

## A study of inflammatory diseases of external ear

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### Abstract

**Background:** Inflammatory disease of external ear is one of the most common entities in otorhinolaryngological practice and is also frequently encountered in primary care. Due to the characteristic of its anatomical location, the external ear is exposed and easily damaged due to trauma, weathering, inflammation and environment.

**Objective:** Objective is to study different etiological factors, clinical features, to evaluate treatment modalities, results and complications.

**Material and methods:** A prospective observational study was conducted on 400 patients with inflammatory disease of external ear who will be undergoing ENT examination, diagnosis and treatment at Tertiary Care Center from the year 2020 to 2023.

**Results:** Out of 400 patients, the male-female ratio is 1.2:1, the most common aetiology is bacterial but most common condition is otomycosis. Earache is the most common symptoms among the patients and 74% of the patients recovered with medical management only and complication rate was 10% only.

**Discussion:** Commonest aetiology is otomycosis owing to hot and humid environment. Most common affected age group is younger may be because of environmental exposure. In most of the cases diagnosis was made to their clinical presentation and improved with conservative treatment so investigations were not required.

**Keywords:** Inflammation; External ear; Otitis externa; Otomycosis

### 1. Introduction

Having ears on your head, while giving you the ability to maintain the balance and the ability to hear the world around you truly is a gift. "Our amazing ears never sleep, even when we do."

The external ear, namely, the auricle and the external auditory canal, is composed of skin, cartilage and all associated appendages. The outer ear itself play a functional role in audition by collecting and transmitting sound. Additionally, it has an important effect on facial appearance and therefore on the individual psychological disposition.

Due to the characteristic of its anatomical location, the external ear is exposed and easily damaged due to trauma, weathering, inflammation and environment.

Inflammation is a complex reaction to injurious agents such as microbes and damaged, usually necrotic, cells that consists of vascular responses, migration and activation of leukocytes and systemic reactions.

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Inflammatory disease of the external ear is one of the most common entities in otorhinolaryngological practice and is also frequently encountered in primary care. The various aetiologies causing inflammation of the external ear, may result from infections, trauma, radiation exposure, irritants and immunological response and skin conditions. It ranges in severity from a mild infection of the external ear to life threatening malignant otitis externa. Its correct treatment requires a good understanding of the anatomy, physiology and microbiology of the external ear. Nowadays with extensive use of broad-spectrum antibiotics and other surgical advances, complications related to external ear inflammatory diseases have decreased.

*Aims and objectives:*

- To study different etiological factors.
- To study various clinical features of inflammatory diseases of the external ear.
- To evaluate treatment modalities and its results.
- To study complications, if any.

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## 2. Materials and method

- Data for this study was collected from patients, who presented to the OPD in ENT department at our tertiary care centre.
- Study was conducted from July 2020 to September 2023.

