

CURRENT STATUS OF FOOD-BORNE PARASITIC ZOOSES IN HONG KONG

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Abstract. Although there have been no recent epidemiological studies on parasitic zoonoses in Hong Kong, the following diseases are known to occur locally: toxoplasmosis, clonorchiasis, fasciolopsiasis, cysticercosis, hydatidosis, sparganosis, trichinellosis, angiostrongyliasis, gnathostomiasis and trichostrongylosis. Most of them are due to the consumption of infected animals imported from China. Due to the general unawareness of parasitic diseases by physicians and health authorities, the importance of zoonoses has been under recognized.

INTRODUCTION

In Hong Kong, food-borne parasitic zoonoses are far more serious as public health problems than is recognized. The local health authorities have traditionally ignored the importance of such diseases, in the belief that the extensive urbanization of Hong Kong and the habit of eating well cooked food would naturally eradicate these presumably rural diseases. This notion appeared to be supported by a survey undertaken by Huang *et al* (1969) who showed a decline in intestinal parasites in patients admitted into the Queen Mary Hospital in 1960's. The direct-smear stool and autopsy examination methods were used for the study. Most local physicians consider parasites as extremely minor pathogens. In the curriculum of the two local medical schools, only about 6-8 lectures are devoted to Parasitology. In Hong Kong, there are neither government nor private clinical laboratories which are competent with the latest diagnostic methods. Only my research laboratory and to a very limited extent, the clinical laboratory in the Microbiology Department, University of Hong Kong, can provide an immunodiagnostic service.

However, recently, a substantial number of cases of toxoplasmosis, trichinellosis, angiostrongyliasis, gnathostomiasis, hydatidosis and cysticercosis have been diagnosed by my laboratory

(Ko *et al*, 1980; Au *et al*, 1983; Ko *et al*, 1984; Ko *et al*, 1987). Since these zoonoses were previously presumed to be absent, our finding strongly suggest that the importance of parasitic zoonoses has indeed been overlooked. However, unfortunately, due to the lack of support and funding, it was not possible to undertake proper epidemiological studies. As a result, there are no current statistics on the actual prevalence of the various infections in the Hong Kong population. Therefore, the present report is based mainly on two limited but more recent surveys (Ko *et al*, 1980; Duchastel, 1984) as well as 49 cases diagnosed by my laboratory during 1987-1990.

FISH-BORNE DISEASES

Clonorchiasis

Clonorchis sinensis is still the most common zoonosis and is frequently encountered by surgeons during routine gall-bladder operations.

Huang *et al* (1969) recovered worms from 36% of 1366 autopsies performed at the Queen Mary Hospital. Belamaric (1973) reported a 60% positive rate which was based on 3,000 autopsy records kept in the Department of Pathology, University of Hong Kong. According to Duchastel (1984), 13.4% of 25,095 Hong Kong residents who applied

to emigrate to Canada during 1979-1981 yielded a positive stool sample for ova. Until 1981, all the applicants were required to submit a stool sample which was examined by a single direct smear method. There were no data on age and sex distribution but based on immigration information, the majority of the applicants were students under 25 years old.

Since the snail intermediate hosts (*Parafossarulus* and *Alocina* spp.) cannot propagate in the local fish ponds which have a high salinity, clonorchiasis, like other zoonoses encountered locally, is basically an imported disease. Infected cyprinids from China serve as the source of infection. However, studies have not been carried out to determine the prevalence of metacercariae in the various species of fish available in the markets. Ko (1984) suggested the silver carp, *Hypophthalmichthys molitrix* and grass carp, *Ctenopharyngodon idellus* are two of the important species.

Although the prevalence of clonorchiasis appears to be declining, the most recent rate (13.4%) reported by Duchastel (1984) should still be considered as significant in terms of the size of the local population (6 million). This rate is similar to that found in South Korea (Soh, 1984). However, the actual prevalence in Hong Kong may be higher because the single smear method used by Duchastel to screen a biased sample was not an accurate epidemiological method.

