Section: Pharmacology

Original Research Article

PRESCRIPTION PATTERN OF ANTIMICROBIAL AGENTS IN THE DEPARTMENT OF OTORHINOLARYNGOLOGY IN A RURAL TERTIARY CARE TEACHING HOSPITAL

Pamarthi Sanjana[1], Madhavi Nekkalapu[2], Kadiyala Venkata Sahitya[3], Supriya Priyambada[4]

[1]IInd year MBBS, Dr Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Chinna Avutapalli, Andhra Pradesh, India
[2]Assistant Professor, Department of Pharmacology, Dr Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Chinna Avutapalli, Andhra Pradesh, India
[3]Assistant Professor, Department of Pharmacology, Kamineni Academy of Medical Sciences and Research Centre, L B Nagar, Hyderabad, Telangana.
[4]Professor &Head, Department of Pharmacology, Dr Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Chinna Avutapalli, Andhra Pradesh, India

Received : 23/03/2024
Received in revised form : 16/05/2024
Accepted : 01/06/2024

Keywords:
Prescription pattern, Antimicrobials, ENT

Corresponding Author:
Dr. Madhavi Nekkalapu,
Email: mnekkalapu@gmail.com

DOI: 10.47009/jamp.2024.6.3.61

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (3); 289-294

Abstract

Antimicrobial agents are frequently prescribed for ENT problems. However, the overuse of antibiotics and other antimicrobials contributes to drug resistance. Although antimicrobial resistance is a natural process, irrational antimicrobial usage, such as in nonbacterial infections, inadequate dosage, and improper route, leads to ineffective treatment, prolonged illness, increased adverse drug reactions, suboptimal therapy, therapeutic failure, and polypharmacy, ultimately resulting in increased medical costs and the emergence of antimicrobial resistance.

Patients attending the ENT department with both sex and all age groups were included in the study. The collected parameters included demographic data, clinical diagnosis, co-morbidities, type of infection, class of antimicrobial agent's prescribed, individual drugs of the class, their generic/branded names, type of therapy (mono/dual/triple therapy), choice of antimicrobial agent in co-morbid conditions, and average number of antimicrobial agents per prescription.

Patients attending the ENT department are broadly grouped into children and adults, i.e., those aged <18 years and those aged 18 years and above. This includes a total of 58 children (<18) and 222 adults (≥18). Regarding age groups, the maximum number of prescriptions belonged to the age group of 21-30 years (24.2%), followed by the age group of 11-20 years (16.8%).

The study observed a total of 419 drugs prescribed, with an average of 1.5 drugs per prescription. The study indicates that the maximum number of patients are suffering from ear infections (47.1%), followed by nose (23.6%), throat (21.8%), and other conditions (7.5%). The others category encompasses swellings below or in front of the ear, ceruminous adenoma, carcinomas, and certain procedures. Patients have co-morbidities such as diabetes mellitus, hypertension, hypothyroidism, migraine, and asthma.

The breakdown of prescribed antimicrobial agents includes beta-lactam antibiotics, azole antifungals, aminoglycosides, fluoroquinolones, and others such as metronidazole, chloramphenicol, and fusidic acid. These agents encompass third-generation cephalosporins, penicillins, carbapenems, fluoroquinolones, aminoglycosides, azole antifungals, and others.

Out of 280 patients, 181 (64.6%) were treated with a single drug, while 99 (35.4%) were prescribed two or more drugs. Consequently, third-generation cephalosporin antibiotics were commonly administered orally in tablet form for various acute and chronic ENT diseases. The majority of prescribed drugs were listed in the National List of Essential Medicines. Brand prescribing prevailed over generic names.

INTRODUCTION

Otorhinolaryngological infections are prevalent among both children and adults, arising from various microorganisms such as bacteria, fungi, and viruses. While upper respiratory tract infections like rhinopharyngitis, pharyngitis, tonsillitis, and otitis media are often viral, they may require antimicrobial treatment if complicated by secondary infections like acute otitis media with effusion, sinusitis, or tonsillitis.[1,2] Consequently, antimicrobial agents are frequently prescribed for these conditions. However, the overuse of antibiotics and other antimicrobials contributes to drug resistance, enabling bacteria to evolve into "superbugs" resistant to these medicines. Antimicrobial resistance is a significant global health concern, leading to nearly five million deaths annually from bacterial infections alone. Compounded by insufficient investment in research and development for new antimicrobials, this issue has prompted the World Health Organization to recognize antimicrobial resistance as one of the top 10 global public health threats.[2]

