

## **Research Article**

### **Fungal Etiology of otitis externa in Type 2 Diabetes Mellitus patients**

**Dr. Vara Prasad Kondity<sup>1</sup>, Dr. Suguna Shobha rani Murahari<sup>2</sup>, Dr. Geethanjali Anke<sup>3</sup>**

<sup>1</sup>Assistant Professor, Department of Microbiology, Government Medical College, Anantapuramu – 515001, Andhra Pradesh, India

<sup>2</sup>Assistant Professor, Department of Obstetrics and Gynaecology, Government Medical College, Anantapuramu – 515001, Andhra Pradesh, India

<sup>3</sup>Senior Resident, Department of Microbiology, Government Medical College, Anantapuramu – 515001, Andhra Pradesh, India

#### **\*Corresponding author**

Dr. K. Varaprasad

Email: [varaprsd184@gmail.com](mailto:varaprsd184@gmail.com)

---

**Abstract:** Ear Canal Infection (Otitis externa) is an inflammation or infection of outer canal, the passage leading from the outer canal to the ear drum. Patients with Diabetes mellitus are more prone to ear infections and considered as one of the predisposing factor for Otitis externa. This is a prospective study done on patients attending a Private hospital. Samples from ear infections are collected and processed using Sabourads Dextrose Agar. Identified exactly by Slide Culture technique and by using Lactophenol Cotton blue stain. Out of 70 suspected cases of Mycotic Otitis externa, 58(82.8%) were positive for fungal culture. Most commonly isolated fungi in this study was Candida species (39.6%) followed by Aspergillus species (20.6%) and Rhizopus oryzae (20.6%). Candida albicans was most common than other species. The study showing highest incidence of fungal infection occurred in the rainy season, and the lowest incidence occurred in summer season. We conclude that fungal culture is beneficial for diagnosing otitis externa and early initiation of treatment. Even though Type 2 Diabetes Mellitus patients are less prone to ear infections when compared to other infections, diagnosing exact etiology plays a important role in treatment and beneficiary to patients with DM.

**Keywords:** Otitis externa, Fungus, Diabetes Mellitus, Candida species

---

#### **INTRODUCTION**

Ear Canal Infection (Otitis externa) is an inflammation or infection of outer canal, the passage leading from the outer canal to the ear drum. It may develop when water, dirt or other debris gets into ear canal. Fungi cause some of the vilest and most recalcitrant of all human infections. They also gave rise to a wide range of less dramatic conditions that are virtually untreatable. One such condition is Otitis externa.

The source of the mycotic infection is often unknown. It is well known, that fungus can remain in the ear without producing any symptoms, but fungus is not a normal inhabitant of the external ear canal. As long as the fungus is on the cerumen and has not invaded the lining of the ear, it is asymptomatic [1].

Diabetes increases susceptibility to various types of infections. Not all types of fungal infection occur frequently in diabetics. The majority of diabetics, particularly well-controlled diabetics, are at no increased risk for acquiring a fungal infection.

Nevertheless, Diabetes mellitus patients exhibit particular susceptibility to three severe infections of the head and neck: Rhinocerebral Mucormycosis, Postoperative endophthalmitis and Malignant Otitis externa.

Rhinocerebral Mucormycosis is an extensive life-threatening infection beginning in the nasal passages and sinuses and extending often into the orbit and the cerebrum. Endophthalmitis, which is infection of the vitreal contents, can occur secondary to bacteremia, trauma or postoperatively. Invasive external or Malignant Otitis externa is an invasive infection beginning in the adjacent soft tissue and into bone. It is usually secondary to Pseudomonas aeruginosa and occurs almost exclusively in diabetics. Notably Mucocutaneous candidiasis is definitely increased in prevalence in some diabetics. Other fungal infections occur with a mild increased frequency only.

Diabetes, debilitated people, people suffering from malnutrition are supposed to be susceptible to Otitis externa [2]. Among Diabetics suffering from

Otitis externa, Aspergillus and candida species are the most frequently recovered organisms. Slow growing fungi might be missed unless special detection techniques are used [3].

**MATERIALS AND METHODS**

This is a Prospective study conducted about one year in 2014-2015 at a private ENT hospital. A total of 70 suspected cases of Otitis externa resembling fungal etiology among Type 2 Diabetes mellitus patients were diagnosed by noticing features using otoscopy and samples from external ear canal are collected and sent to microbiology lab immediately. Clinical related details such as history, any history of previous surgeries, trauma, antibiotic usage, and regarding diabetic medications has taken. General Physical examination has done and also ear examination and ear function tests were assessed.

