



IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals

ISSN 2349-7203



Human Journals

Research Article

February 2024 Vol.:30, Issue:2

© All rights are reserved by Dr.G.Srinivasa Rao et al.

Otorhinolaryngological Infections in Children and Challenges of Antibiotic Resistance



**Dr.G.Srinivasa Rao¹, Dr. Adarsh Meher, Nisanth Patri², Dr. P.Ratna Babu³, Dr.Rajkumar Kudari⁴,
Dr. Ahmad Abdul Khabeer⁵, Dr.K.Ravi⁶,
Dr.Raghavendra Rao.M.V⁷**

1. Associate professor, Department of Radiology, Dr. VRK. Women's Medical college Teaching hospital and research centre, Hyderabad, India.
2. Kent University, College of Public Health, Ohio, USA.
3. Assistant Professor, Department of ENT, Siddhardha Medical College, Vijayawada, A P, India
4. Professor, Hindu College of Pharmacy, Guntur, AP, India
5. Professor, Department of ENT, Gandhi Medical College and Hospital, Hyderabad, TS, India
6. Prof and HOD, Department of ENT, Siddhardha Medical College, Vijayawada, A P, India
7. Scientist-Emeritus, and Director of Research, Apollo Institute of Medical Sciences and Research, Jubilee Hills, Hyderabad, Telangana, India

Submitted: 19 January 2024

Accepted: 24 January 2024

Published: 29 February 2024



HUMAN JOURNALS

ijppr.humanjournals.com

Keywords: Sinusitis, acute otitis, tonsillitis, Otorhinolaryngological infections, Antibiotics

ABSTRACT

Sinusitis, acute otitis media and tonsillitis are very frequent in children but are generally treated with antibiotics. Inappropriate use of antibiotics favors the selection, growth and spread of resistant bacteria; these bacteria colonize the airways and affect the entire community. With the emergence of antibiotic-resistant bacteria, respiratory infections have become more difficult to treat. Effective strategies are needed to restrict the use of antibiotics without harming children that truly need these drugs To reduce the need for antibiotics, more and more attention is paid to the preparation to increases the body's resistance to bacterial infection. Otorhinolaryngological infections are very common in adults and in children also. These infections are caused by various microorganisms and to treat these infections, antimicrobial agents are used frequently. As irrational use of antimicrobials leads to the development of antibiotic resistance and it is a big threat to society.

Aim: To study the prescription pattern of antimicrobial agents in outpatient department of otorhinolaryngology in a tertiary care teaching hospital. The present study was planned to get awareness among practitioners regarding the antimicrobial prescription pattern. **Background:** Otolaryngology is a medical specialty that treats conditions of ear nose throat head and neck. It includes diagnosis and treatment for hearing loss, ear infection, balance disorders, sinus problems, voice, speech and more. Acute otitis media, Sinusitis and tonsillitis are very frequent in children. Most of these infections are caused by viruses, but are generally treated with antibiotics. Inappropriate use of antibiotics favours the selection, growth and spread of resistant bacteria; these bacteria colonize the airways and affect the entire community. With the emergence of antibiotic-resistant bacteria, respiratory infections have become more difficult to treat. Effective strategies are needed to restrict the use of antibiotics without harming children that truly need these drugs. Acute otitis media (AOM) starts as viral, later becoming bacterial. Predisposing factors and stages mirror those of acute suppurative otitis media. Treatment involves antibiotics, decongestants, analgesics, ear cleaning, and myringotomy. Chronic suppurative otitis media (CSOM) with tympanic membrane perforation requires thorough evaluation. Treatment involves cleaning, antibiotics, and addressing contributing factors like adenoids. Surgical options include tympanoplasty.

Summary: The common path symptomatic conditions of otorhinolaryngology are mostly allergic IgE mediating conditions followed by viral, bacterial, or fungal invasion. The most common is viral invasion because declining the immunity of the individual. Common such conditions are Allergic Rhinitis, acute pharyngitis, Maxillary sinusitis, sensorineural sudden hearing loss in children due to acute viral infection etc.

