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Original Research Article

A study on prescribing pattern of antibiotics at a tertiary care hospital

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ABSTRACT

Background: Antibiotics are especially agents/drugs are used to combat or treat infectious diseases and illness caused by them. The aim of the present study was to study the prescribing pattern of antibiotics.

Subjects and Methods: A prospective observational study was conducted over a period of 6 months in a tertiary care hospital. Patients were selected randomly by considering the study criteria. Prescribing patterns of antibiotics were analyzed by using Treatment chart review.

Results: A total of 326 cases were selected randomly and analyzed. The study result showed that a total of 461 antibiotics were prescribed in 326 prescriptions. Ceftriaxone was most commonly prescribed antibiotic. Parenteral administration is the common route of administration in 69% and 31% in oral formulations. Culture sensitivity tests were done only in 5.52% and in 2.76% of the cases, micro-organisms were isolated. Microorganisms isolated were *Klebsiella pneumonia* (1.5%), *Staphylococcus aureus* (0.3%), *Pseudomonas aeruginosa* (0.3), *E. Coli* (0.3%), *Candida albicans* (0.3%). Antibiotics percentage of encounter in 326 prescriptions is 100% (A total of 426 antibiotics were prescribed). The average cost of antibiotics used is Rs.1409.36/- per patient and antibiotics expenditure is 67.61% of the total drug list.

Conclusion: Antibiotics are widely prescribed that leads to drug-related problems, resistance and total cost of antibiotic. Treatment guidelines and protocols will help the inappropriate use of drugs and should be reviewed periodically which in turn will help in New treatment.

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INTRODUCTION

Antibiotics are especially agents/drugs are used to combat or treat infectious diseases and illness caused by them. The rationality of antibiotics is the most controversial and debated issue in today's clinical practice (Jha et al., 2010). Irrational antibiotics/ antibacterial (ABs) usage is a global problem especially in developing countries resulting in an increased emergence of resistance to most common bacteria, higher cost of treatment, prolonged hospitalization and adverse drug reactions (Rajalingam et al., 2016).

Drug utilization evaluation is a tool to improve the rationality in prescribing, i.e.; it helps in monitoring the drug efficacy, cost constraints, and other factors. Drug utilization research facilitates the rational use of drugs and suggests a way to improve prescribing habits (Rathinavelu et al., 2015). The conventional role in preparing and providing medicines and informing patients concerning their use, pharmacists are well placed to assume responsibility for the supervision of drug therapy related to patient safety. It also plays a key role in minimizing adverse drug effects. Antibacterial is

the most imperative weapons in our hands. Hence, evaluation can be done by making an audit of prescribing and dispensing indicators. Manifestations of irrational prescription include the use of drugs when no drug therapy is indicated, the breakdown in on condition that provides safe and effective drugs, pointless use of expensive drugs (Benjamin et al., 2016).

The emergence of resistant bacteria pathogens has increased concerns about antibiotic prescribing patterns. During the last decennia, antibiotic resistance is on the rise. This is mainly due to the abuse of broad-spectrum antibiotics in first-line treatment, or erroneous use (e.g. treatment of viral respiratory tract infections), (e.g. cystic fibrosis patients) or prolonged duration of antibiotic treatment (Sriram et al., 2008).

Third generation cephalosporins are the most commonly prescribed broad spectrum antibiotic even before the culture sensitivity results arrive. Inappropriate use of antibiotics specifically, the broad spectrum antibiotics in hospital results in resistance to antibiotics. Assessment of antimicrobial use can be performed by evaluating their use. Drug use evaluation is a performance improvement method that focuses on the evaluation and improvement of drug use processes to achieve optimal patient outcomes (Kaliamoorthy et al., 2012).

Use of broad-spectrum cephalosporins has been linked to the emergence of vancomycin-resistant enterococci (VRE) and penicillin-resistant streptococci. Following on from a conference on vancomycin-resistant enterococci, where the results of a previous multisite study of vancomycin use were presented, broad-spectrum cephalosporins were identified as a particular target for use evaluation and antibiotic "stewardship" (Marion et al., 2002).

