METACERCARIAE IN FISHES OF SUN MOON LAKE WHICH IS AN ENDEMIC AREA FOR CLONORCHIS SINENSIS IN TAIWAN

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Abstract. The Sun Moon lake in Central Taiwan is a known endemic area for clonorchiasis. Of the 45 fresh water fish, Hemiculter leucisculus, from the lake that were examined by artificial gastric juice digestion in October 1995, all were found to harbor metacercariae in their muscle. The number of metacercariae isolated from each fish ranged from 2 to 2,185, with an average of 254. A total of 11,443 metacercariae was collected from the 45 fish. Of the 4,223 metacercaria that were examined under light microscope, 4,064 (96.23%) were found to belong to Haplorchis taichui, 90 (2.13%) to H. pumilio, 2 (0.05%) to C. sinensis and 67 (1.59%) to unknown species due to the metacercariae being not yet developed or immature. The 2 C. sinensis metacercariae were obtained from 2 out of 45 fish examined. Our results contrast with reports of a decade ago which stated that all the fish of the Sun Moon lake examined were positive for C. sinensis. Possible reasons for the decrease of C. sinensis metacercariae are the disappearance of pig farms around the lake, increased awareness of the trematode by the lakeside inhabitants and probably the exclusive use of mammals as its definitive host by C. sinensis. In contrast, besides mammals, Haplorchis spp also use birds as their definitive hosts.

INTRODUCTION

The Sun Moon lake in Central Taiwan is the largest lake on the island and is a known endemic area for clonorchiasis (Chen, 1991). The lake is inhabited by a lot of freshwater snails and small fish. The last survey for Clonorchis sinensis in that area was done about a decade ago and we felt that another survey for the trematode around this time is justified, because of the rapid development in many areas of Taiwan where in certain cases, some parasites had “ceased to exist”. In many areas, marshlands had been transformed to housing estates or industrial parks, resulting in the eradication of the snail intermediate host and the breaking of the parasite life-cycle. Thus, constant monitoring of a parasite in an endemic area is necessary to update the current epidemiological information.

Our objective in this study is to determine if there is any change in the prevalence of C. sinensis in the fish which inhabit the Sun Moon lake. The fish was selected as the subject of our study because it is the second intermediate host and serve as the direct source of infection for humans.

MATERIALS AND METHODS

In October 1995, 45 freshwater fish, Hemiculter leucisculus, from the Sun Moon lake were examined for metacercariae in their flesh by pepsin-HCl digestion. The size of the fishes ranged from 11.25 to 69.33 g, with an average of 38 g. Briefly, the fishes were caught with a fishing net, weighed, and their flesh cut with scissors after descaling. The flesh was then digested using a magnetic stirrer at 37°C for about 2 hours in 0.5% pepsin and concentrated hydrochloric acid added to bring the pH down to less than 2. Approximately 10-15 ml of the pepsin solution was added to each gram of the flesh.

The metacercariae were identified under light microscope with the criteria of having a conspicuous ventral sucker for C. sinensis, shorter prepharynx length, comparatively lesser transparency and generally larger size for H. taichui than for H. pumilio. Both H. taichui and H. pumilio have hooklets at their comparatively small ventral sucker. These hooklets are not seen in C. sinensis metacercariae (Cheng, 1988; Scholz et al, 1991).
RESULTS

Of the 45 fish examined, all were found to harbor metacercariae in their muscle. Preliminary microscopic examination of squash preparation of muscle showed that majority of the metacercariae were found in the tail region of the fish. The number of metacercariae isolated from each fish ranged from 2 to 2,185, with an average of 254. A total of 11,443 metacercariae was collected from the 45 fishes. Of the 4,223 metacercaria that were examined under light microscope, 4,064 (96.23%) were found to belong to Haplorchis taichui, 90 (2.13%) to H. pumilio, 2 (0.05%) to C. sinensis and 67 (1.59%) to unknown species due to metacercariae being not yet developed or immature. The C. sinensis metacercariae were obtained from 2 out of 45 fish examined.

DISCUSSION

Although our primary objective was to investigate the prevalence of C. sinensis in the fish of Sun Moon lake, we found that the majority of the metacercariae examined were those of Haplorchis spp. Haplorchis spp are also known to infect man but with less severe clinical symptoms than C. sinensis (Radomyos et al, 1983). Haplorchis spp have been reported to occur not only in fish-eating birds such as night heron and egret, but also in cat, dog and pig (Varghese et al, 1971).

Between 1984 to 1987, Cheng (1988), reported that of the 36,376 metacercariae from 10 H. leucisculus caught in the Sun Moon lake, 27,869 (76.6%) were those of C. sinensis and Haplorchis spp constituted only 6,835 (18.8%). Wang et al (1980) also reported that of 120 fish from the Sun Moon lake that were examined, all were positive for C. sinensis. Thus, our results contrasted with those previous reports which found a comparatively high prevalence of C. sinensis in H. leucisculus in Sun Moon lake.

It was reported about one and a half decade ago that one-third of the pig farms on the bank of the Sun Moon lake were rearing pigs that were infected with C. sinensis and their dropping had found a way into the lake (Wang et al, 1980). This might have contributed to the high prevalence of C. sinensis in the fish. Moreover, Wang et al (1980), also reported that of the 289 students and staff of two lakeside schools who were examined by intradermal test for C. sinensis infection, 39 (13.5%) were found to be positive. Some possible reasons for the decrease of C. sinensis metacercariae in the fish are the disappearance of pig farms around the lake, increased awareness of the trematode by the lakeside inhabitants and the primary use of mammals as its definitive host by C. sinensis. In contrast, besides mammals, Haplorchis spp also use birds as their definitive hosts (Yamaguti, 1958).

One possible factor for the increase in the prevalence of Haplorchis spp in the fish of Sun Moon lake may be due to the designation of an area in the lake as a sanctuary for water-fowls. Our present result is based only on a single sampling of the fish in winter. We are presently monitoring the prevalence of the metacercariae in the fishes on a bimonthly basis to see if there is any seasonal changes in their infectivity rate, especially those of C. sinensis. A parasitological survey of the helminths fauna of waterfowls inhabiting the lake may also be warranted.

REFERENCES