Antimicrobial resistance is rising tremendously and poses a major threat to healthcare worldwide. Although antimicrobial resistance is a natural process, irrational antimicrobial usage, such as in nonbacterial infections, inadequate dosage, and improper route, leads to ineffective treatment, prolonged illness, increased adverse drug reactions, suboptimal therapy, therapeutic failure, and polypharmacy, ultimately resulting in increased medical costs and the emergence of antimicrobial resistance.[3] CDC reports antibiotic prescriptions can be appropriate when risks for bacterial or fungal infections are unknown but put patients at risk for side effects and create a pathway for resistance to develop. Antimicrobial prescription patterns differ depending on antimicrobial susceptibility, infecting organisms, physician preference, and costs.[4] A pattern of antimicrobial resistance often follows local patterns of antibiotic prescribing and usage. The irrational and persistent use of antimicrobials may lead to a post-antibiotic era in which even mild infections can be lethal. India, among other countries with a high burden of infectious diseases, contributes to increased consumption of antimicrobials, fueling the development of antimicrobial resistance. Therefore, it is imperative to collect, monitor, and evaluate antimicrobial prescribing patterns and usage periodically from various regions in India.[5]

Periodic data collection and analysis of antimicrobial prescriptions at the regional level are essential to understand and combat antimicrobial resistance.[6] Small-scale studies like this are useful to report the rational usage of antimicrobials. Periodic data collection through small-scale studies helps understand patterns of microbial susceptibility and resistance to various antimicrobials and aids in prescribing antimicrobials rationally for the benefit of patients and the healthcare system as a whole.[7]

MATERIALS AND METHODS

Study Design: Prospective cross-sectional observational study.

Study Location: Dr Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation, ChinnaAvutapalli, Andhra Pradesh.

Ethical Considerations: Study was approved by Institutional Ethics Committee. Voluntary Informed consent was obtained from the patient and from the parent.

Study Duration: A period of 6 months

Study Population: Patients attending the Otorhinolaryngology (ENT) department.

Sample Size: Consecutive sampling method was used. During the period a total of 280 prescriptions were taken as sample size.

Inclusion Criteria

The study includes all the patients of either sex attending the department of ENT. Patients to participate and give voluntary consent are included in the study.

Exclusion Criteria

The study does not include pregnant women lactating females, critically ill patients and psychiatric patients.

Data Collection Procedures: A detailed data collection form was used, which includes the Patient's demographics, diagnosis, co morbidities, prescribed medication details (generic name, dose, dosage form).

Data Collection Instruments: The data was collected in excel sheet, following parameters were collected during the study: Demographic data (age, sex), clinical diagnosis, Co morbidities (if any), type of infection, class of anti-microbial agents prescribed, individual drugs of the class, their generic/branded name, type of therapy includes monotherapy/ dual therapy/triple therapy, Choice of Antimicrobial agent in co-morbid conditions and average number of antimicrobial agents per prescription.[8-10]

Statistical Tools: Descriptive statistical analysis was done by using Excel. Data was represented in the form of percentage, frequency and mean by using appropriate tables. Results were presented by using appropriate diagrams such as pie-charts, line/bar diagram. The prescriptions were obtained from the patients during their visit to the ENT department.

RESULTS

Patients attending the ENT department are broadly grouped into children and adults, i.e., those aged <18 years and those aged 18 years and above. This includes a total of 58 children (<18) and 222 adults (≥18). Regarding age groups, the maximum number

ISSN (O): 2687-5365; ISSN (P): 2753-6556

of prescriptions belonged to the age group of 21-30 years (24.2%), followed by the age group of 11-20 years (16.8%). [Table 1,2]

The study indicates that the maximum number of patients are suffering from ear infections (47.1%), followed by nose (23.6%), throat (21.8%), and other conditions (7.5%). The "others" category encompasses swellings below or in front of the ear, ceruminous adenoma, carcinomas, and certain procedures. [Figure 1]

Out of the 280 patients attending the department, a total of 34 (12.1%) patients have co-morbidities such as diabetes mellitus, hypertension, hypothyroidism, migraine, and asthma. [Table 3]

In the evaluation of 280 prescriptions, a very small proportion (<1%) were prescribed using generic or nonproprietary names. The majority of prescriptions consisted of Fixed Dose Combinations (FDCs), all of which were from the national essential medicines list. All prescriptions were complete in terms of diagnosis, route of administration, duration of therapy, and dosage forms of the drugs. The study observed a total of 419 drugs prescribed, with an average of 1.5 drugs per prescription.

