

Cutaneous Larva Migrans as a frequent problem in travellers

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ABSTRACT

*Dermatological disorders are among the most common complaints of patients seeking medical assistance after returning from trips to tropical countries. Among exotic dermatoses, one of the frequently encountered diagnoses is Cutaneous Larva Migrans (CLM), primarily caused by the nematodes *Ancylostoma braziliense* and *A. caninum*. Cats and dogs, which serve as the definitive hosts for these nematodes, excrete with their stool parasite eggs into the environment, where they transform into larvae. Human infection occurs through the invasive form of the larvae, which penetrate the skin, causing itching and the characteristic serpiginous, slightly raised, and enlarging lesion at the site of invasion. Diagnosis is made based on the highly characteristic clinical presentation, although in non-endemic countries, diagnostic errors and delays in initiating effective causal treatment are relatively common. Effective therapy includes oral albendazole and ivermectin. Prevention of CLM involves avoiding skin contact with potentially contaminated soil by wearing shoes and using towels and mats on the beach. Due to the high interest in travel and the risk of importing exotic diseases, it is important to promote knowledge of tropical medicine among healthcare professionals as well as the travellers.*

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INTRODUCTION

In current times, following global travel restrictions imposed due to the coronavirus disease 2019 (COVID-19) pandemic, interest in travel has returned to the situation observed in 2019, which was record-breaking in this regard. The United Nations World Tourism Organization (UNWTO) has indicated that in the months of January to July of the current year, the number of international travels was comparable to the pre-pandemic period [1]. Due to the increasing accessibility of travel as a means of spending leisure time, ease of reaching the farthest corners of the world, and the continuous growth in the number of travellers in recent decades, even outside the pandemic period, an

expansion of geographic spread of many infectious diseases has been observed [2]. The most renowned research organization dedicated to travel health is the Geosentinel Network, established in 1995 as a result of collaboration between the Centres for Disease Control and Prevention (CDC) and the International Society of Travel Medicine [3]. Based on reports from this organization and others, it is known that ill travellers most commonly report traveller's diarrhoea, febrile illnesses, and dermatological conditions, among which one can mention insect bite reactions, rash of unknown aetiology, skin and soft tissue infections, sunburn, myiasis, tungiasis, cutaneous leishmaniasis, and cutaneous larva migrans [4]. In tropical countries, skin problems

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are common due to lower levels of hygiene, humid and hot climatic conditions, difficulties in accessing medical care, and often a lack of effective medications. Many tropical diseases, including those affecting the skin, belong to neglected diseases, particularly impacting impoverished social strata [5].

Among the most frequently encountered dermatological disorders among travellers is Cutaneous Larva Migrans (CLM), also known as creeping eruption, sand worm eruption, plumber's itch, or duck hunter's itch. The disease was first described by Lee in 1874 [6]. Depending on the studied group, CLM is diagnosed in 8% to 49%, and even more, of tourists reporting skin problems [7]. Cutaneous Larva Migrans is a set of symptoms occurring in humans after infection with nematodes primarily belonging to the species *Ancylostoma braziliense* and *A. caninum*. Usually, dogs and cats serve as the definitive hosts for these parasites, excreting nematode eggs along with faeces. In damp and warm soil, the eggs transform into larvae, which invade human skin [8]. The disease induces intense itching and serpiginous skin changes. While not life-threatening, the condition is bothersome and prompts the affected individual to seek medical help. In non-endemic countries for tropical diseases, diagnostic challenges arise, and CLM is often initially misdiagnosed [9], most commonly as urticaria. Despite the fact that CLM usually dies off spontaneously about 5–6 weeks after human infection, the patient, due to intense itching, risk of bacterial superinfection, and the unpleasant awareness of a live parasite beneath the skin, requires causal treatment. This treatment is widely available and highly effective, involving the oral administration of albendazole or ivermectin. Prevention of this disease necessitates avoiding contact with potentially contaminated soil by wearing shoes on the beach, and sitting or lying on a towel or mat.

Due to the frequency of CLM occurrence among travellers and the difficulties in obtaining a correct diagnosis in non-endemic countries for the disease, it is worth disseminating knowledge about this parasitic infection among both healthcare professionals and travellers.

AETIOLOGY

The aetiological agent of CLM is the nematode, most commonly *Ancylostoma braziliense*, *A. caninum*, and *Uncinaria stenocephala*. To emphasize the role of these specific aetiological agents, the term hookworm-related CLM is also used. To differentiate, infection with the human hookworm is referred to as larva currens. On the other hand, other nematodes such as *Ancylostoma duodenale* or *Necator americanus* have a similar dermatological presentation but are capable of penetrating internal organs. In addition to the remaining species accountable for CLM, one can enumerate also *Bunostomum phlebotomum* (cattle hookworm)

and in more rare cases *Ancylostoma ceylonicum*, *Strongyloides papillosus* (parasite of sheep, goats, and cattle), *Strongyloides stercoralis*, *Ancylostoma tubaeforme* (cat hookworm) and *Strongyloides westeri* (parasite of horses).

