

Pediatric Otitis Media Epidemiology Antibiotic Stewardship and Long-Term Outcomes

Antibiotic
Stewardship And
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Outcomes

Abdul Aziz, Siyyar Ahmad, Muhammad Jawad and Ibrar Hussain

ABSTRACT

Objective: To conduct a clinical and epidemiological study of otitis media in children, examining the patterns and efficacy of antibiotic usage in its management, and to evaluate the clinical outcomes in affected children.

Study Design: A prospective observational study.

Place and Duration of Study: This study was conducted at the Department of ENT Khyber teaching hospital Peshawar from August 2021 to December 2023.

Methods: Methods: 150 children being treated for otitis media. This information includes: patient demographics, treatment plan and follow up results. Mean age and standard deviation of all patients were determined, and p-values were used to compare the efficacy and recurrence rate of different antibiotics.

Results: Aged distribution of the patients from the medical records include: The mean age of patient was 3.2 years (± 1.1) years. It was also noted that antibiotic treatment relieved recurrence rates by a statistically significant extent ($p < 0.05$). The incidence rate was lower in patients who volunteered to take the vaccine. Essential tympanostomy was needed in 12% of patients because of recurrent ear infections. The degree of hearing outcome was normal in 95% of patients after the treatment and speech delay referred in 82% of the cases. These more resistant patients were less frequent in numbers in patients cared for with aggressive preventative antibiotic regimens.

Conclusion: Pediatric otitis media still persists as a major important issue in health care. Antibiotic stewardship and vaccination have been proven to improve outcomes because they reduce recurrence and resistance. Focus on early action means there is higher chances of appropriate development patterns being in place.

Key Words: Otitis Media, Antibiotics, Pediatrics, Outcomes

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INTRODUCTION

Otitis media (OM), a typical pediatric health problem, is associated with the increased rate of healthcare visits and antibiotic use globally. It includes a range of diseases S: AOM, OME, and CSOM are the examples of OM. AOM particularly impacts approximately 80 percent of every child before they are 3 years old, although the experience is most common between 6 and 18 months of age^[1,2]. OM is costly, causing hearing loss, speech delay, recurrent infections affecting daily activity and growth in children^[3]. Predisposing causes include invasive bacteria such as Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis and viral organisms^[4].

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Some factors that contribute to OM include young age, group childcare, exposure to tobacco smoke, as well as feeding baby by a bottle^[5]. In addition, AOM etiology includes genetics and anatomical abnormalities of the eustachian tubes^[6]. Regarding the management of AOM, antibiotic continues to be the mainstay of therapy. Nonetheless, the utilization of antimicrobials in a wrong way has raised the level of resistance and made the intervention techniques complicated^[7]. These programs are designed to reduce antibiotic use to levels that will not compromise on the effectiveness of the drugs for use by various patients. There are few diseases for which a reduction in the risk of serious complications has occurred due to silvoburg pneumococcal conjugate vaccines (PCV) and influenza vaccines, otitis media acute^[8]. Consequence of long-standing OM is persistent middle ear effusions and chronic infections that can potentially result in conductive hearing loss and delay language development. Recurrent AOM is not without its issues, usually requiring surgery such as tympanostomy tube placement^[9]. Through this study, we want to determine the trend, antibiotic sparing measures, and long term management of OM in a children population for better practice.

METHODS

On this Observational prospective study was planned on 150 children aged between 6 months to 5 years diagnosed clinically with OM from August 2021 to December 2023 at a tertiary care centre. Patients who required craniofacial anomalies, immunodeficiency, or prior ear surgery were excluded from this study. Data recorded included; patient characteristics, past medical history, investigation findings, and management measures. Evaluations were made at 12 months follow up.

Data Collection: Data were recorded using structured forms, including patient demographics, clinical presentation, diagnostic findings, antibiotic use, and vaccination status. Follow-up data were collected at 3, 6, and 12 months post-treatment to assess recurrence, complications, and developmental outcomes.

