Original article

Evaluating the effect of a mixture of alcohol and acetic acid for otomycosis therapy

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Abstract

Introduction and objective: Otomycosis is a fungal infection of external auditory meatus. The acute form of the disease causes secretion and pruritus. The usual prescribed medicines for otomycosis are topical clotrimazole 1%, amphotericin B and otosporin. The aim of the present study was to evaluate the efficacy of treatment with isopropyl alcohol and acetic acid for otomycosis.

Materials and methods: In the present study 910 patients examined and those suspected to have otomycosis referred to medical mycology laboratory of Golabchi, Kashan. A questionnaire was also filled for each patient. Both direct and culture examinations were used to confirm otomycosis in the patients. Then the patients were treated with the mixture of isopropyl alcohol+acetic acid.

Results: Out of 910 examined patients, 60 patients were suspected to have otomycosis and referred to medical mycology lab. Mycological examinations confirmed otomycosis in 52 patients (86.7%). Most of the patients (78.8%) were cured perfectly after therapy with the mixture of alcohol and acetic acid. After three weeks, in addition to elimination of clinical signs further smear showed no sign of disease. However in four patients there was a relapse of the disease.

Conclusion: Due to therapeutic effect of the mixture of isopropyl alcohol and acetic acid for otomycosis, its low side effects and low rate of relapse, it is recommended to use this mixture for the treatment of otomycosis.

Keywords: Otomycosis, Isopropyl alcohol, Acetic acid, *Aspergillus niger*

Introduction

Otomycosis is a superficial mycotic infection of the outer ear canal. The infection may be either acute or subacute and is characterized by inflammation, pruritis, scaling, feeling of fullness and severe discomfort [1]. The prevalence of otomycosis has been reported to be as low as 9% of cases of otitis externa, and as high as 30.4% in patients presenting with symptoms of otitis or inflammatory conditions of the ear [2].

Otomycosis occurs worldwide but it is more common in tropical and subtropical zones [3]. The prevalence of the disease is influenced by a number of predisposing factors such as climate (extremely moist and hot environments), chronic bacterial otitis externa, swimming, dermatomycoses, insertion of foreign subjects and wearing head clothes [4]. Several predisposing factors were reported for involving otomycosis including; bacterial infection, hearing aid or a hearing prosthesis, self-inflicted trauma, swimming in contaminated pools, broad spectrum antibiotic therapy, steroids and cytostatic medication, neoplasia and immune disorders, changes in the coating epithelium, pH and quantity and quality of the ear wax [5,6].

Treatment recommendations go from germ termination or controlling the predisposing factors, to local debridement (microaspiration) and/or the use of antimicrobial agents (topic/systemic) [2,7]. Bifonazole is an antifungal agent that was commonly used in the 1980s. The antifungal potency of bifonazole 1% solution has been reported to be similar to that of clotrimazole and miconazole; however, it varies from species to species. Bifonazole and derivatives inhibited the growth of most fungi with an efficacy of up to 100% [8]. Recommended drugs and treatments for otomycosis include topical nystatin (3-4 weeks), clotrimazole 1% and amphotericine B [9].

The extensive and sometimes unnecessary use of antibiotic eardrops for the treatment of otitis media and otitis externa has been linked to the important increase in the prevalence of otomycosis. Secondary overgrowth of fungi is a well-known and recognized complication of the use of broad-spectrum antibiotics like quinolones [10]. Regarding the fact that the drugs should have few untoward effects, be cost-efficient, eradicate and treat the disease shortly, we performed this investigate the efficacy of isopropyl alcohol and acetic acid for otomycosis.

Materials and methods

This study was carried out during the warmer month (June-September) in 2008. All symptomatic patients having otomycosis were examined by ENT specialist and all symptoms, such as secretion, pruritus, inflammation, and hearing difficulty were recorded on a questionnaire. Suspected patients to otomycosis referred to a medical mycology laboratory reference, Kashan. Informed consent forms were also signed by each patient.

Samples were taken by mycologist using two moistured sterile swabs one for direct smear and another for culture. Samples were cultured on Sabouraud dextrose agar with both chloramphenicole

and cyclohexamide antibiotics (Bayer, Germany) and Sabouraud dextrose agar with chloramphenicole (Fina Daru, Iran) and incubated at room temperature for four weeks aerobically. Direct smears were stained using Methylene blue stain and examined by microscopy. Fungal elements (conidia, hyphae and yeast cells) confirmed otomycosis. In addition, cultured media were also identified using teased mount and slide culture methods and the associated fungus accountable for otomycosis was determined. When disease was confirmed by laboratory tests and clinical signs, the treatment using a mixture of 90ml isopropyl alcohol (70%) and 10ml acid acetic (2%) were started and continued every 8 hours for three weeks. All patients were followed up for several weeks. If clinical symptoms were disappeared and also culture results were negative, the patients would be considered treated and the treatment period was recorded in the data sheet.

Results

The current study was carried out on 910 patients attended to an ENT clinic. 60 patients were suspected to have otomycosis, after fulfilling sampling smearing and culturing, the disease was confirmed in 52 (86.7%). Out of 52, 16(30.7%) were males and 36 (69.3%) were females. The greatest number belonged to age group 30-44yrs with 21(40.4%), 45-60yrs with 19(36.5%) and 15-29yrs with 12(23.1%). The most common fungal isolates were as follows: *Aspergillus niger* 32(61.5%), *Candida albicans* 7(13.5%), *A. fumigatus* 3(5.8%), *A. flavus* 3 (5.8%), *Aspergillus* species 3 (5.8%), *Mucor* species 2(3.8%), *Rhizopus* species 1(1.9%), and *Scopulariopsis* species 1(1.9%).

