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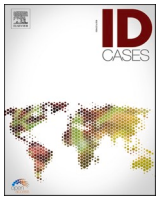

Case report

Sudden emergence and spread of cutaneous larva migrans in Sudan: A case series calls for urgent actions

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ABSTRACT

Cutaneous larva migrans (CLM) is a self-limiting dermatosis parasitic disease that is caused by zoonotic hookworm mainly infects cats, dogs, and accidentally humans. The disease affects hosts through the invasion and the migration of the hookworm larva into top layers of the skin. The disease occurs in tropical and subtropical regions; where people commonly are infected when sitting or barefoot walking on places contaminated with feces of infected cats or dogs. Due to self-limiting nature of the disease, the exact burden and prevalence are commonly underestimated. In this communication, we investigated all cases presented to the skin-diseases outpatient clinic' at the reference hospital of Tropical Diseases Medicine in Khartoum state between January 2019 and January 2021. This is the first-ever a case series report of cutaneous larva migrans in Sudan. We identified 15 cases of CLM presented with rash (100 %), redness of skin (67 %), and only adults were presented with larva crawling under their skins (27 %). Infection sites were (53 %) leg, (40 %) foot, only 7 % showed abdominal infection. The majority of patients were children or young adults, 47 % of them are ≤5 year-old, male to female ratio is 2.75:1. Duration of infection was one to three weeks and all patients fully recovered after treatment with albendazole. This urges for One Health interventions including deworming cats and dogs, improving water, sanitation, and hygiene, community-engagement and raising awareness in area with risk of infection.

Introduction

Cutaneous larva migrans (CLM) is a zoonotic neglected tropical disease of public health importance that is caused by nematodes helminths [1]. Multiple types of hookworms are involved in the development of CLM [2]. The disease is commonly transmitted through the contamination of soil with animal feces (mainly dogs and cats particularly in beaches) that contain eggs, once it hatch it break through humans skin and migrate through the body [2,3]. CLM mainly affected body organs that are directly in contact with the contaminated soil including feet, legs, and hands; however, other body site can be involved [4]. CLM is a major public health problem in developing countries of tropical and sub-tropical weather. Nevertheless, few studies have demonstrated the growing burden of the disease and spreading out the tropical and tropical regions, yet it highlighted the severe neglect and underestimation [5]. The disease is characterized by the appearance of erythematous, serpiginous, pruritic, and skin eruption. In addition to the health and economic burdens, this has added a social burden that is indicated by social stigma and isolation among patients [6].

In general, CLM is not fatal disease and most time it is self-limited infection [2]. This might have largely contributed in the underestimation of the disease burden in addition to the common confusion among healthcare providers of CLM with other dermal diseases of non-larval cutaneous migrations such as loiasis and scabies as well as the Guinea worm disease [2].

CLM has never been reported from Sudan previously. Therefore, here

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in this short communication, we provide the first report CLM from Sudan describing 15 cases of CLM among Sudanese patients that were presented at the Sudan referral hospital for tropical disease, in Omdurman locality, Khartoum state, Sudan between January 2019 and January 2022. We have reviewed all diagnostic reports from the hospital about CLM and extracted cases information to be reported in an attempt to identify risk factors associated with and hotspots of CLM infection transmission.

Case presentation

We have identified 15 cases of CLM that were presented at the dermatology clinic at tropical medicine hospital, Omdurman city, Khartoum state, Sudan between January 2019 and January 2021. All patients are residents in Omdurman city, the western side of Khartoum state. Patients were clinically presented with itching (100 %), skin redness (67 %), and larva crawling inside the skin (27 %) (Fig. 1).

Our demographic analysis shows that patient age ranged very widely between three months and 53 years old, with average age 15 years, and the majority (60 %) were children younger than eight years old. The male to female sex ratio was 2.75:1 with 73 % male and 27 % female (Table 1).

The duration of the disease at the presentation varied from one to three weeks, with 53 % of CLM infections persisted for three weeks and 40 % for two weeks, while only a single patient (7 %) was presented to the clinic on the first week of disease onset (Table 1).

Leg was the most affected site by CLM infection (53 %), followed by the foot (40 %) and only a single case was presented with abdominal infection (7 %) (Table 1).

For the case management, albendazole was prescribed for all patients to take once a day for three weeks duration. All patients respond well for medical treatment and the complaint had regressed and recovered.

Discussion

In this communication, we report for first time cases of CLM from Sudan. This report highlights a sudden emergence and spread of CLM in Khartoum state. The geographical clustering and rapid emergence of cases suggest the development of a disease outbreak, however, considering the limitations in our surveillance, case tracking, and information management systems as well as the tendency of local people to not disclose their travel history, an epidemiological link between the patients wasn't established [7,8]. Particularly that the majority of the patients (60 %) are children under eight years old suggest that the transmission of CLM might be associated with playgrounds where children and their attending guardian have visited for outdoor activities.

