



Treatment of tungiasis with dimeticone: A targeted topical application is superior to wetting the skin of the whole foot



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Premises of the New Life Primary School, Bulidha sub-county, Uganda, one of the study sites.



Most pupils come to school barefoot. At the end of the study participants received a pair of tennis shoes.

Background:

Tungiasis (sand flea disease) is a neglected tropical disease. It is caused by the penetration of the female sand flea *T. penetrans* into the skin (1). In endemic areas tungiasis is associated with debilitating acute and mutilating chronic morbidity (2). Embedded sand fleas are usually removed by sharp non-sterile instruments, such as sewing needles, safety pins or thorns, a hazardous procedure by itself (3). A proof-of-principle study has shown that a mixture of dimeticones with a low viscosity (NYDA[®]) effectively kills sand fleas embedded in the skin when applied three times within a period of 10 minutes to the skin of the feet (2). We suppose that the dimeticone rapidly creeps into the respiratory tract of the embedded sand fleas and causes death through hypoxia (4).

Objectives:

To compare the efficacy of a targeted application of a mixture of two dimeticones of low viscosity (NYDA[®]), i. e. the application of two drops of the dimeticone on top of the rear cone of the embedded parasite, with wetting the whole foot with 3-5 ml of dimeticone.



Multiple lesions at the toes and the soles are common. The associated inflammation causes pain and itching.



Study participant with dozens of lesions at the toes and the sole. Walking causes severe pain.

Methods:

54 school children with tungiasis visiting different primary schools in Bulidha sub-county, Busoga region, Uganda, were admitted to the study. The left and the right foot were randomly assigned to one of the treatments. The targeted and the “whole foot treatment” were repeated 3 times within 10 minutes. All treatments were applied by the same investigator. The patients were monitored every day for one week. The major outcome measure was the presence of viability signs of embedded sand fleas (pulsations, contractions of the embedded sand flea, expulsion of egg, excretion of faecal threads and liquid), as assessed by a handheld digital video microscope.

Statistical analysis

The χ^2 test was used to compare relative frequencies. Confidence intervals for proportion were used with a confidence level of 95%. The analysis is based on preliminary data.

Results:

After seven days 87.3% (95% CI 81; 92%) of the lesions treated by wetting the skin of the whole foot with dimeticone lost all signs of viability, whereas after the targeted application of the dimeticone no viability signs were observed in 97.5% (95% CI 94; 99%; $p = 0.008$).

Follow-up of lesions using a handheld digital microscopy

Whole foot treatment

Baseline



Stage IIIa lesion at the tip of a toe; the rear cone of the parasite protrudes through the skin; the black spot in the center is a faecal thread which is being excreted.

Day 3



The lesion has not developed further in size; its center and the margins have changed into brownish-black color. The opening in the rear cone is still visible.

Day 7



The parasite has turned into a bluish crust; the crust corresponds to the contracted abdomen of the dead, but still embedded sand flea. The skin has desquamated indicating that the inflammation has decreased.

Targeted treatment

Baseline



Stage IIIa lesion near the nail rim. The watch-glass like elevation corresponds to the hypertrophied abdomen of the parasite. Digital video microscope showed pulsations of the rear cone.

Day 3



The lesion has shrunken and its margins show desquamation. The rear cone has collapsed and its opening is not visible any more.

Day 7



The parasite's body has shrunken further and the desquamation of the corneal layer has increased. The remains of the parasite appear in the center of desquamated skin.

Conclusions:

This study shows that the targeted application of dimeticone is superior to wetting the skin of the whole foot with dimeticone. The targeted treatment requires less dimeticone and can be performed by the patient himself. We suggest that the targeted treatment with dimeticone should be used in mass campaigns aimed at the reduction of tungiasis-associated morbidity and that the hazardous extraction of embedded sand fleas with sharp instruments is no longer warrantable.

References:

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