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Original Article

Tungiasis: Outbreak investigation of a zoonosis during overseas deployment

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ARTICLE INFO

Article history:
Received 29 July 2017
Accepted 29 August 2017
Available online 15 November 2017

Keywords:
Tungiasis
Tunga
Ectoparasitic infestations
Flea infestations
Disease outbreaks

ABSTRACT

Background: Tungiasis is an ectoparasitosis caused by the sand flea *Tunga penetrans*. It is endemic in the under privileged communities of Latin America, the Caribbean and Sub Saharan Africa with geographic and seasonal variations even within endemic areas. We describe investigation of an outbreak of Tungiasis in troops deployed as part of UN peacekeeping force in Central Africa.

Methods: Tungiasis was diagnosed in an unusually large number of cases of severely pruritic boils over feet in soldiers of a UN peacekeeping battalion. An outbreak investigation was carried out and the outbreak was described in time, place and person distribution. A retrospective cohort study was done to ascertain the associated risk factors.

Results: A total of 36 cases were identified of which 33 had laboratory confirmation. Of the 36 cases, 10(27.77%) had only Fortaleza Stage II lesions, 22 (61.11%) a combination of Fortaleza Stage II and III lesions and four (11.11%) cases had a combination of Stage, II, III and IV lesions. Secondary bacterial infection was seen in 25 (69.44%) cases. Epidemiological analysis revealed that it was a common source single exposure outbreak traced to a temporary campsite along one of the patrolling routes.

Conclusion: In a Military setting an integrated approach combining health education and environmental control is required to prevent such outbreaks.

Introduction

Exposure to bites, stings, secretions of insects, can result in a wide variety of diseases ranging from benign to multi-system life threatening illnesses. While dermatitis and diseases related to insect exposure in a particular locale may be easily recognizable, clinicians in the armed forces must also be aware of the more exotic insect related diseases as soldiers often

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http://dx.doi.org/10.1016/j.mjafi.2017.08.011

travel to remote areas of the country and the world to discharge their duties and keep themselves abreast with the knowledge of the disease endemic to the area where the troops are deployed.

One such disease is Tungiasis, an ectoparasitosis, which is endemic in Central and South America, the Caribbean and the whole sub-Saharan region of Africa. Tungiasis is caused by infestation with the female flea *Tunga penetrans* (TP, Siphonaptera: Tungidae, Tunginae), also known as sand flea, jigger, nigua, or chigo. The natural habitat of TP is the sandy, warm soil of deserts and beaches and close to farms. Even within endemic regions, the distribution of tungiasis is patchy, and the disease occurs predominantly in impoverished populations.[1,2]

The disease is relatively unknown in the Indian subcontinent, although there have been occasional case reports from the west coast of India.[3] While the knowledge about Tungiasis and its causative agent is high in the populace of endemic/hyperendemic areas,[4] the same is not true for subjects from non-endemic areas who travel to endemic areas. Indian Armed Forces personnel are deployed as part of United Nations (UN) peacekeeping force in different parts of the world, stay in makeshift camps in unfamiliar locales and hence are susceptible to such diseases due to a variety of reasons like naïve immune system, lack of knowledge/awareness of the disease, its causative agent and the modes of transmission amongst the troops as well as the health care providers.

A number of cases of tungiasis, presenting as multiple severely pruritic boils over feet, were reported among Indian troops of an Infantry battalion deployed as part of UN peacekeeping mission in eastern part of Democratic Republic of Congo (DRC). Here we present the results of epidemiological investigation of this outbreak.

Materials and methods

Diagnosis of Tungiasis was made based on classical clinical presentation and microscopic examination of discharge from skin lesions. Photomicrography and histopathological examination could not be done due to non-availability of the facilities in field settings. Case definitions used were (a) probable case: Any person of the affected battalion having one or more papular or pustular lesion in the legs or any other part of the body in the preceding three weeks with a central dark punctum and a gelatinous brownish white granular discharge on needling the lesions. (b) Confirmed case: A probable case with microscopic confirmation in the form of the presence of eggs, filamentous cords of faeces or parts of the flea in the squash preparation of the extracted material from the lesion.

Epidemiological case sheet was developed and used to collect information from all cases about personal details, date of onset, clinical features, lab results and history of movement, long range patrols and temporary camps in recent past. Active search of additional cases was done by carrying out regular physical examination of all personnel staying in the affected location. Line list of all cases was prepared and the outbreak was described in terms of clinical findings of the cases and their distribution in time, place and person. The Fortaleza classification as given in Table 1 was used to classify the skin lesions of the patients.[5]

Table 1 – Fortaleza classification of clinical stages of Tungiaisis.

Stage I	Itchy reddish brown spot of 1 mm
Stage II	Pearly white nodule with surrounding erythema and a central dark punctum
Stage III	Painful round watch glass like patch with surrounding hyperkeratosis/desquamation
Stage IV	Crusted black lesion with or without superinfection
Stage V	Residual scar

Further analytical epidemiological study was done by retrospective cohort study design to ascertain the factors associated with this outbreak. Relative risks were calculated for suspected risk factors and checked for statistical significance. Population attributable risk percent, which tells about proportion of the incidence of a disease in the population that is due to exposure, was also calculated. Cases were treated with extraction of flea parts and antibiotics and control measures in form of anti flea measures Health education of troops (lectures/handouts) regular surveillance by medical officer were initiated simultaneously to prevent further spread of the disease.

Results

Clinical profile: 36 soldiers were found to be suffering from Tungiasis, out of 865 soldiers deployed in that location. 33 of these cases were confirmed by lab investigations also. All 36 cases were males being soldiers and the mean (sd) age of patients was 32.05 (5.04) years. Age distribution of cases is shown in Table 2. In all 36 cases the bite of the flea went unnoticed and did not give rise to any noticeable immediate local reaction like itching or pain. The number of lesions present varied from a solitary lesion in the least affected to fourteen lesions in the two worst affected cases. The distribution of cases according to number of lesions is shown in Table 3.

Table 2 – Age distribution of cases.

Age group (years)	Number of cases (%)
Up to 30	12 (33.33%)
31–40	22 (61.11%)
41–50	2 (5.56%)

Table 3 – Distribution of cases according to number of skin lesions.

Number of lesions	Number of cases (%)
1–5	25 (69.44%)
5–10	7 (19.44%)
More than 10	04 (11.11%)