

# The way to cure a complicate syndrome caused by an insect (parasite) using a cerumen extracted from another insect (no parasite, that lives in some countries where the first disease is endemic)

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## ABSTRACT

Scope of our research is to demonstrate how a neglected tropical disease (that in several countries is endemic) and that is very dangerous and perilous and is caused by an insect (a parasite called *Tungia penetrans*) may be treated using a wax another insect (no parasite, but that lives in one of these countries where the disease is endemic) produces. The importance of the fact resides only in the tempestivity of discovering (by the usage of a simplest lens) yhe moment when the insect penetrates into skin (generally toes or sole of kids under 10 years old). After one week, the stages of incubation of the Yungia does not permit a resolution. This wax could be proposed as a preventive agent with regards to the parasite itself.

**Key words:** *Tungia penetrans*; Tungiasis; KMnO<sub>4</sub>; Dimethicone; Chinese wax

## INTRODUCTION

Tungiasis (sand flea disease) is a neglected tropical disease, prevalent in resource-poor communities in South America and sub-Saharan Africa. It is caused by an inflammatory response against the pinch caused by the penetration in mild wounds or underneath nails (especially of feet, in co-presence of onychomycosis too) of the female sand fleas (*Tunga penetrans*). Although associated with debilitating acute and chronic morbidity, there is no proven effective drug treatment. By consequence patients attempt to remove embedded sand fleas with non-sterile sharp instruments, such as safety pins, a procedure that represents a health threat by itself [1].

Common remedies are to be considered:

Application of topical anti-parasitic medications such as ivermectin, metrifonate, and thiabendazole. Locally freezing the lesion using liquid nitrogen (cryotherapy).

Even if criotherapy may be used only till the second Fortaleza's stage (see below), it is indisputable that sand flea cannot tolerate freezing and for this, criotherapy should be preferred to other medicaments.

The chief aims of this research is to show that chriotherapy must be effectuated only when it is the just moment to do it (we will explaiin that this period might not exceed 14 days).

It has been referred that tungiasis is present worldwide in 88 countries with varying degrees of incidence [2].

A governmental action in Kenya forecasts the application of a diluted solution of KMnO<sub>4</sub> onto the feet of pupils at rural primary schools.

This disease is of special public health concern in highly endemic areas such as Nigeria, Trinidad and Tobago, and Brazil, where its prevalence, especially in poor communities, even if the disease has not to

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be considered endemic, has been known to approach 50% [3].

A topical application of a mixture of two dimeticones of low viscosity (NYDA) onto one foot of 47 school children in Kenya [1] has been experimented and a comparison was made with the application of a 0.05% solution of KMnO<sub>4</sub> onto the other foot of the same 47 school children. The efficacy of the treatment was assessed during a follow up period of seven days using viability signs of the embedded parasites, and must be driven just when the children noticed that they have been pinched and adverted slight pain and erythema around the spot of the penetration of the parasite and not after two weeks when alterations in the natural development of lesion morphology and the degree of local inflammation outcome more evidently. Seven days after treatment, in the dimeticone group 78% (95% CI 67–86%) of the parasites had lost all signs of viability as compared to 39% (95% CI 28–52%) in the KMnO<sub>4</sub> group ( $p < 0.001$ ). In the dimeticone group 90% (95% CI 80–95%) of the penetrated sand fleas showed an abnormal development already after 5 days, compared to 53% (95% CI 40–66%;  $p < 0.001$ ) in the KMnO<sub>4</sub> group. Seven days after treatment, signs of local skin inflammation had significantly decreased in the dimeticone group ( $p < 0.001$ ). The AA asserted that the topical application of dimeticones of low viscosity (NYDA) was an effective means to kill embedded sand fleas, in view (they herald) of the efficacy and safety of the topical treatment with dimeticone, the mechanical extraction of embedded sand fleas using hazardous instruments is no longer warranted.

The symptoms of this disease include:

- Severe pruritus
- Pain
- Inflammation and swelling
- Lesions and ulcerations, with black dots in the center.

Left untreated, secondary infections, such as bacteremia, tetanus, and gangrene, can occur.

In all cases, tungiasis by itself only caused morbidity, though secondary infection may lead to mortality.

A person assaulted by a single flea may present immediately when, though the erythema is barely perceptible, a boring pain and the curious sensation of pleasant itching occurs. This inflammatory reaction is the initial immunological response to the infestation and is sudden.

It must be stressed that meanwhile Tunga males are still mobile after a blood meal like all other fleas, the female flea burrows head-first into the host's skin, leaving the caudal tip of its abdomen visible through an orifice in a skin lesion. This orifice allows the flea to breathe, defecate, mate and expel eggs while feeding from blood vessels. It lives in the cutaneous and subcutaneous dermal layer.

It is suggestive to remember that the male flea dies after copulation.

Fortaleza identified 6 stages or steps of the infection evoked by the penetration of Tunga p., and we can herald that Tungiasis may be cured only before the passage from II to III Fortaleza's step.

The first step of Tungiasis is the Tunga penetration even if too often it is not noticeable by the host, who can suppose the slight pain is due to the pinch of whichever else (mosquitoes or other fleas).

The very first stage of the first step lasts two days and a treatment with dimethicone or any other insulating grease or wax must be begun at this first step, in order to massacre definitively the flea.

Anyway caudal tips and abdomen can be observed thanks a lens and if the person who has been pinched by the Tunga notices this "penetration" subitaneously, can immediately spread over the skin, where the flea is penetrated, paraffinic waxes, avoiding the complete life cycle of the flea.