Fig. 1. Clinical presentation of cutaneous larva migrans.

Table 1
Demographic and clinical characteristics of the cutaneous larva migrans cases that presented at Tropical Diseases Hospital in Sudan between January 2019 and January 2021.

Case No.	Age	Gender	Site	Duration (weeks)	Symptoms
Case 1	3 months	Male	Foot	3 weeks	Itching with redness of skin
Case 2	1 year	Male	Leg	2 weeks	Itchy rash
Case 3	2 years	Female	Foot	3 weeks	Itching with redness of skin
Case 4	2 years	Male	Foot	3 weeks	Itching with redness of skin
Case 5	3 years	Female	Leg	3 weeks	Itching with redness of skin
Case 6	4 years	Female	Leg	2 weeks	Itching with redness of skin
Case 7	5 years	Male	Abdomen	2 weeks	Itching with redness of skin
Case 8	6 years	Male	Leg	3 weeks	Itching with redness of skin
Case 9	7 years	Female	Foot	2 weeks	Itching with redness of skin
Case 10	18 years	Male	Leg	1 week	Itching with redness of skin
Case 11	18 years	Male	Leg	3 weeks	Itching with larva crawling inside the skin
Case 12	25 years	Male	Leg	2 weeks	Itching with redness of skin
Case 13	35 years	Male	Leg	3 weeks	Itching with larva crawling inside the skin
Case 14	48 years	Male	Foot	3 weeks	Itching with larva crawling inside the skin
Case 15	53 years	Male	Foot	2 weeks	Itching with larva crawling inside the skin

However, the fact that all adult (age of 18 years and over) patients are male might be attributed to social and healthcare disparities and inequalities that discourage female from seeking healthcare services. This skewed sex ratio is commonly observed across different infectious diseases in the country [9–12]. Additionally, the relatively high involvement of male in outdoor activities in places that usually contaminated with cats and dogs feces such as beaches and playgrounds is exposing them to higher risk of infection [6].

These cases were differentially diagnosed and confirmed mainly by highly trained dermatologists, however clinicians with such specialized training are not available in most of hospitals in the country including those in the capital city forget about remote areas. Therefore, this lack of expertise might be one of the reasons behind the lack of reporting CLM from Sudan before. Therefore, further research is needed to identify high risk areas, risk factors associated with CLM transmission, and improving the surveillance and reporting systems in the country. Also, healthcare providers in areas at risk need to be trained on the diagnosis, case management, and reporting. They particularly need to be trained on distinguishing CLM from other clinical mimics such as larva currens, dermatitis due to cercarial, contact dermatitis, scabies and migratory myiasis [2].

CLM infection is commonly a self-limiting condition with complete healing occurs at the 5th or 6th week after the onset of the disease due to the death of the larvae [12]. The ideal management is treating the symptoms such as pruritic rashes can be treated by the administration of topical or orally antihistamines, and the administration of albendazole for the larvae [12–16].

There is a growing reports about detection of CLM among return travelers, this is very alarming because with climate change and global warming, introduction of CLM-causing hookworms into novel areas might lead to the establishment of the disease locally and expanding it is

geographical distribution [14–17]. Similarly in Sudan, the emergence and spread of CLM in the country that we report here for the first time is associated with substantial socioeconomic, geopolitical, and climate changes that are highlighted by the escalation of political instability that led to growing violence and devastating economic crisis, and extreme weather events effected the country since late 2018 [18–20]. Several outbreaks of infectious diseases were driven by these changes including chikungunya, Cholera, Rift Valley fever, dengue, Hepatitis E, and malaria [18–20]. Considering the zoonotic nature of CLM, a One Health approach with integrated surveillance and response systems among humans, animals, and the environment is needed for effective prevention and control strategy [20]. Nowadays more than ever, we need to invest in developing and implementing effective preventive and control measures of infectious diseases particularly zoonoses including CLM as evidence has shown the devastating health and economic impacts of these infections among populations in endemic countries. These preventive and control measure should be accompanied by social engagement and health education to raise awareness about the disease and the associated risk factors and improve personal protection as well as reduce the associated stigma.

Ethics approval and consent to participate

Written, informed consent to publish history, findings, and images for educational purposes were obtained from the patients.

Consent for publication

Written informed consent was obtained from the patients for publication of this case report and any accompanying images.

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CRediT authorship contribution statement

Ayman Ahmed: Conceived, design, analyzed, wrote the first draft, revised and approved the final draft. **Maisa Aldai Hemaida**: wrote the first draft, revised and approved the final draft. **Amel Ahmed Hagelnur:** wrote the first draft, revised and approved the final draft. **Hala Fathi Eltigani**: Conceived, design, analyzed, wrote the first draft, revised and approved the final draft. **Emmanuel Edwar Siddig**: Conceived, design, analyzed, wrote the first draft, revised and approved the final draft.

Conflict of Interest

The authors declare that they have no competing interests.

Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Not applicable.

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