

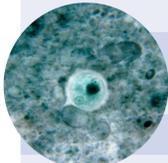
## ZOONOTIC PULMONARY PARASITES: A REVIEW

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**Abstract:** Nowadays most diseases are zoonotic, i.e., they can be transmitted from animals to humans. After a period when this was obvious, during the Covid-19 pandemic, I think we should put an emphasis on these zoonotic diseases, especially zoonotic parasites, which have not been as well studied as infectious ones. Although the number of parasites is continuously decreasing due to the improvement of hygienic, socio-economic conditions, it is increasing in immunocompromised populations, due to climate change - which produces small changes/adaptations in the life cycle of parasites, transmission patterns, but also to travel/transport from one part of the world to another ("a parasite exchange/import"). In this paper we will talk about zoonotic pulmonary parasites belonging to the classes Protozoa, Trematodes, Cestodes and Nematodes.

Zoonotic pulmonary parasites	Endemic areas	Mode of transmission	Symptoms
<b>Protozoa</b>			
 <i>Entamoeba histolytica</i>	Worldwide	Ingestion of mature cysts	Fever, cough, chest pain, right upper quadrant abdominal pain
<i>Leishmania donovani</i>	Asia, Africa, Central and South America	Sand fly-borne infection	Pneumonitis, pleural effusion, and mediastinal lymphadenopathy
<i>Plasmodium spp.</i>	Tropical and subtropical areas	Anopheles mosquito-borne infection	Fever, cough, acute respiratory distress syndrome (ARDS)
<i>Babesia microti</i> , <i>B. divergens</i>	North America	Tick-borne infection	Fever, drenching sweats, loss of appetite, myalgia, headache, and ARDS
<i>Toxoplasma gondii</i>	Worldwide	Ingestion of cysts	Myalgia and general lymphadenopathy, interstitial pneumonia and diffuses alveolar damage
<b>Trematodes</b>			
 <i>Schistosoma spp.</i>	Sub-Saharan, Africa, South America, and Far East	Penetration of the skin of schistosomal cercariae in fresh water	Dyspnoea, wheezing, dry cough, abdominal pain, hepatosplenomegaly, myalgia, eosinophilia, pulmonary artery hypertension
<i>Paragonimus westermani</i>	Southeast Asia, African, and South America	Ingestion of metacercaria from undercooked crustaceans or meat of crab-eating mammals.	Fever, chest pain and chronic cough with haemoptysis, pleural effusion, eosinophilia
<b>Cestodes</b>			
 <i>Echinococcus granulosus</i> , <i>E. multilocularis</i>	Mediterranean, Eastern Europe, the Middle East, South America, sub-Saharan Africa, and Australia.	Ingestion of food contaminated with faeces containing parasite eggs or direct contact with the primary hosts (usually dogs)	Cough, fever, dyspnoea, and chest pain, haemoptysis and/or expectoration of cystic fluid containing parasitic components (hydatidosis), hydropneumothorax or empyema anaphylactic-like reaction and pneumonia
<b>Nematodes</b>			
 <i>Ascaris lumbricoides</i>	Asia, Africa, and South America	Ingestion of food contaminated with eggs with L2	Eosinophilic pneumonia, cough, wheezing, dyspnoea
<i>Toxocara canis</i> and <i>T. cati</i>	Worldwide	Ingestion of food contaminated with parasite eggs	Fever, cough, wheezing, seizures, and anaemia
<i>Ancylostoma duodenale</i> , <i>Necator americanus</i>	Tropical and subtropical areas	Parasites larvae penetrate the skin of animals and humans, <i>Ancylostoma</i> – also by ingestion	Transient eosinophilic pneumonia (Löfller's syndrome) , Wakana disease (nausea, vomiting, dyspnoea, cough, throat irritation, hoarseness, and eosinophilia), alveolar haemorrhage
<i>Strongyloides stercoralis</i>	Worldwide	Skin penetration by larvae	Eosinophilic pneumonia, cough, wheezing, dyspnea, hyperinfection syndrome
<i>Mammomonogamus laryngeus</i>	Tropical areas, including South America, the Caribbean, and Southeast Asia	Ingestion	Foreign body-like lesion in bronchus nocturnal cough
<i>Dirfilaria immitis</i>	Southern Europe, Asia, Australia, and America	Mosquito-borne infection	Cough, haemoptysis, chest pain, fever, dyspnoea, and mild eosinophilia
<i>Brugia malayi</i> , <i>Wuchereria bancrofti</i>	Tropical and subtropical regions of South and Southeast Asia, Central and Latin America, Africa, India, Indonesia, Papua New Guinea and the western Pacific	Mosquito-borne infection	Eosinophilic pneumonia, cough, wheezing, dyspnea, restrictive pattern on spirometry, decreased diffusion lung capacity, progressive and irreversible pulmonary fibrosis
<i>Trichinella spiralis</i>	Worldwide	Ingestion of undercooked meat contaminated with larvae	Cough, pulmonary infiltrates, and dyspnea
<i>Metastrongylus salmi</i> , <i>M. elongatus</i>	Europe, Amazon	Ingestion of the earthworms infected with L3, or L3	Productive cough with a bloody thick sputum, fatigue, chest pain, and progressive dyspnea

### • Conclusions

For a good diagnosis, to confirm the pulmonary parasites, we need to recognize the epidemiology, life cycles, clinical signs, laboratory diagnosis, and treatments to make the proper management in patients. A detailed anamnesis is very important for the diagnosis in zoonotic pulmonary parasites.