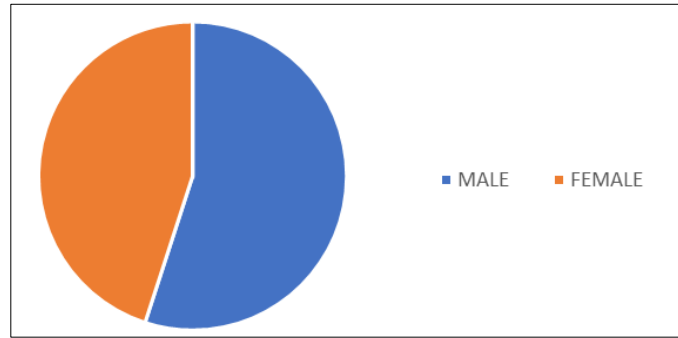
### 2.1. Methodology

- All the patients were randomly selected who presented to the OPD.
- Demographic data was collected and detailed history was taken from the patients.
- Thorough ENT examination was done and findings were noted.
- In all the patients external ear examination was done with the help of headlight followed by otoscopic examination.
- Oto Endoscopic / microscopic examination was performed whenever necessary. As per their clinical presentation, medications and other supportive treatment was given.
  - Broad spectrum antibiotics, analgesics, antihistamines and topical ear drops (antibiotic/ antifungal) for 7 to 10 days and called for follow up examination.
  - Suction clearance/ removal of debris is done in all otomycosis cases and other cases as and when required.
- Patients were advised to investigate as per their clinical presentation.
  - Swab C-S was taken in cases of persistent discharge to know causative organisms and effective antibiotics were prescribed as per C-S report.
  - Haematological investigations, pure tone audiometry and radiological investigations (Xray mastoid-Schuller's view/ HRCT temporal bone) were advised as and when required.
  - Biopsy was done in cases where granulations/ polyp was found in the external ear canal.
  - In Cases with non-infective inflammatory conditions, cotton wick with antibiotic and steroid combination was kept with other supportive treatment.
  - Patients in which pinna was involved above mentioned treatment as well as local application in the form of cream/ ointment was given.
  - In Patients with abscess/ perichondritis, debridement/ incision and drainage were done depending upon the requirement.
  - Mastoid bandage and dressing were done if necessary.
  - Infective Post traumatic lacerated wound - Patients who had wound gaping after suturing and other cases over abrasions were conservatively managed with daily dressing, antibiotics and other supportive treatment.
  - In solid and membranous atresia cases, it was surgically managed with removal of atresia.
  - In cystic swelling cases excision was done.
  - All the patients were called for follow up examination at regular intervals of 1 week, 2 weeks, 3 weeks and then as per their clinical condition.

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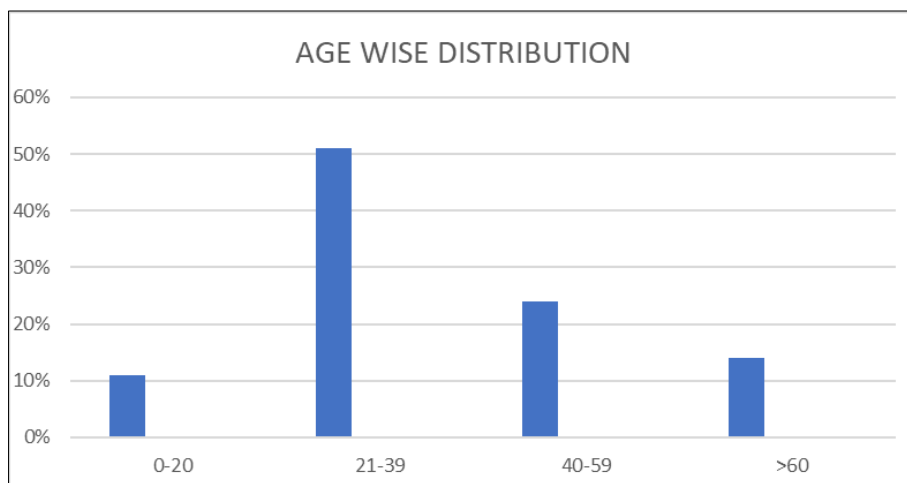
## 3. Results

Total 400 patients were included in our study who were having inflammatory diseases of the external ear. 55% patients are male and 45% patients are female with Male: Female ratio of 1.2:1.



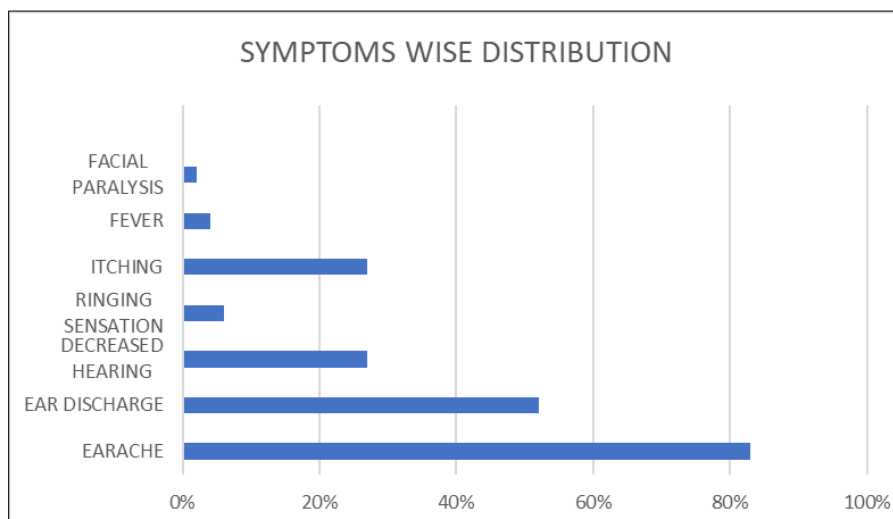
**Figure 1** Gender distribution

The patients' age ranged from 5 to 78 years of age. The median age was 37.15 years. In our study, maximum cases were seen in 21-39 years of age group followed by patients in 40-59 years of age group.



