

Tungiasis in two returning travelers in northeastern Brazil: case report

Tungíase em dois viajantes retornando no nordeste do Brasil: relato de caso

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ABSTRACT

Tungiasis refers to human infection of adult fleas, specifically *Tunga penetrans*. Although common throughout Central America, the rural South of the U.S the Caribbean, sub-Saharan Africa and Brazil, especially in the poorer areas of the Northeastern region, it is rarely reported in travelers. In this article, we provide two case reports of Tungiasis in travelers from Brazil and United States along with a brief review of the clinical features. *Case 01*: An American woman, reported that after 02 days of returning from her trip, she noticed a small erythematous lesion on the outside of the first digit of the left foot, which after 04 days increased in size. The flea was then removed with sterile needle and with local antiseptic was applied. The condition evolved over 72 hours without signs of infection and the lesion healed within 6 days. *Case 02*: A Brazilian woman noticed a small erythematous lesion between her second and third fingers on her right hand 15 days after returning her trip. The lesion started to increase in size, developing a peripheral white area of hyperkeratosis with a central black-gray spot. It was not pruritic. The flea was removed using a sterile needle, and local antiseptic was applied. Over the course of 48 hours, there were no sings of infection, and the lesion healed within 5 days.

Keywords: ectoparasitosis, sand flea, *Tunga penetrans*, travellers.

RESUMO

Tungíase refere-se à infecção humana por pulgas adultas, especificamente *Tunga penetrans*. Embora seja comum em toda a América Central, no sul rural dos Estados Unidos, no Caribe, na África subsaariana e no Brasil, especialmente em áreas mais pobres da região Nordeste, raramente é relatada em viajantes. Neste artigo, são apresentados dois relatos de casos de tungíase em viajantes do Brasil e dos Estados Unidos, juntamente com uma breve revisão das características clínicas. *Caso 01*: Uma mulher americana relatou que, após 2 dias de retornar de sua viagem, ela notou uma pequena lesão eritematosa no lado externo do primeiro dedo do pé esquerdo, que após 4 dias aumentou de tamanho. A pulga foi removida com uma agulha estéril e aplicado um antisséptico local, evoluindo durante 72 horas sem sinais de infecção cicatrizando em 6 dias. *Caso 02*. Uma mulher brasileira notou uma pequena lesão eritematosa entre o segundo e o terceiro dedos da mão direita, 15 dias após retornar de sua viagem. A lesão começou a aumentar de tamanho, desenvolvendo uma área branca de hiperqueratose com um ponto central preto-acinzentado. Não era pruriginosa. A pulga foi removida com uma agulha estéril, e foi aplicado um antisséptico local. Ao longo de 48 horas, não houve sinais de infecção, e a lesão cicatrizou em 5 dias.

Palavras-chave: ectoparasitose, pulga da areia, *Tunga penetrans*, viajantes.

1 INTRODUCTION

Tungiasis, also known as “footworts” is a skin disease caused by the sand flea, commonly referred to as the “jigger flea” or “*Tunga penetrans*”. Originally this disease was primarily found in the Americas, but it was later spread to Africa via ships in the late 1800s, possibly through sailors and rats. Presently, tungiasis is prevalent in Central America, rural areas of the Southern United States, the Caribbean and sub-Saharan Africa (Belaz et al., 2015; Chen et al., 2011; Grupper & Potasman, 2012). Tungiasis is categorized as one of the neglected tropical diseases included in the World Health Organization’s Road Map for neglected tropical diseases 2021-2030, emphasizing the need for integrated interventions to reduce its burden (Saboyá-Díaz et al., 2022).

It’s endemic throughout Brazil, particularly in the impoverished areas of the Northeast. Although it is prevalent among the local population, cases of tungiasis in travelers are rarely reported (Ariza et al., 2007; Bonfim et al., 2010; Carvalho et al., 2010; Matias, 1989).

The primary source of nutrition for adult fleas is the blood of mammals. After penetrating the skin, mated female fleas burrow underneath, leaving only their abdomens exposed for breathing, excreting, and laying eggs. During this period, they undergo significant hypertrophy, reaching a diameter of up to 1 cm. Approximately eight to ten days after entering the host, females begin laying eggs, which are released onto or into the host over a period of 4 to 6 weeks, resulting in the potential release of hundreds of eggs into the surrounding environment. After this period, the fleas die and are shed from the skin through the body’s natural repair mechanisms.

After 3 to 4 days, the eggs deposited in soil or sand hatch and release larvae, which feed on organic debris and go through two instar stages before developing into pupae encased in cocoons. The time frame from hatching to the emergence of adult fleas from the cocoon is approximately 3 to 4 weeks. *Tunga penetrans* can infest a wide range of reservoir hosts, including rats, dogs, cats, monkeys, goats, cattle, horses, and pigs (Lefebvre et al., 2011).

Infestations occur in humans when they walk barefoot on soil or sand, containing adult fleas. The female sand flea is capable of jumping up to 20 to 30 centimeters onto its host where it then burrows into the skin. The disease becomes harmful when multiple infestations are present or when the fleas are not properly removed, which may lead to super-infections (Ariza et al., 2007; Matias, 1989).

The diagnosis is based on clinical observation and history of traveling to an endemic country (Cancio-Suárez, et al., 2020). The risk factors most commonly associated with the spread and prevalence of Tungiasis are economic status, the debilitating nature of the disease and a lack of awareness. Since most endemic areas

are characterized by a low economic status plus inadequate living conditions and limited education, Tungiasis can contribute to more serious issues such as poverty and fatal diseases. Many endemic areas have animal reservoirs where the female sand fleas live and are spread.

