

GNATHOSTOMA INFECTION IN SOUTH VIETNAM

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Abstract. Four species of *Gnathostoma* have been documented in Vietnam: *G. spinigerum*, *G. hispidum*, *G. doloresi*, and *G. vietnamicum*. The only species known to infect humans is *G. spinigerum*. Infections in animals have been reported in Vietnam since 1914. Recently, reports have revealed a high prevalence among pigs (24.1%), eels (11%), and dogs (4.3%). The first human infection was reported in 1963. Based mainly on findings of larvae from tissue, the number of reported human cases was still low, until 1999 (4 cases). Since 1999, however, more than 600 cases from different cities of south Vietnam have been diagnosed based on clinical symptoms and signs, eosinophilia and ELISA at the Department of Parasitology, School of Medicine, University of Pharmacy and Medicine, Ho Chi Minh City. Larvae were founded in tissue, or from the intestinal lumen, of 14 cases. The main clinical manifestation was subcutaneous swelling with or without eruption. In addition to improving recognition of this, until now, neglected infection and diagnostic abilities, the environmental, cultural, social and dietary changes may be responsible for the increasing number of cases. Immunoblot and IgG subclass antibodies should be used for more sensitive screening or more specific confirmation in human cases. The infection status in animal and fish are under ongoing evaluation. Based on the extend of human and animal infection, appropriate interventions will be needed in the future.

INTRODUCTION

At least ten species of *Gnathostoma* have been registered in the world. Among them, four species, *G. spinigerum*, *G. hispidum*, *G. doloresi*, and *G. nipponicum*, have been identified as etiologic agents of human gnathostomiasis (Miyazaki, 1991). In Vietnam, *G. spinigerum*, *G. hispidum*, *G. doloresi*, and *G. vietnamicum* have been documented in the literature (Hoa *et al*, 1965). However, only *G. spinigerum* is known to be responsible for human cases (Xuan and Rojekittikhun, 2000).

HISTORICAL REVIEW ON GNATHOSTOMIASIS IN VIETNAM

Gnathostomiasis has been reported in Vietnam since the early 20th century.

In animals. *G. spinigerum* was found in the stomach of a tiger from the national zoo, in 1914 (Railliet and Henri, 1914). It was recovered from domestic cats in northern Vietnam (in 1938)

(Houdenur, 1938) and in Saigon in 1965 (Hoa *et al*, 1965). *G. hispidum* was found in pigs in 1911 in Hue (Railliet and Henri, 1914). Among pigs slaughtered in Chanh Hung, Saigon, in 1965, the prevalence *G. hispidum* was 30-40%, with a high intensity of 10-20 parasites per host. The highest intensity was 42 mature parasites and many larvae in the layer muscle of the stomach (Hoa *et al*, 1965). *G. doloresi* has also been found in pigs but with lower prevalence (1%) (Hoa *et al*, 1965). In Saigon, 1965, Hoa reported a new species of *Gnathostoma* found in the kidneys of otters (*Lutra elioti*) and named it *G. vietnamicum* (Hoa, 1965).

In humans. Although four species of *Gnathostoma* have been found in animals, human gnathostomiasis was considered a rare disease. The first human case was due to *G. spinigerum*, described in 1965, in a boy from Tay Ninh, with a migrating tumor on his head (Hoa *et al*, 1965). More than 20 years later, no more human cases have been reported.

RECENT STUDIES ON GNATHOSTOMA IN ANIMALS AND FRESHWATER FISH

A survey on *Gnathostoma hispidum* in 5,935 pigs raised in southern provinces from 1983-1993 showed an average prevalence of 24.1%. Kien Giang and Ca

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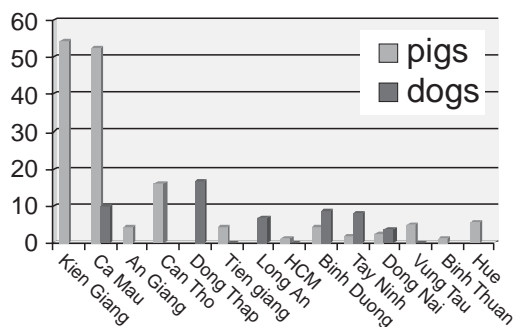


Fig 1- Prevalence of gnathostomiasis in pigs and dogs, by province.

Mau had higher prevalence (52.4 –54.0%). The infection rate of *Gnathostoma doloresi* in pigs was 0.1% (Luong van Huan *et al*, unpublished) (Fig 1).

