cantonensis* infection (10 cases?) were reported from Okinawa early this year (Tohma, personal communication). The patients were supposed to be infected from green salad.

PARASITIC DISEASES FOUND IN MIYAZAKI MEDICAL COLLEGE IN 1999

In our laboratory multiple-dot ELISA method was introduced for the primary purpose of immunoserological screening of samples for parasitic diseases since 1991. This has enabled us to respond faster than before to attending physicians. Since then we have received increasing numbers of samples year after year (Fig 1). During 1999, we received a total of 403 samples. Although the majority of cases were from Kyushu districts, those from outside of Kyushu have been increasing in number. Among the 403 cases, 267 were new cases while the rest (136 cases) were follow-up studies evaluating the efficacy of treatment or assessing the prognosis. The samples we received were mostly sera from patients having eosinophilia and/or elevated total IgE of unknown etiology. In few cases, worms or stool specimens were sent to our laboratory for identification of the species (Table 1). Among 267 cases referred to our laboratory, 110 were diagnosed as having parasitic diseases. Incidence of parasitic diseases referred to and diagnosed in our laboratory during 1999 are summarized in Table 2. Obviously protozoan parasitic infection is extremely rare in Kyushu districts. Instead, food-borne helminthiases, especially of zoonotic nature, are the serious public health issue in this area. Among all, paragonimiasis and VLM due to *A. suum* are the two dominant parasitic diseases in Kyushu. As mentioned earlier, paragonimiasis is a re-emerging disease in southern Kyushu which used to be known as a heavy endemic area of this disease. On the other hand, *A. suum*-VLM

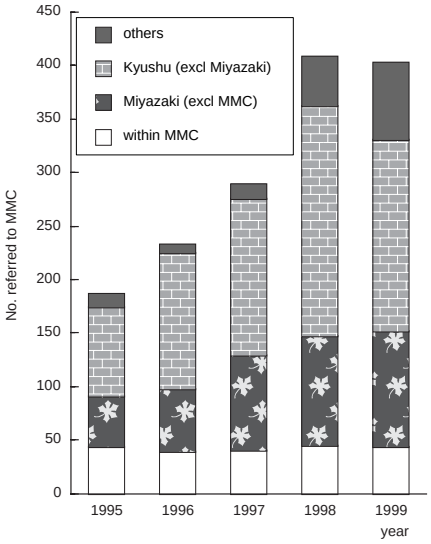

Fig 1- The number of cases referred to our laboratory during 1995-1999.
MMC: Miyazaki Medical College.
Miyazaki Prefecture is a part of Kyushu district, Japan.

Table 1
Specimens examined in our laboratory during 1999.

New cases[a]		267
Sera for immunodiagnosis	245	
Worms for identification (excreted 13; by endoscopy 3)	16	
Stool examination	5	
Histopathology sections	5	
Tel/Fax consultation	2	
Follow-up (sera)		136
Total		403

[a] The total number of new cases was less than that of the specimen examined, because in some cases, more than two specimens from one case were examined. Among 267 cases, 110 were found to be parasitic diseases. This figure is less than the number of sera examined for follow-up, because some cases received a repeat examination.

is an emerging disease in this area probably due to recent concentration of cattle, pig and poultry farms in southern Kyushu. Although imported parasitic diseases are rather rare in Kyushu district, we had one case each of giardiasis, taeniasis saginata, and neurocysticercosis in patients assumed to be infected during travelling overseas.

Table 2
Incidence of various parasitic diseases diagnosed in our laboratory in 1999.

Protozoa		Trematoda		Cestoda		Nematoda		Others	
Giardiasis	1	**Paragonimiasis**	30	Diphylobothriasis	3	Strongyloidiasis	6	Tick bite	1
		Fascioliasis	5	**Diplogonoporiasis**	1	Ascariasis	2	Myiasis	2
		Schistosomiasis	2	**Teniasis saginata**	1	Enterobiasis	1		
				Sparganosis	2	Trichuriasis	1		
				Cysticercosis	1	Thelaziasis	1		
						***A. suum* VLM**	20		
						Anisakiasis	10		
						Gnathostomiasis	6		
						Spirurinosis	3		
						Dirofilariasis	2		
						Toxocara VLM	2		

Bold-face : Food-borne zoonoses
: Larva migrans

ECONOMIC LOSS DUE TO UNAWARENESS OF PARASITIC DISEASES

Because of unawareness, parasitic zoonoses are often misdiagnosed as malignant diseases. Paragonimiasis is often misdiagnosed as lung cancer. Radioimaging appearance of fascioliasis resembles that of cholangiocellular carcinoma. Multiple nodular lesions in liver due to ascarid VLM are often misdiagosed as metastatic cancer. Once patients are suspected of having malignancy, they are hospitalized and receive extensive laboratory examinations for over a week. By rough estimate (Table 3), such examinations cost approximately US$3,000. On the other hand, stool examination for parasite eggs costs only US$3 while immunodiagnosis for parasitic diseases costs US$40. Therefore, unnecessary laboratory examination/hospitalization due to misdiagnosis result in enormous economic losses (Nawa and Uchiyama, 1999).

Table 3
Costs required for diagnosis.

Disease	Cost (US$)
Malignancy	
Examinations	1,600
Admission fee	1,400
Parasitic diseases	
Stool examination	3
Immunodiagnosis	40

DISCUSSION

In Japan, parasitic diseases with high mortality and morbidity, *eg* malaria, filaria and schistosomiasis, were completely eradicated. Soil-transmitted parasitic diseases such as ascariasis, hookworm infections and trichuriasis were also almost completely eradicated by extensive mass screening and treatment conducted by the Japan Association of Parasite Control in conjunction with school health activities under legislation. Unfortunately, however, food-borne parasitic zoonoses have never been regarded as a nation-wide problems and, except for clonorchiasis, legislative registration system has never been applied to food-borne parasitic zoonoses. Although the data reported in this paper are merely rough estimates based on personal communication or just on our own data, the incidences of some food-borne parasitic zoonoses are obviously high enough to call for more attention.

In the present study, protozoan infections were rare in Kyushu district. In Japan, majority of cases of protozoan infection are considered as imported diseases and are mainly found in urban areas. Food-borne parasitic zoonoses, on the other hand, predominate in rural areas. One reason for this is that the traditional food habits are much more well-preserved in rural areas. In Kyushu, not only sea-foods but also freshwater fishes and even game meat are often served as “Sashimi”, which inevitably predisposes consumers to parasitic zoonoses. Another reason is the concentration of meat production activities in rural areas. Kagoshima and Miyazaki Prefectures, a major part of southern Kyushu district, are ranked among the top three in beef, pork and chicken production in Japan. These circumstances provide factors which favor the transmission of food-borne zoonotic parasites in various ways.

A major problem is that the presence of various food-borne parasitic zoonoses is often ignored not only by clinical practitioners but also by diagnosticians. As mentioned above, many cases of food-borne parasitic zoonoses have been misdiagnosed as malignancies. To avoid economic loss and and unnecessary burdens to patients, clinicians as well as laboratory workers in Japan should pay more attention to the presence of food-borne parasitic zoonoses. Also, we need a central reference laboratory which can provide standardized diagnostic system and gather accurate data on food-borne parasitic zoonoses.

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