Cutaneous Larva Migrans represents the larval form of the disease in humans, as the parasites do not mature and produce eggs. The disease remains present only in the superficial layers of the skin. The absence of collagenase prevents penetration of the basal layer of the skin and colonization of the liver, gastrointestinal tract, or lungs [10]. The life cycle of CLM is depicted in the Figure 1 [11].

The definitive hosts for these nematodes are animals, most commonly dogs and cats, which excrete parasite eggs into the environment along with faeces. In warm and humid environments, the eggs develop into rhabditiform larvae, which then progress into filariform larvae, the infective stage capable of penetrating human skin. Humans become infected by walking barefoot on contaminated ground or by sitting directly on sand or grass. The larvae produce proteases and hyaluronidases that facilitate invasion through the human skin layers. In tropical regions, infection through clothing or bedding dried on the ground instead of on clotheslines has also been described [12].

EPIDEMIOLOGY

Cutaneous Larva Migrans is a frequently encountered parasitic condition in the tropical zone, prevalent in countries of South and Central America, the Caribbean, Africa, and Southeast Asia. Despite being primarily associated with hot climates, isolated indigenous cases have been reported in cooler regions, such as Europe [13]. In some publications, CLM appears to occur with high frequency in specific populations. For instance, in Manaus, Brazil, 18.2% of children were found to be infected. Factors that seem to favour infection include age below 15, male gender, environmental contamination with faeces of dogs and cats, walking barefoot, and poverty [14]. The exact prevalence of CLM among travellers is not precisely known, but reports of this tropical dermatosis among outbound travellers have been consistently appearing for many years [15–17].

It is worth noting that animals in tropical countries, although not exclusively, are often stray, and there is a lack of veterinary care for them. Consequently, deworming is not systematically implemented. Cats and dogs roam freely, infecting, among other places, hotel beaches where tourists often walk. Moreover, the sand collected from these beaches is used in hotel sandboxes, becoming a source of infection for children playing there [18].

Cutaneous Larva Migrans is also recognized as an occupational disease affecting carpenters, electricians, plumbers, farmers, gardeners, and pest exterminators. Individuals engaged in these professions are more susceptible

