Brief Communication:

_Gnathostoma_ Infective Stage Larvae in Swamp Eels ( _Fluta alba_ )
at a Metropolitan Market in Bangkok, Thailand

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Abstract. A total of 1,788 livers from swamp eels ( _Fluta alba_ ), purchased at a market in Bangkok, Thailand, from April to July 2002, were studied for the prevalence and intensity of _Gnathostoma_ third stage larvae (L3s). Of all livers, 466 were infected with _Gnathostoma_ L3s (infection rate = 26%). The larvae recovered averaged 0.43 ± 0.51 larvae/liver. All larvae were identified as _Gnathostoma spinigerum_ by morphological criteria. The prevalence of _G. spinigerum_ L3s in the eels was much higher in the rainy season (June and July, 74%) than during April and May (8%). Therefore, prevention programs for gnathostomiasis should be emphasized during the rainy season. (received 28 October 2002; accepted 17 November 2002)

Keywords: _Gnathostoma spinigerum_, gnathostomiasis, tropical medicine, swamp eels

Introduction

_Gnathostoma spinigerum_ is the major causative agent of human gnathostomiasis [1-4]. Human infections with this parasite are common in Thailand. The disease has also been reported in Japan, China, Malaysia, Indonesia, Philippines, Israel, and other areas where raw or pickled fish are consumed [5-7].

Clinical manifestations of human gnathostomiasis are caused by migration of the immature larvae (L3s). Larval migration in subcutaneous tissues causes intermittent, migratory, painful, pruritic swellings (cutaneous larva migrans). Migration in other tissues (visceral larva migrans) can result in cough, hematuria, ocular involvement, and eosinophilic meningitis with myeloencephalitis, which is the most serious manifestation. High eosinophilia is generally present [8-10].

The major route of infection is ingestion of uncooked larvae present in fresh water fishes. Among local fresh water fishes in Thailand, the highest prevalence of _G. spinigerum_ L3s was found in _Fluta alba_ (swamp eels) [7,11-13]. A survey of the larval contamination of swamp eels sold in markets can provide data that are useful for the prevention and control of gnathostomiasis. We report the prevalence of _Gnathostoma_ third stage larvae (L3s) in swamp eels sold at a large market in Bangkok.

Materials and Methods

Collection of swamp eel viscera. A total of 1,788 swamp eels were obtained at the Tavavej market in Bangkok from April to July 2002. This market is the center of the swamp eel trade in Thailand.

Collection of Gnathostoma larvae. Swamp eel livers were separated from other viscera and washed with tap water. Each liver was digested with 25 ml of artificial gastric juice (1.5% pepsin in water, adjusted to pH 2.0 with 1M HCl) in a 27 ml screw-cap tube. Digestion was performed in a water bath (37°C, 4 hr) with frequent agitation. The digested liver was washed repeatedly by sedimentation with 0.85% NaCl solution. _Gnathostoma_ L3s in each sample were identified and counted by stereomicroscopy.
Table 1. The prevalence of *G. spinigerum* L3s infestation in livers of eels from Tevaraj market, Bangkok, during 2002.

<table>
<thead>
<tr>
<th>Period</th>
<th>Number of livers studied</th>
<th>Number of infested livers</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>April-May</td>
<td>1302</td>
<td>106</td>
<td>8.1%</td>
</tr>
<tr>
<td>June-July*</td>
<td>486</td>
<td>360</td>
<td>74.1%†</td>
</tr>
<tr>
<td>Total</td>
<td>1788</td>
<td>466</td>
<td>26.1%</td>
</tr>
</tbody>
</table>

* rainy season in Thailand
† *p* <0.05 vs April-May data by proportional Z test.

**Results**

Of 1,788 eel livers examined in this study, 466 were positive for *Gnathostoma* L3s, giving an infection rate of 26% (Table 1). All of the *Gnathostoma* larvae were identified as *G. spinigerum*, since the cephalic hooklet had the typical shape of *G. spinigerum*, as described by Daengsvang [1,2]. The number of larvae recovered averaged 0.43 ± 0.51 larvae/liver.

The swamp eels were collected, live, at a large metropolitan market in Bangkok, Thailand, from April to July 2002; they came to market from rural areas. The prevalence of *G. spinigerum* L3s in eels during the rainy season (June to July) was 74%, which was far higher than the prevalence of 8% during April and May (*p* <0.05).

**Discussion**

In the natural definitive hosts (ie, domestic and wild felines and canines), adult *Gnathostoma spinigerum* worms reside in a tumor that they induce in the gastric wall. This manifestation is entirely different from that in human beings, who are accidental hosts of this parasite. The common manifestation of human gnathostomiasis is intermittent cutaneous migratory swelling. However, the disease also causes serious effects and can be fatal if parasites migrate to the central nervous system [9,10].

Humans acquire *Gnathostoma* infection by consuming raw or partially cooked fresh-water fishes that contain L3s. In Thailand, there are limited data on the prevalence and concentration of the parasite in fresh-water fishes. To obtain such information, surveys of the distribution of *Gnathostoma* L3s in second intermediate hosts are necessary. Such information is helpful for planning control programs and monitoring the disease [11].

In a previous study of 59 species of fresh-water fishes sold in markets of Bangkok, 9 species were infected with *Gnathostoma* larvae [7]. The highest prevalence of *G. spinigerum* L3s was in *Fluta alba* (swamp eels) [7,12]. To assess the burden of *Gnathostoma* parasites in this second intermediate host, we report here a study of *G. spinigerum* L3s in livers from swamp eels that were offered for sale in a large metropolitan market in Bangkok.

High prevalence of contamination was detected in our study (26%). In a study of central Thailand, the prevalence of *G. spinigerum* L3 contamination ranged from 10% to 33% [13]. The infection rates obviously depend on the sources of the swamp eels. Fresh-water fishes, including eels, that are available in the markets of Bangkok come from rural areas of Thailand [7,11-13]. Control of the contaminated fishes necessitates tracing their transfer from rural areas to the capital. Whatever the source, fresh water is requisite for the parasite life-cycle development.

Our study suggests that the level of infection of eels increases abruptly during the rainy season. This confirms the findings of Rojekittikhun et al [7], who noted that the prevalence of *G. spinigerum* L3s in the second intermediate hosts is highest during the rainy season. The number of larvae recovered peaks during periods of heavy rainfall [7,11]. Therefore, programs for prevention of gnathostomiasis should be emphasized during the rainy season.

**References**

2. Daengsvang S. *Gnathostoma spinigerum* and human gnathostomiasis. A review. In: The 25th Anniversary of the Faculty of Tropical Medicine, Mahidol University (Sucharit S, Ed), Krung Siam Press, Bangkok, 1986; pp 124-147.
3. Radomyos P. Daengsvang S. A brief report on *Gnathostoma spinigerum* specimens obtained from...