Tungiasis is typically a self-limiting infestation; however, complications are common in endemic areas. Sequelae include severe pain, inflammation, cracking, loss of toenails, as well as finger deformity. The skin wound caused by the ectoparasite can also serve as an entry point for pathogenic microorganisms, such as *Staphylococcus aureus*, *Streptococcus spp.* and *Clostridium spp.* (Paranhos, et al., 2022). While Tungiasis is a self-limiting, it has the potential to contribute to more severe health problems, especially in resource-poor areas and in touristic hot-spots (Belaz et al., 2015; Chen et al., 2011; Grupper & Potasman, 2012; Hager et al., 2008; Richardson & Mangili, 2016).

2 MATERIAL AND METHODS

2.1 CASE REPORTS

We report two cases of Tungiasis that occurred in two healthy travelers with no history of trauma or other cases of Tungiasis in their families. Both individuals were on work-related travel in the municipality of Cascavel, in the State of Ceará, Northeastern Brazil, in mid-August 2017, where they were inspecting homes and their surroundings, specifically identifying *Aedes aegypti* larvae breeding sites in sandy soil areas.

3 RESULTS

Case 01

A female biologist from the United States reported that two days after returning from her trip, she noticed a small erythematous, red lesion on the outer side of the first toe of the left foot, which after 04 days increased in size. During this time she observed a central spot of black-gray color, that was not itchy. She sought medical advice in Baltimore, USA, where she was diagnosed with Tungiasis. The flea was subsequently removed using a sterile needle and with local antiseptic was applied. Within evolving 72 hours there were no signs of infection and the lesion healed completely within six days (Figure 1).

Figure 1. A central black-gray spot, not -itchy on the first toe of the left foot.



Case 02

A Brazilian female physician, 15 days after returning from her trip noticed a small red lesion between the second and third fingers of the right hand. After 10 days, she observed an increase in size of the lesion which developed a white area of thickened (hyperkeratosis) skin at the periphery with a central black-gray

spot. The lesion was not itchy. She sought medical advice in Recife, Pernambuco State, Brazil, and was diagnosed with Tungiasis. The flea was removed using a sterile needle and local antiseptic was applied. Within 48 hours there were no signs of infection and the lesion healed completely within 5 days (Figures 2 and 3).

Figure 2. A peripheral white area of hyperkeratosis with a central black-gray spot, non-pruritic on the right hand.



Figure 3. The white area of hyperkeratosis on the right hand remained after the removal of the flea.



4 DISCUSSION

Tungiasis, ectoparasites infestation, typically has an incubation period of 1 to 2 days and matures between 8 and 12 days. It is often asymptomatic, but can manifest with symptoms such erythema, edema, pain, itching, pustules, suppuration, ulcers and deformities. The lesions predominantly occur in the periungual and interdigital plantar regions. Tungiasis is a cutaneous infection that is indigenous to South American and Caribbean regions, but has also spread to Latin America, India, and sub-Saharan Africa with a prevalence ranging from 15% to 40%. Cases have also been documented in the United States primarily among travelers to endemic areas (Ariza et al., 2007; Karunamoorthi, 2013; Matias, 1989; Richardson & Mangili, 2016).

Tunga penetrans is endemic in Brazil, particularly in low-income communities such shantytowns in Fortaleza, and other impoverished urban or rural areas in northeastern Brazil. Inhabitants of these communities often have high parasite burden (Ariza et al., 2007). Due to the limited jumping ability of the flea, most lesions are found on the soles, the toes webs, and subungual regions of the foot. However, lesions can occur in any anatomic location, as seen in case 02, where the initial presentation was an inflammatory

papule with a central black dot. These lesions can be asymptomatic, pruritic or painful. It is worth noting that some cases are self-limiting (Ariza et al., 2007; Belaz et al., 2015; Bonfim et al., 2010; Matias, 1989).

The treatment for Tungiasis involves the complete removal of the flea, preferably during the early stages of the infection. However, if the pregnant flea has already enlarged, it must be removed through excision. Complications of Tungiasis may include ulceration and fibrosis. In rare cases, tetanus, bacteremia, and gas gangrene have been reported. To prevent infections, it could be necessary antibiotic ointment and administer anti tetanus prophylaxis. Oral antibiotics should be prescribed if there are any signs of secondary infection (Carvalho et al., 2010).

In both cases (01 and 02) it was reported that the treatment was straightforward and without complications. With the rise in national or international travel to Tungiasis endemic areas, it is crucial for physicians and travelers to have understanding of its presentation and treatment (Carvalho et al., 2010; Carvalho et al., 2003). Tungiasis is an emerging infection in travelers, highlighting the need to educate individuals traveling to endemic areas about the importance to prevent infestation by this parasite (Cancio-Suárez, et al., 2020).

To ensure that travelers return from endemic areas without sand fleas embedded in their skin, it is important for them to acquire knowledge about diseases prevalent in the area as well as how to prevent, treat, and recognize symptoms of Tungiasis. Taking preventive measures such as wearing closed-toe shoes, wash hands and using insect repellent can significantly reduce the risk of contracting Tungiasis. However, individuals living in endemic communities often lack access to adequate treatment. In absence of proper healthcare and knowledge, Tungiasis can result in dangerous super-infections, loss of digits, disfigurement, severe pains and even disability. Poverty and Tungiasis are closely intertwined, as the lack of proper healthcare prevention measures contributes to the prevalence of sand flea infestations. Tungiasis has the potential to significantly diminish the quality of life for individuals with high number of infestations.

5 CONCLUSION

With the increasing globalization and travel, monitoring Tungiasis has become a challenge, particularly among travelers in high-risk areas, including non-endemic regions. It is crucial to raise awareness among travelers and travel physicians to prevent occurrence of Tungiasis.

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