In terms of dosage forms, the majority of prescribed drugs were oral, followed by topical and injectable. A total of 14.6% of prescriptions included a combination of oral and topical drugs, while 2.5% included a combination of oral and injectable medications. [Figure 3]

Antibiotics prescribed: In the present study, a total of 419 antimicrobial agents were prescribed. The majority of drugs were administered orally (210). The most common orally administered Fixed Dose Combination (FDC) was cefpodoxime + clavulanic acid (Tablet Polypod CV). For topical use, the most common FDC was Neomycin + Clotrimazole (Otobiotic ear drops). The most frequently prescribed injectable antimicrobial was Ceftriaxone (inj. Gentrax).

The breakdown of antimicrobial agents prescribed is as follows: Beta-lactam antibiotics: 206, azole antifungals: 88, Aminoglycosides: 86, Fluoroquinolones: 32, Others (including metronidazole, chloramphenicol, fusidic acid): 6

These antimicrobial agents include third-generation cephalosporins, penicillins, carbapenems, fluoroquinolones, aminoglycosides, azole antifungals, and others. [Table 4]

Among third-generation cephalosporins, cefpodoxime (84.3%) is the most commonly prescribed antimicrobial, followed by ceftriaxone (13.1%), cefoperazone (2%), and cefixime (0.6%). In the category of azole antifungals, clotrimazole (97.7%) is more frequently prescribed than fluconazole (0.3%). For aminoglycosides, topical neomycin is the most prescribed (89%). Among fluoroquinolones, levofloxacin (84.4%) is more commonly prescribed than ciprofloxacin (15.6%) [Figure 4].

Out of 280 patients, a total of 181(64.6%) were treated with a single drug and 99(35.4%) were prescribed two or more drugs. [Table 6]

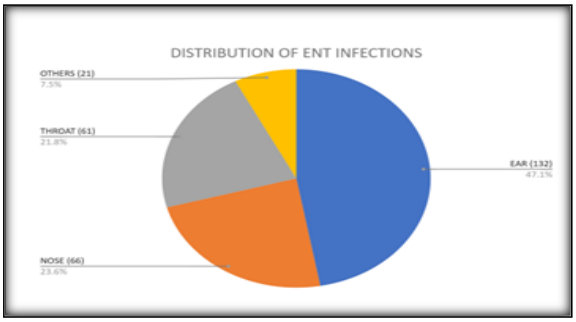

Figure 1: Distribution of patients based on ENT disease

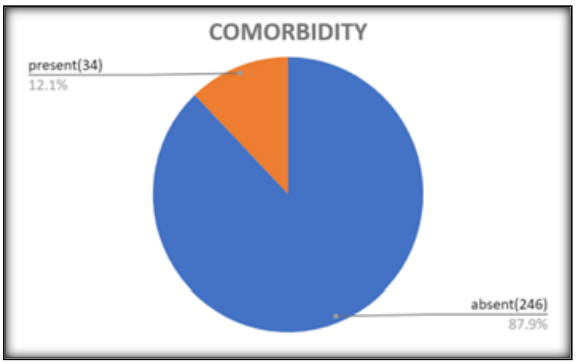

Figure 2: Distribution of patients with comorbid conditions

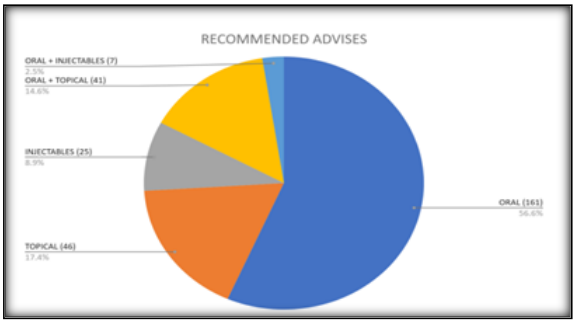

Figure 3: Route of drugs prescribed.

