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ORIGINAL RESEARCH

Clinico-Microbiological Profile Of Otitis Externa In A Tertiary Care Hospital

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ABSTRACT:

Background: Otitis externa is a notorious ear infection and a major health problem in developing countries causing serious local damage and threatening complications. Early and effective treatment based on the knowledge of causative microorganisms and their antimicrobial sensitivity can ensure prompt clinical recovery and possible complications can thus be avoided. **Objectives:** To study the clinico-microbiological profile of otitis externa. **Materials and Methods:** Clinically diagnosed cases of otitis externa were enrolled in the study and the ear discharge was obtained using pre-sterilized swabs. They were processed for aerobic culture and sensitivity. Drug susceptibility testing was done using Kirby Bauer disc diffusion method. **Results:** Total of 45 patients clinically diagnosed with otitis externa were enrolled in our study. Otitis externa showed fairly equal occurrence among all age groups. Most common presenting complaint after ear discharge was ear pain (65.9%). Out of 45 samples tested, 16 were sterile. Amongst the 29 aerobic isolates, most common causative organisms isolated were *Staphylococcus aureus* (62%) and *Pseudomonas aeruginosa* (24.1%). Antimicrobial profile of Gram negative isolates revealed maximum sensitivity to ciprofloxacin, piperacillin, piperacillin-tazobactam and imipenem. All *S.aureus* isolates were sensitive to vancomycin, teicoplanin & linezolid. **Conclusion:** Continuous and periodic evaluation of microbiological pattern and antibiotic sensitivity of isolates is necessary to decrease the potential risk of complications by early institution of appropriate treatment.

Keywords: Otitis externa, *Pseudomonas aeruginosa*, *Staphylococcus aureus*

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INTRODUCTION

Otitis externa and otomycosis are inflammatory conditions involving the external auditory canal and are usually associated with bacterial and fungal infections of the skin and subcutaneous tissue. Many factors contribute to the risk of developing otitis externa, including diabetes, pre-existing dermatitis, bacterial colonisation, exposure to external factors (swimming, trauma), and previous infections. From the time of its initial description by Mayer in 1844 until World War II, acute otitis externa (AOE) was thought to be a fungal infection. Medical attention was focused on AOE during World War II because of its high incidence among troops in the South Pacific. It is a common disease affecting a

significant proportion of the population. It can be a localized AOE or diffuse OE. Localised AOE (aka 'furuncle') is a staphylococcal infection of the hair follicle. It presents with severe pain and tenderness which is out of proportion to the size of furuncle. Movements of the pinna and jaw are painful. Diabetic patients may show recurrent symptoms.^[1] Diffuse OE is inflammation of the meatal skin which may spread to involve the pinna and epidermal layer of tympanic membrane. It is usually caused by trauma to the meatal skin and invasion by pathogenic organisms. It presents with persistent, severe ear pain and ear discharge. Commonly seen in hot and humid climate and in swimmers, because excessive sweating changes the pH of the

meatus from acidic to alkaline that favours the growth of pathogens. Bacterial causes of OE are *S. aureus*, *Pseudomonas spp.* and *E.coli*. Fungal otitis externa (otomycosis) is mainly caused by *Aspergillus niger*, *A. fumigatus* and *Candida albicans*.¹ The importance of this study lies in the fact that ear infections are diseases of multiple etiologies and their tendency for chronicity and dreaded complications, calls for an early microbiological diagnosis and a prompt and effective treatment. This study has been planned to focus on microbial profile of otitis externa and correlate with the etiological diagnosis. Knowledge of the prevailing flora and their susceptibility to antimicrobials will guide the clinician to prescribe an empirical regimen so that more specific management can be provided.