Informed consent has taken from patient and Ethical Committee has approved to do this study. The specimen debris from the external auditory canal was taken after syringing. The collected debris was used for direct microscopy and for fungal culture on Sabourads dextrose agar and Corn meal agar. Direct Microscopy has done to see any fungal elements in direct smear using KOH stain. All the samples collected were processed by inoculating into Sabourads Dextrose Agar slants. When the growth comes the colony characteristics were noted and processed through Slide culture technique using Corn meal Agar, to know the exact morphology of fungus. Further in detail structure of fungi was noted down by doing Lacto Phenol Cotton Blue stain of growth on Slide culture [4].

**RESULTS**

Out of 70 suspected cases of Mycotic Otitis externa, 58(82.8%) were positive for fungal culture. Among 58 culture positive samples, 53(91.3%) were positive for both microscopy and culture. 9 (12.8%) were negative for both microscopy and culture. 3 (4.2%) were positive for microscopy and negative for culture (Table No.1).

The fungi isolated by doing culture on Sabourads Dextrose Agar are depicted in table no.2

Candida speciation has done by Dalmau technique using corn meal agar, exact morphology has studied by noticing Yeast cells, chlamydospores, elements of Hyphae. Candida albicans has identified by Reynaulds Braude phenomenon.

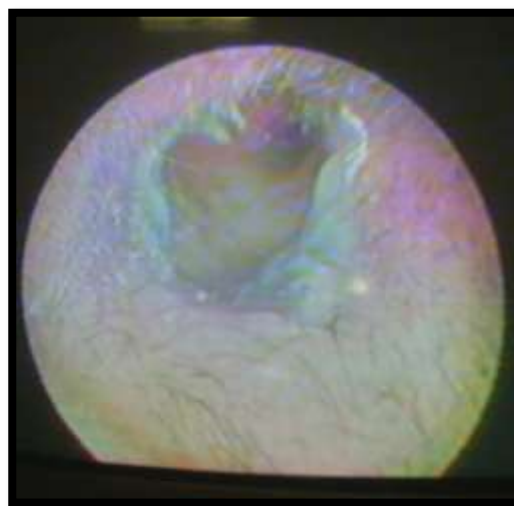
**Table 1: showing comparative study of culture and microscopy of suspected Otitis externa cases**

		Microscopy		Total
		Positive	Negative	
Culture	Positive	53	5	58
	Negative	3	9	12
Total		56	14	70

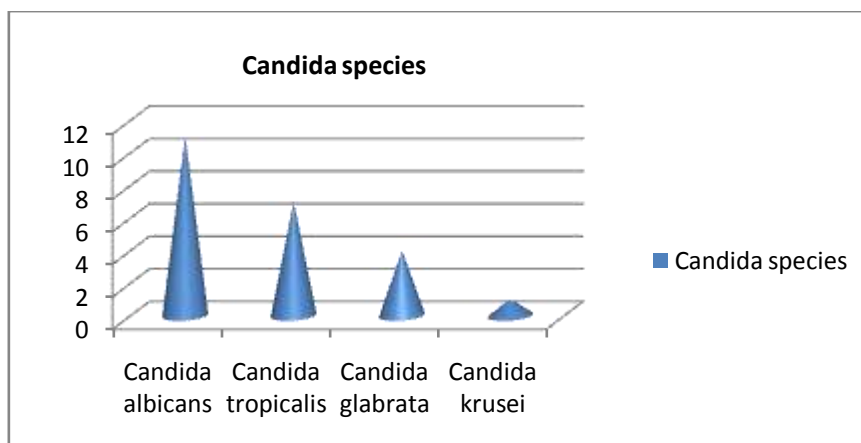
Probability value has find out using danielsooper.com software by taking df=1 and calculating chi square value, very highly statistically significant (P<0.05).

**Table 2: Various fungi isolated from Otitis externa samples**

S. No.	Name of the Fungus isolated	No. of cases isolated	Percentage
1	Candida species	23	39.6 %
2	Aspergillus species	12	20.6%
3	Rhizopus oryzae	12	20.6%
4	Mucor racemosus	5	8.6%
5	Septate hyphae unidentified	5	8.6%
6	Paecilomyces lilanicus	1	1.7%
Total		58	

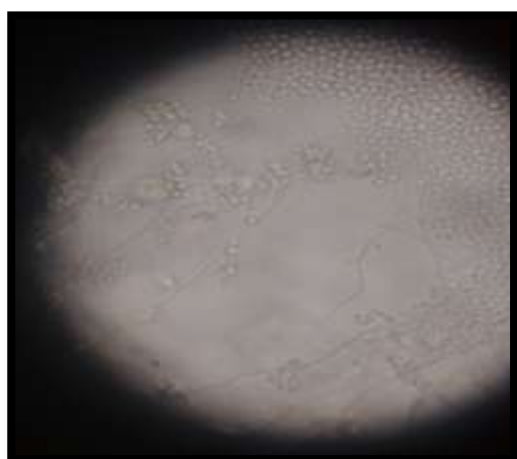


**Fig1: Representing the otoscopic appearance of Candida**



**Fig. 2: Diagrammatic representation of various species of Candida isolated.**

Candida albicans was most common pathogen isolated about 47.8% followed by candida tropicalis (30.4%), Candida glabrata (17.3%), Candida krusei(4.3%).



