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Trabajo Original

Otros

Trematode Aspidogastrea found in the freshwater mussels in the Yangtze River basin *Trematodos Aspidogastrea encontrados en los mejillones de agua dulce en la cuenca del río Yangtze*

Xiaodong Zhan¹, Chaopin Li^{1,2} and Hua Wu¹

¹Department of Medical Parasitology, Wannan Medical College, Wuhu, Anhu, China. ²School of Medicine, Anhui University of Science & Technology, Huainan, Anhui, China

Abstract

Objective: To investigate the prevalence of trematode *Aspidogastrea* in the freshwater mussels in the Yangtze River basin within Anhui province, China.

Methods: We initially harvested the freshwater mussels living in the Yangtze River running through Anhui area, and labeled them with corresponding number. Then the samples were dissected for isolating the flukes, which were identified by conventional staining.

Results: Infection rate of trematode *Aspidogastrea* in freshwater mussels in the Yangtze River basin within the territory of Anhui province was 30.38% (103/339) in general, and a total of 912 flukes of *Aspidogastrea* were detected in the 103 mussels, with average infection rate of 8.85 for each mussel.

Conclusion: Trematode *Aspidogastrea* is prevalent in the freshwater bivalves living in the Yangtze River basin running through Anhui area, and the trematode was identified as *Aspidogaster* sp. belong to *Aspidogaste* under *Aspidogastridae* of *Aspidogastrea*.

Key words:

Freshwater mussels.
Aspidogastrea.
Trematode.

Resumen

Objetivo: investigar la prevalencia de trematodos *Aspidogastrea* en mejillones de agua dulce en la cuenca del río Yangtze en la provincia de Anhui, China.

Métodos: se recogieron mejillones de agua dulce en el río Yangtze a su paso por la provincia de Anhui y se etiquetaron con su número correspondiente. Posteriormente se disecaron para aislar los trematodos por medio de tinción convencional.

Resultados: la tasa de infección de trematodos en mejillones de agua dulce en la cuenca del río Yangtze, en el territorio de la provincia de Anhui fue 30,38% (103/339), en general, y un total de 912 trematodos fueron detectados en 103 mejillones, con tasa promedio de infección de 8,85 por cada mejillón.

Conclusión: el trematodo *Aspidogastrea* es frecuente en los bivalvos de agua dulce que viven en la cuenca del río Yangtze, en la región de Anhui, y el trematodo fue identificado como *Aspidogaster* sp. pertenecen a la familia *Aspidogaste* bajo el género *Aspidogastridae* de *Aspidogastrea*.

Palabras clave:

Mejillones de agua dulce. *Aspidogastrea*.
Trematodo.

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Correspondence:

Chao-pin Li. School of Medicine, Anhui University of Science & Technology, Huainan 232001, Anhui Province, China
e-mail: cpli001@126.com

INTRODUCTION

The Aspidogastrea, a small group of flukes belonging to the Trematoda, are parasites of freshwater and marine molluscs or vertebrate host, and were reported in the mussels in Fujian province and Heilongjiang areas of China (1,2). However, few reports are available on aspidogastrea infection with the freshwater mussels living in the Yangtze River basin running through Anhui province of China. In order to investigate the prevalence of Aspidogastrea, we conducted a survey in April of 2014 on the freshwater mussels living in the Yangtze River basin across Anui area. This paper was undertaken to report our findings.

MATERIALS AND METHODS

SAMPLE COLLECTION

The sample species of freshwater bivalves were collected from areas of Anqing, Chizhou, Tongling, Chaohu, Wuhu and Ma'an-shan, the coastal cities along the Yangtze River across Anhui province. All bivalve mollusks, regardless of male or female, were wild growth with a life of 3 to 5 years. The samples were labeled with number and sampling location, and brought back to the laboratory for examination.

ISOLATING THE TREMATODE

The instrument and tools for isolation of the flukes included dissecting microscope, wax disc, scalpels, scissors and small-sized tweezers. Isolation of the flukes was performed by: a) opening the bivalve in the wax disc with a scalpel cutting through the occlusor; b) the soft bodies, visceral mass, were totally separated from either inner valve and placed onto the plate; c) the mantle was stripped with a scalpel under the microscope and the pericardial cavity was cut open; d) the fluke detected was transferred with a sucker into another small dish containing small amount of clean water; and e) sufficient amount of saline was added into the dish to rinse the species by gently shaking it. The flukes were counted by individual bivalve mollusks and preserved in 70% alcohol for following identification.

SPECIMEN PREPARATION

Specimens were prepared in accordance with the technique by Chaopin Li (2008) (3), and cleansed and stained in the carmalum. After initial decolorization with 1% hydrochloric acid solution, the specimens were rinsed in clean water, and then subjected to gradient elution in alcohol and dehydration in 70% alcohol. When pressed to flat and thin, the specimens were fixed with Bowen's fixative, and gradiently dehydrated till concentration of 95% alcohol (repeated staining may be required as appropriate). After final twice dehydration in 100% alcohol, the specimens

were treated with wintergreen oil and transferred onto the slide that was mounted with Canada balsam after adjusting the posture, and dried in a thermostat cabinet for following use. The flukes were measured by unit of millimeter, and all samples were preserved in the Department of Medical Parasitology, Wannan Medical College.