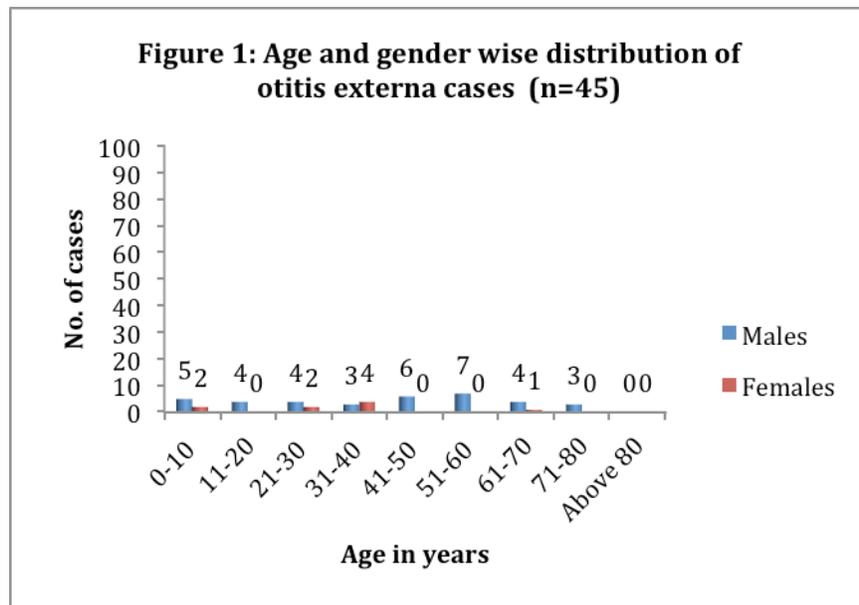
MATERIALS & METHODS

This prospective study was conducted for a period of 1 year (January 2016 to December 2016) in Dayanand Medical College & Hospital, Ludhiana. Patients clinically diagnosed of otitis externa, who did not receive any antimicrobial therapy (topical or systemic) for the last 7 days were included in the study. Ear discharge was obtained from the diseased ear of the patient, using pre-sterilized swabs. Swabs were used for Gram staining & aerobic culture on blood agar (BA) and MacConkey’s agar. The plates were incubated at 37°C for 48 hrs. Organisms were identified using standard procedures. Antimicrobial susceptibility testing of isolates was carried out by Kirby Bauer disc diffusion method on Muller Hinton agar.² Results were interpreted in accordance with central laboratory standards institute (CLSI) guidelines.³ The study was approved by Institutional Ethical Committee.

RESULTS

During 1 year study period, 45 patients clinically diagnosed with otitis externa were enrolled in our study. Out of these 36(80%) were males and 9(20%) females. 36(80%) patients belonged to the

urban and 9(20%) belonged to the rural population. Otitis externa showed fairly equal occurrence among all age groups. Male preponderance was observed in the age group of >40 years, whereas slight female preponderance was in 31-40 years (**Figure 1**). Out of 45, 44 (97.8%) patients had unilateral disease (27 with right ear and 17 with left ear involvement), while only 1 (2.2%) patient had bilateral disease. Most common symptoms after ear discharge were ear pain (65.9%), hearing loss (22.7%), dizziness (11.4%) and feeling of fullness (6.8%). Other symptoms included headache and fever. (**Figure 2**) Majority (44.4%) of the patients presented with mucopurulent ear discharge. Co-morbidities like hypertension and diabetes mellitus was seen in 13.3% and 20% cases respectively. Of the 45 samples received for culture & sensitivity testing, 29(64.4%) yielded positive culture and 16 (35.5%) samples were sterile. All 29 positive samples had monomicrobial growth. On co-relation of direct examination with culture in 45 cases with ear discharge, direct microscopic examination by Gram staining was positive in 36 cases, out of which culture was positive in 29 and negative in 7 cases. Overall Gram staining positivity was 80% and culture positivity was 64.4%. (**Table 1**) Out of 29 isolates obtained, 18 (62%) were Gram positive, 10 (34.4%) were Gram negative & 1(0.3%) was fungal isolate. The most common bacteria isolated were *Staphylococcus aureus*(62%) and *Pseudomonas aeruginosa*(24.1%). One isolate of *Candida tropicalis* was obtained. All isolates of *S.aureus* were sensitive to amikacin, vancomycin, teicoplanin and linezolid and majority (72.3%) showed resistance to penicillin. Isolates showed 93.7% susceptibility to gentamicin, 77.7% to ciprofloxacin, followed by 52.9% sensitivity to co-trimoxazole. Out of the 18 *S.aureus* isolates, 1(5.5%) was Methicillin resistant *Staphylococcus aureus* (MRSA). (**Figure 3**) All *P.aeruginosa* isolates were sensitive to ciprofloxacin, ceftazidime, piperacillin, meropenam, tobramycin and aztreonam, whereas only 71.4% isolates were susceptible to amikacin, imipenam, piperacillin-tazobactam and cefoperazone-sulbactam. (**Figure 4**)



