

Evaluation of Antibiotic Utilization in Otitis Media and Otitis Externa in Tertiary Care Hospital

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ABSTRACT

Background: This present study aimed to determine the current prescribing pattern for otitis media and otitis externa in a tertiary care hospital. **Materials and Methods:** This cross-sectional study involved 120 patients clinically diagnosed with active otitis media and otitis externa. The data source was collected from case reports, treatment charts, and suitably designed documentation forms. **Results:** A total of 296 antibiotics were prescribed, and with respect to class of antibiotics, fluoroquinolones (37.8%) were the most commonly prescribed, followed by aminoglycosides (25.33%). 164 empirical antibiotics were prescribed to 97 patients. There were 132 definitive antibiotics prescribed, with neomycin accounting for 11.82 percent of them. The antibiotics were prescribed as dual therapy in 52 patients (43.33%), followed by triple therapy in 48 patients (40%), and monotherapy in 19 patients (15.83%), whereas one patient was not prescribed any antibiotics. **Conclusion:** The most commonly prescribed antibiotics in our study were fluoroquinolones. The analysis of prescription patterns is essential to improving the utilisation of drugs and should be carried out frequently. The study result aims at focusing attention on the importance of strategies that have to be carried out to rationalise the use of medications in patients with otitis media and otitis externa.

Keywords: Antibiotic utilization, Antibiotics, Otitis media, Otitis externa, Prescribing pattern.

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INTRODUCTION

An inflammation of the ear is called otitis. Otitis externa is an inflammation that only affects the outer ear canal and does not spread past the eardrum, whereas otitis media is an infection of the space filled with air behind the eardrum. It is a significant factor in reversible hearing loss. Labyrinthitis, meningitis, mastoiditis, facial nerve paralysis, and brain abscesses are just a few of the serious, sometimes fatal, side effects that can arise from inadequate therapy.

India was reported to be associated with the highest prevalence of ear infections, with more than 6% experiencing the disorder. The most commonly prescribed drugs (60%) are antibiotics. According to the WHO, antibiotics used against many diseases are losing their effectiveness, and micro-organisms are developing resistance to them due to misuse or overuse. Antibiotic prescribing patterns vary from country to country or even

from region to region due to various factors such as infectious organisms, antibiotic susceptibility, physician preference, and cost. Inappropriate use of antibiotics often leads to an increased frequency of adverse drug reactions, suboptimal treatment, treatment failure, multimodality, and, most importantly, the emergence of antibiotic resistance. Therefore, the present study aimed to evaluate the antibiotic prescribing pattern used in the management of otitis media and otitis externa in the Outpatient (OPD) and Inpatient (IPD) departments at Father Muller Medical College Hospital, Mangalore.

MATERIALS AND METHODS

We conducted a cross-sectional study in a tertiary care hospital from June 1, 2019 to April 30, 2022. The patients diagnosed with otitis media and otitis externa were selected using a convenience sampling technique. AIDS patients were excluded. We collected a detailed clinical history that included age, gender, and previous antibiotic therapy. These data were collected from the patient's profile in MRD and during patient consultations in OPD. Aural toileting was done after otoscopy and microscopic investigations. Microsoft Excel 2019 was used to collect, record, and analyse data. All patients gave their informed consent to take part in



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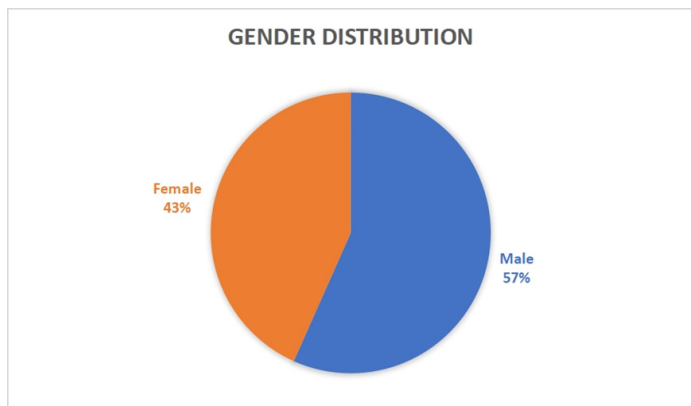
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Table 1: Age Distribution of The Study Population.

Age range (years)	Frequency (n)	Percentage (%)
0-10	28	23.33
10-20	9	7.5
21-30	14	11.66
31-40	18	15
41-50	17	14.16
51-60	19	15.83
>60	15	12.5

Table 2: Distribution of diagnosis.

