

Case Report: Infestation of *Tunga penetrans* in villages near Zomba Central Hospital

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Abstract

An outbreak of *Tunga Penetrans* (Jigger Flea) infestation affecting a number of villages near to a Central Hospital in Malawi is described. Due to the large number of affected individuals, high parasitic load, and extended duration of infection an alternative to the recommended approach of surgical removal of the flea was required. Benzyl benzoate paint and liquid paraffin had been used in local Primary Healthcare settings previously and topical treatment with antiparasitic agents has been advocated in the literature, particularly for severe infestation. Benzyl benzoate and liquid paraffin were applied topically to four adults with numerous jigger flea burrows, and their progress assessed regularly. After completion of 7 days of treatment patients noted that fleas were dislodging spontaneously, and that embedded parasites had not increased in size to the same extent that untreated fleas had in previous infestations. Following confirmation of the viability of its implementation in a resource-poor setting, this treatment regimen has subsequently been adopted by the local branch of the District Health Office for distribution to infected communities.

Introduction

Tunga Penetrans, or the 'Jigger Flea', is one example of an ectoparasite that is hyper-endemic in sub-Saharan Africa, South America and parts of the Indian subcontinent; it causes the condition Tungiasis. *T. Penetrans* inhabit dusty, sandy soil, their preferred host being the pig, although infestation of cattle and poultry has been reported. Resultant morbidity and mortality of affected livestock can have indirect health implications due to decreased food availability, but it is the infestation of humans which produces the most significant challenge to human health. During the gestational phase of the Jigger Flea life cycle the organism is an obligate parasite. The fertilised female burrows into the skin, swells in size as eggs develop, and invokes an inflammatory response in the surrounding tissue to encourage excoriation and release of eggs. Usually the remaining 'jigger' is expelled by the body or removed through scratching, although sometimes part or all may remain. As *T. Penetrans* is a notoriously poor jumper, areas of skin most at risk are the feet and, in those working in agriculture, the hands. It is worth noting that children playing in infested environments are also at risk of developing lesions on the knees, elbows, and buttocks. Preferred sites of infestation are cracks in the skin, inter-digital spaces and the nail bed.¹ In addition to the discomfort caused by infestation with *T. Penetrans*, resulting skin breaches leave the host at risk of complications including bacterial infection (which may, in severe cases, progress to gangrene) and tetanus.

An outbreak of severe Tungiasis was identified in Southern Malawi by VSO staff working at a Central Hospital. The resource-poor setting of this outbreak with limited access to medical facilities and lack of footwear had resulted in extensive infestations in many individuals. Affected individuals suffered significant stigmatisation,

decreased mobility and therefore decreased ability to perform such basic tasks as collecting water or farming. Although the recommended treatment is early removal of the flea², in this setting an invasive approach was not considered to be appropriate. The reasons for this decision were three-fold: firstly, the large number of parasites and proportionately small number of trained healthcare personnel prohibited large-scale removal. Secondly, local approaches to removal had, due to a lack of resources, centred around a limited number of safety pins. Use of such a method exposed recipients to Hepatitis B and HIV transmission in this high prevalence setting, in addition to transmission of other infectious agents. Thirdly, inexpert removal of a jigger flea leaves an ulcerated region in the skin and carries a significant risk of both retained parasitic material and superinfection. Topical treatment with antiparasitic agents or paraffin has been advocated in the literature for severe infestation, and so was implemented here.^{3,4}

Patients and Treatment

Six patients from Tungiasis-endemic villages with multiple and disabling lesions were initially seen by community health workers and referred to the central hospital for treatment. All were instructed and supervised in the three week treatment regimen by native Chichewa speakers. Affected areas were washed in water and benzyl benzoate paint applied liberally to any area of jigger fleas three times a day. Prior to bedtime the affected areas were washed again and liquid paraffin applied for overnight treatment. During the course of treatment, patients were asked not to use any sharp implements to remove embedded jigger fleas. Local voluntary organisations and village health committees were recruited to support patients during their treatment. Patients were reviewed on a weekly basis. To assess changes in condition photographs were taken, with consent, of the affected parts before treatment and at weekly reviews. Affected individuals were also questioned regarding spontaneous expulsion of jiggers and improvements in activities of daily living.

Results

Four of the six patients failed to comply with the treatment regimen. Those two patients remaining on treatment noted after seven days that the embedded parasites were not growing as quickly or causing as much irritation as untreated fleas had in the past. Treated fleas were also loosening of their own accord, allowing simple extraction without the use of sharp implements. In terms of activities of daily living, neither of the two treated patients was able to walk prior to treatment due to parasites on the plantar surface of both feet. After seven days the first patient was able to walk comfortably and was able to resume the tasks of collecting water and working in the fields. The second patient treated also reported being able to walk comfortably after seven days of treatment, and resumed farming work shortly afterwards.

Discussion

Patient two absconded from hospital before treatment could be started. One contributing factor was a lack of understanding of the means of *T. Penetrans* transmission. This resulted in isolation and neglect

*Patient 1 – Pre-treatment**Patient 1 – Day 7 of treatment**Patient 1 – after 21 days' treatment*

In spite of medical information regarding the condition, there remained uncertainty and fear among the staff concerning the risk of transmission of jigger fleas. Patient one was forcibly discharged after one day of treatment due to a similar misunderstanding regarding transmission risk. Fortunately she was given the topical treatments, continued to apply them as directed, and was located by the District Health Office for assessment at intervals of one and two weeks. These problems highlighted the stigmatisation of patients infected with Jigger Fleas in a healthcare facility setting. Clearly, treatment in the community was a preferable approach.

Hospital staff working with the District Health Office to find a solution to a public health issue in the community proved to be very positive and future cooperative interventions are already planned. The presence of healthcare workers in resource-poor communities produced a great degree of interest in the treatment program. A meeting of local village leaders was presented with a drama show highlighting the importance of foot hygiene for early identification of Jigger Fleas and the dangers of sharing needles for their removal. This has helped to address the stigma of Tunga Penetrans infestation, and dispel the many myths associated with this condition. Such cooperation between clinicians, environmental health officials and community-based organisations has hopefully paved a way for more cohesive action on healthcare issues in the future in this district.

Conclusions

From the findings outlined above we conclude that the topical application of benzyl benzoate paint three times daily and liquid paraffin nocte for three weeks may prove to be a viable community-based treatment for Tungiasis in individuals with a high parasitic load. If trained personnel, sterile instruments, dressings and a clean environment are available it would be appropriate to surgically remove newly-embedded parasites. However, in the absence of such facilities, it may be suitable to implement our recommended treatment regimen in all instances of jigger flea infection. This would reduce the risk of infection with HIV/hepatitis viruses and other organisms

from unclean instruments, and should reduce incidence of secondary infection as a result of inexpert removal. It should be made clear that such an approach would need careful investigation to firstly confirm the efficacy and suitability of topical treatment using larger sample sizes, and secondly critically assess the outcomes of both topical and surgical treatment approaches. In a resource-poor setting such as this, Tungiasis is likely to remain endemic while extreme poverty limits access to the enclosed footwear required to prevent infestation. For now, an appropriate response to infestation to reduce morbidity associated with infestation should be implemented. Improved links between local populations and health facilities should assist in facilitating such a response.

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