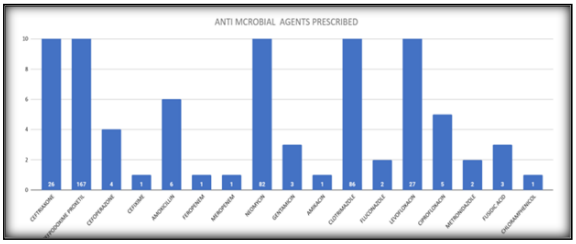

Figure 4: Antimicrobial agent prescribed

Table 1: Age & Sex wise distribution of patients

Age	Age in years								
	<1	1-10	11-20	21-30	31-40	41-50	51-60	61-70	>70
Male	6	17	18	25	20	15	18	10	6

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Female	0	7	29	43	11	26	20	7	2
Total	6	24	47	68	31	41	38	17	8
%	2.1	8.6	16.8	24.2	11.3	14.6	13.6	6	2.8

Table 2: Grouping of patients into children (=18 years).

	<18 years	>18 Years
Male	39	96
Female	19	126
Total	58	222
%	20.7	79.3

Table 3: Co-morbidity and prescribed antimicrobial

Co morbidity	No of patients	Prescribed antimicrobial
Diabetes mellitus	13	Cefpodoxime
Hypertension	9	Cefpodoxime & Levofloxacin
Hypothyroidism	9	Cefpodoxime
Asthma.	2	Cefpodoxime
Migraine	1	Cefpodoxime
Total	34	

Table 4: Class of anti-microbial agent

Class of anti-microbial agent	No of prescriptions
3rd Generation Cephalosporins	
Ceftrizxone	26
CEFPODOXIME PROXETIL	167
CEFOPERAZONE	4
CEFIXIME	1
PENICILLINS	
Amoxicillin	6
CARBAPENEMS	
Feropenem	1
Meropenem	1
AMINOGLYCOSIDES	
Neomycin	82
Gentamycin	3
Amikacin	1
AZOLE ANTIFUNGAL	
Clotrimazole	86
Fluconazole	2
FLUOROQUINOLONES	
Levofloxacin	27
Ciprofloxacin	5
Others	
Metronidazole	2
Fusidic acid	3
Chloramphenicol	1

Table 5: Highest prescribed drug in different route of drug

Route	Drug	No of prescriptions	%
Oral	Cefpodoxime	130	46.4
Topical	Neomycin, Clotrimazole	46	16.4
injectable	Cetrizxone	20	7.1

Table 6: Type of therapy

Type of therapy	No of prescriptions	%
Monotherapy	181	65
Dual therapy	59	21
Triple therapy	40	14

DISCUSSION

The prescription patterns observed in this study shed light on the rational usage of antimicrobial agents in the department of oto-rhinolaryngology (ENT) at a rural tertiary care teaching hospital. Analyzing 280 prescriptions, demographic data revealed a higher prevalence of ENT diseases among female patients compared to male patients, with 52% females and 48% males. This trend mirrors findings from a study by Arora R et al. The increased incidence among females may be attributed to heightened exposure to kitchen smoke.[11,12]

Regarding age distribution, the majority of prescriptions were for patients aged 21-30 years, followed by those aged 11-20 years, with a small percentage (2.1%) for children under 1 year old. This aligns with findings from a study by Joshi U et

ISSN (O): 2687-5365; ISSN (P): 2753-6556

al in Chhattisgarh, where most patients fell within the 13-35 years age group (40.89%), followed by >35 years, 6-12 years, and the least in the 0-5 years age group.[13]

Ear infections were the most prevalent condition observed in this study, affecting 47.1% of patients, followed by nose and throat conditions, with the others category encompassing various conditions such as swellings below or in front of the ear, ceruminous adenoma, carcinomas, and certain procedures. This distribution is similar to findings from a study by Vanitha M et al in Hyderabad, where 55% of patients were diagnosed with ear diseases, followed by throat and nose diseases.[11]

In the present study of 280 patients attending the ENT department, a minor group had comorbidities such as Diabetes mellitus, Hypertension, Hypothyroidism, Migraine, and Asthma. Among these, the majority of patients had diabetes, followed by hypertension, hypothyroidism, asthma, and migraine. Cefpodoxime + clavulanic acid was the antimicrobial of choice in cases of comorbid conditions. This differs from a study conducted in Uttar Pradesh by Arora R et al,[12] where the most common comorbid condition was diabetes mellitus (11.8%), followed by hypertension, gastritis, hypothyroidism, and tuberculosis. The study's findings also contrast slightly with those of Chandra S et al,[14] where only a small percentage (6.54%) of prescriptions contained drugs prescribed by generic name, with the majority being prescribed by their brand names. However, all drugs in the present study were prescribed from the national essential medicines list, and all prescriptions were complete regarding diagnosis, route of administration, duration of therapy, and dosage forms of the drugs.