Diagnosis	Frequency(n)	Percentage (%)
Otitis externa	13	10.83
AOM	21	17.5
COM	2	1.66
ASOM	14	11.66
CSOM	70	58.3
CSOM-AAD	7	10% of CSOM
CSOM-TTD	36	51.4% of CSOM

**Figure 1: Gender Distribution of Study Population.**

the study. The Father Muller institutional committee has ratified the expedited review and approved the research proposal. All pertinent information was examined using SPSS version 23.0. In this study, the statistical analysis used was descriptive and consisted of categorical data analysis. Percentages and frequencies were analysed for categorical independent variables. The median and interquartile range were also used wherever a disproportionately large number was skewing the average. The association between age and the occurrence of disease was statistically analysed using Fisher's exact test. Statistical significance was indicated by a p value of <0.05 .

RESULTS

The study was undertaken at Father Muller Medical College and Hospital, Mangalore, India, and was approved by the IEC. This study was conducted over a period of six months.

Patient case records were reviewed, and a total of 120 subjects were included based on the study criteria and their microbiological investigations. Among 120 ear swabs, 98 (81.6%) were found to be culture-positive and 22 (18.33%) were negative. But every case is managed with antibiotics except one, regardless of culture status.

The patients ages ranged from new-born to 77 years old, with a mean age of 34 years. The incidence of ear infections was high in patients aged new-born to 10 years (23.33%). Table 1 depicts the distinct pattern of disease occurrence across age groups. The association between age and the occurrence of ear infections was found to be statistically significant ($p = 0.041$) using Fisher's exact test.

Male sex predominance was seen in our study, with a male-to-female ratio of 1.3:1. The details are summarised in Figure 1. Out of these 120 patients, 13 were diagnosed with otitis externa and 107 with otitis media. Of these, the majority were diagnosed with CSOM, followed by AOM. A detailed summary is given in Table 2.

Otomicroscopy revealed unilateral disease in the majority of the patients, whereas bilateral disease was found in a few. Sixteen patients had mild-to-severe hearing loss, of whom 13 underwent surgery. Other complications include mastoiditis, myringitis, and facial palsy (Table 3).

Prescription pattern of antibiotics

A total of 296 antibiotics were prescribed, and with respect to class of antibiotics, fluoroquinolones were the most commonly prescribed, followed by aminoglycosides. 164 empirical antibiotics were prescribed to 97 patients. Ciprofloxacin, Neomycin, Cefpodoxime-Proxetil, and Amoxicillin-Clavulanate were the most commonly prescribed antibiotics. The detailed summary is given in Table 4.

There were 132 definitive antibiotics prescribed, with neomycin accounting for 11.82 percent of them. The antibiotics were prescribed as dual therapy in 52 patients (43.33%), followed by triple therapy in 48 patients (40%), and monotherapy in 19 patients (15.83%), whereas one patient was not prescribed any antibiotics.

DISCUSSION

Ear infection is a common disease that is treatable, but if left untreated, it can cause serious complications such as hearing loss, speech disorders, poor quality of life, and a financial burden on the health care system. Ear infections are common in developing

Table 3: Frequency Distribution of Complications.

Complication	Number of patients
Hearing loss	16
Mastoiditis	6
Myringitis	3
Facial palsy	3

Table 4: Most Commonly Prescribed Empirical Antibiotics.

Antibiotics	Frequency	Percentage
Ciprofloxacin	46	28.04%
Neomycin	36	21.95%
Cefpodoxime-Proxetil	27	16.46%
Amoxicillin-Clavulanate	19	11.58%
Polymixin-B	14	8.53%
Ofloxacin	12	7.31%
Cefuroxime	4	2.43%
Gentamicin	2	1.21%
Linezolid	2	1.21%
Cotrimoxazole	1	0.60%
Azithromycin	1	0.60%

countries due to their poor living standards, unsanitary conditions, and lack of adequate nutrition.

Thus, identifying the aetiologies of ear infections and the right antibiotic therapy would help reduce the severity of the infection by recommending the right empirical antibiotics by clinicians, particularly in developing countries.

In addition to these problems, the overprescribing of antibiotics globally has exacerbated the rise in antimicrobial resistance, which is one of the biggest threats to global public health.