INTRODUCTION

Infectious diseases in the field of ENT affect various age groups and represent a major problem for public health, since they include a wide spectrum of diseases, which range from self-limiting or mild clinical pictures to severe or fatal ones, featuring complications and morbidity, which compromise fundamental physiological functions such as hearing, smell, taste, phonation and breathing and may cause permanent disabilities (1) The high frequency of ENT infections demands investments in public health, because these diseases have an effect both on the organization of health services, in terms of access to treatment and availability of ENT specialists, and on the consumption of economic and pharmaceutical resources due in part to antibiotics (2,3 ENT is one of the areas where use and misuse of antibiotic treatment has resulted in enormous issues relating to antibiotic resistance and increasing complexity of medical management of more resistant and more virulent pathogens (4).

Loading of infectious diseases in the head and neck area is not uniformly distributed on a world level and it is higher in low-income countries, because of scarcity of ENT specialists, higher prevalence and severity of the infections, disorders of the immune system (HIV, malnutrition) (5).

It is currently estimated that 328 million adults and 32 million children (equal to approximately 5.3% of the world's population) live with an invalidating hearing loss and that approximately 15% of the world's population is affected by various degrees of hearing impairment (6).

Prevalence of people affected by hearing loss on a world level is not uniform: in high-income countries, prevalence is low (0.5% in children and 4.4% in adults), while in the African and Asian Regions, greater impact may be found (7).

The WHO includes among the principal causes of deafness chronic ear infections, rubella, measles, parotitis and meningitis and estimates that up to 60% of hearing impairment in infancy could be avoided by paying specific attention to issues linked to childbirth (17%), use of ototoxic drugs (4%) or to other causes (8%) and using prevention of the above-mentioned infections (31%) (8).

Upper respiratory tract infection diseases, such as influenza, acute tonsillitis, acute sinusitis and acute otitis media, usually initiate with a symptom of fever. (9)

The microorganisms that cause acute otitis media (AOM) are by *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Staphylococcus aureus*, the antimicrobial resistance data focuses mainly on *Streptococcus pneumoniae*, with limited data on other microorganisms (10).

In order to reduce antibiotic resistance, different guidelines on AOM management encourage a watchful waiting approach rather than immediate antibiotic treatment (11).

However, over-treatment with antibiotics and inaccurate dosing are still reported (12,13).

Key bacterial pathogens implicated in OM include *Haemophilus influenzae*, *Moraxella catarrhalis*, *Escherichia coli*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Streptococcus pneumoniae*, and *Streptococcus pyogenes* (14,15).

A comprehensive observational study was conducted at the ENT Outpatient Department (OPD) of SMC Vijayawada over 8 months from July 2022 to February 2023. The study aimed to analyze prescription patterns, patient demographics, and the impact of antibiotic usage on various ENT diseases.

Materials and Methods: Unveiling Prescription Practices in ENT Outpatient Care

Study Setting and Duration:

The study was conducted at the ENT Outpatient Department (OPD) of SMC Vijayawada over an extensive period of 8 months, commencing from July 2022 to February 2023. This duration was chosen to capture seasonal variations and provide a holistic understanding of prescription patterns.

Data Collection:

During the study, meticulous data collection took place, encompassing 260 patient prescriptions. Patient details, including age, were documented, along with information on probable diagnoses and specific medication details such as generic names, doses, and dosage forms. This comprehensive dataset aimed to facilitate a thorough analysis of prescription practices in the ENT OPD.

Data Analysis:

The collected data underwent a robust analysis using descriptive statistical methods. The mean age, standard deviation, minimum, and maximum values were computed to offer insights into the age distribution of the patients. The analysis also included a breakdown of prescription patterns by treatment type, gender, antibiotic resistance, and specific antibiotics prescribed.

Table of treatment type by gender			
Treatment type	Male	Female	Total
Immediate	59 (22.69%)	80 (30.77%)	139 (53.46%)
Wait and watch	43 (16.54%)	78 (30%)	121 (46.54%)
Total	102 (39.23%)	158 (60.77%)	260