A total of 419 drugs were prescribed, with oral tablets being the most common route of administration, consistent with findings from studies by Chandra S et al,[14] and Srinivasa J et al,[6] where the oral route was the most commonly employed.

Regarding dosage forms, the majority of drugs prescribed were in tablet form, followed by topical drops, ointments, and injectable. This aligns with findings from a study by Srinivasa J et al,[6] conducted in Bangalore, where tablets were the most common dosage form (46.2%), followed by capsules (28.6%) and topical drops (19%).

The most commonly prescribed Fixed Dose Combination (FDC) orally was Cefpodoxime + Clavulanic acid (Tablet Polypod CV), while the most commonly prescribed topical FDC was beomycin + clotrimazole (Otobiotic ear drops). Ceftriaxone injection (Inj. Gentrax) was the most commonly prescribed injectable antimicrobial.

The present observational study illustrates the prescription patterns of antimicrobial agents in the ENT department. The majority of prescriptions involved a single antimicrobial agent (65%), followed by dual therapy and triple therapy. Similar findings were reported by Naveen et al,[7] in their study conducted in Telangana, where the majority of patients (66.01%) received a single antibiotic, followed by two antibiotics, with a small percentage not receiving any antibiotic.

A total of 419 antimicrobial agents were prescribed in the department, including beta-lactam antibiotics (such as third-generation cephalosporins, penicillins, and carbapenems), fluoroquinolones, aminoglycosides, azole antifungals, and others (including nitroimidazoles, broad-spectrum antibiotics, and steroidal antibiotics). Various antimicrobial agents prescribed included cefpodoxime proxetil, ceftriaxone, cefixime, cefoperazone, amoxicillin, imipenem, meropenem, neomycin, amikacin, gentamicin, clotrimazole, fluconazole, levofloxacin, ciprofloxacin, metronidazole, chloramphenicol, and fusidic acid.

Out of the 419 antimicrobials prescribed, beta-lactam antibiotics (49.16%) were the most commonly prescribed, followed by azole antifungals, aminoglycosides, fluoroquinolones, and others (metronidazole, chloramphenicol, fusidic acid). Among beta-lactam antibiotics, 3rd generation cephalosporins were the most commonly prescribed. This differs from a study by Patel et al,[15] conducted in Gujarat, where the most commonly prescribed antimicrobial prescriptions were fluoroquinolones (37.53%), followed by beta-lactam and nitroimidazole. In the present study, among 3rd generation cephalosporins, cefpodoxime (84.3%) was the highest prescribed antimicrobial, followed by ceftriaxone, cefoperazone, and cefixime. Among azole antifungals, clotrimazole (97.7%) was highly prescribed, followed by fluconazole. Among aminoglycosides, topical neomycin was highly prescribed (89%), and among fluoroquinolones, levofloxacin was prescribed more frequently than ciprofloxacin. These findings differ from a study conducted by Ingle SA et al. [9] in Maharashtra, where the most commonly used antimicrobial agents were tablet amoxicillin-clavulanic acid (55%), followed by tablet ciprofloxacin and tablet azithromycin, while other agents such as antifungal agents (clotrimazole) and antiviral agents (tablet acyclovir) were used in trace amounts.

CONCLUSION

The present study focuses on the prescribing pattern of antibiotics in the Department of ENT at a Rural Tertiary Care Teaching Hospital. From the results it can conclude that; the 3rd generation Cephalosporin's antibiotics were commonly prescribed for various acute and chronic and for various ENT diseases by administered orally in the tablet form. Most prescribed drugs were from the National List of Essential Medicines (NLEM). Brand prescribing was more common than prescribing by generic names. The study demonstrated a rational prescribing pattern for antibiotics in ENT infections. Regular evaluation and study of prescribing patterns are essential to

ISSN (O): 2687-5365; ISSN (P): 2753-6556

improve and modify practices for the healthcare benefit of patients.

Limitations of the study: The short duration of only 6 months, this did not account for seasonal variations in ENT infections and their prescribing patterns. Laboratory investigations were not performed, so antimicrobial therapy was based on empirical and clinical diagnosis. The number of prescriptions was limited to 280 due to the short duration of the study. Adverse effects of the prescribed drugs were not assessed, and some prescriptions did not mention the diagnosis, making it difficult to comment on the rationality of drug use.

