

The use of high frequency waves to treat onychomycosis - preliminary communication of three cases

Uso de ondas de alta frequência no tratamento de onicomicose - comunicação preliminar de três casos

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Abstract: The research evaluated the efficacy of high frequency waves in the treatment of onychomycosis in three patients during twelve months through the clinical examination of nails and also through mycological examination. The causative agent of the mycosis, in the three patients, was the dermatophyte *Trichophyton rubrum* and after application of high frequency, it was possible to notice a great improvement in the appearance of nails and also growth inhibition in culture despite the fact that the mycological examination remained positive. The preliminary study of the three cases demonstrated that the fungistatic activity of high frequency waves is a promising method to be used in combination with conventional drugs.

Keywords: Nails; Onychomycosis; Primary treatment

Resumo: A pesquisa avaliou a eficácia de ondas de alta frequência, no tratamento de onicomicose em 3 pacientes, durante 12 meses, através do exame clínico das unhas e exame micológico. O agente causal da micose nos três pacientes foi o dermatófito *Trichophyton rubrum*, e, após a aplicação da alta frequência, foi possível observar uma grande melhora no aspecto das unhas e uma inibição do crescimento em cultura, apesar do micológico direto se manter positivo. O estudo preliminar dos três casos demonstrou a atividade fungistática das ondas de alta frequência sendo um método promissor para ser utilizado, em associação com fármacos convencionais.

Palavras-chave: Onicomicose; Tratamento primário; Unhas

Dermatophytosis are lesions caused by a group of fungi known as dermatophytes that affect keratinized skin tissues, nail and hair of men and animals. Onychomycosis are frequent fungal infections that affect nails and are responsible for 15 to 40% of the nail diseases. They are considered the most difficult mycosis to diagnose and treat as the treatment is slow, causes numerous side effects apart from its high cost to the patient.¹ Toenails are the most affected ones as the humid, dark and warm ambience

found inside shoes favours the growth of this kind of agent that has keratin² as its main source of nutrients. As well as dermatophytes, yeasts from the genus *Candida* may affect the skin, nails and mucosal of susceptible individuals or individuals who are constantly in contact with humidity.³

In the last years, medical literature has been disclosing an increase in fungal infections being dermatophytosis the infections mainly responsible for such increase. Studies show that around 10 to 15% of

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the world population can be infected throughout life by a dermatophyte and that these agents are the most isolated ones (80-90%) followed by yeasts from the genus *Candida* (5-17%).⁴

Currently the conventional treatment for onychomycosis is done with the association of topical and systemic medication. Topical treatment, although less efficient, is generally preferred by patients. Topical antifungal nail polishes were formulated to allow a better distribution of the drug on the nail, with less side effects.⁵ It was observed by the authors in a study carried out with three topical antifungal (amorolfine, bifonazole and ciclopirox-olamine) on the fungus *Trichophyton rubrum* that the most efficient fungistatic and fungicidal activity *in vitro* was from the drug amorolfine, followed by bifonazole and ciclopirox-olamine.⁶

The treatment of onychomycosis in general results in failure as it is a long treatment, the cost of medications becomes high and it can result in side effects. Persistence of the patient and some hygienic care are fundamental for the success and healing of the mycosis.

High frequency waves are largely used in clinical spa and can help in the treatment of onychomycosis as the generated ozone has fungicidal and bactericidal effect, stimulating the local circulation where it is applied and its vasodilator and hyperemic functions facilitate the penetration of systemic medications. The treatment with high frequency waves also presents a thermal effect acting on the metabolism, leading to its activation and increasing cellular oxygenation. Therefore, there are various indications regarding the use of high-frequency current such as: acne treatment, skin revitalization, facial and capillary stimulation, etc...⁷ This treatment of onychomycosis can be easier and more comfortable for the patient as it has no side effects and its cost can be more accessible than the cost of conventional treatment.

The objective of this preliminary study was to demonstrate the effect of the use of high-frequency waves in the treatment of onychomycosis in three patients. To do so, before the application of ozone vapor subungual material for mycological analysis (direct test and culture) was collected and after that, weekly applications of ozone on the nail plate were made, for a period of 12 months, in a Podiatry Clinic in Araraquara-SP. It was monthly performed the cleaning of the nails and sub-ungual material was removed for further mycological analysis. Before they were treated, the three patients presented positive mycological tests (direct test and culture) for the dermatophyte *Trichophyton rubrum* and patient 3 also presented an association with yeasts from the

genus *Candida*. Direct mycological test was positive during the treatment but there was inhibition of fungal growth in culture.

It was observed that the material analyzed for patient 1 presented fungal growth only on the 1st, 4th and 5th collections being negative in all the other samples (Figure 1A). Patient 2 presented fungal growth in the 1st and 4th collections and negative in all the other samples. (Figure 1B) and patient 3 presented inhibition of growth of the dermatophyte from the 4th collection and of yeasts from the 7th sample (Figure 1C). The occurrence of a new fungal growth after periods of negativity can be explained by the fact that patients 1 and 2 stopped the high frequency treatment during 4 weeks at the beginning of the treatment and therefore the growth was observed again (Figure 1 A and B). As for the clinical aspect of the nails, all patients presented significant improvement in the format and color. (Figure 2 A, B and C).

Despite the positive results obtained in this study, even with a small number of patients, one of the unfavorable factors was their availability to return to the Podiatry Clinic many times for the application of high frequency waves and the cost which would become high due to the long time of application and the cleaning of the nails performed monthly.

Reports about ozone therapy in the medical literature are limited to isolated works and

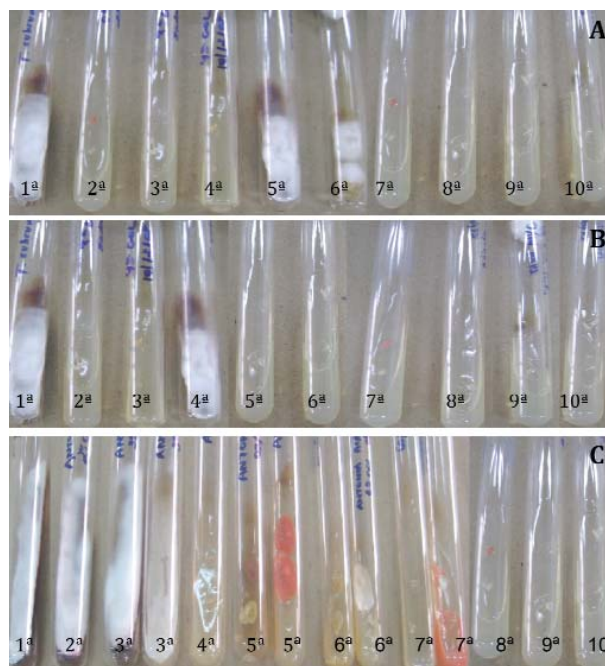


FIGURE 1: Fungal growth in culture in the 10 samples taken. A. patient 1; B. patient 2 and C. patiente 3



FIGURE 2: Aspect of the nails before and during the treatment. A. patient 1; B. patient 2 and C. patient 3; (a) before treatment (b) after 2 months; (c) after 4 months; (d) after 6 months; (e) after 8 months and (f) after 12 months of treatment.

experiences that do not present results strictly controlled.⁸ To confirm the efficiency of such method tests with a greater number of patients are already underway, combining the application of ozone with

topical antigungal to verify if there will be a better clinical and mycological response in a shorter period of time and at a lower cost. □

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