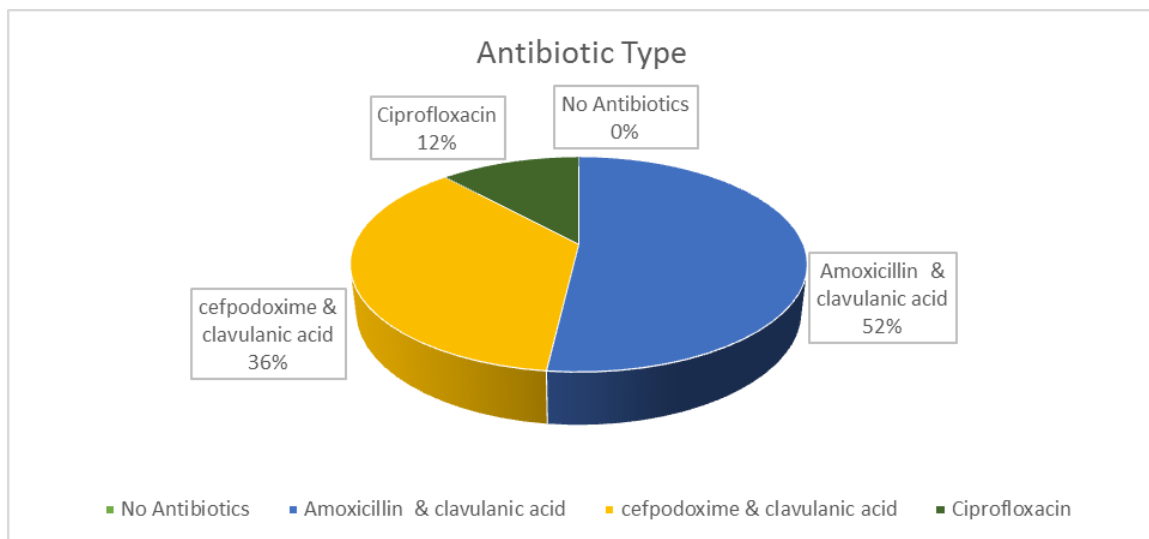
Table of treatment type by Resistance			
Treatment type	No Resistance	Resistance	Total
Immediate	66 (25.38%)	73 (28.08)	139 (53.46%)
Wait and watch	94 (36.15%)	27 (10.38%)	121 (46.54%)
Total	160 (61.54%)	100 (38.46%)	260

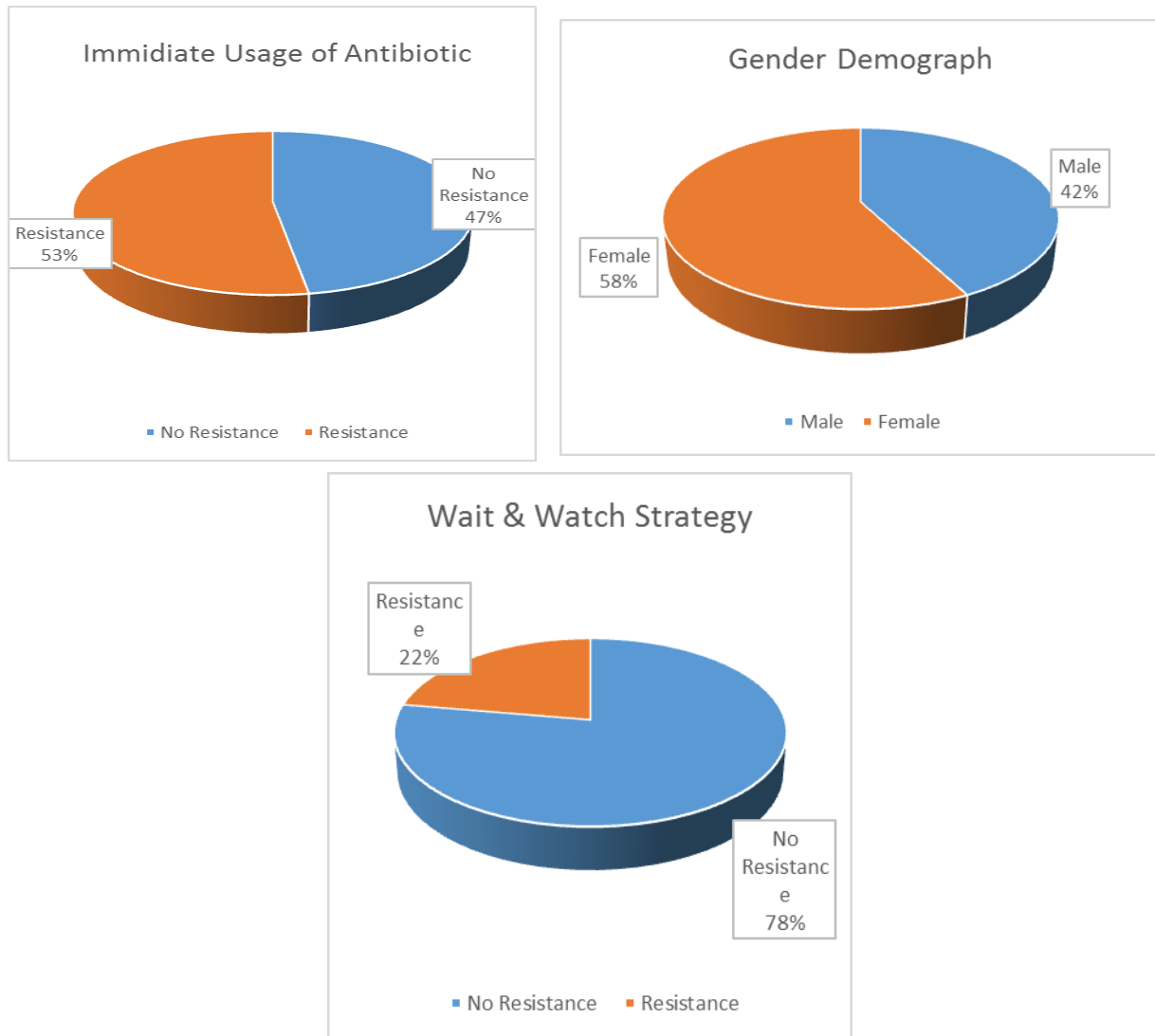
Table of Antibiotics by Resistance			
Antibiotics	No Resistance	Resistance	Total
No Antibiotics	0 (0%)	1 (0.38%)	1 (0.38%)
Amoxicillin & clavulanic acid	83 (31.92%)	27 (21.54%)	139 (53.46%)
cefepodoxime & clavulanic acid	58 (22.31%)	30 (11.54%)	88 (33.85%)
Ciprofloxacin	19 (7.31%)	13 (5%)	32 (12.31%)
Total	160 (61.54%)	100 (38.46%)	260

