Onychomycosis of 52 years Responds to Treatment with Very Dilute Food-grade Hydrogen Peroxide: Case Report

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Abstract: Evidence is shared of therapeutic effect of orally administered dilute (0.5% and 1%) food-grade hydrogen peroxide (FGHP) in a 71-year-old female with 52 years history of onychomycosis of all finger and toe nails. This patient, who had received conventional fungal treatment for many years without improvement and who voluntarily consented to food-grade hydrogen peroxide therapy, improved with new nails growing. Over the period of 16 months study, the patient did not report adverse effects, except nausea when on the 1% solution. This is a further proof of principle of FGHP efficacy against onychomycosis which necessitates additional studies to confirm effectiveness and dosage and safety of oral FGHP, and to certify permanency of treatment.

1. Introduction

One of the most troublesome infections to treat is onychomycosis [1]. Even with recent advances in therapy, it may take a year or longer to achieve cure [2,3] with considerable associated risk of adverse events [1]. Recurrence of infection from treatment failures is an issue of great concern too [4]. Treatment options have included topical agents especially when the nail is only partially affected, a combination of oral and topical antifungal treatment [5] and laser, surgical and radiation interventions in severe cases [6,7]. Most antifungal agents in use have been formulated to penetrate tissues of the nail to target the parasites in the

proximal subungual and the distal lateral subungual regions from the lunula [8]. That a prolonged period for treatment is required to effect cure shows how challenging it is for these therapeutic agents to reach and act on the fungi.

In a recent first proof of principle efficacy study on an 80-year-old female with 25-year history of onychomycosis involving all finger nails, low concentrations of oral FGHP (0.5% solution alternating with 1.0%) acted within three months to dislodge all ten dystrophic nails which had previously not responded to conventional antimycotics after more than 10 years of therapy [9]. That patient had received a variety of antimycotics including maximum doses of oral itraconazole and griseofulvin, followed by topical miconazole tincture for several years. Although there was no evidence of new nail formation within the 18-month period of study in that patient, it was evident that the FGHP solution penetrated the subungual area to begin to free the dystrophic nails from the nail bed as early as three weeks after initiating therapy. Of interest also in that study was the absence of any significant adverse clinical effects.

Further evidence of efficacy of FGHP is provided in this second observational study.

2. Case Report, and Results

In the present proof of principle efficacy study, a 71-year-old female with 52-year history of onychomycosis involving all finger and toe nails consented to try the food-grade hydrogen peroxide therapy after the possible benefits and risks had been explained to her. The study complied with the Helsinki Declaration updated in 2013. Her fungal infection started at age 19 in the right middle finger. Within 5 (five) years, that infection progressed to involve all the finger nails. By the 1990s, when she was in her 40s, all the toe nails too became infected. The affected nails were itchy, with some discharging fluid intermittently. She had attended a number of dermatology clinics for treatment, the latest being the national referral and teaching hospital, Korle Bu Teaching Hospital, Accra, Ghana. Treatment received included oral griseofulvin, itraconazole 200 mg twice daily for a week, repeated for another week after a three-week interval, and topical miconazole tincture for several years without effect. There is a strong maternal family history of onychomycosis, her mother, brother, two sisters, a cousin, and son being sufferers. None of these had had relief from conventional medical treatment.

Before initiating therapy, pictures of both finger and toe nails were taken, See Figures 1 and 2 below. The nails were dystrophic, some being more severe than others, additional to evidence of paronychia.

Picture of the fingers of both hands and feet before treatment was initiated

Fig. 1: Picture of finger nails before treatment

Fig. 2 Picture of toe nails before treatment

One percent (1%) and 0.5% concentrations of food-grade hydrogen peroxide were prepared from a 35% stock solution obtained from Wellness Shop Products, USA [10]. Commercially bottled drinking water was used for the dilutions. The patient was given the following instructions before commencement of the FGHP Treatment:

- She was instructed to ingest the 40ml of the diluted FGHP on an empty stomach. This meant she had to wait for at least four hours after the last meal before taking the next dose of FGHP.
- After taking that dose, she must wait again for at least one hour for the hydrogen peroxide to be absorbed from the stomach before eating.
- She was also advised not to eat snacks in-between meals. She could, however, drink water when thirsty.