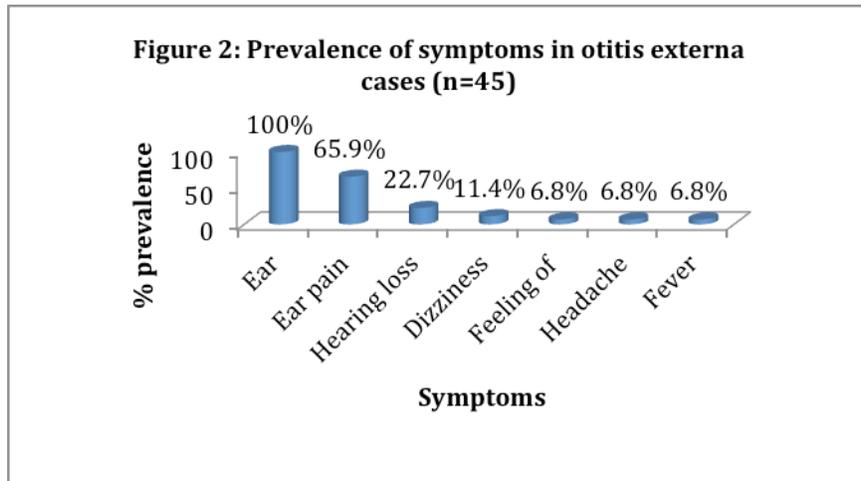
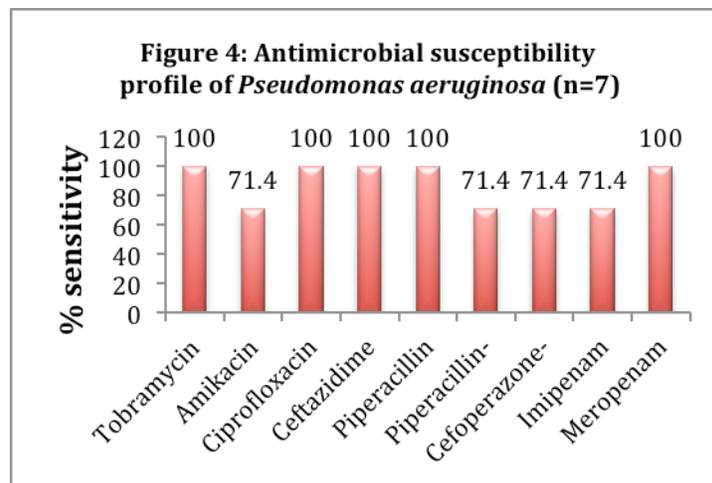


Table 1: Co-relation of direct examination with culture in otitis externa cases (n= 45)

Direct examination	Culture	
	Culture positive (n= 29)	Culture negative (n=16)
Positive (n=36)	29	7
Negative (n=9)	0	9



DISCUSSION

Ear infections are a commonly encountered entity in routine clinical practice. In otitis externa (OE) infection arise from the

external auditory meatus. In our study group, 45 patients with otitis externa were enrolled. There was predominance of otological infections in male patients with a male:female ratio of 4:1. This is in accordance with studies done by Arti Agrawal *et al.*⁴ and Shrestha BL *et al.*⁵ This may be a reflection of the overall male predominance of childhood infections due to anatomic,