Table of Antibiotics by Disease					
Antibiotics	Sinusitis	AOM	Tonsillitis	Pharyngitis	Total
No Antibiotics	1 (0.38%)	0 (0%)	0 (0%)	0 (0%)	1 (0.38%)
Amoxicillin & clavulanic acid	31 (11.92%)	23 (8.85%)	20 (7.69%)	65 (25%)	139 (53.46%)
cefepodoxime & clavulanic acid	20 (7.69%)	11 (4.23%)	18 (6.92%)	39 (15%)	88 (33.85%)
Ciprofloxacin	6 (2.31%)	14 (5.38%)	4 (1.54%)	8 (3.08%)	32 (12.31%)
Total	58 (22.31%)	48 (18.46%)	42 (16.15%)	112 (43.08%)	260

Patient Demographics:

The average age of the patients was found to be 10.83 years, with a standard deviation of 4.01. The age range spanned from 4 to 18 years, highlighting the prevalence of ENT issues in the paediatric population.





Prescription Trends:

Treatment types were categorized into 'Immediate' and 'Wait and watch.' The analysis revealed that 53.46% of patients received immediate treatment, while 46.54% adopted a more conservative wait-and-watch approach.

Antibiotic Resistance Analysis:

Antibiotic resistance was a critical aspect studied. A total of 38.46% of patients exhibited resistance. The immediate treatment group showed a higher resistance rate (28.08%) compared to the wait-and-watch group (10.38%).

Antibiotic Prescriptions:

The study delved into specific antibiotics prescribed, revealing that Amoxicillin and clavulanic Acid dominated prescriptions (53.46%), followed by Cefpodoxime & Clavulanic

Acid (33.85%) and Ciprofloxacin (12.31%). These findings highlighted prevalent prescription patterns and potential areas for intervention.

Disease-specific Antibiotic Usage:

Antibiotic prescriptions were further dissected based on specific ENT diseases, including Sinusitis, AOM, Tonsillitis, and Pharyngitis. Amoxicillin and clavulanic Acid were consistently prevalent across all diseases, reflecting a uniform approach to antibiotic selection.