The treatment schedule is as follows:

1. First Month: 40 ml of 0.5% diluted FGHP, orally, three times daily
2. Second Month: 40 ml of 1.0 % diluted FGHP, orally, three times daily
3. Third Month: 40 ml of 0.5% diluted FGHP, orally, three times daily

After an interval of one month (off FGHP treatment), the above treatment schedule, 1-3, was repeated (second cycle). Three months after the second cycle of treatment, she was placed on a maintenance dose of 40ml of 0.5% FGHP, three times daily, for a further 4 (four) months.

Effects of FGHP

By the end of the first cycle of treatment, the infected finger and toe nails became loose and were manually dislodged from the nail beds by the patient. Besides, the paronychia had resolved to a great extent, but without any evidence of new nail formation (Figures 3 and 4).

Figure 3. Shows dislodged finger nails from the nail beds after 3 months of FGHP therapy

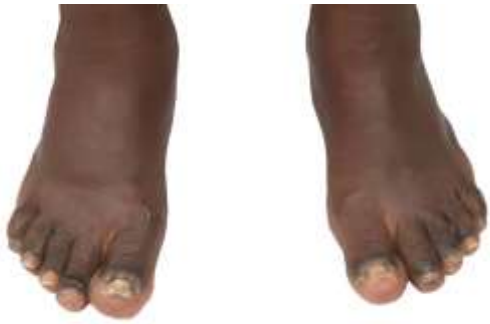

Figure 4. Shows dislodged toe nails after 3 months of FGHP therapy

The patient did not experience itching in any of the affected nails, and fluid discharge stopped after that dose.

Significant to note, 2 (two) months after the second cycle of FGHP treatment (that is 9 months from the beginning of the FGHP therapy), the patient noticed new nail growth in three of the toes. That was why she was placed on the maintenance dose of 0.5% FGHP for four (4) months to protect the regenerating nails from being reinfected. Sixteen (16) months into the study, eight (8) toe nails (four of them fully grown) and eight new finger nails had appeared, all showing markedly improved health of the nail folds (Figures 5 & 6).

Figure 5. Picture of fingers showing new nails,16 months from the beginning of FGHP treatment. Arrows indicate the regenerating nails.

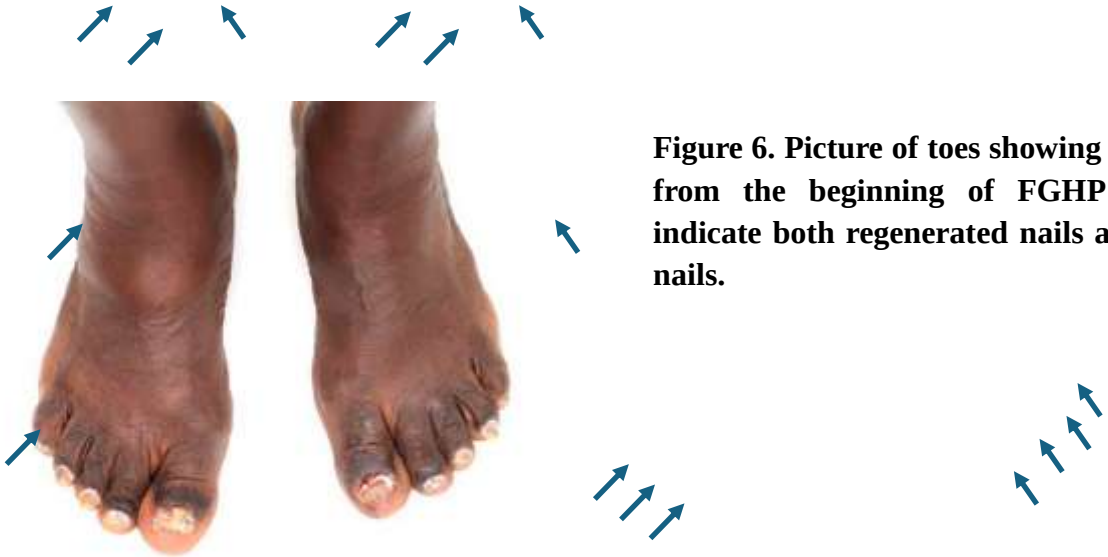

Figure 6. Picture of toes showing new nails, 16 months from the beginning of FGHP treatment. Arrows indicate both regenerated nails and new regenerating nails.