Prescribing drugs is an important skill which needs to be continuously assessed and refined accordingly. It not only reflects the physician's knowledge of pharmacology and pathophysiology but also his/her skill in diagnosis and attitude towards selecting the most appropriate cost-effective treatment. The study of prescribing patterns seeks to monitor, evaluate and suggest modifications in practitioners' prescribing habits so as to make medical care rational and cost-effective. Information about antibiotic use patterns is necessary for a constructive approach to problems that arise from the multiple antibiotics available. India reports on antibiotic utilization at an institutional level include both cross-sectional and longitudinal studies of prescribing patterns (Vandana et al., 2012).

The therapy was considered rational if the antimicrobial use and its route of administration, dose, frequency, and duration of use were considered appropriate for infection. Therapy was considered irrational if the antimicrobial was used without indication, prophylaxis under circumstances of unproven efficacy or by clearly inappropriate route, dose or preparation for that indication. Therapy was considered questionable when insufficient clinical or laboratory data was present to enable the therapy to be classified as clearly rational or irrational e.g. patient of congestive heart failure having the cough but do not know that cough is due to CHF or infection then treatment with antimicrobial agent considered questionable (Laurence et al., 2004).

SUBJECTSAND METHODS

The present prospective observational study was conducted at HKE'S Basaweshwar Teaching and General Hospital, Kalaburagi, K.A., India. Data were collected from case sheets of in-patients admitted to the Department of Medicine at HKES's Basaveshwar Teaching and General Hospital. The study was carried out over a period of 6 months (September 2017 onwards). Patients were enrolled into the study by considering study criteria; patients admitted to the department of medicine; patients of either gender; patients who were willing to participate in the study; patients above 18 years of age. Patients were excluded by considering the following: patients treated on out-patient basis were excluded from the study; patients who are not willing to participate in the study; patients below 18 years of age.

Study design

A total of 326 cases were selected randomly and analyzed. A prospective observational study was conducted over a period of 6 months in a tertiary care hospital. Patients admitted to the department of medicine were selected randomly and followed from the date of admission to date of discharge enrolled in the study by considering the study criteria. Patient Informed consent was taken from each patient at the time of enrolment into the study. Details regarding patient demography and medication was collected from the case sheets and noted in a suitably designed patient data collection proforma. Obtained data were analyzed to assess Prescribing Pattern of Antibiotics at the study site. A patient consent form was prepared as per ethical guidelines containing the description of the study. Once the patients were selected, the informed consent/assent was obtained from them and enrolled in the study. Prior to the study, Institutional Ethical Committee Clearance was taken from the Institutional Review Board (IRB).

RESULTS

A total of 326 cases were selected randomly and analyzed. The study result showed that a total of 461 antibiotics were prescribed in 326 prescriptions.

Table 1. Gender and age wise distribution among the patients.

Description	Total	Percentage
Male	189	58%
Female	137	42%
Age group, Adults/geriatrics	**Total no of antibiotics**	**Total Percentage**
18-30	71	22%
31-45	80	25%
46-60	65	20%
61-75	77	23%
>75	33	10%

Table 2. Class and type of antibiotics prescribed.

Class of antibiotic prescribed	Type of the drug	Number of prescriptions
Cephalosporins	Ceftriaxone Cefotaxim Rifixime Cefoperazone Cefoprim Cefixime	221
Flouroquinolones	Levofloxacin Ciprofloxacin Moxifloxacin Ofloxacin	39
Antiprotozoals	Metranidazole	33
Tetracyclines	Doxycycline	27
Microlide(17)	Clarythromycin Nitrofurantoin Azithromycin	17
Betalactams	Piperacillin Ampicillin Meropenam	9
Pencillins	C-penicillin Amoxicillin	5
Aminoglycosides	Amikacin Kanamycin	**5**
Oxazolidinosis	Linezolid	**2**
Lincosamide	Clindamycin	1
Most commonly prescribed antibiotics	**No of prescriptions**	
Ceftriaxone	141	
Piperacillin +Tazobactum	81	
Cefotaxim	69	
Metronidazole	33	

Table 3. List of most common essential antibiotics as recommended by WHO.