Gnathostomiasis

Although gnathostomiasis has not been parasitologically documented in Hong Kong, two (4%) of the 49 parasitic cases referred to my laboratory were due to this infection. The diagnosis was based on symptoms of the patients and the results of indirect IgG-ELISA using crude adult *Gnathostoma* extracts as antigens. The latter was performed with the antisera against parasites causing similar symptoms. The patients were originally admitted to the hospital for suspected encephalitis. One of them who had the typical symptoms, probably acquired the infection in Thailand. The second patient had eaten raw fish in a restaurant.

Of the 28 freshwater catfish, *Clarias fuscus*, which was purchased from local markets and examined by the author in 1973, 11% were infected with *G. spinigerum*; 106 third-stage larvae were recovered (unpublished data). Larvae had also

been found in *C. batrachus*, *Ophiocephalus* spp., frogs and snakes. However, there are no current data on the infection rates in the animal hosts.

Anisakiasis and diphyllorhynchiasis

Although Japanese food is extremely popular in Hong Kong, cases of anisakiasis and diphyllorhynchiasis have not been reported. This is probably due to the fact that most physicians have not even heard of these diseases. However, the infections are likely to be restricted to the more affluent sector of the population because it is extremely expensive to eat sashimi and sushi in local restaurants.

MEAT-BORNE DISEASES

Trichinellosis

The first outbreak of trichinellosis was only documented in Hong Kong in 1981. Eighteen Gurkha soldiers who had eaten barbecued pork were seriously ill (Ko, 1984). Since then, cases involving the local Chinese are routinely encountered especially in summer and winter ie during barbecue and "steam-boat" seasons. The younger generation loves to barbecue on beaches, in country parks etc. This is not only because they like such food, but also as a means to escape from their tiny and overcrowded high-rise flats. Therefore, in Hong Kong, besides the eating habit, the socio-environmental factor also contributes to the endemicity of trichinellosis.

There are no statistics on the prevalence of infection in man. From 1982-1986, I personally noted 50 cases. In 1989, two cases were referred to me. However, a study on the prevalence of infection in pigs imported into Hong Kong has recently been completed and the data are being analyzed. Hong Kong annually imports about 1 million pigs, 90% of which are from various provinces of China. Examination of 400 diaphragms (by pepsin digestion) and 4,000 serum samples collected from pigs originated from China, Hong Kong, Thailand and Taiwan showed that pigs infected with *Trichinella spiralis* from China are the source of infection. Two (0.5%) of the diaphragm samples were positive and both animals were from Henan Province. Serological examinations using excretory/secretory antigens, Triple ELISA, FAST ELISA,

chemiluminescence (with and without magnetic beads) have shown that about 3% of the pigs from China were positive (Chan 1986; Ko and Yeung 1989a, 1989b; Ko and Yeung 1990; Chan and Ko 1990). Given the limitations of the pepsin digestion and serological methods, it would be justified to estimate the prevalence rate in imported Chinese pigs as 1%. This is a significant rate because of the huge number of animals involved.

Toxoplasmosis

This zoonosis was also presumed to be absent locally until a survey on the distribution of toxoplasmic antibodies in 2,499 Hong Kong Chinese was carried out in 1977-78 (Ko *et al.*, 1980). The study which was based on the indirect immunofluorescent antibody method, showed the following results: 7.4% of the residents were positive with a titer of 16, 2.1% with a titer of 64, 0.2% with a titer of 256, 0.1% with a titer of 1,024 and 0.04% with a titer of 2,048. The rates were significantly higher in the 10-19 year-old and 30-39 year-old age groups. There were no significant differences in prevalence rates between males and females or between rural or city dwellers.