IDENTIFICATION OF THE SPECIES

The parasite species were morphologically identified under a microscope or dissecting microscope, with reference to related literatures (2,4,5).

RESULTS

TREMATODE INFECTIONS

Of the 339 freshwater mussels collected, 103 were infected with aspidogastrea species, and the infection rate was 30.38%. A total of 912 aspidogastreans were recovered from the 103 mussels infected, in which the number in each individual varied from 2 to 61, with an average of 8.85 flukes. The aspidogastreans isolated from the bivalve mollusks comprised larvae and adults in which large number of eggs was seen.

ADULT MORPHOLOGY

Under stereomicroscope, the live adult aspidogastreans present with light red color tegument and active telescopic swimming. The fluke specimens are laterally expanded to an oval to oblong shape, and the body size varies a lot for each individual. The mouth is located at the anterior tip of the body and trumpet-shaped. The pharynx presents with oval shape, followed by a single tubular intestinal caecum that extends to the posterior body end. The testis is found in the middle body approximately posterior to the ventral side, where a spermatic duct runs into the cirrus sac that is placed in the middle line at the anterior edge of ventral sucker, and the penis occurs in the cirrus sac. The ovary arises anteriorly at the testis and is ovally shaped. The vitellarium presents with follicular figure and posteriorly arranges at either side of the body. The ventral disc, shaping like a shield plate, extends along most of the body by ventral aspect.

IDENTIFICATION OF ASPIDOGASTREA

We conducted an identification on the Aspidogastrea in terms of its morphology and classification referring to Faust and Tang (1936) (5), and recognized that this species belongs to *Aspidogaster* under the Aspidogastridae of subclass Aspidogastrea, by currently naming it as *Aspidogaster* sp. due to few information is available.

DISCUSSION

Although the Aspidogastrea is small group of flukes comprising only two subclasses Aspidogastrea and Digenea, and appears to be archaic species of freshwater bivalves. None of the species has any economic importance, but the group is of very great interest to biologists in research of the evolution of parasites (4). Previous literatures reported the distribution of Aspidogastrea in areas of Fujian, Heilongjiang, Hubei and Sichuan, China, and that *Aspidogaster conchicola* is most prevalent in Fuzhou area, and hosted generally in the pericardial cavity of mussel (1,2,6,7). The freshwater bivalve mollusks are the most optimal host of the Aspidogastrea. Tang Zhongzhang (1980) described six species of Aspidogastrea in China, including *Aspidogaster conchicola* Baer (1827), *Aspidogaster amurensis* Achmerov (1956), *Aspidogaster ijimai* Kawamura (1913), *Aspidogaster indica* Dayal (1943), *Cotylaspis sinensis* Faust and Tang (1936), and *Lophotaspis orientalis* Faust and Tang (1936) (4). The site that flukes parasitize in a host is primarily associated with pericardial cavity of the freshwater bivalves, yet the infection occasionally occurs in the kidney (2,4). Apart from the hosts of Aspidogastrea previously described, Yao et al. (1996) found that the water-snail, intermediate host of *Schistosoma japonicum*, was infected with Aspidogastrea (8), and Wei et al. (2001) once recovered the *Aspidogaster chongqingensis* in the body of *Spinibarbas sinensis* (6).

The Yangtze River in Anhui areas start from the outlet of Poyang Lake of Jiangxi province and runs a total of 416 km through the coastal cities of Anqing, Chizhou, Tongling, Wuhu and Ma'anshan, where are the subtropical transition zone with adequate light, mild climate, abundant rainfall and distinct four seasons. Sufficient water resources, various landform and soils in the basin along the Yangtze River make it possible for the aquatic lives to grow in large quantity, including a variety of snails and bivalves. The mussels used in our experiment are mostly occurring in the rivers, lakes and pools in those areas, and our investigation showed that the freshwater bivalves living in Yangtze River basin are infected with aspidogastrea species, which belongs to *Aspidogaster* of Aspidogastridae under Aspidogastrea. Although the species remains accurate identification, our findings will fill the gaps in research of

the trematode Aspidogastrea in the basin of the Yangtze River in Anhui, and supply valuable information for policies in freshwater aquaculture, including freshwater bivalve mollusks and pearls.

Wang Lizhen (1995) conducted a survey on the Aspidogastrea infection with mussels living in the Lake Dian (in Yunnan province of China), and found that the pericardial cavity of mussels were infected with aspidogastrea species in large quantity and death of the bivalves was attributed to the existence of such parasites (9). However, our results showed that the freshwater mussels can lively survive the infection, though more than 300 aspidogastreans were detected in individual bivalve. What exactly leads to the death of the freshwater mussels remains further investigation.

The Aspidogastrea detected in the freshwater bivalves collected in the basin of the Yangtze Rive in Anhui areas is preliminarily identified in terms of the classification by Liu et al. (10) as *Mollusca*, *Bivalvia*, *Unionida*, *Unionidae*, *Anodontinae*, *Anodonta*. We found that both larvae and adults were omnipresent in the mussels, suggesting that the mussels may potentially re-infect with the flukes.

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