Journal MVZ Cordoba
2020; 25(1):e1616.
https://doi.org/10.21897/rmvz.1616

Brief Communication

Report of *Pseudosuccinea columella*, infected with *Fasciola hepatica* at Sierra de los Cuchumatanes, Guatemala

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Received: April 2019; Accepted: September 2019; Published: January 2020.

ABSTRACT

Objective. Identify the natural infection of freshwater snails as an intermediate host of *Fasciola hepatica* in Guatemala. **Materials and methods.** Freshwater snails were collected in a high-altitude village (3.000 mamsl) from Huehuetenango department, where fasciolasis is endemic. The identification of the snail species was based on the morphological characteristics observed under the stereoscope using an identification key. The trematode phases were searched externally by visual inspection using a light source, and internally by dissection and visual inspection of the tissues under a stereoscope and microscope. **Results.** 260 snails were found and identified as *Pseudosuccinea columella*. Two of them were found naturally infected with larval phases of *F. hepatica*. **Conclusions.** This is the first report of *P. columella* carrying phases of *F. hepatica* in the highlands of Guatemala. It is necessary to increase the research of the ecology of this parasite in other understudied areas in Guatemala and Central America, due to the latent risk of infection for populations of herbivorous animals and humans.

Keywords: Trematode infections; snails; zoonosis (*Source*: National Library of Agriculture).

RESUMEN

Objetivo. Identificar la infección natural de caracoles de agua dulce con *Fasciola hepatica* en una localidad del altiplano de Guatemala. **Materiales y métodos.** Se colectaron caracoles de agua dulce en una aldea endémica de fascioliasis, en la localidad de Paquix, en el departamento de Huehuetenango, ubicado a ~3.300 msnm. La identificación de la especie de caracol se basó en las características morfológicas observadas por estereoscopio usando una clave de identificación. La búsqueda de fases del trematodo se realizó mediante la inspección visual externa con fuente de luz y la disección e inspección visual dentro del molusco bajo estereoscopio y microscopio. **Resultados.** 260 caracoles fueron encontrados e identificados como *Pseudosuccinea columella*. Se examinaron

How to cite (Vancouver).
Lepe-López M, Villatoro-Paz F, Valdez-Sandoval C, Rios L, Díaz-Rodríguez M, Guerra-Centeno D. Report of *Pseudosuccinea columella*, infected with *Fasciola hepatica* at Sierra de los Cuchumatanes, Guatemala. Rev MVZ Cordoba. 2020; 25(1):e1616. DOI: https://doi.org/10.21897/rmvz.1616

ISSNe: 1909-0544

los especímenes colectados y se encontraron dos caracoles infectados de forma natural con fases larvarias de *F. hepatica*. **Conclusiones.** Este es el primer reporte de este hospedero intermediario portando formas de *F. hepatica* en Guatemala. Es necesario aumentar los reportes de este parásito y de sus interacciones ecológicas en otras áreas no estudiadas de Guatemala y Centro América, debido al riesgo latente de infección para poblaciones de animales herbívoros y humanos.

Palabras clave: Infecciones por trematodos; caracoles; zoonosis (*Fuente*: Biblioteca nacional de agricultura).

INTRODUCTION

Fascioliasis is a parasitic disease affecting humans and animals. It is associated with the cattle and sheep production in endemic tropical areas (1). *Fasciola hepatica* (Linnaeus, 1761) is the species of liver fluke present in America. A fundamental part of the life cycle of this trematode is carried out in a freshwater snail intermediate host (2). After the hatching of the eggs, the miracidium seeks and penetrates a snail, developing various parasitic phases (sporocyst, redia and cercaria). The cercariae abandon the snail and become infective metacercariae encysted in the aquatic vegetation, being then consumed by herbivorous animals or humans. In Latin America, fascioliasis is frequently reported in Bolivia, Paraguay and Argentina (3,4). However, the notification of the clinical cases is scarce in poor countries, where this illness is classified as a Neglected Tropical Disease (NTD) (5).