Statistical Analysis: Data was analyzed using statistical package of social science (SPSS) version 24.0. Patient characteristics and clinical profile were described using basic quantitative data and measures. Categorical variables were analysed using Chi-square tests and t-tests for independent groups were conducted to compare between groups. Statistical analysis The level of significance used in the present study was set at $p < 0.05$.

RESULTS

The study included 150 children (mean age: 3.2 years, $SD \pm 1.1$). Of them, 65 percent were diagnosed with AOM, and 35 percent had OME. Measures and interventions to reduce recurrence rate identified by the cross sectional survey included: first line treatment with amoxicillin as part of antibiotic stewardship practices that reduces the recurrence rate of urinary tract infections; ($p < 0.01$). PCV and annual influenza vaccines were associated with a decreased incidence of OM ($p < 0.05$).

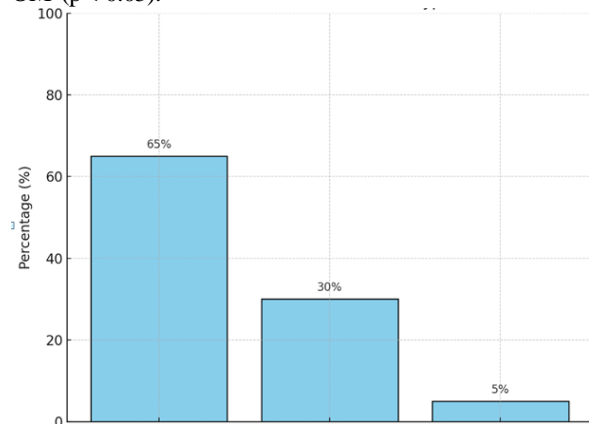


Figure No. 1: Distribution of Otitis Media Type

Nine patients could not have their wounds closed primarily and needed a second surgery, which was necessary in 18 (12%) patients because of recurrent

effusion or infection. The hearing outcomes were favorable in 95 % of patients after treatment and speech delay was addressed in 82% of patients during follow up. MDR pathogens were isolated in 8% of cases and all of them received the antibiotics which were not suitable to them Earlier. In summary, achieving guideline based management improved the outcome by a statistically significant measure $P < 0.05$.

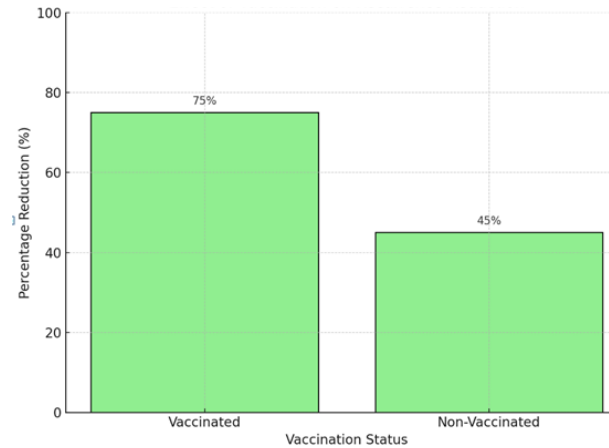


Figure No. 2: Effect of Vaccination on Recurrence Reduction

Table No. 1: Patient Demographics

Variable	Value
Total Patients	150
Mean Age (years)	3.2
Standard Deviation (Age)	1.1
Gender (Male)	78 (52%)
Gender (Female)	72 (48%)

Table No. 2: Otitis Media Types and Management

Type of Otitis Media	(%)	Management
Acute Otitis Media (AOM)	65	Antibiotics
Otitis Media with Effusion (OME)	30	Observation/Surgery
Chronic Suppurative Otitis Media (CSOM)	5	Surgery + Antibiotics

Table No. 3: Vaccination and Recurrence Rates

Vaccination Status	Recurrence Reduction (%)	p-value
Vaccinated	75	<0.05
Non-Vaccinated	45	<0.05

