



Parasitic Infections and Cardiovascular Diseases

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Cardiovascular diseases (CVDs) are the most important cause of disability and death in the world. Many factors are involved in the development of CVDs, including hypertension, hyperlipidemia, overweight and obesity, smoking, diabetes, insufficient physical activity, and an improper diet.^{1,2} Interestingly, in addition to non-infectious causes, a series of bacteria, fungi, parasites, and viruses are known to cause various types of heart complications.³ Occasionally, parasitic infections may affect the cardiovascular system and cause diseases such as coronary artery disease, stroke, and chronic granulomatous disease. Unfortunately, there is not much information about the role of parasites in causing heart diseases in developing and even developed countries.⁴

A wide variety of protozoa and helminths can affect the heart. These complications often manifest themselves in different ways, such as myocardial or pericardial disorders. Some chronic or latent parasitic infections may be reactivated in people with immune system defects or people with immune system suppression and cause systemic complications, including CVDs. Intestinal protozoa such as *Entamoeba histolytica*, or blood and tissue protozoa, including *Toxoplasma gondii*, Trypanosomes species, *Babesia*, malaria, *Leishmania*, or some parasitic helminths, including *Dirofilaria immitis*, *Trichinella spiralis*, *Toxocara*, *Schistosoma*, *Taenia solium*, and *Echinococcus* species (Table 1), can lead to significant cardiac complications.⁵⁻⁸

Considering the migration of people and the increase of patients with immune system defects or suppressed immunity, it is highly important to pay attention to parasitic diseases. Unfortunately, the involvement of parasites triggering heart-related complications has been neglected in areas where parasitic diseases are prevalent. Therefore, for the well-being of public health, the knowledge gained from examining the parasitic agents that cause cardiac complications in the endemic area will be useful.

Authors' Contribution

Conceptualization: Shahrooz Yazdani, Mohammad Zibaei.

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Competing Interests

The authors declare that they have no conflict of interests.

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Table 1. Clinical Forms of Parasite Infections and Their Most Important Symptoms in Cardiovascular Diseases

Parasites	Diseases	Organs Involved	Symptoms/Signs
Protozoa			
<i>Entamoeba histolytica</i>	Ameobiasis	Colon (primarily) and extra intestinal wall	Bloody diarrhea, colitis, and tissue destruction
<i>Naegleria fowleri</i>	Primary amoebic meningoencephalitis	Brain	Severe and persistent headache, neck stiffness, confusion, hallucinations, sleepiness, sore throat, nausea and vomiting, and disturbances of taste and smell
<i>Toxoplasma gondii</i>		Skeletal muscle, myocardium, brain, and eyes	Swollen lymph glands, muscle aches and pains, headache, generally feeling unwell, inflammation of the lungs, heart muscle, and eye
<i>Trypanosoma cruzi</i>	American trypanosomiasis/Chagas	Blood and muscles	Irregular heartbeat, heart failure, and sudden cardiac arrest
<i>Trypanosoma gambiense</i>	African trypanosomiasis/Sleeping sickness	Blood, lymph, and tissues	Headache, enlarged lymph nodes, and meningoencephalitis
<i>Trypanosoma rhodesiense</i>		Blood, lymph, and tissues	Enlarged lymph nodes and meningoencephalitis
<i>Plasmodium</i> spp.	Malaria	Viscera (primarily liver)	Shaking chills, headaches, muscle aches, and tiredness. Nausea, vomiting, and diarrhea
<i>Leishmania</i> spp.	Kala-azar/Black fever	Viscera (liver and spleen)	Irregular bouts of fever, weight loss, enlargement of the spleen and liver, and anemia
Helminths			
<i>Dirofilaria immitis</i>	Heartworm/Dog heartworm	Subcutaneous tissues and heart	Cough (including coughing up blood), chest pain, fever, and pleural effusion
<i>Trichinella spiralis</i>	Trichinosis	Muscle tissues	Swelling (face and eyes), aching joints and muscle pains, itchy skin, diarrhea or constipation, and heart and breathing problems
<i>Toxocara</i> spp.	Visceral and ocular larva migrans	Visceral organs and eyes	Coughing, wheezing, stomach ache, itchy rash, eye pain or redness, changes to sight, and loss of vision
<i>Schistosoma</i> spp.	Bilharziasis/Blood flukes	Mesenteric and bladder vessels	Fever, chills, cough, muscle aches, abdominal pain, enlarged liver, blood in the stool or blood in the urine, and problems passing urine
<i>Taenia solium</i>	Cysticercosis	Muscle tissues	Seizures, headaches, difficulty with balance, and excess fluid around the brain (called hydrocephalus)
<i>Echinococcus</i> spp.	Hydatidosis/flatworm	Interior organs	Pain or discomfort in the abdominal region or chest, nausea, vomiting, and coughing