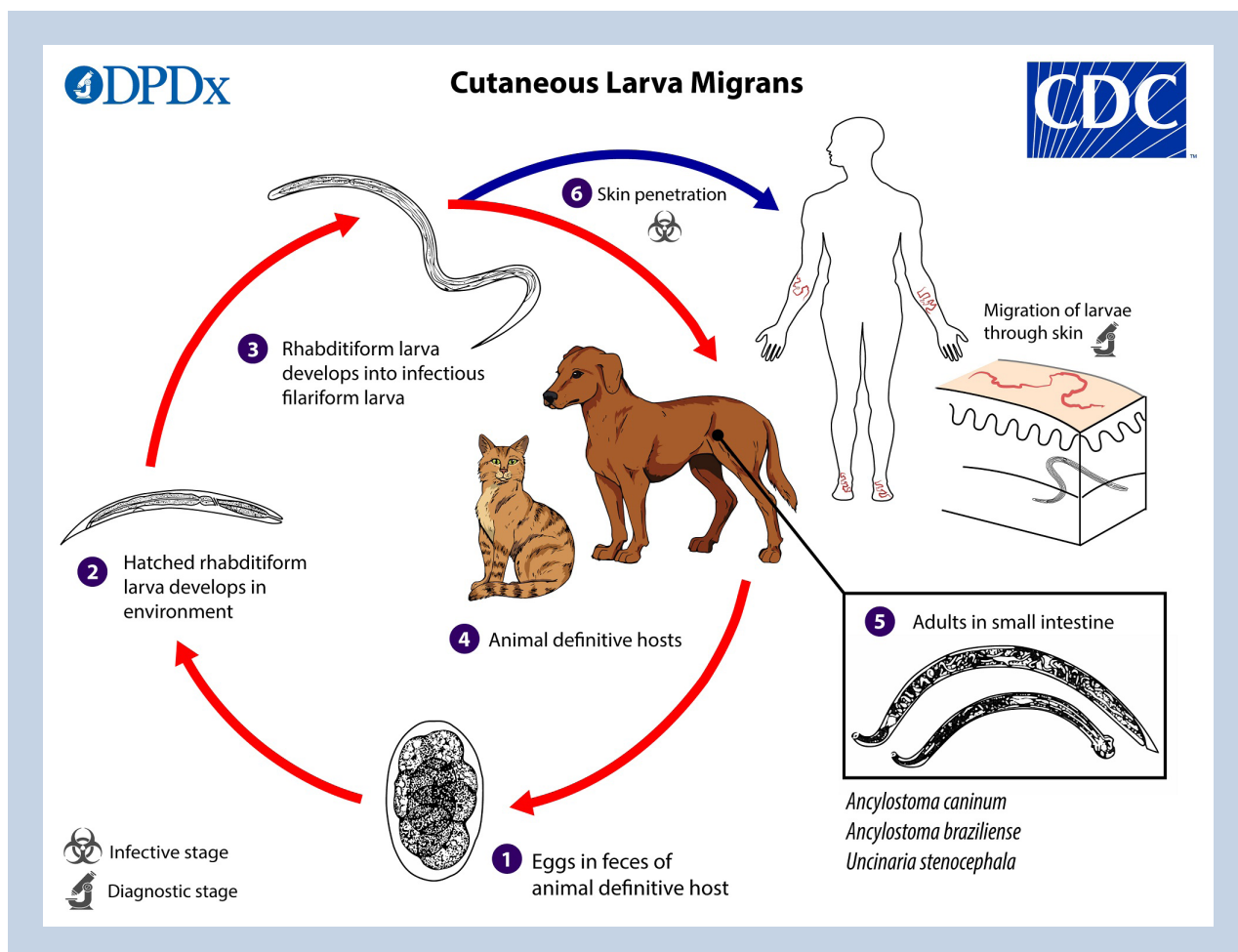


Figure 1. The life cycle of Cutaneous Larva Migrans (Source: Centres for Disease Control and Prevention)

to parasitic infestation by the mentioned nematodes due to direct contact with potentially contaminated ground.

CLINICAL SYMPTOMS

Symptoms of infection typically develop 10–15 days after exposure. In the case of *Ancylostoma braziliense*, the disease can manifest within hours of infection. Initially, the patient experiences intense itching, followed by the appearance of a small bump, which then evolves into a serpiginous, enlarging redness. Symptoms most commonly occur on the feet, thighs, buttocks, and back, in areas that had contact with contaminated ground. However, any part of the body can be affected. The lesion enlarges by several to a dozen millimetres per day, measuring a few millimetres in width, and can be single or multiple in cases of extensive infestation. Patients do not typically present with systemic symptoms, and their general well-being is usually good [19]. The disease often resolves spontaneously 5–6 weeks after infection and is typically self-limiting, although in some individual cases, it can persist for several months. Humans are accidental and dead-end hosts. A typical lesion is depicted in Figure 2.

Blisters may also accompany the lesions. However, due to the distressing itching, bacterial superinfection may occur, leading to symptoms of localized inflammation, such as from *Staphylococcus pyogenes* [20].

DIAGNOSIS

Cutaneous Larva Migrans is diagnosed based on the characteristic clinical presentation and a history of exposure in a tropical country. Therefore, subjective and objective examinations are sufficient for establishing the diagnosis. Basic blood tests do not reveal specific deviations, and eosinophilia occurs in less than 40% of cases. Faecal examination does not show eggs or adult forms of parasites due to the developmental cycle in which humans are only infested by the larval forms of the nematodes. Serological testing is not useful, although there have been reports of the potential utility of non-invasive optical coherence tomography, but it is not a widely available technique [10]. Biopsy is not indicated, but if performed, it would reveal larvae in the epidermis surrounded by an eosinophilic infiltrate within a circular canal and spongiotic dermatitis with vesicles containing neutrophils and eosinophils.



Figure 2. Typical manifestation of Cutaneous Larva Migrans (Photo: R. Olszański)

A clue in the diagnostic process is the lack of response to potential treatment consisting of antibiotics, antifungal preparations, and corticosteroids.

A notable diagnostic option is the use of telemedicine, specifically teledermatology in this case. The disease often occurs in rural areas where access to a dermatologist is challenging or impossible. Additionally, in non-endemic countries, there are few specialists who are experts in tropical medicine. The CLM presentation is typical, and diagnosis becomes possible through photos and a brief description of the patient's symptoms [21].

In the differential diagnosis, it is important to consider urticaria, scabies, loiasis, myiasis, schistosomiasis, fungal skin infections, contact dermatitis, larva currens, ingrown hairs (cutaneous pili migrans), gnathostomiasis, as well as superficial thrombophlebitis, lichen striatus, phytophotodermatitis, and herpes zoster [10, 13].