Odds Ratio			
Development of resistance	Odds ratio	95% Wald Confidence Limits	
Immediate antibiotic usage vs. wait and watch	3.85	2.23	6.62

Odds Ratio Estimates:

The Odds Ratio (OR) for "Development of resistance" comparing "Immediate antibiotic usage vs. wait and watch" is 3.85, with 95% Wald Confidence Limits of 2.23 to 6.62. An OR of 3.85 indicates that the odds of developing resistance are 3.85 times higher among patients who received immediate antibiotic treatment compared to those who adopted a wait-and-watch approach. This suggests a significant association between immediate antibiotic usage and the development of resistance. The 95% Wald Confidence Interval provides a range within which we can be reasonably confident that the true odds ratio lies. In this case, the interval ranges from 2.23 to 6.62. Since the interval does not include 1, it suggests a statistically significant association.

Discussion

Clinical Implications:

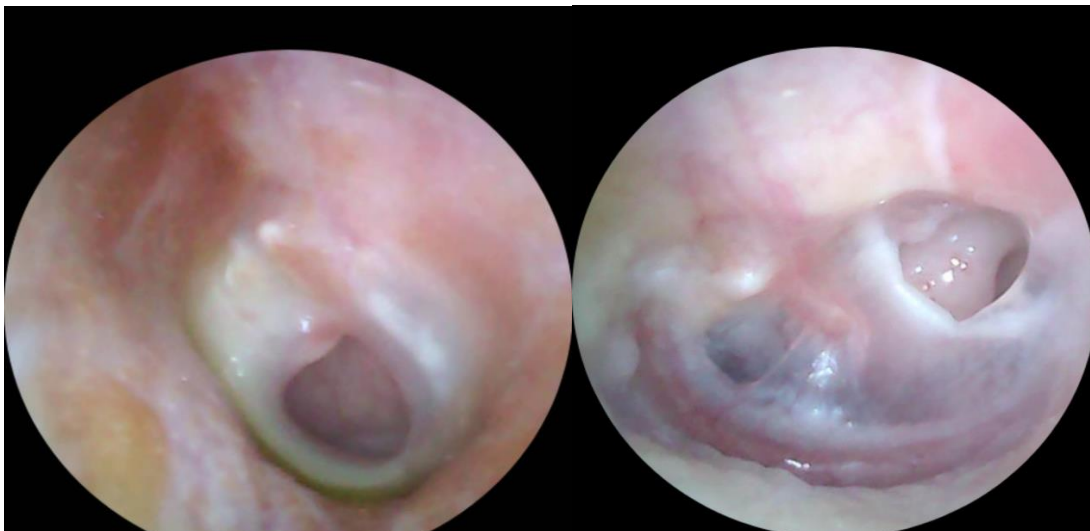
The findings underscore the potential risk associated with immediate antibiotic usage in terms of the development of resistance. Healthcare providers should consider this information when making treatment decisions, emphasizing the importance of judicious antibiotic prescribing to minimize the risk of resistance. Understanding the association between immediate antibiotic usage and resistance development contributes to broader discussions on antimicrobial

