

# Fungal Infections in Ear, Nose and Throat: A Clinical Study.

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## ABSTRACT

**Background:** Since the beginning of medical mycology at the turn of the century there has been a continual increase in the discovery of pathogenic fungi. The morbidity and mortality associated with these infections are becoming substantial and is emerging as a public health problem. Determining the rate of infections and determining the emerging pathogen and its potential risk factors will have an important influence on the prevention and control of these fungal diseases. Data regarding these is almost non-existent for the north-eastern part of the country. Aim: The present study was done to study the pattern of fungal infections in the north-eastern India in terms of clinical parameters and required diagnostic techniques.

**Methods:** An observational cross-sectional study was done in which all the patients who attended the Otorhinolaryngology Department of Jawaharlal Nehru Institute of Medical Sciences, Imphal during the period of August 2015 to July 2017 with features suggestive of fungal infections were included. The exclusion criteria consisted of patients suffering from malignancies and receiving radiotherapy or chemotherapy. A detailed history was taken by using a structured, open interview schedule which had sections on socio-demography and case-history. Then, all the patients were given a thorough clinical examination followed by routine laboratory investigations, radiological examination and endoscopic examination wherever indicated. Further, the study subjects underwent mycological investigations. Data collected were analysed and presented descriptively. **Results & Conclusion:** 80 eligible study-subjects participated in the study (58 ear, 15 throat and 7 nose & PNS cases). Otomycosis was found to be more common in the 2nd to 3rd decades of life (56.9%) and aspergillosis of nose & PNS being more common in the 2nd decade of life (42.85%) whereas oral and oropharyngeal candidiasis was more common in older age-groups (40%). In the overall, there was a male preponderance (M:F=1.15:1). Otomycosis which was mainly due to infection with *A. niger* had a definite relation with warm and humid climatic condition. *A. fumigatus* was responsible for majority of nose & PNS infections while *C. albicans* was the commonest fungus responsible for fungal infection of the throat.

**Keywords:** Aspergillosis, Candidiasis, Fungal infections, Otomycosis.

## INTRODUCTION

Since the beginning of medical mycology at the turn of the century there has been a continual increase in the discovery of pathogenic fungi. Initially, it was known that normally saprophytic fungi may invade patients with severe debilitating primary diseases such as diabetes, leukemia, Hodgkin's disease and various neoplasms. Before the antibiotic and corticosteroid era, opportunistic mycoses were found in patients with serious microbial infections, severe diabetes, other endocrinopathies or malignant diseases.<sup>[1,2]</sup> Fungal diseases which were once considered as rare entities have increased in recent decades with the introduction of antimicrobials in 1945, corticosteroids in 1950, immunosuppressive therapy in 1960, organ transplantation in the 1960s,

emergence of AIDS and increasing use of bone-marrow grafting in the 1980s. In addition, community-acquired fungal infections which encompass not only the opportunistic infections but also the endemic mycoses are also known.

The morbidity and mortality associated with these infections are becoming substantial and is emerging as a public health problem. In the US, exclusive of those in HIV/AIDS patients, fungal infection is the 7th most common cause of infectious diseases.

Determining the rate of infections and determining the emerging pathogen and its potential risk factors will have an important influence on the prevention and control of these fungal diseases which are usually difficult to be diagnosed as well as difficult to be treated. Data regarding these is almost non-existent for the north-eastern part of the country.

### AIM

The present study was done to study the pattern of fungal infections in the north-eastern India in terms of clinical parameters and required diagnostic techniques.

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## MATERIALS AND METHODS

An observational cross-sectional study was done in which all the patients who attended to the Otorhinolaryngology Department of Jawaharlal Nehru Institute of Medical Sciences, Imphal during the period of August 2015 to July 2017 with features suggestive of fungal infections were included. Patients suffering from malignancies and receiving radiotherapy or chemotherapy were excluded from the study. After obtaining consent from the patients, a detailed history was taken. Then, all the patients were given a thorough clinical examination followed by routine laboratory investigations (CBC, RBS, LFT, KFT, Urine R/E, R antibody), radiological examinations (X-ray nose and PNS, CT nose and PNS) and endoscopic examination, wherever indicated. Further, the study subjects underwent mycological investigations. Swab/scraping/biopsy was taken from relevant areas for microscopic examination of fungal flora and fungal culture. Histopathological examination (HPE) of the tissue from the relevant areas was also done. Data collected were analysed and presented descriptively.

