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Dracunculiasis (Guinea worm disease), a parasitic infection: epidemiology, life cycle, prevention, treatment, and challenges – correspondence

Md. Rezaul Islam, M.Pharm[a], Showkat A. Mir, MSc[b], Shopnil Akash, M.Pharm[a,*], Kuldeep Dhama, PhD[c,*]

Dear Editor,

The nematode *Dracunculus medinensis*, sometimes known as the guinea worm, is the source of the infection known as dracunculiasis. The filariae *Wuchereria bancrofti*, *Brugia malayi*, and *Loa loa* are all members of the order *Spirurida*, a group of parasites that also includes *D. medinensis*. Dracunculus, a misnomer and allusion to the sign, is Latin, meaning 'small dragon'. As a result, one of the primary sources of inspiration for the field of medicine will likewise vanish when the guinea worm goes extinct[1]. Six possible human cases of dracunculiasis in Duli village, Gog district, Gambella region, Ethiopia, were reported to WHO between 2 April and 8 April 2020. There were seven probable cases as of 27 April 2020, according to the Ethiopian Dracunculiasis Eradication Program (EDEP), which had discovered one more person with an emerging worm that was morphologically similar to a human guinea worm. Since the last cases were reported in December 2017, there have been no reports for more than 2 years. Despite the parasite's low-level transmission in nonhuman hosts, including dogs and peridomestic baboons, the EDEP has achieved impressive strides toward stopping disease transmission in people since its creation in 1993. Five of the seven suspected cases were found in the Angota side of Duli village, and the other two were in the Wadmaro and Metaget Dipach villages in the Gog Dipach Kebele. Everyone who was afflicted drank hazardous water from farm ponds. In June 2019, it was claimed that these water sources connected to the baboon infection in the same town. All of the suspected individuals' worm specimens have been gathered and are prepared for delivery to the US Centers for Disease Control laboratory for verification. All specimens match *D. medinensis* morphologically[2]. A preventable waterborne parasite disease that affects rural areas of underdeveloped countries in South Asia and Africa without access to clean drinking water is guinea worm disease (GWD), also known as dracunculiasis. It is believed to have been around for several thousand years in India. In July 1996, Banwari Lal, a 25-year-old man from the Rajasthani area of Jodhpur, became the final instance of guinea worm sickness in India. However, three other cases were subsequently recorded from various locations in Rajasthan. Only a few populations in rural areas of Africa now still have GWD. The annual number of cases reported around the globe has decreased from roughly 900 000 in 1989 to only 3000 in 2009 and 1000 in 2011[3].

Drinking unfiltered water containing copepods, small crustaceans infected with *D. medinensis* larvae, causes humans to become infected in 2 ways: (1) after consumption, the copepods die and release the larvae, which enter the stomach and intestinal wall of the host and enter the abdominal cavity and retroperitoneal space; and (2) after maturation into adults and copulation, the male worms die and the females (length: 70–120 cm) migrate in the subcutaneous tissues. (3) About a year after infection, the female worm causes a skin blister to form and burst, usually on the distal lower extremities. The female worm emerges and releases larvae when this lesion comes into contact with water, which the patient seeks out to soothe the area's agony. (4) A copepod ingests the larvae. (5) And have become infectious larvae after 2 weeks (and two molts). (6) The cycle is completed when the copepods are consumed[4]. The tissue parasite *D. medinensis* is the cause of dracunculiasis. Copepods, sometimes known as 'water fleas', are tiny crustaceans that consume the larvae of the *D. medinensis*. When people consume raw or undercooked fish from contaminated water sources or drink contaminated water, they become diseased.

The larvae of *D. medinensis* are released into the small colon when the gastric fluids kill the crustaceans. In the connective tissue, where they grow and mate 2–3 months later, *D. medinensis* larvae travel through the intestinal wall. After mating, the male worm promptly expires. As they mature over a 12-month period, pregnant adult females – which can reach lengths of 1 m but are just 1–2 mm thick – slowly move to the skin's surface. About 90% of the time, they migrate to the lower limb as their most frequent destination. The female worm extends from the wound to release larvae into the water when the skin ulcer comes into touch with a source of fresh water. After that, the transmission cycle resumes. Although it was previously believed that there was no animal reservoir, the worms and larvae have lately been found in dogs, suggesting that they may be a plausible pathway for the disease to return to water sources[5]. Drinking water that has infected microcrustaceans makes people sick

[a]Department of Pharmacy, Faculty of Allied Health Science, Daffodil International University, Daffodil Smart City, Ashulia, Savar, Dhaka, Bangladesh, [b]School of Life Sciences, Sambalpur University, Sambalpur, Odisha and [c]Division of Pathology, ICAR-Indian Veterinary Research Institute, Bareilly, Uttar Pradesh, India

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*Corresponding author. Address: Faculty of Allied Health Science, Department of Pharmacy, Daffodil International University, Daffodil Smart City, Ashulia, Savar, Dhaka 1207, Bangladesh. E-mail: shopnil29-059@diu.edu.bd (S. Akash); Division of Pathology, ICAR-Indian Veterinary Research Institute, Bareilly 243122, Uttar Pradesh, India. Tel.: +8801935567417. E-mail: kdhama@rediffmail.com (K. Dhama).