The complete lifecycle of Tunga p. is presented as follows.

Heavily infested patients may not notice a stage 2 infection due to the other fleas' causing irritation as well. Feces may be seen, but this is more common at the 3<sup>rd</sup> stage, (at the second week of incubation) when it is too late for healing. Around the third day after penetration, erythema and skin tenderness are felt, accompanied by pruritus (severe itching) and a black furuncular nodule surrounded by a white halo of stretched skin caused by the expansion of the flea. For this matter it is better to begin to apply paraffinic waxes right the first or the second day after the aggression of Tunga p., in order to suffocate the parasite, since fecal coils may protrude from the center of the nodule where the flea's anus is facing upward. They should be washed off quickly as the feces may remain in the skin

unless removed. If neglected, during this 3<sup>a</sup> substage, pain can be severe, especially at night or, if the nodule is on the foot, while walking. Eggs will also begin to be released and a watery secretion can be observed. The radical metamorphosis during the 3<sup>rd</sup> to 6<sup>th</sup> day after penetration, or neosomy, precedes the formation of a small caldera-like rim rampart as a result of the increased thickness of the flea's chitinexoskeleton. During the caldera formation, the nodule shrinks a bit and it looks as if it is beginning to dry out; this takes 2 weeks and comprises stage 3.

At the third week after penetration and stage 4, the eggs' release will have stopped and the lesion will become smaller and more wrinkled. As the flea is near death, fecal and water secretion will stop altogether. Pain, tenderness, and skin inflammation will still be present. Around the 25<sup>th</sup> day after penetration, the lesion looks like a black crust and the flea's carcass is removed by host repair mechanisms and the skin begins to heal. With the flea gone, inflammation may still persist for a long time.

Anyway caudal tips and abdomen can be observed thanks a lens and if the person who has been pinched by the *Tungia* notices this "penetration" subitaneously, and thus can immediately spread onto the spot of the skin, where the flea is penetrated, paraffinic waxes, avoiding the flea drives her complete life cycle and disease grows perilous and perhas letal.

After the first applications (three pro day) the treatment must last almost 7 days.

It is possible to behold the lack of faeces or eggs owing to the lens after the 4<sup>th</sup> day of applications.

The flea is completely exterminated.

We have attempted to employ the same wax even as preventive agent, especially in some parts of the child's body that can be assaulted by *Tungia p.*

For instance, we prayed the kid to spread the wax onto a little wound onto hand and between one finger and another and convinced him to play with sand in the foreshore close to a dirty river.

## MATERIALS AND METHODS

We have recruited a Brazilian child (7 y.old) who once upon a time was pinched in his right foot by a *Tungia*

penetrans and for the fact he did not inform his parents of the disadvantage, underwent to a drastic cure by metronidazole and amoxicillin (with all the carreau of risky side effects that buid up a perennial morbidity), after 2 months from the assault of the sand flea and the complete Calvary due to the syndrome of intections.

This volunteer uses to play with sand (as all childrens do) along the a river on the sand.

It is wellknown that *Tungia p.* likes lukewarm temperatures (till 30°C) and humid environmental conditions.

We have scrutinised the paper Thielecke and Nordin (1) published in 2014 and attempted to discover if it is possible to treat Tungiasis throuhout all the lifecycle of the insect by occlusive paraffines, like dimethicone, for the sake of the diachysis of all paraffines that resemble human sebum (the AA refer that the employ of the mix of viscous dimethicone is advisable during the passage from II and II Fortaleza's stage) and we can assert that it is utterly true and a complete tretament throuhout all the 6 Fortaleza's stages is not possible at all, nevertheless we have revealed that if the treatment is made using an occlusive wax (chinese wax) that is a fatty, solid substance, produced by bees from Far East, and employed by them in the construction of their comb, results can be amazing. This cerumen is first excreted, from a row of pouches along their sides, in the form of scales, which, being masticated and mixed with saliva, become whitened and tenacious. Its natural color is pale or dull yellow.

Since the melting point of chinese wax is quite elevated we have prepared an emulsion with macadamia nut oil, in order to render it spreadable more easily.

It is suggestive to recall that chinese wax is produced by an insect, the coccus sinensis, and so this typology of healing could reflect the Dantesque retaliation.

The malaise evoked by an insect (a parasite) can be cured with a secrete obtained from another insect.

The applications began the very first day the child noticed a slight pain and itch in his left hallux (he has no more the right big toe) and were repeated three times pro day.

We used a lens the very first day noticing that the abdomen of the *Tungia* was mobile and flapping alla round the point of penetration of the parasite.

## RESULTS

Effectively for the first two days the entire caudal tip and abdomen were well visible under the lens.

After the third day, we observed only a little reddish spot, where the flea was penetrated and the child asserted he felt a little itch but not pain.

At fourth day, even pruritus disappeared and after the 7<sup>th</sup> day the skin was clear as no insect had never penetrate the cutis.

The child at the end of our study is safe and shows any symptom of infection nor itching or pain.

## DISCUSSIONS AND CONCLUSIONS

For the fact that *Tungia p.* hits children under 10 years and they do not possess the ability to notice that something odd or wrong is happening in their organism, and even that too often they had played in certain places or zones prohibited by their parents, and in these places there is a real chance to encounter

the sand fleas, this situation complicates the cursus of eventual operations of diagnose and a prompt and early intervent.

Praffinic waxes and occlusive jellies and especially chinese wax find a notable interest if applied at the very beginning of the Tunga penetration until the beginning of the third Fortaleza's step.

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