In our study, we found the median patient age to be 31.75 (IQR = 39.9). The peak age of disease occurrence was found to be between 0 and 10 years of age. Children under the age of ten were more vulnerable to otitis due to shorter, thinner, and more horizontal Eustachian tubes than adults.¹ Similar result were revealed in Nepal.²

Males were impacted more frequently than females, with a ratio of 1.3:1. Similar results were found in studies conducted by Mangi S *et al.* in Pakistan³ and by Addas F *et al.* in Saudi Arabia,⁴ where male frequency was higher at 57.84% and 63%, respectively. On the contrary, a study conducted in Malaysia by Draman WN *et al.* found female frequency (65%) to be higher. This disparity can be explained by the fact that gender and the occurrence of ear infections are not correlated, as shown by the chi-square test in our study. So, the increased frequency in Malaysia can be explained as a result of random variability.

Otomicroscopy revealed unilateral disease in 104 patients and bilateral disease in 16 patients. A study in Malaysia⁵ showed

similar results. A unilateral ear infection may develop into a bilateral ear infection, causing severe symptoms that require aggressive treatment.⁶

Otitis media was diagnosed in 89.16% of the subjects included in our study, and the remaining 10.83% had otitis externa. CSOM is particularly prevalent in India compared to other developing countries.

CSOM is a particularly prevalent infection in India compared to other developing countries.⁷ It is believed to be a consequence of unresolved Acute Otitis Media (AOM), although how acute infection leads to chronic infection remains largely unclear.⁶ CSOM is a leading cause of hearing impairment, occasionally leading to acute mastoiditis and life-threatening intracranial infections.⁸ The current data suggests ciprofloxacin and cephalosporins should be used cautiously as first-line treatments for CSOM.⁶

Ciprofloxacin was the most commonly prescribed empirical antibiotic in our study; however, a study conducted in Denver⁹ by Berman S., Byrns PJ., *et al.* preferred amoxicillin as the first antibiotic for otitis because this study included only paediatric participants.

The Food and Drug Administration has only approved non-toxic ear drops containing ofloxacin or ciprofloxacin.⁶ The most common topical antibiotics prescribed in this study were neomycin and ciprofloxacin.

For most children diagnosed with AOM, antibiotics are of minimal benefit.¹⁰ For children above 6 months with mild to moderate unilateral AOM, the American Academy of Paediatrics' 2013 guidelines recommend using safety-net antibiotic prescriptions (SNAP; also known as delayed antibiotic prescriptions). SNAPS reduce antibiotic use and also maintain patient satisfaction.¹¹ For most children with AOM, amoxicillin is the drug of choice, which should be taken for 10 days in patients 2 years of age and younger, 7 days for patients between 2 and 5 years of age, and 5-7 days for patients 5 years of age and older. In cases of severe infections, a duration of 10 days is recommended.¹²

Whereas the 2018 National Institute of Health and Care Excellence (UK) recommends no antibiotics or SNAP for the majority of children and focuses on symptomatic relief. If antibiotic use is indicated, then amoxicillin with a duration of 5 to 7 days is recommended.¹³

There were some limitations in this study. The sample size was insufficient, and only a few patients followed up.

CONCLUSION

The current study found that otitis media and externa were common in children aged 0 to 10, with a male predominance. Ciprofloxacin, neomycin, and cefpodoxime-proxetil were the most commonly prescribed antibiotics. Dual therapy was frequently prescribed, and the oral or auricular route was preferred. Analysis of prescription patterns is essential to improving drug utilisation and should be carried out frequently.

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Informed consent

The institutional review board approval was requested and the patients prior consent was obtained.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

WHO: World Health Organization; **MRD:** Medical Records Department; **OPD:** Outpatient Department; **IPD:** Inpatient Department; **AIDS:** Acquired immunodeficiency syndrome; **SPSS:** Statistical Package for the Social Sciences; **IEC:** Institutional Ethics Committee; **CSOM:** Chronic Suppurative Otitis Media; **AOM:** Acute Otitis Media; **IQR:** Interquartile range; **SNAP:** Safety Net Antibiotic Prescription; **COM:** Chronic Otitis Media; **ASOM:** Acute Suppurative Otitis Media; **CSOM-AAD:** Chronic Suppurative Otitis Media-Attico Antral Disease; **CSOM-TTD:** Chronic Suppurative Otitis Media-Tubo-tympanic disease.

SUMMARY

Otitis externa is an inflammation that only affects the outer ear canal and does not spread past the eardrum, whereas otitis media is an infection of the middle ear. The most commonly prescribed drugs (60%) are antibiotics. A total of 296 antibiotics were prescribed, and with respect to class of antibiotics, fluoroquinolones (37.8%) were the most commonly prescribed, followed by aminoglycosides (25.33%). To optimise the use of medications, prescription pattern analysis is crucial and should be done periodically.

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