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Prevalence of Anisakid Larvae in Marine Fishes Sold in Shenzhen, China

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Abstract: The aim of the present investigation was to examine the prevalence of anisakid larvae in marine fishes sold in Shenzhen in March to November 2008. A total of 394 individual fishes representing 40 fish species were obtained from different wholesale markets. They were examined for the presence of anisakid larvae by examination of the viscera and whole body cavity. About 23 species of fish (57.5%, 23/40) namely *Decapterus maruadsi*, *Harpodon nehereus*, *Muraenesox cinereus*, *Trichiurus haumela*, *Pneumatophorus japonicus*, *Sebastods schlegeli* and so on were found to be infected with anisakid larvae with an overall infection rate of 31.0% (122/394). The results of present investigation demonstrated the risk of human infection with anisakid larvae in Shenzhen, China which have implications for implementing control strategies against anisakid infection in humans in China.

Key words: Marine fishes, anisakids, market, prevalence, Shenzhen, China

INTRODUCTION

Anisakiasis is a human gastrointestinal parasitosis that results from accidental ingestion of infective larvae belonging to the family Anisakidae. Anisakids have a global distribution among a wide variety of marine fish species. The prevalence of larval anisakids in some northern hemisphere fisheries has increased currently and infection of sea fish with anisakids causes significant economic losses to the fishery industry due to the apparent increase in prevalence and intensity and subsequent condemnation of infected fish (Rohlwing *et al*., 1998; Abollo *et al*., 2001). For example, the presence of anisakid larvae on and in the viscera and flesh may impact upon visual aesthetics and the market value and parasite removal adds to product cost whilst further reducing its attraction to consumers (Farjallah *et al*., 2006; Soliz *et al*., 2006; Zhu *et al*., 2007; Rello *et al*., 2008).

More importantly, it is well known that larval anisakids of some genera such as *Anisakis*, *Contracaecum* and *Pseudoterranova* can cause eosinophilic granuloma at the gastrointestinal wall and elicit various clinical manifestations of acute abdomen in human in lots of countries (Adams *et al*., 1997; McCarthy and Moore, 2000; Couture *et al*., 2003; Chai *et al*., 2005; Lee *et al*., 2009). Actually, there is a marked increase in the prevalence of human infection with anisakid larvae worldwide in the last two decades (Chai *et al*., 2005). Since the first reports confirrming the pathogenic effect of *Anisakis* species in humans (Van Thiel *et al*., 1960), there has been increasing awareness of fish-borne parasitic diseases (Smith and Wootten, 1978; Olson *et al*., 1983; Dick *et al*., 1991; Kijewska *et al*., 2009; Farjallah *et al*., 2006).

Infection of sea fish with anisakid larvae has been documented as a severe problem for fishery industry in China (Ma *et al*., 1997; Zhang *et al*., 2007; Li *et al*., 2007) which poses public health concerns. But there have been no official reports of the human cases of anisakid infection in China in the literatures this may be because that the physicians do not know anisakiasis and which is usually diagnosed as other diseases by mistake. In order to provide relevant base-line data for the better control of anisakid infection in marine fishes and for assessing the risk of human infection with anisakids, the objective of the

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present investigation was to estimate the prevalence of anisakid infection in marine fishes sold in market in Shenzhen, China by post mortem examination.

MATERIALS AND METHODS

About 394 marine fishes of 40 species were obtained from different wholesale fish markets in Shenzhen, China. The whole body cavity and viscera of each fish were carefully and thoroughly examined for the presence of anisakid larvae. Nematode specimens were counted, fixed in hot 70% ethanol. They were identified as anisakid larvae at generic level based on the host and tissue from which they were derived, the geographical origin of the host/parasite and the morphology of the parasite (Olson *et al*., 1983; Nascetti *et al*., 1993; Orecchia *et al*., 1994; Mattiucci *et al*., 1997).

RESULTS AND DISCUSSION

Of the 394 fish individuals representing 40 fish species examined, 23 species of fish (57.5%, 23/40), namely *Decapterus maruadsi*, *Harpodon nehereus*, *Muraenesox cinereus*, *Trichiurus haumela*, *Pneumatophorus japonicus*, *Sebastods schlegeli* and so on were found to be infected with anisakid larvae with an overall infection rate of 31.0% (122/394) (Table 1). The anisakid larvae found represented *Anisakis* and *Hysterothylacium*. No anisakid larvae were found in other 17 fish species (Table 1). In the investigation, the highest prevalence of anisakid larvae occurred in *D. maruadsi* (100%) and *H. nehereus* (100%) while the lowest prevalence of anisakid larvae occurred in *P. argenteus* (9.1%). Almost, all of the parasites were found encapsulated in tight flat coils in the viscera on the liver or free in the body cavity.