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(copepods). In about a year, the larvae are liberated, pierce the intestinal wall, and develop into adult worms in the abdominal cavity. The gravid female migrates through subcutaneous tissues, usually to the distal lower extremities, after the male dies following mating. An indurated papule forms on the worm's cephalic end, and it finally vesiculates and ulcerates. A loop of the worm's uterus protrudes through the skin and releases motile larvae when it comes into touch with water (for instance, when someone tries to relieve the excruciating pain by submerging the affected limb). The worms that do not make it to the skin perish, dissolve, or calcify. Copepods consume their larvae. Each infectious episode lasts roughly a year in the majority of endemic locations[6]. Most Guinea worm patients do not exhibit any symptoms for about a year following their initial infection. People do not begin to feel ill until the worm is about to burst through the skin. Fever, nausea, vomiting, diarrhea, shortness of breath, burning, itching, discomfort, and swelling where the worm is in your body (typically the legs and feet), and blisters, when the worm breaks through the skin, are some of the signs and symptoms of Guinea worm sickness. Although guinea worm sickness seldom results in death, it can nonetheless have major side effects, leave victims permanently disabled, and put a strain on their finances. People frequently find it difficult to work, attend school, or take care of themselves or others because the pain associated is so severe. Though it frequently results in lifelong incapacity, this lasts, on average, 8.5 weeks. Without proper care, worm-related wounds can develop bacterial infections that result in sepsis, septic arthritis, and contractures (when joints lock and deform). These infections can occasionally prove fatal[7]. Pain and swelling can be reduced with the aid of anti-inflammatory medications like aspirin and ibuprofen. Diphenhydramine has anti-itching properties. To avoid a subsequent bacterial infection at the location where the worm emerges, consider applying a topical antibiotic cream or ointment. If cellulitis, sepsis, or an abscess appears, systemic antibiotics may be necessary. The management of wounds is crucial. The damaged body part should be exposed to water to encourage the worm's migration to the skin as part of the worm extraction procedure. Next, the wound needs to be cleaned. Applying gentle traction to the worm while carefully pulling it out is advised; take care not to damage it. An object, such as a matchstick or a piece of gauze, is wrapped around the worm to exert pressure and stop it from moving back inside. Antibiotics applied locally are used to stop the spread of secondary bacterial infections. The afflicted area is covered with gauze and a bandage. Pain and swelling can be reduced with the aid of anti-inflammatory medications like aspirin and ibuprofen. It could take up to 8 weeks or more of daily repetition of all these stages until the worm is successfully extracted. Wading can contaminate the water and spread the sickness; thus, the infected patient should take care to avoid it[8].

To keep tension and stop the worm from retracting into the body, it is typically wrapped around a piece of gauze or a stick. During the extraction process, topical antibiotics are frequently administered to the wound site to avoid infection by another organism. For the relief of pain and the reduction of inflammation, aspirin or ibuprofen may be used[9]. The hardest and most expensive parts of the eradication procedure are finding and controlling the final surviving cases and contaminated animals since they typically exist in isolated, frequently unreachable rural locations. A significant obstacle is the lack of access to disease-endemic areas caused by insecurity, particularly in nations where human diseases and animal infections are still common. Dogs infected with *D. medinensis* continue to be a problem for the global eradication effort, especially in Chad, Ethiopia, and Mali. A number of canines have been found in the same high-risk location since 2012 with emerging worms that are genetically identical to those that are emerging in humans. Ethiopia reported three infected dogs, four infected baboons, and eight infected cats in 2020. Chad reported 1508 infected dogs and 63 infected cats. Mali reported infections in nine dogs. Enhancing surveillance to find all infected animals and contain them (tethering of infected animals and proactive tethering), providing community members and animal owners with health education, and implementing robust and all-encompassing vector control interventions can stop the spread of disease among animals[10]. In our discussion of parasitic infection: outbreak, epidemiology, life cycle, etiology, pathophysiology, symptoms, prevention, treatment, and challenges, we covered Dracunculiasis.

Ethics approval

Not applicable.

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Conflicts of interest disclosure

The authors declare no conflict of interest, financial or otherwise.

Data availability statement

All data used to support the findings of this study are included in the article.

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