ATYPICAL PRESENTATION

The course of CLM is usually highly characteristic, allowing for a clinical diagnosis. However, there are also reported cases with less typical presentations:

- unusual locations: on the scalp [22], penis, chest [23];
- massive infestation in several body areas: numerous parasitic lesions, often with accompanying redness;
- vesicubullous lesions and oedema, or, rarely, folliculitis [19];

- chronic form of CLM, where lesions persist for months [24, 25], although typically in the course of infection, larvae die spontaneously after 1–2 months from the onset of symptoms;
- without a history of travel to a tropical area, suggesting indigenous infections, which have so far been described only in case reports;
- resistance to recommended treatment and recurrence of the disease despite no re-exposure [26].

CHILDREN

Cutaneous Larva Migrans is common in children, although it is rare to diagnose it in infants due to the developmental lack of independent mobility in the youngest children. One of the described modes of transmission in tropical countries is through clothing dried on the ground, instead of on clotheslines. In children who walk barefoot, playing directly on the ground, sitting, and lying down without a towel or blanket, direct contact with contaminated soil can lead to infection with parasite eggs. The youngest children may not report itching but they may be restless, have trouble sleeping, and show a lack of appetite.

Children may present with skin symptoms in various parts of the body, such as the back, buttocks, chest, and even the hairy scalp, depending on the region of the skin exposed to contact with the nematodes. In tropical regions, the disease is common, but it also affects travelling children who become infected after exposure during trips with their caregivers [27]. The selection of effective treatment remains a debated issue due to age-related limitations (see below).

In tropical areas, especially in regions with low levels of education and strong beliefs in magic and spells, children with CLM may be stigmatized or even believed to be under a spell due to the skin changes resembling snake bites [28]. Therefore, raising awareness about the aetiology of the disease and the availability of effective treatment options should be widely promoted to prevent children from being stigmatized.

IMMUNOSUPPRESSION

In the literature, cases of CLM in patients in advanced stages of HIV infection are known. However, current data do not confirm a higher frequency of infestation with these nematodes in immunosuppressed patients. Albendazole remains the treatment of choice, as treatment failures with ivermectin have been observed in immunodeficient patients.

TREATMENT

The treatment is usually effective and involves the administration of albendazole or ivermectin. The recommend-

Table 1. The drugs recommended by the Centres for Disease Control and Prevention for treating Cutaneous Larva Migrans

Drug name	Adult dose	Paediatric dose
Albendazole (Zentel), 400 mg tablet	400 mg once daily for 3–7 days	> 2 years old: 400 mg once daily for 3 days
Ivermectin (Posela), 3 mg tablet	200 mcg/kg as a one-time dose	> 15 kg body weight: 200 mcg/kg as a one-time dose

ed standard therapeutic doses, according to CDC recommendations [19], are provided in Table 1.

In the case of CLM in pregnant women, both albendazole and ivermectin are categorized as class C in CDC guidelines. This means that these drugs can be used only if the benefits significantly outweigh the risks. In the Polish registration, albendazole is contraindicated during pregnancy. In breastfeeding women, albendazole should be recommended with caution. Ivermectin is excreted in small amounts in breast milk and can be used when the benefits of treatment for the mother outweigh the risks for the child.

Albendazole is contraindicated for children below 2 years of age, and the safety of using ivermectin in children weighing less than 15 kg has not been determined.

In the past, other forms of treatment such as freezing the lesions were used. However, due to the high effectiveness of albendazole and ivermectin, difficulties in locating live larvae, the painfulness of the procedure, and the low effectiveness of cryotherapy, it should be discontinued [10]. An alternative option is local treatment with a solution or ointment containing 10–15% thiabendazole, applied 3 times a day for 15 days. The effectiveness is limited in the case of multiple lesions and folliculitis [29]. Another option for local treatment is preparations containing ivermectin (e.g. Soolantra). Local treatment may be an attractive option for CLM in pregnant and breastfeeding women as well as in young children.

SUMMARY

Dermatological disorders are one of the three main reasons for illness after a stay in tropical regions, and one of the most common manifestations is cutaneous larva migrans. Currently, there is no effective vaccine or chemoprophylaxis for this disease, and the recognized method of prevention is protecting the skin from contact with contaminated soil, and in the broader context of public health, regular deworming of animals. Despite the very characteristic clinical picture in most patients, CLM is often an unrecognized disease entity, and patients seek effective treatment from successive specialists. It is worth promoting knowledge about CLM due to the intense tourist movement, including to tropical regions, and the potential risk of introducing exotic diseases into non-endemic areas. Treatment for CLM is effective, but it is crucial to first establish the correct diagnosis.

Conflict of interest: None declared

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