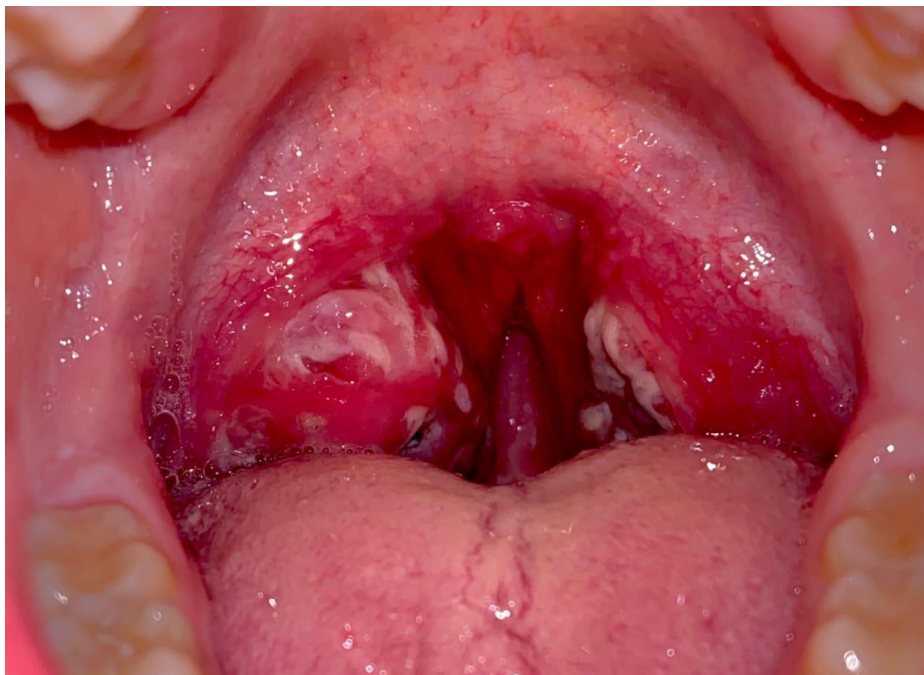
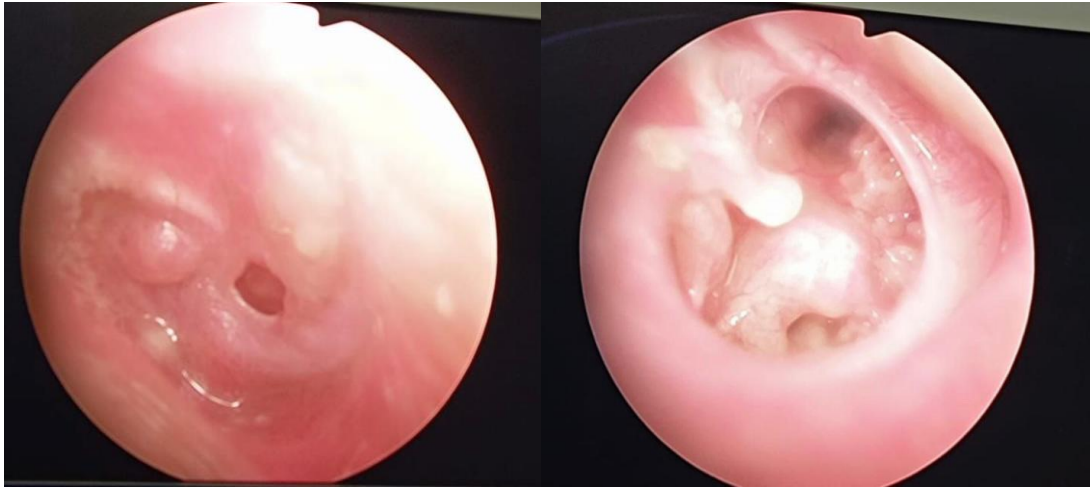
stewardship. It highlights the need for policies and practices that encourage responsible antibiotic prescribing to mitigate the growing global concern of antibiotic resistance.

ENT diseases are aggravated in the present era, increasing day by day, mainly due to atmospheric pollution, air water, sound pollution, leads to inequality/imbalance maintenance of ecosystem of the nature. But not least unnecessary dumping of anti-microsomal agents- Antibiotics. Which also damages not only harmful bacteria or pathogens and also commensal bacteria which maintains our body Ecosystem. Antibiotics are being prescribed indiscriminately. Indiscriminate use of antibiotics can breed to resistance. A thorough clinical examination to assess if it requires any antibiotics or not rather than starting antibiotics as a routine for every patient coz not all patients require antibiotics. Viral infections present differently such as quick onset, watery rhinorrhoea, and show seasonal incidence such as cases should not be advised antibiotics. In case of seasonal flu, we need to know which is the organism and based on the organism, antibiotics should be prescribed. In chronic infection cases c/s. Duration of any antibiotics should be at least 7 days otherwise would lead to resistance. Avoiding double antibiotics and triple antibiotics is an important step to avoid resistance.

Images

Endoscopic pictures of ear showing tympanic membrane perforation and pus





Acute pharyngitis with posterior pharyngeal wall granulations



Acute pharyngio-tonsiliti

Conflict of interest

There is no conflict of interest between the authors of the manuscript.

Conclusion:

The study shed light on the prevalent patterns of antibiotic prescriptions in the ENT OPD, emphasizing the importance of avoiding indiscriminate antibiotic use. The findings advocate for a thorough clinical examination to determine the necessity of antibiotics, considering factors such as age, gender, disease type, and potential resistance risks. Implementing a more targeted and personalized approach to ENT treatment can contribute to the effective management of these conditions and mitigate the growing concern of antibiotic resistance.

