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ORIGINAL ARTICLE

A STUDY ON INFLAMMATORY DISEASES OF THE EXTERNAL EAR

Jay Kothari[1] • Nipa Dalal[1] • Alpesh Patel[1] • Kinnari Rathod[1] • Vaishvi Hindia[2]

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Abstract Inflammatory diseases of the external ear are common in both otorhinolaryngology and primary care due to the ear's exposed anatomical location, making it susceptible to trauma, environmental factors, and infections. This study aimed to explore the etiological factors, clinical features, treatment methods, outcomes, and complications associated with external ear inflammations. A prospective observational study was conducted on 400 patients who underwent ENT examination and treatment at a Tertiary Care Center from 2020 to 2023. The male-to-female ratio was 1.2:1. The most common cause was bacterial infections, with otomycosis being the most prevalent condition. Earache was the most frequent symptom. Seventy-four percent of patients recovered with medical management alone, and the complication rate was 10%. Otomycosis, often influenced by hot and humid environments, primarily affected younger individuals due to increased exposure. Most diagnoses were clinical, and conservative treatment proved effective, reducing the need for further investigations.

Keywords: Inflammation · External ear · Otitis · externa · Otomycosis

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✉ Jay V. Kothari
jaykothari03@gmail.com

[1]Department of Otorhinolaryngology, NHLMMC, Ahmedabad, Gujarat, India.

[2]Department of Pediatrics, KGP, Vadodara, Gujarat, India.

Introduction

Having ears on your head not only allows you to maintain balance but also gives you the ability to hear the world around you—truly a gift. “Our amazing ears never sleep, even when we do.” The external ear, consisting of the auricle and external auditory canal, is made up of skin, cartilage, and associated appendages (Lucente and Hanson, 2009). The outer ear plays a crucial role in hearing by collecting and transmitting sound. Additionally, it has a significant impact on facial appearance and, consequently, on an individual’s psychological disposition.

Due to the characteristics of its anatomical location, the external ear is exposed and vulnerable to damage from trauma, weathering, inflammation, and environmental factors. Inflammation is a complex response to harmful agents such as microbes and damaged, often necrotic, cells, involving vascular changes, leukocyte migration and activation, and systemic reactions (Meng and Chen, 2023). Inflammatory diseases of the external ear are among the most common conditions encountered in otorhinolaryngological practice and are frequently seen in primary care. The various etiologies of external ear inflammation may result from infections, trauma, radiation exposure, irritants, immunological responses, and skin conditions. The severity of these conditions can range from mild infections of the external ear to life-threatening malignant otitis externa. Proper treatment requires a thorough understanding of the anatomy, physiology, and microbiology of the external ear (Wiegand et al., 2019). With the widespread use of broad-spectrum antibiotics and advances in surgical techniques, complications related to external ear inflammatory diseases have significantly decreased (O’Handley et al., 2020).

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This study aims to examine the different etiological factors, various clinical features of inflammatory diseases of the external ear, and evaluate treatment modalities, outcomes, and complications.

Materials and Methods

Data for this study were collected from patients who presented to the OPD in the ENT department at our tertiary care center. The study was conducted from July 2020 to September 2023.

Research stages

a. All patients who presented to the OPD were randomly selected.
b. Demographic data were collected, and a detailed history was taken from the patients.
c. A thorough ENT examination was performed, and the findings were recorded.
d. External ear examination was conducted in all patients with the help of a headlight, followed by otoscopic examination.
e. Oto-endoscopic or microscopic examination was performed whenever necessary. Based on their clinical presentation, medications and other supportive treatments were provided.
f. Broad-spectrum antibiotics, analgesics, antihistamines, and topical ear drops (antibiotic/antifungal) were prescribed for 7 to 10 days, with patients being called for follow-up examination.
g. Suction clearance and removal of debris were performed in all otomycosis cases and other cases when required.
h. Patients were advised to undergo investigations based on their clinical presentation.
i. Swab culture and sensitivity (C-S) was taken in cases of persistent discharge to identify causative organisms, and effective antibiotics were prescribed based on the C-S report.
j. Haematological investigations, pure tone audiometry, and radiological investigations (X-ray mastoid – Schuller's view/HRCT temporal bone) were advised as needed.
k. Biopsy was performed in cases where granulations or polyps were found in the external ear canal.
l. In cases of non-infective inflammatory conditions, a cotton wick with an antibiotic and steroid combination was placed, along with other supportive treatments.
m. For patients with pinna involvement, the above-mentioned treatment was provided, along with local applications in the form of creams or ointments.
n. In patients with abscesses or perichondritis, debridement, incision, and drainage were performed based on the clinical requirement.
o. Mastoid bandaging and dressing were done if necessary.
p. For infective post-traumatic lacerated wounds, patients with wound gaping after suturing and other cases of abrasions were conservatively managed with daily dressing, antibiotics, and other supportive treatments.
q. In cases of solid and membranous atresia, surgical management with removal of the atresia was performed.
r. In cases of cystic swellings, excision was performed.
s. All patients were called for follow-up examinations at regular intervals of 1 week, 2 weeks, 3 weeks, and thereafter based on their clinical condition (Javia and Deutsch, 2012; Gettelfinger et al., 2017; Watkinson and Clarke, 2018; Pasha and Golub, 2021).