## RESULTS

A total of 80 patients could be enrolled as the study-subjects. The mean age (SD) of them was 34.58 ( $\pm$  16.97) years ranging from below 5 years to 70 years. Out of them, 58 (72.5%) presented with features of ear infection, 15 (18.75%) presented with throat infection and the remaining 7 (8.75%) with nose and paranasal sinus (PNS) infection. Majority of the patients studied for fungal infections of ear belonged to the age-group of 21-40 years (33; 56.9%). Majority of the cases studied for nose and PNS were of the age-group 21-30 years (3; 42.85%) while majority of the cases studied for throat infections was in the age-group of 61-70 years (6; 40%). Males were found to be affected more than the females (53.4% versus 46.6% in ear cases, 85.7% versus 14.3% in nose and PNS cases and 66.7% versus 33.3% in throat cases). Majority of the ear cases (38; 65.5%) belonged to lower socio-economic status whereas majority of the nose and PNS cases and the throat cases ( $\geq$  80%) were from middle class families.

Ear cases reported more in the rainy season of June-August (39; 67.2%) whereas nose and PNS cases and throat cases were found to be distributed randomly throughout the year. Itching with or without irritation was the main symptom in ear cases (54; 93%), whereas nasal obstruction was the symptom present in all the nose and PNS cases (7; 100%) while white patches on tongue and oral mucosa was the main symptom in throat cases (14; 93%).

The risk factors for ear cases were habit of scratching ears (48%), using antibiotic/corticosteroid

ear drops (20%) and local use of oil preparation or herbal juice (18%). For nose and PNS cases it was solely because of antecedent diabetes and for throat cases the risk factors were diabetes (60%), wearing of dentures (20%) and prolonged antibiotic and/or corticosteroid use (13.4%).

The main clinical findings at the different areas of involvement were debris in EAC and congested meatal skin in all ear cases, mass in nasal cavity in nose & PNS cases and curd-like plaque which on wiping left a raw or bleeding area in throat cases [Table 1].

**Table 1: Positive clinical findings.**

Clinical findings	No. of cases	Percentage (%)
Ear cases		
• Debris in EAC	58	100
• Congested meatal skin	58	100
• Congested TM	20	34.5
• Conductive deafness	24	41.4
• Perforated TM	7	12
• Associated lesion of pinna	3	5.2
Nose & PNS cases		
• Mass in nasal cavity	6	85.7
• PNS tenderness	4	57.1
• External swelling	3	42.9
• Discrete black spots in nose	1	14.3
Throat cases		
• Curd-like plaque	14	93
• Red lesions on dorsum of tongue	1	7

X-ray for nose & PNS cases showed hazy nasal cavity with sinusitis in all the cases and focal hyperdense area in 2 cases (28.6%). CT scan in these cases showed high density nasal mass with extension to sinuses (71.4%), areas of calcification (28.6%), nasal mass (14.3%), sinus mass (14.3%) and sinonasal mass with extension to cheek (14.3%).

Mycological investigation by using KOH method gave positive results in  $\geq$  60% of all the cases studied whereas Lactophenol cotton blue preparation method gave positive results in  $\geq$  40% cases [Table 2].

**Table 2: Results of mycological investigations.**

Method	+ve ear cases	+ve nose & PNS cases	+ve throat cases
KOH preparation	43 (74%)	5 (71.4%)	9 (60%)
Lactophenol cotton blue preparation	37 (64%)	4 (57.1%)	6 (40%)

Out of all the nose & PNS cases studied, HPE showed fungal granuloma in four cases (57.1%), fungal hyphae in two cases (28.6%) and necrotic mass in one case (14.3%).

On fungal culture, ear cases predominantly showed *Aspergillus niger* (46%), nose & PNS cases

predominantly showing *A. fumigatus* (42.8%) and throat cases predominantly showing *Candida albicans* (73.3%) [Table 3].