behavioral, and differences in personal habits between males and females.⁶ On the contrary, a study from Uttarakhand showed female preponderance with male:female ratio of 1:1.2.⁷ Otitis externa showed fairly equal occurrence among all age groups, which was similar to the findings of a study done in USA⁸ and New Zealand⁹ Geographically, our study comprised more of urban patients (80%) as compared to patients from rural background (20%). This can be due to the fact that our institute is a tertiary care hospital. In our study, overall Gram staining positivity was 80% and aerobic culture positivity was 64.4%. Effectiveness of prior empirical antibiotic therapy, poor technique of obtaining ear swabs and sending swabs when diagnosis is uncertain may account for this finding. The most common presenting symptom in cases with otitis externa after ear discharge was ear pain (65.9%) and the most common isolate was *S.aureus* & *P. aeruginosa*. This is comparable with the study conducted by Rahul Jayakar *et al* on cases of acute otitis externa, where 46.5% isolates were *P. aeruginosa* and 31.9% were *S. aureus*.⁹ Among the 29 culture positive, the most common aerobic bacterial isolate in our study were *Staphylococcus aureus*(62%) and *Pseudomonas aeruginosa*(24.1 %). One case of otomycosis with growth of *Candida tropicalis* was obtained. These results are comparable with clinical studies conducted in 1998 to 2000 throughout the United States, where microbiology specimens were collected from patients diagnosed with acute otitis externa. In their study, among the various microbial isolates, 53% were Gram negative bacteria, 25% were Gram positive cocci and 1.7% were fungi. *P.aeruginosa* (71.3%) was the most common Gram negative isolate and *Staphylococcus epidermidis* (9%) was the most common Gram positive species recovered followed by *S. aureus* (7.5%). Fungi mainly included *Aspergillus* and *Candida* spp.⁸ Comparable results were observed in clinical studies conducted in 1998 to 2000 throughout the United States, where microbiology specimens were collected from 2240 diseased ears diagnosed as acute otitis externa. Among the microbial isolates, 53% were Gram negative bacteria, 25% were Gram positive cocci and 1.7% were fungi. *P.aeruginosa* (71.3%) was the most common Gram negative isolate and *Staphylococcus epidermidis* (9%) was the most common Gram positive species recovered followed by *S. aureus* (7.5%). Fungi mainly included *Aspergillus* and *Candida* spp.⁸ Similar findings were observed in a study conducted between 2007-2011 by Rahul Jayakar *et al*, in which out of the 144 cases of otitis externa, *P. aeruginosa* and *S. aureus* were the most common isolates.⁹ In our study, all isolates of *S.aureus* were sensitive to amikacin, vancomycin, teicoplanin and linezolid and majority (72.3%) showed resistance to penicillin. Isolates showed 93.7% susceptibility to gentamicin, 77.7% to ciprofloxacin, followed by 52.9% sensitivity to co-trimoxazole. Out of the 18 *S.aureus* isolates, 1(5.5%) was MRSA (Methicillin resistant *Staphylococcus aureus*). All *P.aeruginosa* isolates were sensitive to ciprofloxacin, ceftazidime, piperacillin, meropenam, tobramycin and aztreonam, whereas only 71.4% isolates were susceptible to amikacin, imipenam, piperacillin-tazobactam and cefoperazone-sulbactam. Susceptibility profiles of microbial isolates in the study conducted by Roland PS and Stroman DW was also consistent with our findings. In their study, *S. aureus* isolates showed >90% susceptibility to aminoglycosides and fluoroquinolones and all *P.aeruginosa* isolates were susceptible to piperacillin & ciprofloxacin.⁸ In our study, among the topical antibiotics, ciprofloxacin was most commonly prescribed by the ENT physicians in treating ear discharge. Sensitivity to ciprofloxacin was found to be good (>80%). Main advantage of

ciprofloxacin is that it is not ototoxic. Since it is quite effective without possible damage, this quinolone was the best to be prescribed in treating ear infections. Our study also correlates with other studies which show ciprofloxacin to be safe and effective particularly against *P. aeruginosa* and *S. aureus*.^{10,11}

CONCLUSION

- *S.aureus* and *P.aeruginosa* are the most common pathogens isolated in otitis externa.
- Most of them are sensitive to ciprofloxacin. So ciprofloxacin should be chosen as the first line antibiotic to treat OE as it is safer drug with fewer side effects.
- Continuous and periodic evaluation of microbial pattern and antibiotic sensitivity of pathogens causing OE will help to decrease the potential risk of complications.
- Therefore, appropriate use of antibiotics by selection, dosage and duration and public enlightenment for personal hygiene and environmental cleanliness might be helpful in decreasing the disease burden.

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