Infection with anisakid larvae has been recorded in approximately 200 fish species worldwide (Abollo *et al*., 2001). In China, >150 fish species have been found to be infected with anisakid larvae with several fish species having a prevalence of 100% (Zhang *et al*., 2007). The present survey of anisakid infection in marine fishes sold in wholesale markets in Shenzhen revealed that 57.5% fish species and 31.0% of examined fish individuals were infected, some of which are commonly eaten fish such as *M. cinereus*, *T. haumela*, *P. crocea* and *P. polyactis*, thus posing a high risk for human infection in particular in Shenzhen where people have the habit of eating raw or undercooked fish and have the pursuit of eating exotic and delicate foods such as sushi (in which raw fish is the main component) and cisheng (sliced raw fish). The infection rate of anisakid larvae in marine fishes in the present investigation was higher than that in sea fish caught from the Yellow Sea (Zhang *et al*., 2007). Nevertheless in China, the severe prevalence of anisakid infection in sea fish has received little attention in the last years, possibly because human infection with anisakids has not been officially documented in scientific literature, although it has been reported in the media.

Table 1: Prevalence of anisakid larval in marine fishes sold in Shenzhen, China

Fish species	No. of examined fish	No. of positive fish (%)
Decapterus maruadsi	3	3 (100.0)
Harpodon nehereus	2	2 (100.0)
Muraenesox cinereus	15	14 (93.3)
Trichiurus haumela	38	34 (89.5)
Pneumatophorus japonicus	6	4 (66.7)
Sebastods schlegeli	15	8 (53.3)
Sparus macrocephalus	2	1 (50.0)
Pseudosciaena crocea	13	6 (46.2)
Argyrosomus argentatus	17	7 (41.2)
Trachurus japonicus	8	3 (37.5)
Pseudosciaena polyactis	35	13 (37.1)
Nibea albiflora	11	4 (36.4)
Chirocentrus dorab	9	3 (33.3)
Epinephelus awoara	11	3 (27.3)
Lateolabrax japonicus	4	1 (25.0)
Nemipterus virgatus	33	8 (24.2)
Plectorhinchus diagrammus	6	1 (16.7)
Scomberomorus niphonius	12	2 (16.7)
Scarus ghobban	7	1 (14.3)
Therapon theraps	8	1 (12.5)
Pagrosomus major	9	1 (11.1)
Trachinocephalus myops	10	1 (10.0)
Pampus argenteus	11	1 (9.1)
Pampus nozawae	6	0.0
Psenopsis anomala	9	0.0
Formio niger	4	0.0
Mugil cephalus Limmaeus	3	0.0
Scatophagus argus	14	0.0
Siganus fuscescens	8	0.0
Branchiostegus albus	6	0.0
Cololnbis snira	12	0.0
Cookeolus boops	2	0.0
Epinephelus areolatus	1	0.0
Ditrema temmincki Bleeker	3	0.0
Taius tumifrons	5	0.0
Sparus latus Houttuyn	4	0.0
Plectorhynchus cinctus	5	0.0
Megalaspis cordyla	1	0.0
Navodon septentrionalis	19	0.0
Sillago sihama	7	0.0

CONCLUSION

The high prevalence of anisakid larvae in marine fishes sold in market indicates the potential of human infection and represents a risk for public health in Shenzhen and elsewhere in China. Moreover, Shenzhen is a metropolitan city of 1,952 km^2 and has a population of approximately 10 million it shares a border with the Hong Kong Special Administrative Region, China in the south. Various raw or uncooked food such as sushi and cisheng are consumed by people in Shenzhen and Hong Kong

daily. Therefore, it should be aware of the risks of human infection with anisakids and integrated strategies and measures should be taken to reduce or eliminate such risks.

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REFERENCES

Abollo, E., C. Gestal and S. Pascual, 2001. *Anisakis* infestation in marine fish and cephalopods from Galician waters: An updated perspective. Parasitol. Res., 87: 492-499.

Adams, A.M., K.D. Murrell and J.H. Cross, 1997. Parasites of fish and risks to public health. Rev. Sci. Tech., 16: 652-660.

Chai, J.Y., K.M. Darwin and A.J. Lymbery, 2005. Fish-borne parasitic zoonoses: Status and issues. Int. J. Parasitol., 35: 1233-1254.

Couture, C., L. Measures, J. Gagnon and C. Desbiens, 2003. Human intestinal anisakiasis due to consumption of raw salmon. Am. J. Surg. Pathol., 27: 1167-1172.