Results and Discussion

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).

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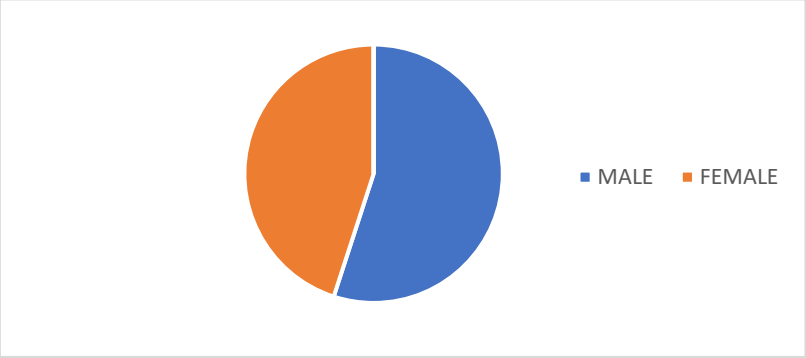


Figure 1. Gender distribution

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).

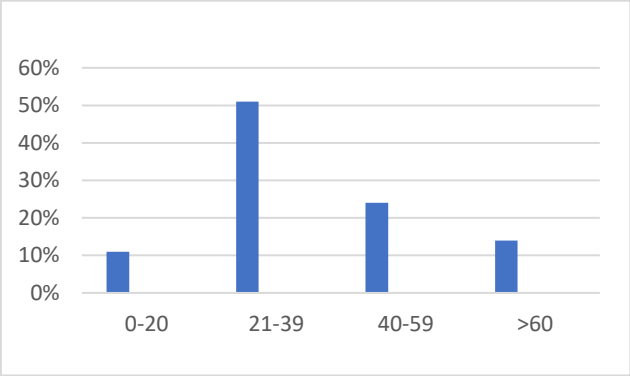


Figure 2. Age Wise Distribution

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).

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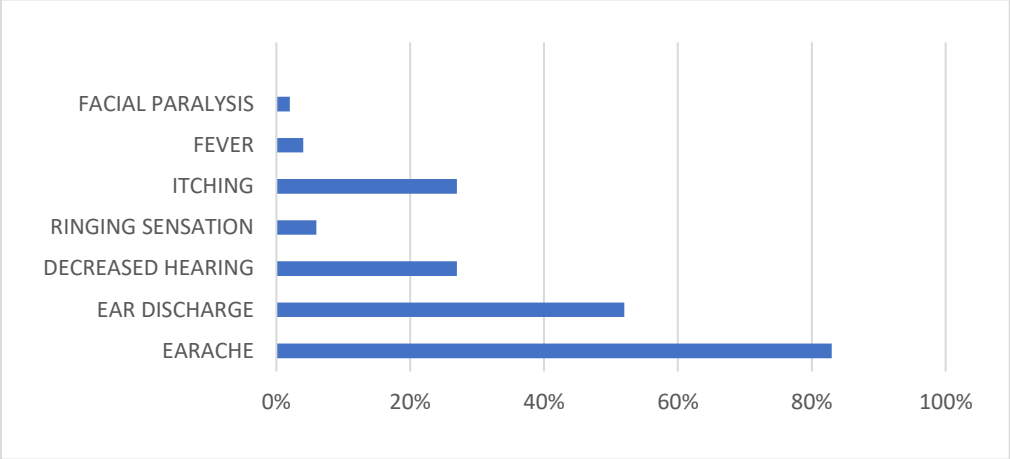


Figure 3. Symptoms Wise Distribution

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 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 2).

Table 2. External inflammation

External inflammation		Percentage
Infectious	Bacterial	49%
	Fungal	19%
	Viral	8%
Non infectious	Other	24%

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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.

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.

Agius et al. (1991); Kim et al. (2018) 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

	Present study (%)	Kim et al. (2018)	Agius et al. (1991)
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	Kim et al. (2018)
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 %). Same was observed in Agius et al. (1992), 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 et at. (1992) study, 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 (Isaacson and Vora, 2003). In this study ringing sensation was in 6% but in Agius et at. (1992) study, 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 et at. (1992) study not a single case was reported. Both patients of malignant otitis externa have developed facial paralysis

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due to extension of the disease in the tympano-mastoid region and osteomyelitis.

Table 5. Symptoms wise distribution

Symptoms	Number (%)	Agius et at. (1992)
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 (Davidson and Husseman, 2012).

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.

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 Kim et al. (2018) study 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 Kim et al. (2018) very few cases show this involvement.

Table 6. Anatomical distribution

Anatomical sites	Percentage	Kim et al. (2018)
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 pat of EAC	17%	NA
Outer layer of Tympanic membrane	17%	NA

In our study the commonest aetiology is otomycosis (22%) owing to the hot and humid environment. So, most 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

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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 (Na, 2006). 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 (Postgate and Hunter, 1962). While viruses need living cells to keep them alive, allowing them to reproduce and spread so they do not do well on surfaces (Ryu, 2016). Fungal infection in ear is most commonly due to water entry in ear and it can lead to otomycosis (Bojanović et al., 2023). 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 (Vaz et al., 2020). 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.

Conclusion

In Inflammatory diseases of the external ear, most 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.

Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflict of interest.

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