

A prospective clinical and micro-pathological study of fungal infection of ear, nose and throat in a tertiary care hospital

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Received: 21-10-2021 / Revised: 28-12-2021 / Accepted: 07-01-2022

Abstract

Introduction: Fungi are ubiquitous in the environment. Human beings are constantly exposed to their infection daily. The upper respiratory tract, i.e. ear, nose and throat are constantly exposed to various airborne fungal spores. Over 1,00,000 species of fungi have been described of which only 100 are recognized as pathogenic for human and animals. **Materials and methods:** This prospective consecutive study was done in Department of ENT, Central Hospital Ramgarh, Ramgarh. Written informed consent was taken from every patient before start of study. The study comprised of 136 patients were selected from the Outpatients Department of Otorhinolaryngology after confirmation of fungal infection. The study was carried out for a period of eight months (from July 2020 to February 2021). **Results:** Predisposition factors and organism isolation in ear, nose and throat of patients were showed in their percentage. **Conclusion:** It may be concluded that Aspergillus species were most common isolated organism in ear and nose sinusitis. Candida albicans was common isolated organism in throat. Dentures were causative factor in establishing Candida infection. Medical therapy has begun to shift an emphasis from systemic antifungal therapy to various forms of topical treatment and immunomodulation.

Key Words: Fungi, sinusitis, Candida albicans, immunomodulation.

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Introduction

Fungi are ubiquitous in the environment. Human beings are constantly exposed to their infection daily. The upper respiratory tract, i.e. ear, nose and throat are constantly exposed to various airborne fungal spores. Over 1,00,000 species of fungi have been described of which only 100 are recognized as pathogenic for human and animals[1].

Infectious particles in the size range of 10 µm or larger get deposited on nasal or tracheal epithelium and are readily expelled or phagocytised particles in the range of 5 to 10 µm may gain entry to the lower respiratory tract. Candida has an affinity for fibronectin, thus facilitates attachment to cellular surface. It is also seen that candida can gain access to blood stream through intact gastrointestinal mucosa[2].

Aspergillus also has the ability to grow on the skin surface such as in desquamated cells and cerumen found in the ear canal or on mucus membrane of the PNS. Thus, surface colonization has to precede any invasive disease due to this organism[3].

The external auditory canal has a cartilaginous frame work in its outer third, while its inner two third is bony[4]. Isthmus is the narrowest part of the canal. Medial to the isthmus lies the infection recess, which is important in the pathogenesis of otomycosis. Meyer (1844), first described the fungal infection of external ear. Fungi have been described as the secondary pathogens that affect skin of canal only after it is exposed to bacterial toxin. Recent evidence confirms the notion that fungi can be primary pathogens[5].

Materials and methods

This prospective consecutive study was done in Department of ENT,

Central Hospital Ramgarh, and Ramgarh. Written informed consent was taken from every patient before start of study.

The study comprised of 136 patients was selected from the Outpatients Department of Otorhinolaryngology after confirmation of fungal infection. The study was carried out for a period of eight months (from July 2020 to February 2021).

Inclusion Criteria

Once the clinical diagnosis for fungal infection in ENT were made after seeing spores or mycelia mats in the ear canal and mass in the nasal cavity and predisposing factors. All the cases were included for mycological examination.

Exclusion Criteria

1. Those patients who do not consent are excluded.
2. Patients below 5 years and above 70 years of age were excluded.
3. Pregnant patients were excluded.

All cases of otomycosis underwent through cleaning of fungal debris in the external auditory canal either by dry mopping, syringing, and at the same time, sterile cotton swab was taken and sent for microscopy and culture. Later, ear was treated with topical antifungal agent and was followed up for a minimum period of one month for observing clearance or recurrence of the disease. During this period, patients were advised to avoid water entering into the ear while bathing or swimming. All cases of fungal infection of nose and paranasal sinuses were examined in detail, sent for radiographic examination, x-ray PNS of the patients and were worked up thoroughly. Then, the patients were treated surgically and were followed up by medical treatment. All the infection of oral cavities was examined and attempts were made to find out the predisposing factors than sterile cotton swab were taken and sent for culture. Aspergillus and Candida species were isolated by using pairs SDA medium and incubating at 37 and 25°C. Colony of Aspergillus were identified by their colony morphology and LPCB wet mount. Colony of Candida species was identified by colony morphology and Gram staining, germ tube and sugar assimilation and fermentation test. All results were observed in

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their percentage of culture of various isolated organism and predisposing factors.

