ORIGINAL ARTICLE

Fungal Spectrum in Otomycosis Patients

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Abstract

Mycological analysis was carried out on debris, scraping or exudate samples from the external auditory canal(s) of 102 patients clinically suspected cases of otomycosis. The total number of samples taken from 102 patients were 108, of which 102 samples were obtained from one ear and 6 samples from the other ear. Predisposing factors contributing to such a presentation were dermatomycosis (51.22%), turban usage (29.26%), veil usage (14.63%) and swimming (4.88%). Only 82 (75.92%) samples were positive for the presence of fungal elements, of which 48(44.44%) specimens were smear and culture positive while 34(31.48%) were smear negative but culture positive. Males and females were almost equally affected, ratio being (1.1:1). Chief fungal isolates included Aspergillus niger (52.43%), Aspergillus fumigatus (34.14%), Candida albicans (11%), Candida pseudotropicalis (1.21%) and Mucor sp. (1.21%). Among 8 patients mixed fungal growth was obtained, while bacterial coinfection/ superinfection was detected in 14 cases.

Key Words

Otomycosis, Aspergillus, Candida, Mucor

Introduction

Otomycosis is a subacute or chronic superficial fungal infection of the external auditory canal. The fungal agents responsible for this clinical entity are found as saprobes in the environment. The fungi are usually secondary invaders of the tissue rendered susceptible by bacterial infections, physical injury or excessive accumulation of cerumen in the external auditory canal.

The disease is world wide in distribution. It is estimated that approximately 5-25% of the total cases of otitis externa are due to otomycosis. This is more prevalent in warm, humid climate between 2nd and 3rd decades of life among individuals belonging to lower socioeconomic status keeping poor hygiene.

Predisposing factors of otomycosis include chronic infections of the ear, use of oils, eardrops, steroids, swimming (wetness predisposes to fungal infections), fungal infection else where in the body like dermatomycosis or vaginitis, immuno-compromised state, malnourishment in children and hormonal changes precipitate flaring up of the infection as seen during menstruation or pregnancy.

Material and Methods

Study group: Mycological analysis was carried out on debris, scraping or exudate samples from auditory canal(s) of 102 patients, both males and females, clinically suspected of otomycosis, in the Department of Oto-Rhino-Laryngology (E.N.T.) OPDs and I.P.D.s of J.N. Medical College, AMU, Aligarh.

Collection of Samples: The samples were collected from the patients with the help of a sterile cotton swab from the external auditory canal or a sterile scalpel blade.

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Scraped samples of skin were collected in cases of complaints of itching or lesions else where on the body surface.

Laboratory Investigations: Direct microscopic examination of the obtained specimens was carried out for detection of fungal elements using:

· KOH (10%)

· Gram's stain

· PAS stain

Culture: Samples were inoculated on Sabouraud's Dextrose Agar (SDA) with and without antibiotics and incubated at 25°C and 37°C for a minimum period of 4 weeks. The culture tubes were examined for the presence of growth every 3-4 days.

Identification: Direct Microscopic Examination: Lactophenol Cotton Blue Mount preparation and Gram's Stain were used.

Slide culture examination was used for differentiation of morphology.

Biotyping was performed using Carbohydrate Fermentation tests, Carbohydrate Assimilation Tests, Germ tube Test, detection of Chlamydospore formation on Corn Meal Agar.

Anti fungal sensitivity testing: of the isolated specimens was carried out using Yeast Nitrogen Base Agar (Himedia) with aminoacids or without aminoacids, using standards discs of anti-fungal agents such as clotrimozole, ketoconazole, itraconazole, fluconazole and amphotericin B.

Culture of Bacteria: Aerobic cultures were also performed on routine media such as Blood agar, Teepol agar and Mac Conkey agar for the detection of bacterial growth. Identification and biotyping was performed for the characterization of isolated organisms as with other routine bacterial culture specimens.

Results

108 ear swabs were collected from 102 patients. 102 samples were obtained from one ear and 6 samples from the other ear also, in case of six patients.

In the study group, only 82 (75.92%) samples were positive for the presence of fungal elements of which 48 (44.44%) specimens were smear (microscopically) and culture positive, where as only 34 (31.48%) samples were culture positive for the presence of fungal elements (Table 1). 25(28.14%) samples out of 108 were smear and culture negative. However one sample which was reported as smear positive for fungal elements, did not show growth, even after incubation for six weeks ($x^2 = 23.82$, $p < 0.00001$).

Table 1. Correlation between smear (microscopy) and culture positivity of ear swabs for growth of fungal elements (n=108).

Isolates	Smear Positive	Smear Negative	Total
Culture Positive	48 (44.44)	34 (31.48)	82 (75.92)
Culture Negative	1 (0.9)	25 (28.14)	26 (24.08)
Total	49 (45.34)	57 (54.63)	108 (100)

(Percentages have been mentioned in parenthesis)
($x^2 = 23.82$, $p < 0.00001$)

54 males and 48 females constituted the study group (n=102), (M:F::1.1:1). In the fungal culture positive group, Males (n=43) and Females (n=39) were observed to be almost equally effected (M:F::1.1:1) with otomycosis.

Predisposing factors for the development of otomycosis were determined, by history elicitation and subsequent examination. 51.22% of the patients included in the study group showed presence of concomitant dermatomycosis, 29.26% used turbans as a headgear, 14.63% used veil (purdah / hezab) and 4.88% patients were swimmers (Table 2).