Dick, T.A., B.R. Dixon and A. Choudhury, 1991. Diphyllobothrium, *Anisakis* and other fish-borne parasitic zoonoses. Southeast Asian J. Trop. Med. Publ. Health, 163: 150-152.

Farjallah, S., S.B. Ben, H. Blel, N. Amor and K. Said, 2006. Anisakid parasites of two forkbeards (*Phycis blennoides* and *Phycis phycis*) from the Eastern Mediterranean coasts in Tunisia. Parasitol. Res., 100: 11-17.

Kijewska, A., J. Dzido, O. Shukhgalter and J. Rokicki, 2009. Anisakid parasite of fishes caught on the African shelf. J. Parasitol., 95: 639-645.

Lee, E.J., Y.C. Kim, H.G. Jeong and O.J. Lee, 2009. The mucosal changes and influencing factors in upper gastrointestinal anisakiasis: Analysis of 141 cases. Korean J. Gastroenterol., 53: 90-97.

Li, L., Z. Xu and L.P. Zhang, 2007. Investigation on the nematode of *Hysterothylacium aduncum* (Anisakidae) from Bohai Sea and Yellow Sea in China. Zhongguo Ji Sheng Chong Xue Yu Ji Sheng Chong Bing Za Zhi, 25: 364-367.

Ma, H.W., T.J. Jiang, H.W. Ma, T.J. Jiang and F.S. Quan *et al*., 1997. The infection status of *Anisakis* larvae in marine fish and cephalopods from the Bohai Sea, China and their taxonomical consideration. Korean J. Parasitol., 35: 19-24.

Mattiucci, S., G. Nascetti, R. Cianchi, L. Paggi and P. Arduino *et al*., 1997. Genetic and ecological data on the *Anisakis simplex* complex, with evidence for a new species (Nematoda, Ascaridoidea, Anisakidae). J. Parasitol., 83: 401-416.

McCarthy, J. and T.A. Moore, 2000. Emerging helminth zoonoses. Int. J. Parasitol., 30: 1351-1360.

Nascetti, G., R. Cianchi, S. Mattiucci, S. D'Amelio and P. Orecchia *et al*., 1993. Three sibling species within *Contracaecum osculatum* (Nematoda, Ascaridida, Ascaridoidea) from the Atlantic Arctic-Boreal region: Reproductive isolation and host preferences. Int. J. Parasitol., 23: 105-120.

Olson, A.C.Jr., M.D. Lewis and M.L. Hauser, 1983. Proper identification of anisakine worms. Am. J. Med. Technol., 49: 111-114.

Orecchia, P., S. Mattiucci, S. D'Amelio, L. Paggi and J. Plötz *et al*., 1994. Two new members in the *Contracaecum osculatum* complex (Nematoda, Ascaridoidea) from the Antarctic. Int. J. Parasitol., 24: 367-377.

Rello, F.J., A. Valero and F.J. Adroher, 2008. Anisakid parasites of the pouting (*Trisopterus luscus*) from the Cantabrian Sea coast, Bay of Biscay, Spain. J. Helminthol., 82: 287-291.

Rohlwing, T., H.W. Palm and H. Rosenthal, 1998. Parasitation with *Pseudoterranova decipiens* (Nematoda) influences the survival rate of the European smelt *Osmerus eperlanus* retained by a screen wall of a nuclear power plant. Dis. Aquat. Organ., 32: 233-236.

Smith, J.W. and R. Wootten, 1978. *Anisakis* and anisakiasis. Adv. Parasitol., 16: 93-163.

Solíz, D.G., V.M.V. Martínez, D.M.A. Alonso and A.O. Argueta, 2006. Anisakid nematodes from stranded pygmy sperm whales, *Kogia breviceps* (Kogiidae), in three localities of the Yucatan Peninsula, Mexico. J. Parasitol., 92: 1120-1122.

Van Thiel, P., F.C. Kuipers and R.T. Roskam, 1960. A nematode parasitic to herring causing acute abdominal syndromes in man. Trop. Geogr. Med., 12: 97-113.

Zhang, L., M. Hu, S. Shamsi, I. Beveridge and H. Li *et al*., 2007. The specific identification of anisakid larvae from fishes from the Yellow Sea, China, using mutation scanning-coupled sequence analysis of nuclear ribosomal DNA. Mol. Cell Probes, 21: 386-390.

Zhu, X.Q., M. Podolska, J.S. Liu, H.Q. Yu and H.H. Chen *et al*., 2007. Identification of anisakid nematodes with zoonotic potential from Europe and China by single-strand conformation polymorphism analysis of nuclear ribosomal DNA. Parasitol. Res., 101: 1703-1707.