Results

Table 1: Predisposition Factors for Fungal Infection in Ear, Nose and Throat

Factors	Ear		Factors	Nose		Factors	Throat	
	No of patients (46)	%		No of patients (38)	%		No of patients (52)	%
Use of unsterile sticks	20	43.47%	Prolonged use of topical steroid	10	26.31%	Prolonged use of topical steroid	12	23.07%
Use of unsterile oil	10	21.73%	Prolonged antibiotic usage	4	10.52%	Chronic bacterial infection	4	7.69%
Use of tropical ear drops	6	13.04%	Allergy/atopy	2	5.26%	Allergy/atopy	26	50.00%
Habited of swimming	6	13.04%	Smoking	18	47.36%	Smoking	10	19.23%
Use of head cloth	4	8.69%	Post-surgery	4	10.52%	Post-surgery	-	-

Table 2: Organism Isolated in Ear, Nose and Throat

Fungal Infection in ENT	Isolated Organism	No. of Patients	%
Ear	Aspergillus niger	31	69.56
	Aspergillus flavus	4	8.69
	Candida albicans	10	21.7
	Total Number of patients	46	100
Nose	Aspergillus niger	16	42.10
	Aspergillus flavus	14	36.84
	Aspergillus fumigatus	8	21.05
	Total No. of patients	38	100
Throat	Candida albicans	52	100

Discussion

All clinical and micro-pathological study of fungal infection of ear, nose and throat revealed that the common predisposing factors were injury to canal wall caused by introducing unsterile sticks and hairpins in 43.47%, topical instillation of unsterile oil in 21.73%, topical instillation of eardrops in 13.04%, followed by swimming in 13.04% and in 8.69%, there was a history of using head cloth. Most common presentation of predisposing factors in nose were prolonged uses of topical steroids in 26.31%, prolonged antibiotics use in 10.52%, allergy in 5.26%, smoking in 47.36% and post-surgery in 10.52%. Predisposing factors of fungal infection of throat were prolonged uses of topical steroids in 23.07%, chronic bacterial infection in 7.69%, allergy or atopy in 50.00% and smoking in 19.23%[6].

In ear infection, isolated mycosis were present, *Aspergillus niger* 69.56%, *Aspergillus flavus* 8.69% and *Candida albicans* 21.73%. Isolated mycosis in nose infections were present *Aspergillus niger* 42.10%, *Aspergillus flavus* 36.84% and *Aspergillus fumigatus* 21.05%. 100 percent of all the patients of throat infection patients were affected from *Candida albicans*[7].

K O Paulose et al (1989) conducted a prospective study at the Bahrain Military Hospital for a period of one year, after detailed history and examination, a clinical diagnosis of otomycosis was made. A sterile cotton wool application swab was taken and sent for analysis for bacterial and fungal growth. Results revealed that out of 193 patients, 171 cases produced positive fungal isolates and *Aspergillus* species (*niger* and *fumigatus*) have been the most common fungal pathogens[8].

Mohanty J C et al (1999) carried out a study in 54 patients attending ENT OPD in Berhampur. After establishing a clinical diagnosis of otomycosis, the commonest fungal isolates were *Aspergillus niger* and other species of *Aspergillus*. All patients became asymptomatic after using the drops for 6 weeks after initial suction clearance[9].

Mohd S Sheikh (1993) conducted a study in 52 patients of otomycosis showed that it is a predominantly unilateral disease, i.e. 80.77 percent

had unilateral disease and only 19.25 percent had bilateral infection[10].

Kaur R et al (2000) performed mycological analysis on debris from external ear canal of 95 percent patients who had been clinically diagnosed with otomycosis. 77 samples were positive for fungal growth in which 2 of these samples contains two fungi bringing the total number of isolates to 73. Most common pathogens were *Aspergillus fumigatus* (41%), *Aspergillus niger* (36.9%) and *Candida albicans* 82 percent all of isolated.

Conclusion

It may be concluded that *Aspergillus* species were most common isolated organism in ear and nose sinusitis. *Candida albicans* was common isolated organism in throat. Dentures were causative factor in establishing *Candida* infection. Medical therapy has begun to shift an emphasis from systemic antifungal therapy to various forms of topical treatment and immunomodulation.

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Conflict of Interest: Nil Source of support: Nil