Outcome of the study: Despite these limitations, the study demonstrates some rational prescribing practices, with antimicrobial prescriptions for ear, nose, and throat infections in accordance with standard treatment guidelines. Continuous motivation, education, and monitoring are necessary at different levels to encourage rational use of medicines and reduce overall health expenditure by prescribing drugs by generic names.

REFERENCES

1. Karim R, Uddin MS, Rahman MS, Nure MA, Saha RR, Begum T et al.A survey of prescription pattern of antibiotic drugs on patients suffering from ENT infection within Dhaka metropolis. Int J Basic Clin Pharmacol.2017;6(2). doi: 10.18203/2319-2003.ijbcp20170317.
2. WHO, World AM. Awareness Week: preventing antimicrobial resistance together (Dated 17 November,2023).
3. World Health Organization. Global actionplan on antimicrobial resistance. Geneva, Switzerland: WorldHealth Organization;2015. [(accessed on 6 September 2019)].
4. World Health Organization. The evolvingthreat of antimicrobial resistance: options for action. Geneva, Switzerland: World Health Organization;2012. [accessed on 6 September 2019].
5. Chandy SJ, Thomas K, Mathai E,Antonisamy B, Holloway KA, Stalsby Lundborg C. Patterns of antibiotic use in the community and challenges of antibiotic surveillance in a lower- middle-income country setting: A repeated cross-sectional study in Vellore, South India. JAntimicrobChemother. 2013;68(1):229-36. doi: 10.1093/jac/dks355, PMID 22945913.
6. Srinivasa J, Rajendran V, Nadig P, Swamy S. Prescribing pattern of antibiotics in ENT outpatient department in a tertiary care teaching hospital. Int J Basic Clin Pharmacol.2020;9(12):1892-6. doi: 10.18203/2319-2003.ijbcp20205129.
7. Aalasyam N, Potnuru S, Sileveru CM, Pokala U, P. N. Antimicrobial prescriptionpattern in ENT outpatientdepartment in a tertiarycareteachinghospital, Telangana, India. IJRSMS. 2023 Apr 4:1-7. doi: 10.1055/s-0043-1761502.
8. PandiamunianJ, SomasundaramG. A study on prescribing pattern of anti microbial agents in the medical intensive care unit of a tertiary care teaching hospital in Puducherry union territory, South India. IntJPharmPharmSci. 2014;6:235-8.
9. Ingle SA, Divhare SA, Hiray RS, Shingare S. Determination of the drug utilization patterns of antimicrobial agents used in the department of ear, nose and throat at a tertiary care teaching hospital. Int J Basic Clin Pharmacol. 2022;11(5):453. doi: 10.18203/2319-2003.ijbcp20222142.
10. Ain MR, Shahzad N, Aqil M, Alam MS, Khanam R. Drug utilization pattern of antibacterials used in ear, nose and throat outpatient and inpatient departments of a university hospital at New Delhi, India. J Pharm Bioallied Sci.2010 Jan-Mar;2(1):8-12. doi: 10.4103/0975-7406.62695, PMID 21814423.
11. Vanitha M, Vineela M, Benjamin RK. Prescribing pattern of antibiotics in patients attendingENT OPD in a tertiary care hospital. IOSRJDMS. 2017;16(9):30.
12. Arora R, Upadhyay S, Singh H, Bajpai A. Drug utilization pattern of antimicrobial agentused in ear, nose and throat outpatient and inpatient department at tertiary care teaching centre.Int J Otorhinolaryngol Head Neck Surg.2020;6(2):369-74. doi: 10.18203/issn.2454-5929.ijohns20200153.
13. Joshi U, Banjara H, Hishikar R, Chandrakar R. Prescription pattern of drugs in ENT. Outpatient department of tertiary care teaching hospital. Int J Basic Clin Pharmacol.2018 Sep;7(9). doi: 10.18203/2319-2003.ijbcp20183430.
14. Chandra S, Lal S, Kujur AD, Varshney M. Analytical study of prescribingpattern of drugs in ENT outpatientdepartment of a tertiary Care Hospital. 2019;18(9):51-6.
15. Patel DA, Pillai A, Gohil UM. A study of antimicrobial prescription pattern in the ear, noseand throat infections at a tertiary care teaching hospital, Rajkot. IntJPharmSciRes. 2018 Sep 1;9(9):3960-3.

ISSN (O): 2687-5365; ISSN (P): 2753-6556