Class	Type	Indication	Indication in our teaching hospital
Cephalosporins	Ceftriaxone Cefotaxim Cefixime	Lyme disease, Meningitis Pneumonia, Surgical infections. Pharyngitis, GE, gonorhea GE,pharyngitis	COPD, GE, UTI, Pneumoni. GE, RTI, ALD, Asthma,
Penicillins	Amoxicillin, pencillin Amoxicillin +Clavulanic acid,	Aom, Pharyngitis,pneumonia, UTI	Pneumoni, RTI,
Quinolones	Levofloxaci, Ciprofloxacin Moxifloxacin, Ofloxacin	Sinusitis, OM, ear nose and throat infections, GE, UTI, LRTI.	Pneumonia GE, UTI.
Tetracyclines	Doxycycline	Pharyngitis, sinusitis, pneumonia, Conjunctivitis	RTI, UTI, GE
Antiprotozoals	Metronidazole	UTI, RTI, GI, Pneumonia, Pharyngitis	Pancreatitis, UTI, RTI
Microlid	Clarythromycin, Nitrofurantoin, Azithromycin, Vancomycin	RTI, OM, Bronchitis, Pneumonia, *H. Pylori* Infection, Surgical Infection Prophylaxis, Sinusitis	UTI, TB, CLD, COPD.
Others Betalactams, Oxazolidinosis	Meropenem Linezoli	H pylori infections , RTI, Colitis, pharyngitis, pneumonia	GE, Pancreatitis, Asthma, RTI,

DISCUSSION

During the study period, a total of 326 prescriptions were evaluated, out of which 189 (58%) patients were male and 137 (42%) were female patients. Most of the patients were in the middle age group (31-45 yrs). Study reveals that cephalosporins (221) were prescribed more followed by fluoroquinolones (39), antiprotozoals (33), tetracyclines (27), macrolides (17), Beta-lactams (9), penicillins (5), Aminoglycosides (5), Oxazolidones (2), Lincosamides (1). In a total of 326 prescriptions, 461 antibiotics were prescribed. So, antibiotics percentage of encounter is 100%.

Table 4. Prescriptions evaluation data for all patients.

Characteristics	Number	Percentage
Diagnosis		
RTI	112	34.3%
UTI	33	12.5%
Hepatitis	15	10.1%
GE	41	4.6%
Fever	12	3.6%
Pancreatitis	11	3.3%
RVD	8	2.4%
Others	94	28.8%
Antibiocs Selected		
Cephalosporins	221	47.9%
Quinolones	39	8.4%
Antiprotozoals	33	7.1%
Tetracyclines	27	5.8%
Macrolides	17	3.6%
Penicillins	5	1%
Others	119	25.8%
ROA		
Infusions(iv)	271	58%
Oral(capsules/tablet)	142	31%
Injections(inj)	48	11%

Table 5. Comparison between antibacterial therapies in teaching hospitals against roger walker and cochrane suggestion.

Diagnosis	Roger Walker /Cochrane Suggestion	Therapy in our Teaching Hospital
UTI	Cephalosporins Quinolones	Cephalosporins Quinolones,Tetracyclines
Hepatic Encephalopathy	Metronidazole	Ceftriaxone
TB	Streptomycin,amikacin, kanamycin, quinolones, azithromycin,clarithromycin	Amikacin,kanamycin, Clarythromycin, ofloxacin, Ceftriaxone,Cefotaxim
GI	Metronidazole,Vancomycin, Azithromycin, ampicillin, ciprofloxacin	Metranidazole, Cephalosporins, Tetracyclines, Quinolones, Meropenam
Hepatitis	Azithromycin, clarythromycin,	Ceftriaxone
Pneumonia	Pencill,ins, cephalosporins	Penicillins, Cephalosporins, Quinolones, Amikacin, Clarythromycin , Metranidazole
COPD	Tetracyclines , pencillins,cephalosporins,	Tetracyclines, Cephalosporins, Quinolones, Amikacin,Azithromycin
HIV	Clindamycin, co-trimaxozole, fluconazole,azithromycin,	Cefotaxim,Co-trimoxazole, Tetracyclines

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An average number of antibiotics per prescription was also evaluated. 204 prescriptions were prescribed with a single antibiotic followed by 85 with two antibiotics, 23 with 3 antibiotics and 14 with 4-5 antibiotics.In a total of 326 prescriptions, only 18 cases culture sensitivity tests were done and microorganisms were isolated in 9 cases in which *Klebsiella pneumonia* was isolated in 5 cases followed by *Staphylococcus aureus*

(1), *Pseudomonas aurgenosa* (1), *E-coli* (1) and *Candida albicans* (1).

