

## REVIEW

# The global prevalence of *Spirometra* parasites in snakes, frogs, dogs, and cats: A systematic review and meta-analysis

Milad Badri<sup>1,7</sup> | Meysam Olfatifar<sup>2</sup>  | Amir KarimiPourSaryazdi<sup>3</sup> | Leila Zaki<sup>3</sup> | Luis Manuel Madeira de Carvalho<sup>4</sup> | Majid Fasihi Harandi<sup>5</sup> | Fatemeh Barikbin<sup>6</sup> | Parisa Madani<sup>7</sup> | Aida Vafae Eslahi<sup>1</sup> 

<sup>1</sup>Medical Microbiology Research Center, Qazvin University of Medical Sciences, Qazvin, Iran

<sup>2</sup>Gastroenterology and Hepatology Diseases Research Center, Qom University of Medical Sciences, Qom, Iran

<sup>3</sup>Department of Parasitology and Entomology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

<sup>4</sup>CIISA, Centro Interdisciplinar de Investigação em Sanidade Animal, Faculty of Veterinary Medicine, University of Lisbon, Lisbon, Portugal

<sup>5</sup>Research Center for Hydatid Disease in Iran, Kerman University of Medical Sciences, Kerman, Iran

<sup>6</sup>Post Graduate Students of Operative Dentistry, Student Research Committee, Qazvin University of Medical Sciences, Qazvin, Iran

<sup>7</sup>Metabolic Diseases Research Center, Research Institute For Prevention Of Non-Communicable Diseases, Qazvin University Of Medical Sciences, Qazvin, Iran

## Correspondence

Aida Vafae Eslahi, Medical Microbiology Research Center, Qazvin University of Medical Sciences, Qazvin, Iran.  
Email: [Vafaeslahia@yahoo.com](mailto:Vafaeslahia@yahoo.com)

Meysam Olfatifar, Gastroenterology and Hepatology Diseases Research Center, Qom University of Medical Sciences, Qom, Iran.  
Email: [Ol.meysam92@gmail.com](mailto:Ol.meysam92@gmail.com)

## Abstract

**Background:** *Spirometra* infection is an neglected food- and waterborne disease with worldwide distribution.

**Objectives:** The present study aims to estimate the global prevalence of *Spirometra* species in snakes, frogs, dogs and cats.

**Methods:** Multiple databases (PubMed, Scopus, ProQuest, Web of Science and Google Scholar) were searched for relevant literatures published up to March 2022.

**Results:** Among 131 data sets (including 113 articles) that met the inclusion, 15 investigations reported *Spirometra* infection in snakes, 23 in frogs, 41 in dogs and 52 in cats. The pooled prevalence (95% confidence interval) in intermediate hosts and definitive hosts was found to be 0.313% and 0.089%, respectively. Based on continent, the infection was most prevalent in Asia for studies on snakes (0.696%) and frogs (0.181%), while Africa (0.224%) and Oceania (0.203%) were the regions with the highest pooled prevalence rates of the infection in dogs and cats, respectively. Among different diagnostic methods, the highest pooled prevalence was related to morphological method for studies on snakes, frog and cats with rate of 0.665%, 0.189% and 0.104%, respectively. Regarding studies on dogs, the highest pooled prevalence was observed for molecular technique (0.101%).

**Conclusions:** The results presented here revealed the importance of establishing a prevention and control measure focused on protection of aquaculture systems from being contaminated with faeces of dogs and cats, and raising awareness of parasitic zoonotic diseases to decrease the transmission risk.

## KEYWORDS

amphibians, canine, feline, reptiles, *Spirometra*, zoonosis

Milad Badri and Leila Zaki contributed equally to this work.

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2022 The Authors. *Veterinary Medicine and Science* published by John Wiley & Sons Ltd.