Pseudosuccinea (*Lymnaea) columella* (Say, 1817) was first reported in Guatemala in 1982 by Paraense. The specimen was collected at ~1,500 mamsl in Purulhá locality at Baja Verapaz department (Figure 1). Nevertheless, this species of snail has never been looked for in other locations, in the highlands of Guatemala, were human fascioliasis cases have been reported (6). The main purpose of this communication is to report for the first time the natural infection of *Pseudosuccinea columella* with *F. hepatica* in the highlands of Guatemala.

MATERIALS AND METHODS

Sampling was carried out during the dry season of 2008 in Paquix locality, at Huehuetenango department in Guatemala (Figure 1, dot 1). This area belongs to the Sierra de los Cuchumatanes mountainous system, at 3,300 mamsl, were sheep breeding and watercress cultivation (*Nasturtium officinale,* W.T. Aiton 1812) are the livelihood for native persons.

Figure 1. Map showing the study locality (dot 1). Also shown is the area where *Pseudosuccinea columella* was previously reported by Paraense in 1982 (dot 2).

We collected snails along water creeks and transferred live specimens in plastic boxes to the parasitology laboratory at the veterinary faculty of University of San Carlos in Guatemala City. The identification was based on the morphological description provided by Paraense (7) and the identification key of freshwater snails provided by Burch (8). The shell was measured to 0.1mm using a caliper. The search for possible infected snails with trematode phases was made by visual inspection using a stereoscope and a light source for transillumination. Furthermore, dissection and visual internal inspection under stereoscope and microscope was made to confirm the presence of parasites phases.

RESULT

We collected 260 snails (Figure 1) in a water creek (15°26’03.4”N, 91°26’50.2”W). Two individuals were positive to trematode phases by visual inspection. Shell morphology of the collected snails was consistent with the characteristics of

P. columella described by Paraense and Burch (shell succiniform, thin and fragile, with a large, oval aperture and body whorl, and small spire; surface sculptured with microscopic, raised, spiral periostracal threads, [Figure 2]).

Figure 2. Succiniform shell of *P. columella* found at the sampling site at Huehuetenango, Guatemala.

DISCUSSION

This is the first report of *P. columella* with natural infection of *F. hepatica* in the highlands of Guatemala. We assume that the dispersion of this snail species covers different altitudes of the country, allowing the trematode transmission to animals and humans in different areas of the nation. On our collection site, in the Huehuetenango department, the average temperature is 11.89 °C (minimum of 3.37°C and maximum of 19.49°C). At the collection site carried out by Paraense in 1982, in the department of Baja Verapaz, the average temperature is 18.31°C (minimum of 11.40°C and maximum of 24.82°C). The different average temperatures in both collection sites support the idea postulated by other authors, about the invasive capacity of *P. columella* in different environmental conditions. It has been hypothesized that *P. columella* was introduced from North America to other regions of the planet in the mid-twentieth century. In Africa, the introduction of this intermediate host has caused the increase in the prevalence of *Fasciola gigantica* in Egypt (9).

In terms of NTD it is important to recognize the need to establish a specific monitoring program for zoonotic fascioliasis in Guatemala. For human onchocerciasis, another parasitic NTD in Huehuetenango caused by *Onchocerca volvulus* (Leuckart, 1894), a surveillance program of World Health Organization and the local health system, confirmed the prevalence, and made possible the interruption the transmission using mass treatment (10). Until now, some unofficial reports at the same locality of our snail collection, refer fascioliasis cases in children and adults (11).

P. columella has been confirmed as intermediate host of *F. hepatica* in Egypt, New Zealand, Brazil, Argentina, France and Cuba (9,12,13,14,15,16). The presence of trematode phases inside the mollusks by visual inspection is valid to report natural infection (16). It is important to replicate these efforts in different regions of Central America, exploring the possibility of strict absence given the variation of altitudes (between zero and 4000 mamsl) and the identified potential zoonotic risk areas.

Conflict of interest

The authors declare that there is no conflict of interests.

Acknowledgments

We are grateful to Manuel Rodriguez and Ludwig Figueroa for providing the laboratory of parasitology, veterinary faculty at Guatemala City.

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