**Table 3: Culture findings.**

Culture findings	Ear cases (%)	Nose & PNS cases (%)	Throat cases (%)
<i>Aspergillus niger</i>	27 (46)	-	-
<i>Aspergillus flavus</i>	9 (15.5)	-	-
<i>Aspergillus fumigatus</i>	15 (25.9)	3 (42.9)	-
<i>Candida albicans</i>	3 (5.2)	-	11 (73.3)
<i>Penicillium</i>	-	1 (14.3)	-
<i>Fusarium</i>	-	1 (14.3)	-
<i>Rhizopus</i>	-	1 (14.3)	-

## DISCUSSION

The current study finding of fungal ear infections being highest in the age-group of 21-40 years (57%) correlates with the findings made by Kohli (1963) who found maximum incidence during the 2nd-4th decade of life. It is also comparable to study-findings made by Ence BK et al that the mean age varied from 23-43 years.<sup>[3]</sup> Further, the current finding of fungal throat infections more in the old aged group of 61-70 years is in consistence with findings made by Bodey GP.<sup>[4]</sup> The male predominance as seen from the present study was also in accordance with findings made by Kohli, Manning SC et al and Vazquez et al.<sup>[5]</sup> Regarding the socio-economic background of the cases, very few people from the higher socio-economic group usually attends the study center. Hence, no definitive conclusion can be derived from the present study although majority of the fungal infections were seen among people of low to middle income groups.

The incidence of fungal ear cases being more in the months of June to August is anticipated as high humidity, high rainfall and high temperature are known to precipitate fungal infections. The finding is in accordance with the findings made by Sree Rama Rao et al from their study in Andhra Pradesh and by Joy et al from their study in a northern Indian city.<sup>[6]</sup> The predominant presenting symptoms in fungal ear infection in the present study were itching, pain and blocked sensation. Ismail HK in 1962 found similar findings.<sup>[7]</sup> The main symptoms for nose & PNS cases as found out from the present study were nasal obstruction, epistaxis, headache etc. Shugar MA also found similar findings way back in 1987.<sup>[8]</sup> White patches on tongue and oral mucosa being the predominant symptomatology in throat infections as found from the current study were also comparable with findings already made by Vazquez JA et al and Pankhurst C.<sup>[9]</sup>

The current study found that history of trauma to ear by scratching with hand or by other application such as matchstick was present in almost half of the fungal ear patients. These findings tally with the

findings made by Joy et al, Sinha and Mohapatra, Sood et al.<sup>[6,10,11]</sup> Diabetes was the main predisposing factor for the nose & PNS and throat cases in the present study. This is in agreement with Berlinger who reported poorly controlled diabetes to be one of the important risk factors.<sup>[12]</sup> Bodey GP also found similar finding from his study.<sup>[4]</sup>

Wet blotting paper-like debris was found in more than half of the ear cases in the current study. Conidiophores with black head projecting into the lumen of the meatus are characteristic of *A. niger* infection and are helpful in diagnosis. Mass in the nasal cavity in nose & PNS cases as seen in 85% of the cases in the present study collaborated the study findings made by Shugar MA and Stammberger H et al.<sup>[8,13]</sup>

The HPE results seen in the present study are also in accordance with findings made by Shugar MA and Stammberger H et al.<sup>[9,13]</sup> Again the fungal culture findings are in agreement with available literatures.<sup>[7,9,10]</sup> Similarly x-ray findings of nose & PNS were in agreement to findings made by Stammberger H et al and Hartwick RW et al.<sup>[13,14]</sup> In our study, CT scan revealed high density central mass in nasal cavity in 71% of nasal cases with areas of calcification in 29%. Som PM et al also commented that on CT, fungal disease appears as high density central mass. They further added that calcification might be present in some cases.<sup>[15]</sup>

## CONCLUSION

The present study was of limited duration with a small sample size. So, to draw a definitive conclusion from it might not be doing justice to the concerned disease. Still certain findings do come to light from this study. The main findings were that otomycosis and aspergillosis of nose & PNS were more common in the 2nd to 3rd decades of life whereas oral and oropharyngeal candidiasis was more common in older age-groups. In the overall, there was a male preponderance. Otomycosis which was mainly due to infection with *A. niger* had a definite relation with warm and humid climatic condition. *A. fumigatus* was responsible for majority of nose & PNS infections while *C. albicans* was the commonest fungus responsible for fungal infection of the throat. Thus, it was seen that the clinical pattern of fungal infections in the north-eastern India was not different from other patterns prevailing in other parts of the country and abroad.

It was also found that making a correct diagnosis will not be hard if appropriate protocol for investigation is followed with particular emphasis in culture finding.

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