

Review

Epidemiology of African Tick-Bite Fever (*Rickettsia africae*) in Uganda

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African tick-bite fever is a rickettsial illness that has recently emerged as a significant disease among international travelers. This tick-borne zoonosis is transmitted by Amblyomma ticks, which is endemic to sub-Saharan Africa and parts of the eastern Caribbean. Uganda is a major tourism destination with plenty of natural environments visited by tourists. In addition to tourists, the Ugandan population could also be at risk since the greater majority of Ugandans are rural based and dependent on agriculture. The disease could be misdiagnosed at health care centers since it is not a priority.

Key words: African tick-bite fever, *Rickettsia africae*, spotted fever group rickettsiosis, zoonosis, Uganda.

INTRODUCTION

African tick-bite fever (ATBF) is a tick-borne spotted fever, a *Rickettsia* infection carried by ticks infected with *Rickettsia africae*. *R. africae* belongs to the spotted-fever group (SFG) *Rickettsia* that causes spotted fevers in humans. It is a zoonosis, an animal infection that can spread to humans; transmitted by *Amblyomma variegatum* and *Amblyomma hebraeum* ticks that feed on livestock and wild animals (Jensenius et al., 2003a). These ticks thrive in rural vegetation habitats. Livestock are common hosts, however, when infected with *R. africae*, they show no clinical or laboratory signs of disease. They are however, intermittently rickettsemic and may then be sources of infection for ticks (Kelly et al., 1991a, b). The distribution of *A. variegatum* covers western, central, and eastern parts of sub-Saharan Africa and the West Indies, whereas *A. hebraeum* is only in southern Africa (Walker, 2003). *A. variegatum* readily

feeds on people (Morel, 1967; Norval, 1993), and is commonly infected with *R. africae* (16-75%) in widely separated areas in Africa (Beati et al., 1995; Dupont et al., 1994; Macaluso et al., 2003; Ndip, 2004). Rickettsial diseases are vector-borne infections that cause acute febrile illness and are zoonotic. Rickettsiae are obligate intracellular Gram-negative bacteria mostly associated to arthropods, some of which cause mild to severe diseases in humans. Rickettsial infections are not transmitted from person to person.

DISTRIBUTION OF THE DISEASE IN SUB-SAHARAN AFRICA AND THE EASTERN CARIBBEAN

R. africae is the most widespread SFG *Rickettsia* in sub-Saharan Africa, where it causes African tick-bite fever

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(Parola et al., 2005), an acute, influenza-like syndrome. Symptoms of African tick-bite fever usually appear within 2 weeks and include fever, headache, rash, muscle pain, and a red sore with a dark centre (known as an eschar) that develops at the site of the bite. ATBF can be treated with antibiotics. The disease cases are commonly reported in tourists returning from Safari in sub-Saharan Africa (Parola et al., 2005). ATBF is quite common in international travelers; up to 11% of visitors to disease-endemic areas have evidence of infection (Jelinek and Loscher, 2001; Jensenius et al., 2003b). Native Africans in endemic areas could be exposed to the disease when they are still young, with mild subclinical disease, unexpectedly rare. They may not seek medical attention; serological surveys prevalence could reach up to 100% in endemic areas. Eschars could be invisible on dark skin. Disease diagnosis could be a challenge in endemic areas.

Pathogenic *Rickettsia* species are classified into two groups based on phylogenetic analyses (Raoult and Roux, 1997). The typhus group (TG) includes two: *Rickettsia prowazekii* and *Rickettsia Typhi*, and the SFG include: 15 pathogenic species and numerous species of unknown pathogenicity (Parola et al., 2005; Perlman et al., 2006). Two additional validated species, *Rickettsia bellii* and *Rickettsia canadensis*, and a variety of unvalidated species from insects or leeches are organized into the most outer outgroups of the genus *Rickettsia* (Perlman et al., 2006; Blanc et al., 2007; Weinert et al., 2009).

A study conducted by Nakayima et al. (2014) on Ugandan ticks, a higher prevalence of *Rickettsia* spp. (57.8%) was revealed with major emphasis on *R. africae*. Medical diagnosis could employ clinical symptoms while laboratory research could employ molecular methods. *A. variegatum*, commonly known as the tropical bont tick, is a species of tick of the genus *Amblyomma* endemic to Africa (Yonow, 1995). It has spread from its centre of origin to several countries, including the Caribbean islands. It is a hard tick that feeds on a number of domesticated animals including cattle, sheep, goats, horses and dogs, as well as humans. Introduction of the ticks to the Caribbean islands is suspected to have been through cattle imports from Senegal. They are three-host hard ticks (where each life stage completes a blood meal on a particular host before dropping off and ecdysis), they are vividly coloured (especially the males). ATBF is second only to malaria as the cause of acute febrile illness in travelers returning from sub-Saharan Africa (Freedman et al., 2006), and *R. africae* seropositivity rate (which is indicative of past infection) is high in indigenous populations from rural areas and could reach 60 to 90% (Ledger et al., 2022). The *Rickettsia* genus includes 25 validated species, 17 of which are proven human pathogens. Among these, the pathogenicity varies greatly, from the highly virulent *R.*

prowazekii, which causes epidemic typhus and kills its arthropod host, to the mild pathogen *R. africae*, the agent of African tick-bite fever, which does not affect the fitness of its tick vector (Fournier et al., 2009).

CONCLUSION

Travelers to endemic areas need to take preventive measures against tick exposure. Additionally, Africans living in rural areas are at a great risk, so there is need to create awareness about the disease amongst the population and health care providers. The disease is treatable with antibiotics. Tick control measures by livestock farmers could help in controlling the vector populations. Educating policy makers, scientists, clinicians, and patients about rickettsial diseases, early disease detection and diagnostics development improve disease control.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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