A Simple and Affordable Technique for Treating Fungal Nail Infection: Case Report

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A Simple and Affordable Technique for Treating Fungal Nail Infection: Case Report

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Abstract

Fungal nail infections are common and notoriously difficult to treat. In this paper I present two cases of fungal nail infection treated conservatively with dry heat using a regular electromechanical blowdryer (hair dryer).

Introduction

Fungal nail infections (onychomycosis or tinea unguium) are common (2-3% of the population [1]) and notoriously difficult to treat. The fungal organism responsible for most fungal nail infections is Trichophyton rubrum. Trichophyton mentagrophytes is the second most common source of fungal nail infections. These dermatophytes cause infections of the skin, hair and nails due to their ability to obtain nutrients from keratinized material. Less than 10% of fungal nail infections are caused by nondermatophytes, yeasts or mold [1].

The treatment of fungal nail infections is expensive and long-term. It requires a commitment on the part of the patient to take medicine for several months. Unfortunately, topical preparations do not effectively treat fungal nail infections.

In this paper I present two cases of fungal nail infection treated conservatively with dry heat using a regular electromechanical blowdryer (hair dryer).

Case Description

My 71 year old father, a retired professor of plant diseases, living in Syria had fungal nail infection in his two big toes from which he suffered for more than a year. He had typical nail changes: brittleness, thickening of the nail and white or yellow streaks on the side of the nail. The patient tried several topical fungicides without effect. Based on his knowledge in fungal pathology, he decided to try treating his infected nails using heat. He trimmed the edge and surface of the affected nails by rubbing them against the abrasive surface of a nail file from an average nail care kit. He then applied dry heat from a regular blowdryer on the affected nails in a pinpoint fashion using a pierced cardboard sheet. The hole in the cardboard was fitted to the size of the nail. Treatment was applied after shower and after each instance of feet washing to keep the nails dry. Sessions were repeated daily for periods gauged by the level of tolerable pain. In about six weeks the toenails regained their normal color and thickness (see picture). This technique was repeated by my 30 year old sister who applied it on both infected big toe nails and obtained the same results.

Discussion

Fungi can be divided into two basic morphological forms, yeasts and hyphae. Yeasts are unicellular fungi which reproduce asexually by budding or fission. Hyphae are multicellular fungi which reproduce asexually and/or sexually. Most fungi occur in the hyphae form as branching, threadlike tubular filaments called mycelium.

The methodology reported in this paper has its origin in the management of some fungal plant diseases [2-4]. In agriculture, loose smut of wheat and barley is a disease that can destroy a large proportion of a barley crop and is caused by Ustilago species. The disease cycle of loose smut begins when teliospores are blown to open flowers and infect the plant giving rise to basidiospore which germinate into hyphae, the vegetative part of a fungus, consisting of a mass of branching. The grains remain apparently intact with the fungus inside in latent stage.

The most widely used method of control for loose smut is treating the seeds with systemic fungicide. Another option is heat-treating the seeds to kill the fungus inside without affecting its germinability capability [3, 4]. This is a delicate process because too much heat will kill the plant embryo and not enough heat will allow the fungus to survive. Experimentally, the minimum effective heat dose is 42-45° C. for 2-5 minutes [4-6]; however, longer heating periods can be more effective for control of Ustilago species but with the risk of compromising germinability [4]. Temperatures up to 80° C. may be needed for saprophytic fungi that live in the soil and feed on dead and decaying material [7]. Heating through sun exposure (solarization) is habitually used for sterilization of soil from fungi and other pathogens especially in green houses and by
The fungus affecting human nails (of the genus Trichophyton) form hyphae that produce asexual reproduction propagules termed conidia (synonymous with spores). Conidia are borne on specialized stalks called conidiophores. The morphology of these specialized conidiophores is often distinctive of a specific species and can therefore be used in identification of the species.

The similarity in the nature of these two pathogens is the basis for our assumption that using dry heat to treat fungal infection of the toe might be effective. This was indeed the case with satisfactory results in both patients. The nail, denervated tissue made of keratin, can withstand higher temperatures than surrounding soft tissue. Therefore, temperature levels can reach significantly higher degrees in the nail before pain receptors in the nail bed become stimulated. Pain lag depends on the temperature of the air current, personal pain perception threshold, thinness of the tiled nail and intactness of nerve conduction.

We caution that thermotherapy is contraindicated in diabetic long-term patients with peripheral neuropathy and microvascular fragility, due to the risk of gangrene. Medical device manufacturers are encouraged to design a clinically-usable blowdryer with pinpoint orifice and rising degrees of heating. Moreover, a randomized controlled trial with cost-benefit analysis comparing the effectiveness of different dosages of dry thermotherapy versus systemic fungicide treatment in the treatment of this common ailment is worth contemplating about.

Acknowledgement

I thank Dr. Abdullatif Walid for his new idea and the effort he made in applying this innovative technique for treating nail fungal infection on himself.

References

Illustrations

Illustration 1

Picture of the nails of a 71 year old man treated with dry thermotherapy using a blowdryer. A localized, aging-related, discoloration remains in the left big toe nail. Pretreatment picture unavailable.
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