**Fig 3: Showing Candida albicans with chlamydospores clusters at tips of hyphae, Pseudohyphae elements on Dalmau technique.**

Males were most commonly affected about 62% when compared to females. Among out of 70 cases, most commonly affected age group was 40-60 years about 85%.

**Table: 3 showing seasonal variation of fungal infections**

Season	No. of Positive cases	Percentage (%)
Raining	31	44.2
Winter	19	27.1
Spring	12	17.1
Summer	8	11.4

The study showing highest incidence of fungal infection occurred in the rainy season, and the lowest

incidence occurred in summer season, where the atmospheric humidity is very low.

**Table 4: Showing symptoms of Otitis externa**

Clinical feature	No. of cases observed
Pain	57
Itching	62
Discharge from ear	48
Impaired hearing	12

The patients has presented with varying symptoms such as pain, itching, discharge from ear, impaired hearing. Maximum No. of patients complained of pain associated with itching.

**DISCUSSION**

Diabetes mellitus is a major predisposing factor for many fungal infections, causing oral infections, genitourinary infections, lower respiratory tract infections, skin and mucous membrane infections, ear infections. These fungal infections need early diagnosis for prompt treatment. Fungal infections are causing difficulties in diagnostic and therapeutic modalities and also leading to serious morbidity and mortality to patients.

Both Type 1 and 2 Diabetes Mellitus patients are more prone to infections. Muller LMAJ *et al.*; [5] documented that both DM1 and DM2 patients are at increased risk for bacterial skin and mucous membrane infections and mycotic skin and mucous membrane infections.

70 were suspected cases of Mycotic Otitis externa; samples collected from type 2 Diabetes Mellitus patients. Out of which 58(82.8%) were positive for fungal culture. Several studies observed that skin and mucous membrane infections are common in patients with Diabetes [6, 7,8]. Muller LMAJ *et al.*; [5] mentioned that Otitis externa was one of the main

infections in this group, and Shah *et al.*; *et al* [6] also reported among patients with diabetes there is an increased risk of Otitis externa.

Most commonly isolated fungi in this study was *Candida* species (39.6%) followed by *Aspergillus* species (20.6%) and *Rhizopus oryzae* (20.6%). *Candida albicans* (49.8%) was most common than other species. Documentation by Muller LMAJ *et al.*; [5] was among all infections in patients with type 2 DM, 5.4% were Mycotic skin and mucous membrane infections and 1.3% Skin *Candida* infections.

The study showing highest incidence of fungal infection occurred in the rainy season, and the lowest incidence occurred in summer season, where the atmospheric humidity is very low. Maximum No. of patients complained of pain associated with itching.

Mycology Studies done on ear infections especially among Type 2 Diabetes mellitus were very less. Diagnosing the exact fungal etiology is very important for early diagnosis and therapeutic purpose and decreases unnecessary usage of antibiotics and also hospital stay.

#### CONCLUSION

We conclude that fungal culture is beneficial for diagnosing otitis externa and early initiation of treatment. Even though Type 2 Diabetes Mellitus patients are less prone to ear infections when compared to other infections, diagnosing exact etiology plays an important role in treatment and beneficiary to patients with DM.

#### REFERENCES

1. Laxmipathi G, Murti RB; Otomycosis J. Indian Med Assoc., 1960; 34:439-41.
2. Yassin A, Maher A, Moawad MK; Otomycosis, a survey in the eastern province of Saudi Arabia. J. Laryngotol., 92:869-76.
3. Baxter M; Proceed of the 8th congress of the International society of human and animal mycology. 1982.
4. Baron EJ, Peterson LR, Finegold SM; Bailey and Scott's Diagnostic Microbiology. Mosby; 1994.
5. Muller LMAJ, Gorter KJ, Hak E, Goudzwaard WL, Schellevis FG, Hoepelman Aim, *et al.*; Increased risk of common infections in Patients with Type 1 and Type 2 Diabetes Mellitus. CID, 2005; 41:281-8.
6. Shah BR, Hux JE; Quantifying the risk of infectious diseases for people with diabetes. Diabetes care, 2003; 26:510-3.
7. Walters DP, Gatling W, Mullee MA, Hill RD; The distribution and severity of diabetic foot disease: a community study with comparison to a non-diabetic group. Diabetic Med, 1992; 9:354.

8. Yosipovitch G, Hodak E, Vardi P, Shraga I, Karp M, Sprecher E, *et al.*; The prevalence of cutaneous manifestations in IDDM patients and their association with diabetes risk factors and microvascular complications. Diabetes care, 1998; 21(4):506-9.