Forty-one cases (78.8%) were successfully treated with isopropyl alcohol+acetic acid in three weeks; in other words, the clinical symptoms disappeared and the culture results were also negative. The disease recurred in four cases (7.7%); while in 48 (92.3%) mentioned no recurrence. Out of four recurred cases, 1(25%) and 3 (75%) responded to isopropyl alcohol+acetic acid in three weeks and more than three weeks period; respectively. While out of 48 cases without any recurrence history, 41(78.8%) and 11(21.2%) responded to the treatment in three weeks and more than three weeks period; respectively (Table 1). Using Fischer test, there were statistically significant associations among results (P=0.026).

Table 1: The prevalence rate of otomycosis treatment period using Isopropyl alcohol+acetic acid based on age groups

Age range	3 weeks	> weeks	Total
15-29	9(17.3%)	3(5.8%)	12(23.1%)
30-44	17(32.7%)	4(7.7%)	21(40.45)
45-60	15(28.8%)	4(7.7%)	19(36.5%)
Total	41(78.8%)	11(21.2%)	52(100%)

Out of 16 males having otomycosis, the lesion site was right ear in 7(43.8%), left ear in 7(43.8%) and both ears in 2(12.5%). Out of 36 females having otomycosis, the lesion site was right ear in 14(38.9%), left ear in 11(30.6%), and both ears in 11(30.56%). Out of 16 male cases with otomycosis, 13(81.2%) and 3(18.8%) responded to the therapy in three weeks period and more than three weeks period; respectively, while out of 36 females, 28(77.8%) and 8(22.2%) responded to the therapy in three weeks and more than three weeks period; correspondingly, but there was no statistical significant association among the results (P<0.99).

Out of 33 cases lived in city, 27(81.8%) and 6(18.2%) responded to the therapy in three weeks and more than three weeks period; respectively. Out of 19 cases

inhabited in the country, 14(73.7%) and 5 (26.3%) responded to therapy in three weeks and more than three weeks period; respectively; however this finding was statistically insignificant (P~5). Out of 52 cases with positive culture results, 51 (98.1%) had also positive smear results and only one case (1.9%) had negative result.

Discussion

Otomycosis is an entity frequently encountered by otolaryngologists and can usually be diagnosed by clinical and laboratory examination. *Aspergillus* and *Candida* species are the most commonly identified fungal pathogens in otomycosis [11]. The results revealed that out of 52 patients with otomycosis treated with Isopropyl alcohol+acetic acid, 78.8% responded to the therapy in three weeks, while 21% did more than three weeks. The successful treatment was considered as disappearing all clinical symptoms, and negative smear and culture results. This study demonstrated that the sensitivity of smear test comparison with culture test was 98.1%, while the predicative value of negative smear result in compared with culture test was 88.9%, and this finding, by itself, can signify the priority of smear test instead of culture test when it is unavailable. When the smear test is positive, the commencement of treatment is necessary.

The current study showed 75% having the history of recurrence of all or part of the symptoms andresponded to the treatment in more than three weeks period, while 16.7% with no history of recurrence did it in more than three weeks period. This finding indicates that those without the history responded to the treatment five times more than those having the history. With regard to fisher test, there was a comprehensible statistical association between the results (P=0.026). Also the study demonstrated that out of 33 participants lived in the city, Kashan, 27(81.8%) responded to the treatment in three weeks period, while out of 19 inhabited in the country, 14 (73.7%) were treated in three weeks period. The results pointed out that those living in the country did not follow completely the hygienic principles such as make ears dry after taking a bath, clear exfoliation and secretion of auditory meatus, and also the patients did not refer to the medical centers regularly. But there was no meaningful statistical correlation among results.

The study also showed that males responded to the treatment nearly 1.5 times more than females did, and this was statistically insignificant. In addition to the recommended agents and therapeutic interventions, in a study carried out by Piantoni *et al.* [8] the efficacy of the lotion, bifonazole 1%, on 25 patients with otomycosis was proved. Also, in a study conducted by Kombila *et al*. [9] in France, the efficacy of a temponad treated with the mixture of econazole and amphotericine B was appeared. The above mentioned agents are not available in Iran or in the event of their availability; they are expensive and it is recommended to study them in another research. Moreover, the current used agents for the treatment of otomycosis including polymixine and nystatin have many adverse effects [11-13].

Achieving some objectives is needed for the treatment of otomycosis. The objectives are as follows: making ears dry, clearing them regularly, and decreasing the pH level of auditory meatus. Fortunately, isopropyl alcohol 70% (90ml) and acetic acid 2% (10ml) contain two portions of an acid and alcohol which the acid decreases the pH level of auditory meatus and the diluted alcohol (in 10-20 ml distilled water) clears it and prevents the growth of the fungi there. Several reports recommended this solution for otomycosis treatment

[11,13-15]. Considering the high cost of the current used agents for otomycosis treatment, their scarcity and long term treatment, we used isopropyl alcohol+acetic acid solution which is economical and easily accessible. It eradicates immediately the fungi and treats the disease. As in the fulfilled study, the majority (78.8%) responded to the treatment in three weeks period. Unlike other drugs having various untoward effects, the used solution has only little irritation for the first days of the treatment.

Conclusion

Due to therapeutic effect of the mixture of isopropyl alcohol and acetic acid for otomycosis, its low side effects and low rate of relapse, it is recommended to use this mixture for the treatment of otomycosis.

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