**Figure 2** Age wise Distribution

Total 83% patients were having earache and 52% patients were having ear discharge followed by other symptoms like decreased hearing, itching, ringing sensation, fever and facial paralysis.



**Figure 3** Symptoms

Majority of patients (79%) presented early (within 14 days of onset). While 21% patients presented after 14 days of onset of symptoms. In our study commonest aetiology was otomycosis (22%) followed by other aetiologies listed in Table no. 1

**Table 1** Different types of conditions

Types	Percentage
Otomycosis	22%
Diffuse Otitis externa	19%
Perichondritis	13%
Keratosis obturans	10%
Furunculosis	6%
Infected Post traumatic lacerated wound over pinna Wound gaping (3%) Abrasion (2%)	5%
Dermatological condition	4%
Seroma	4%
Infected Cyst	4%
Herpes zoster oticus	3%
Myringitis bullosa	3%
Malignant otitis externa	2%
Granular myringitis	2%
Solid atresia of EAC	2%
Membranous atresia of EAC	1%

It was observed that bacterial infection is most common in external inflammation. Classified in infectious and non-infectious aetiology. (Table no. 2)

**Table 2** Type of the Condition

Infectious/ Non infectious	Organism	Percentage
Infectious	Bacterial	49%
	Fungal	19%
	Viral	8%
Non infectious	Other	24%

According to our data, 74% patients were treated medically only 26% cases required surgical management like incision and drainage, cyst excision as well as debridement. Only 10% of cases had complications out of which 7% had perforation in tympanic membrane, 1% had pinna deformity, 1% had recurrence of seroma and 1% cases had facial paralysis.

#### 4. Discussion

Total 400 patients came with inflammatory conditions of the external ear to our institute from July 2020 to September 2023. Patients were selected randomly in our study irrespective of their gender. Male and female were almost equally affected in Present study. There was no predilection for any sex in the prevalence of disease.

A.M.AGIUS et al study 1991 (1) and Bong seok shin study 2018(2) both studies have almost similar prevalence in sex. Slight male preponderance is there in both above studies which is comparable to our study. Maybe because of more male predominance in the society. However females were more predominantly affected in perichondritis due to Indian culture of ear piercing.

**Table 3** Incidence of external ear diseases in terms of gender

Gender	Present study (%)	Bong seok shin et al study (2018) <sup>(2)</sup>	A.M. Agius et al study (1991) <sup>(1)</sup>
Male	220 (55%)	137 (50.9%)	26 (54%)
Female	180 (45%)	132 (49.1%)	22 (46%)
Total	400 (100 %)	269 (100%)	48 (100%)

In our study, 44 patients were aged less than 20 years, 204 patients were aged 20-39 years, 96 patients were aged 40-59 years and 56 were aged 60 years and above.

Maximum 204 patients were found in the 21 to 39 years age group. Younger age group is more affected may be because they frequently go out for work, are more involved in outdoor activity and they have more environmental exposure which might be the contributory factor.

**Table 4** Age group (years) distribution of patients

Age distribution	Our study	Bong seok shin et al study 2018 <sup>(2)</sup>
0-20	11%	14.4%
21-39	51%	40.8%
40-59	24%	22.5%
>60	14%	21.7%

In our study maximum patients had complaints of earache (81%) followed by ear discharge (52%). Same was observed in Agius AM et al study 1992(1). As it is an inflammatory condition, pain is the presenting symptom. Due to inflammation glands get hypertrophied and start secreting with superadded bacterial, fungal or viral infections resulting in ear discharge. Decreased hearing and itching were found in 27% of the patients in our study but in Agius AM et al study 1992(19), decreased hearing was in 60% and itching was in 35%. Inflammation leads to oedema and narrowing of the canal, may be the reason for decreased hearing. In this study ringing sensation was in 6% but in Agius AM et al study 1992(1), it was observed in 58% of the cases which is not correlated with our study. In our study facial paralysis in 3% and fever (4%) was observed whereas in Agius AM et al study 1992(1) not a single case was reported. Both patients of malignant otitis externa have developed facial paralysis due to extension of the disease in the tympano-mastoid region and osteomyelitis.