Throughout the 16-month study period, the patient did not complain of itching in any of the finger and toe nails. She briefly experienced nausea when she was on the first dose of the 1% solution of FGHP. This was managed by spicing the FGHP solution with watermelon juice. She did not experience vomiting or constipation. Rather, she remarked a boost in energy, in addition to deep joy for the shedding of the dystrophic nails, for regeneration of nails, and resumption of normal social life.

3. Discussion:

For the second time, we have shown that the administration of diluted solutions (0.5 and 1% concentrations) of FGHP in small volumes (40 ml) three times daily) results not only in the shedding of fungus-infiltrated nails but also in new nail growth. This demonstrates that FGHP therapy could reignite nail growth, even after 52-year suspension of that process in onychomycosis. This is the first of such report in the literature reviewed so far.

Why the nails regenerated in this patient with 52-year history of infection and not in the first patient with shorter history (25 years) of infection is, however, puzzling. This could be attributed to the degree of virulence of the fungus, as it is already well known that different fungi species are involved in nail infections [11]. That may well be the case, as the infection in the first patient was severer and more destructive of the finger nails [9]. It is important, therefore, to determine the fungus specie type to plan FGHP intervention including dosage and duration of therapy to completely eliminate more virulent ones before they damage the germinal matrix permanently.

The strong family history of onychomycosis revealed by the patient in this study is of interest. That might suggest genetic predisposition to onychomycosis, possibly related to some defect in the immune system specific to responses to fungal infection. Contact infection could also be considered, even though there is no evidence of that in the husband with whom

she has lived many years. Of interest also is the fact that there were no identifiable comorbidities such as obesity that might predispose her or the family to the disease; we did not, however, screen for diabetes mellitus and other risk factors. Irrespective of genetic status, fungi specie, and other predisposing factors to the etiology of the disease, this study indicates that FGHP therapy is effective.

Other observation of interest in the study is the absence of adverse reports from the patient, aside from nausea. Several other studies, in vivo and in vitro, have also reported safety of low concentrations of hydrogen peroxide from adverse effects such as cancer even when used over prolonged periods [12].

In our previous publication, an attempt was made to explain the source of the fungal infection and why all ten fingers of the 80-year-old patient were involved [9]. The oral cavity, being a reservoir of pathogens, could be the source of fungal and other infections elsewhere in the body, as others had suspected [13,14]. The patient in the present study offered a clue to support this thesis when she reported that, as a teenager, she habitually nibbled her finger nails. Even though there could have been direct fungal infection of the fingers from the oral cavity, that would not explain why the toe nails were also infected. A more plausible explanation, therefore, is that which had been advanced before by others that the parasites, most likely, spread from the oral cavity into the gastrointestinal tract from where they are absorbed and circulated through the portal to the systemic circulation [14]. From the systemic circulation, the fungi, being anaerobic parasites, could reach the finger and toe nails, a preferential site for them to locate, being regions where keratinized nail growing cells requiring limited oxygen supply are found.

This study also supports the view that hydrogen peroxide is highly selective in its actions, targeting pathogens to destroy and eliminate them whilst preserving normal cells including cells of the nail germinal matrix. This selectivity could be explained on the molecular basis of hydrogen peroxide action on iron-rich pathogens including fungi and cancer cells [15,16,17]. This predisposes pathogens and cancer cells to the Fenton reaction in which hydrogen peroxide reacts with a ferrous ion to form the powerful oxidizing free hydroxyl radical to destroy pathogens and cancer cells [18]. Administered in very low concentrations, this would explain why oncogenesis has not been reported as an adverse effect [11,12].

It is interesting also to note that molecules of HP reach the extracellular space, locate pathogens cocooned in a polysaccharide cage, and penetrate membrane walls of the pathogens to destroy them [19]. Considering that ingested 40 ml of 0.5% and 1% FGHP is diluted in the gastric fluid and then further diluted when absorbed into the blood circulation (which volume is 4 to 5 liters in an adult), molecules of circulating hydrogen peroxide that reach the extracellular space would be few. It is incredible, therefore, that these HP molecules, few as they may be, are enough to ignite the powerful Fenton reaction to autolyze the fungi pathogens without damaging healthy cells. It is even possible that a lower concentration of hydrogen peroxide could achieve therapeutic effect in management of fungal infections. To determine that would require pharmacokinetic studies, in addition to long term studies regarding the immune state of patients and recurrence of the disease.

Good evidence has been established that a very low concentrations of hydrogen peroxide has antimycotic effects resulting in regrowth of infected and damaged nails, without noticeable adverse reactions.

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