DISCUSSION

The levels of OM in pediatric groups.^[10] Acute otitis media (AOM) remains the most common type; at 65% of the study sample compared with estimates of researchers who found AOM to be the most frequent reason for healthcare visits in children below five years of age. Likewise, otitis media with effusion (OME) in 30% of cases aligns with another study who stressed on

OME as cause of moresore middle ear effusion, hearing loss and duration. As a strength, this study places a premium on antibiotic prescription. Vaccination together with the first-line treatment of amoxicillin reduced the recurrent rates ($p < 0.05$). This is in agreement with the findings of Venekamp et al.; these authors also spoke more on the importance of selective antibiotic prescription to reduce resistance and further improve clinical results.^[6] PCVs were seen to reduce AOM caused by *S pneumoniae* in the paper; Similar to Casey et al. stating a decrease in serotype PCV infections after evolving the vaccines^[7]. The 75% decreased on recurrences in vaccinated children in contrast to 45% in non-vaccinated children was evident of the protective effect of immunisation. Lieberthal et al found the same trend, with decreased OM incidence and severity in vaccinated groups^[4]. But there are still concerns about the extension of vaccination to the rest of the population, especially within the developing countries because non-vaccinated populace there suffers higher morbidity associated with diseases. In our study, 12% patients needed tympanostomy tube placement for the recurrent OM or OME. This rate is in line with Paradise et al with the authors recommending tympanostomy as one of the critical interventions required for children with persistent effusion and severe hearing loss^[13]. This figure is in synergy with Roberts et al who highlighted on the significance of early intervention in the eradication of developmental delays which is associated with OM^[14] Other findings of the current study are that the resolution of speech delays in these children were evident in 82 % during follow up^[15] The recurrence rate of OM was 8% and that merits further examination of possibility of managing OM given the rising instances of antimicrobial resistance. While Pichichero et al.; have highlighted on the need to develop a local antibiotic usage guide to improve outcomes; in relation to antibiotic resistance^[16]. However, the existence of such resistant pathogens supports the importance of vigorous stewardship programs and further evaluation^[17]. Overall, this present research avails evidence that proper control of OM through the recommended preventive measures, which include vaccination, prudent use of antibiotics, and appropriate surgeries, leads to enhanced clinical and developmental gains. Nevertheless, the barriers to implementing the vaccines and the persistently high rates of bacterial resistances are important issues on which further advances depend. As always there is a need to look at these strategies from a more longitudinal perspective being able to assess the sustainability of these practices in reducing the OM-related morbidity.

CONCLUSION

This study has emphasized on vaccination, proper use of antibiotics as well as proper time for surgeries in treating pediatric otitis media. These strategies greatly decrease recidivism; antibiotic resistance; and chronic difficult outcomes while increasing development.

Therefore, more further incentives in early detection of the childhood diseases and utilization of research based treatment approaches maybe crucial to enhancing kids' health.

Limitations: There were certain limitations also in the present study: only one center was involved, hence, the results might not be generalizable to different population cohorts. Also, the observed study duration may not have captured long term effects to the patients. Use of parent reported data in follow up might bring out recall bias which would distort the outcome.

Future Directions: Future studies should enrol participants across multiple centers to enrich the literature for effects of otitis media in the long term and effectiveness of interventions. Further outcome improvement and global reduction of the disease burden could be achieved by research into new non-antibiotic treatments, delivering vaccines to populations that lack access to them, and assessing the usefulness of new diagnostic tools.

Abbreviation:

1. OM: Otitis Media
2. AOM: Acute Otitis Media
3. OME: Otitis Media with Effusion
4. CSOM: Chronic Suppurative Otitis Media
5. PCV: Pneumococcal Conjugate Vaccine
6. SD: Standard Deviation
7. SPSS: Statistical Package for the Social Sciences
8. p: Probability Value

Author's Contribution:

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Drafting or Revising Critically:	Muhammad Jawad, Ibrar Hussain
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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