Compared to Western countries where the prevalence rates of toxoplasmic antibodies are known to be as high as 30-40%, the rate in Hong Kong Chinese is relatively low. However, it is not known whether this low rate still persists as there has been no recent study. Information on the prevalence of *Toxoplasma* in meat, milk and animals is also lacking.

Taeniasis and cysticercosis

A low prevalence (> 1%) of *Taenia solium* and *T. saginata* infections in the Queen Mary Hospital patients was reported by Huang *et al.* (1969). But there is no recent information on these two cestode infections. However, measles pork is commonly encountered in local abattoirs. We could routinely collect pork heavily laden with *Cysticercus cellulosae* from the Kennedy Town abattoir.

Cysticercosis in man was considered as insignificant. Sporadic cases were incidentally noted by pathologists or surgeons. But following my identification of the bladder worm in a muscle biopsy of a Gurkha soldier in 1987, the first study on the occurrence of this zoonosis in Hong Kong was initiated. The project, which was in collaboration

with the British Military Hospital, involved studying 13 Gurkhas who presented with epileptic fits or encephalitis between 1987-88. The cases were examined on the basis of symptoms, hematological and serological data as well as the results of computerized tomography scanning. Six Gurkhas were confirmed as cases on neurocysticercosis. However, the disease is not only restricted to the Gurkhas; 7 (14%) of 49 cases referred to my laboratory from the various local hospitals were later considered positive. Therefore, this infection must be endemic and its importance has been completely overlooked.

Pigs imported from China are the major source of *C. cellulosae*. Unfortunately, due to the forthcoming privatization of all Government abattoirs by 1991, the meat inspectors are not interested in any collaborative research. However, an attempt is being made by my laboratory to develop a method which can be applied to screen Chinese pigs for the presence of anti-*C. cellulosae* antibodies.

Sparganosis

One case each of ocular and spinal sparganosis were reported by Ng *et al.* (1988). Two previous cases were reported by Huang and Kirk (1962). In 1970's, the prevalence of the sparganum of *Spirometra* spp. (a common cestode of local cats) in frogs and snakes dissected in our Zoology courses was about 1-2%. In recent years, however, we failed to find infected animals.

MOLLUSCA- AND CRUSTACEA-BORNE DISEASES

Angiostrongyliasis was supposedly absent in Hong Kong until I diagnosed the first case in 1983 (Ko, 1984; Ko *et al.*, 1984; Kum and Ko, 1985; Kum and Ko, 1986; Ko *et al.*, 1987). Since then, 10 more cases were confirmed by my laboratory. Adult worms had also been recovered from the heart of a spider monkey kept in a zoo located at the city center (Ko, 1978).

Angiostrongyliasis is one of the few zoonoses in Hong Kong which is not due to the importation of infected animals. A limited survey undertaken in 1975-76 showed that 2 of 18 *Rattus sladeni* and 4 of 50 *R. rattus* trapped in the New Territories were infected with *A. cantonensis* (unpublished data). The following common local snails and

slugs were successfully infected with *A. cantonensis* in the laboratory:- *Achatina fulica*, *Cyclotus sinensis*, *Macrochlamys nitidissima*, *Bradybeana similaris*, *Cryptosoma imperator*, *Camaena circatoricosa*, *Cipangopalaudina chinensis*, and *Deroceras laeve*. However, no study has been undertaken to determine the prevalence of the third-stage larvae in these molluscs.

Although there is no information regarding the occurrence of paragonimiasis, this zoonosis must be present. The local residents consider the Chinese mitten crab, *Eriocheir sinensis*, a special delicacy. Every autumn about 500 tons of live crabs are air-freighted from various provinces of China into Hong Kong for local consumption. During the peak season, the crabs are being sold for about US \$13/catty. Since paragonimiasis is still endemic in China, it is likely that some of the imported crabs are infected with the metacercariae. A report published by the Institute of Parasitic Diseases of the Chinese Academy of Preventive Medicine (review of the work done 1965-1978) showed that in Anhui Province, as many as 40% of the freshwater crabs were infected. However, no attempt has been made by the Hong Kong health authorities to screen the imported or local crabs for the presence of this trematode infection.