Another survey of *Gnathostoma* infection in domestic dogs found *G. spinigerum* in the stomachs of 1,498 dogs from 13 provinces. The overall prevalence in dogs was 5.27%, which increased by months of age. Dong Thap had the highest prevalence (17%). The infection rate in dogs under six months was 1.09%, and over 24 months it was 7.33%. (Luong van Huan *et al*, unpublished). A survey of *Gnathostoma* larvae in swamps eels (*Monopterus albus*), a secondary intermediate host, was done in Ho Chi Minh City (HCMC), and showed an infection rate of 11%, which increased in rainy season (28.18%). All of the recovered larvae were *G. spinigerum* (Xuan and Rojekkittikhun, 2000). A report on parasites in freshwater fish from the Mekong River delta in 2001, found *G. hispidum* in snake-head fish (*Channa micropeltes*) (Te, 2001). In our current study, we also found *G. spinigerum* in snake-head fish (*Channa striata*) sold in HCM City.

RECENT STUDIES OF HUMAN GNATHOSTOMIASIS

Until 1998, 3 other human cases due to *G. spinigerum* were documented, with worms found in skin lesions (Mai, 1992). The immunological test (ELISA) for gnathostomiasis has been used from 1999. Using this technique, we have found 654 cases of human gnathostomiasis, of which 14 were parasitologically confirmed. From the above positive cases, a random sample of 166 cases was reviewed using immunoblot (IB). There were 155 cases where ELISA 1:400 was IB positive. The other 11 cases were IB negative, of which 8 were eosinophilic

Table 1
Clinical manifestations of positive cases.

Clinical manifestations	Cases	Percent
Non-specific	141	21.6
Cutaneous	417	63.8
Visceral	96	14.7
Central nervous system	79	12.1
Eye	2	0.3
Gastro-intestinal system	11	1.7
Lung, pleural membrane	4	0.6
	654	100

meningitis. Among 654 positive cases, there were 381 males (58.3%) and 273 females (41.7%), two thirds of them were 20-49 years of age (range 3-72). The common manifestation was cutaneous, with 417 cases (63.8%). Visceral manifestations were found in 96 cases (14.7%). Most of them had cerebral or meningeal signs (79 cases, 12.1%). There were 141 cases (21.6%) without specific anatomical manifestations (Table 1).

Most of the cases (411/446, 92.2%) had increased eosinophil >5% (from 6 to 75%), of total peripheral white blood cells. Eosinophilia was suggested for the diagnosis of visceral diseases especially for cases without cutaneous manifestations. There were 32 cases with skin signs but no increase in eosinophil (8.8%). In 14 parasitologically-confirmed cases, larvae were found: from the skin (10; 7 with spontaneously exiting larvae, 3 by skin biopsy), removal by eye surgery (2 cases: 1 with a larva in the vitreous cavity, and 1 in the anterior chamber), removal by gastro-intestinal endoscopy (1 from the stomach and 1 from the colon). All 14 causative agents found were *G. spinigerum*.

DISCUSSION

Case detection increased after development of the ELISA technique. Thanks to reports of human cases, the awareness of physicians and the general public has been improved. However, the number of detected cases is still under-estimated. Popular raw dishes from various countries in the world have been well-adopted in Vietnam. These factors can lead to the emergence of human gnathostomiasis in the near future.

The only species related to human cases that was parasitologically confirmed was *G. spinigerum*. Other species were found in many intermediate hosts but

have not been found related to human disease. Middle age male gender and some occupations related to exposure or eating habits might be risk factors of disease.

The main manifestations are cutaneous and neurologic. Most cases related to eating undercooked fish. However, some patients had a history of eating raw shrimp (tiger prawns). We could not find larvae in other species of fish or shrimps. Other manifestations might be documented increasing the alertness of physicians and patients.

The ELISA technique has an important diagnosis role. In several cases, a positive reaction to other parasites revealed the possibility of multiple infection or cross-reactivity. We need to develop a more specific immunologic test to clarify the diagnosis for these cases.

CONCLUSION

Gnathostomiasis has a variety of manifestations. Therefore, the physician should be informed and made aware of the disease. Despite the increasing number of cases, it is still under-diagnosed. ELISA is a reliable diagnostic test. Epidemiologic surveys in intermediate hosts and humans should be done to define appropriate public health interventions. Health education about the risk of eating raw or undercooked food should receive more attentions.

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