Table 2. Predisposing factors for otomycosis among culture positive cases (n=82)

Factors	No. of patients	Percentage
Dermatomycosis	42	51.22%
Turban usage	24	29.26%
Veil usage	12	14.63%
Swimming	4	4.88%
Total	82	100%

The common symptoms presenting solely, or in combination of each other encountered in the study group have been summarized in (Table 3). Pruritis was the most common complaint encountered followed by fullness of ear, pain, otorrhoea, hearing impairment or headache.

Chief fungal isolates included: Aspergillus niger (52.43%), Aspergillus fumigatus (34.14%), Candida albicans (11%), Candida pseudotropicalis (1.21%) and Mucor sp. (1.21%). Among 8 (7.8%) patients mixed fungal growth was obtained (7.8%) (Table 4).

Table 3. Common symptoms among the patient group (n=102)

	Pruritis	Fullness	Pain	Otorrhoea	Hearing of Ear	Headache mpairment	Total
Pruritis	12	24	29	20	06	10	101
Fullness of Ear	24	34	24	06	04	01	93
Pain	29	24	18	04	06	08	89
Otorrhoea	20	06	04	09	02	01	42
Hearing	06	04	06	02	18	02	38
Impairment							
Headache	10	01	08	01	02	06	28
Total	101	93	89	42	38	28	
	(99%)	(91.7%)	(87. 25%)	(41.17%)	(37.25%)	(27.45%)	

(Percentages have been mentioned in parenthesis)

Table 4. Common Spectrum of Fungal isolates from Otomycosis patients (n=82).

Fungal Isolates	No. of Patients	Percentage
Aspergillus niger	43	52.43%
Aspergillus fumigatus	28	34.14%
Candida albicans	9	11%
Candida pseudotropicalis	1	1.21%
Mucor sp.	1	1.21%
Total	82	100%

Bacterial co-infection was detected among 44 cases. Commonly isolated bacteria included coagulase negative staphylococci (CONS), Pseudomonas sp., Staphylococcus aureus, E. coli and Klebsiella sp.

On performing anti-fungal susceptibility testing it was observed that all the isolates of Candida sp. were uniformly susceptible to clotrimozole, ketoconazole, itraconazole, fluconazole and amphotericin B. 46 (64.79%) out of 71 Aspergillus sp. Isolates showed varied degrees of resistance to antifungal agents. 25 (35.21%) were resistance to clotrimozole, 9 (12.67%) were resistant to ketoconazole, 7(9.85%) were resistant to itraconazole and 5 (7.04%) isolates were resistant to fluconazole. However no Aspergillus isolate was found resistant to amphotericin B. 1 isolate of Mucor sp. showed resistance to clotrimozole but was sensitive to all the other drugs.

Discussion

82 (75.92%) patients were proven to be suffering with otomycosis. In this group 48 (44.44%) cases were smear and culture positive, where as 34 (31.48%) were smear negative but culture positive for fungal elements. 25 samples did not show growth of fungal elements although the presentation resembled that of otomycosis. One sample did not show growth on media, although was positive for the presence of fungal elements on smear examination, probably because of stringent requirement for some essential nutrient.

Environmental conditions, personal hygiene, occupational predisposition were few of the factors contributing to a large extent to the development of otomycosis in patients. In our study 51.22% patients were detected to have concomitant dermatomycosis as proved by smear and culture examinations. A higher incidence (36% to 47%) such dermal fungal coinfections has been reported by other workers (1, 2). Auto-inoculation of the external auditory canal by pathogenic fungi might be a possible source of the infecting dermatophytes.

Pre-disposing factors determined in this study include wearing turbans, veil usage (purdah/ hezab) and swimming. These were found closely related to the habit, profession and religion practiced by the patients. In this study a number of females (14.63%) using veil were found to be suffering with otomycosis. A high incidence of 74.7% otomycosis has been reported among turban users and 28% among swimmers (2). A larger number of cases were detected during the rainy season as compared to the summer months.

Commonest isolated fungal species were of Aspergillus sp. followed by Candida sp. and Mucor sp. among otomycosis patients. Aspergillus niger is a reported causative organism of otomycosis (40-79%), closely followed by A. flavus, A. fumigatus and Candida albicans (2.5-30%) (1-3, 5-7). Some workers have reported other organisms as causative isolates such as Penicillium sp., Acremonium sp., Fusarium sp. and other known species of Candida such as C. parasilosis, C. gulliermondi with varying percentages of isolation (3-5). Correlation between the smear examinations and culture isolations of fungal elements was statistically highly significant ($p<0.0001$).

Conclusion

Moist environment, poor hygiene, turban usage and veil usage in Indian climatic conditions are the primary

predisposing factors for the development of otomycosis. More number of clinical cases are detected during the rainy season as compared to the summer months due to the moist and humid available conditions facilitating good fungal growth.

Mere microscopic examination cannot be taken as evidence of negativity for fungal presence and has to be authenticated with a culture investigation of the specimen.

The present study reiterates that Aspergillus sp. is one of the most common causative organisms implicated in the causation of otomycosis, which also show resistance to various anti-fungal agents.

Bacterial co-infection/super-infection is present in a large number of cases coexisting with the fungal flora. The low detection rate in this study was perhaps due to the usage of topical antibiotics before the samples could be taken. Simultaneous treatment of concomitant infections such as otomycosis and dermatophytoses is mandatory to prevent the recurrence of both.

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