Besides *E. sinensis*, other major crab hosts for *Paragonimus westermani* (eg *Potamon* spp., *Sesarma* spp.) are also present in Hong Kong. Therefore, given the right conditions, local outbreaks of paragonimiasis may occur.

OTHER DISEASES

Hydatidosis

Although two cases of hydatid lungs were noted previously (Ko, 1984), an unusual case involving a woman who had immigrated from China was encountered in 1989. The woman underwent surgery in China in 1983 for the removal of a hepatic cyst. In July 1989 she was admitted into the Queen Elizabeth Hospital where the doctors noted multiple cysts in the lungs, pericardium, liver and spleen. Indirect-IgG ELISA tests using freeze-dried crude antigens provided by Dr RC Thompson's laboratory in Murdoch University, Australia, yielded highly positive reactions. She was treated with mebendazole and a surgical

operation was considered. But she later discharged herself from the hospital. At the end of December, she was admitted into the maternity ward of the same hospital and gave birth to a baby. The pediatricians and obstetricians, who had no knowledge of her previous medical history, were much surprised to find protoscolices from the aspirate of the newborn. Presumably a cyst associated with the birth canal ruptured during delivery. The fate of the baby is not known since he was taken back to Shanghai shortly after birth.

Trichostrongylosis

Trichostrongyloid type of ova were found in the stool sample of a Vietnamese refugee in 1990 who was suffering from diarrhea. There was no previous record of such an infection in Hong Kong.

Fasciolopsiasis

The current rate of fasciolopsiasis in man is not known. According to previous published records, the rates of *Fasciolopsis buski* infection varied from 0.3-19% (Huang *et al.*, 1969; Grant, 1969; Willis and Duncan, 1972). However, Duchastel (1984) failed to observe the ova of either *F. buski* and *Fasciola hepatica* in the stool samples of local residents. Nevertheless, he reported a 0.1% rate for the former parasite in Southeast Asian refugees who lived in Hong Kong.

Although both *F. buski* and *F. hepatica* are common in pigs, sheep and cattle imported into Hong Kong, there has been no attempt to determine the prevalence of infections in locally reared animals or the presence of metacercariae in water-chestnuts, water-ling and water-cress sold in the markets.

DISCUSSION AND CONCLUSION

Food-borne zoonoses in Hong Kong are mainly due to the following unique factors: importation of infected animals and vegetations, frequent overseas travel by local residents and a huge influx of refugees (from China and Vietnam). This makes it impossible to control these diseases at source, ie, by disrupting the life-cycle of parasites. The only effective measure is for the Government to implement efficient screening procedures of animals and vegetables from endemic areas. This

requires the establishment of a central laboratory which can provide an up to date diagnostic service for both human and animal infections.

Although the number of cases reported in this paper is relatively small, their known occurrence in Hong Kong alone is important since until recently, most of them were presumed to be absent. However, these cases likely represent the tip of an iceberg. The current lack of information is largely due to the absence of proper epidemiological studies, unavailability of immunodiagnostic services, and the general unawareness of parasitic diseases by local physicians, health and agricultural authorities. The importance of these diseases will not be fully realized until our medical students, technicians, meat-inspectors, etc. are given a wider exposure to parasitology during their basic training and a more active role is taken by the Government regarding research.

Due to the above inherent epidemiological factors, any further urbanization of Hong Kong cannot eradicate the occurrence of parasitic zoonoses. On the other hand, with the upcoming change in the political system by 1997, a greater migration of people to and from China will become unavoidable. The shipment of some animals (especially wild species) across the border may also be deregulated. Therefore, the impending demographic, administrative and cultural changes in the near future will definitely lead to an increase in the prevalence of parasitic zoonoses in Hong Kong.

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