REFERENCES

1. Aljehani MJA, Alrasheed SK, Ahmed HM, et al. The prevalence and attitude of ear nose throat (ent) infections/problems among medical students. Taibah University, Al-madinah Al-munawara, Kingdom of Saudi Arabia (KSA). *Int J Adv Res* 2016;4:751-9. doi:10.21474/IJAR1/2456 [Google Scholar]

2. Emerson LP, Job A, Abraham V. A model for the provision of ENT health care service at primary and secondary hospital level in a developing country. *Biomed Res Int* 2013;2013:562643. doi: 10.1155/2013/562643. [PMC free article] [PubMed] [Google Scholar]
3. DeAntonio R, Yarzabal JP, Cruz JP, et al. Epidemiology of otitis media in children from developing countries: a systematic review. *Int J Pediatr Otorhinolaryngol* 2016;85:65-74.[PubMed] [Google Scholar]
4. Naples J, Schwartz M, Eisen M. Reemergence of the natural history of otolaryngologic infections: lessons learned from 2 american presidents. *Otolaryngol Head Neck Surg* 2017;157:462-5. [PubMed] [Google Scholar]
5. Magill AJ, Hill DR, Solomon T, et al. Hunter's tropical medicine and emerging infectious diseases. 9th ed. Amsterdam: Saunders Elsevier; 2013. [Google Scholar]
6. World Health Organization (WHO). Multi-country assessment of national capacity to provide hearing care. Available at: http://www.who.int/pbd/publications/WHOREportHearingCare_Englishweb.pdf. Accessed: 18 July 2017.
7. World Health Organization (WHO). WHO global estimates on prevalence of hearing loss. Mortality and burden of diseases and prevention of blindness and deafness WHO, 2012. Available at: http://www.who.int/pbd/deafness/WHO_GE_HL.pdf?ua=1. Accessed: 18 July 2017
8. World Health Organization (WHO). 3 March 2017: World Hearing Day. Prevention of blindness and deafness - Presentation - Key messages. Available at: <http://www.who.int/pbd/deafness/world-hearing-day/WorldHearingDay2017KeyMessagesOverview.pdf?ua=1>. Accessed: 18 July 2017
9. The National Health and Family Planning Commission of the People Republic of China. The Prevention and Control Standards of Airborne Transmitted Nosocomial Infection; 2016. <http://www.whcdc.org/wcs/Upload/201808/5b84eeb4d8b5b.pdf>.
10. DeAntonio R., Yarzabal J.P., Cruz J.P., Schmidt J.E., Kleijnen J. Epidemiology of otitis media in children from developing countries: A systematic review. *Int. J. Pediatr. Otorhinolaryngol.* 2016;85:65–74.
11. Suzuki H.G., Dewez J.E., Nijman R.G., Yeung S. Clinical practice guidelines for acute otitis media in children: A systematic review and appraisal of European national guidelines. *BMJ Open.* 2020;10:e035343. doi: 10.1136/bmjopen-2019-035343. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
12. Marom T., Bobrow M., Eviatar E., Oron Y., Ovnat Tamir S. Adherence to acute otitis media diagnosis and treatment guidelines among Israeli otolaryngologists. *Int. J. Pediatr. Otorhinolaryngol.* 2017;95:63–68. doi: 10.1016/j.ijporl.2017.02.003. [PubMed] [CrossRef] [Google Scholar]
13. Shviro-Roseman N., Reuveni H., Gazala E., Leibovitz E. Adherence to acute otitis media treatment guidelines among primary health care providers in Israel. *Braz. J. Infect. Dis.* 2014;18:355–359. doi: 10.1016/j.bjid.2013.11.007.
14. Appiah-Korang L, Asare-Gyasi S, Yawson AE, Searyoh K. Aetiological agents of ear discharge: a two year review in a teaching hospital in Ghana. *Ghana Med J.* 2014;48:91-95.
15. Gisselsson-Solén M, Henriksson G, Hermansson A, Melhus A. Risk factors for carriage of AOM pathogens during the first 3 years of life in children with early onset of acute otitis media. *Acta Otolaryngol.* 2014;134:684-690.