**Table 5** Symptoms wise distribution

Symptoms	Number (%)	Agius AM et al study 1992 <sup>(1)</sup>
Earache	332 (83%)	60%
Ear discharge	208 (52%)	65%
Decreased hearing	108 (27%)	60%
Itching	108 (27%)	35%
Ringing sensation	24 (6%)	58%
Fever	16 (4%)	NA
Facial paralysis	8 (2%)	NA

In our study, majority of patients (79%) presented early (within 14 days of onset). While 21% patients presented after 14 days of onset of symptoms.

The early presentation may be due to the intensity of pain and underlying cause being acute conditions like otomycosis, diffuse otitis externa, trauma etc. causing sharp and shooting pain.

Patients with discharge and decreased hearing present late to the clinics since patient belongs to lower socioeconomic class having less awareness and are more ignorant about complaint but if it is associated with pain, they present promptly. In our study only one patient of malignant otitis externa came after 6 months of onset of the complaint. This may be due to persistent complaint of continuous dull aching pain even after receiving local treatment.

**Table 6** Anatomical distribution

Anatomical sites	Percentage	Bong seok shin et al study 2018 <sup>(2)</sup>
Helix	26%	12.6%
Antihelix	25%	9.3%
Concha	25%	5.2%
Earlobe	9%	29.7%
Tragus	9%	1.1%
Triangular fossa	24%	3.3%
Medial surface of pinna	10%	33.8%
Cartilaginous part of EAC	60%	NA
Bony part of EAC	17%	NA
Outer layer of Tympanic membrane	17%	NA

The most common anatomical site involved was cartilaginous part of EAC (60%) while earlobe (9%) and tragus (9%) are the least common site of involvement while Bong seok shin et al study 2018 (2) showed maximum cases involving medial surface of pinna (33.8%) and rarely involved tragus (9%). In our study Helix (26%), antihelix (25%) and concha (25%) also showed almost equal cases whereas Bong seok shin et al study 2018(2) very few cases show this involvement.

In our study the commonest aetiology is otomycosis (22%) owing to the hot and humid environment. So, the majority of these cases are seen in the monsoon.

Second most common aetiology seen is diffuse otitis externa (19%), excessive self-cleaning of ear and self-inflicted trauma may be the contributory factor.

Perichondritis was seen in 13%. Ear piercing is a major cause followed by local injury.

In our study 3% cases presented with wound infection/ gaping after suturing which was done outside. And in other 2% cases, patients had abrasion and presented with pain and redness.

In our study it is observed that cases of otomycosis, diffuse otitis externa, and perichondritis more common in younger age groups because they are more involved in outdoor activities so environmental exposure may be the reason. And in cases of keratosis obturans, malignant otitis externa is more commonly seen in older age groups. Because of their comorbidities like diabetes mellitus and immunocompromised conditions organisms like pseudomonas aeruginosa can grow rapidly and can lead to malignant otitis externa.

In this study predominantly the diagnosis was done on clinical presentation which improved with conservative management only hence investigation had limited requirement.

Overall, it was observed that external ear inflammatory condition had bacterial infection compared to fungal etiology. Bacteria reproduce on their own and many can survive on surface for days to week. While viruses need living cells to keep them alive, allowing them to reproduce and spread so they don't do well on surfaces. Fungal infection in ear is most commonly due to water entry in ear and it can lead to otomycosis. Some cases (24%) like cyst, seroma, dermatological condition are non-infectious and can easily be treated.

Broad spectrum antibiotics and supportive medications and care was given to patients. Most of the patients were given topical treatment in the form of ear drops / application of ointment. Our present study was conferred with the literature (3) which showed that most of the inflammatory disease of external ear can be cured by medical management only.

Perforation in the tympanic membrane is the most common complication observed in our study. Non-resolving inflammation of the external ear leads to involvement of tympanic membrane, initially starting with inflammation resulting in perforation. In malignant otitis externa disease spread through the bony canal to the mastoid and subsequently to the skull base. Pinna deformity after perichondritis, recurrence of seroma and facial paralysis after malignant otitis externa are other complications observed in our study.

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## 5. Conclusion

In Inflammatory diseases of the external ear, the majority of the patients require medical management. Only a few cases develop complications which are not life threatening. Otorhinolaryngologist plays a key role by not only treating the patients but educating them regarding Avoidance of precipitating factors and Taking care of ear so it can be prevented.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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