Table 6. Assessment of prescriptions for the class , type, dose, dosage form, duration and frequency of drugs.

Class of Antibiotic	Type of Antibiotic	Dose	Dosage Form	Duration	Frequency
Cephalosporins	Ceftriaxone/Cefotaxim/Cefixime Cefopim/Cefoperazone	1gm 1.5gm /2.5gm	Inj	7-10days	BD
Flouroquinolone	Levofloxacin Ciprofloxacin Moxifloxacin/Ofloxacin	250,500,750mg 100,250,500,750mg 400mg/200,300,400g	Inj, Tab	7-10days	BD,TID
Penicillins	Amoxicillin Ampicillin/Piperacillin C-Penicillin	200,250,400,500mg 250,500mg/2,3,4g 0.5-5 MU	Inj, Cap, Tab Solution	7-14days	BD,TID
Tetracyclines	Doxycycline	200,400mg	Inj, Cap, Tab	7-10days	BD
Antiprotozoal	Metranidazole	250,500mg	Inj, Cap, Tab	10days	BD
Macrolide	Clarithromycin/Azithromycin Nitrofurantoin/Vancomycin	1g/1.5g, 50,100mg/10mg.	Inj, Tab	10days	BD
Oxazolidones	Linezolid	600mg	Inj	10-14days	BD
Sulphanamides	Sulphamethoxazole +trimethoprim	100mg,250mg500, 1000mg	Inj, Tab	14days	BD
Aminoglycoside	Amikacin Kanamycin	15mg/kg/dy,50mg 2.5mg/ml	Inj	2mnths 7-10days	BD
Beta lactumases	Meropenam	500mg,1g	Inj	7-21days	TID
Lincosamide	Clindamycin	75,150,300mg	Topical lotion	7-10days	BD

Table 7. Prescription errors of antibiotics in the study.

Prescription Errors	No of Prescriptions
wrong drug mentioned	2
Dose not mentioned/wrong dose	1
Duration not mentioned/under duration/ over duration	14
Frequency not mentioned	1
Dosage form not mentioned	1
Interactions	22

Table 8. Culture sensitivity reports.

Total number of cases	No. of culture sensitivity test done		No. of microorganisms isolated
326	**18**		**9**
Organism Identified	**Susceptible to**	**Resistant to**	**Number of Cases**
Klebisella pneumonia	Doxycycline	Ceftriaxone	5
Staphylocoocus Aureus	Ampicillin	Doxycycline	1
Pseudomonas auerginosa	Ceftriaxone	Cefuroxime	1
E. Coli	Pipecillin+tazobactum	Amikacin	1
Candida albicans	Levofloxacin		1

Cost of antibiotics includes Total no of prescriptions=326; Total no. of antibiotics = 461; cost of antibiotics (461)=Rs 4,59,452.75/-; Total cost of other drugs (938)=Rs.22,0,092.81/-; Total cost of all prescriptions (1399)=6,79,545.56/-;

Percentage of cost of antibiotics include: cost of antibiotics/total cost of all prescriptions x percentage i.e. 459452.75/679545.56x100 = 67.61%.

Cost of antibiotics per prescription: Cost of antibiotic per prescription =Total cost of antibiotics /total no of prescription i.e. 459452.75/326=1409.36 ± 150 /-.

CONCLUSION

The study concludes an overview of antibiotics usage. At the study site, ceftriaxone was highly prescribed antibiotic. Antibiotics usage is very high in percentage, so antibiotics restriction policies can reduce the unnecessary usage of the drug and periodic study on appropriate usage of antibiotics and culture sensitivity pattern should be conducted at a regular interval, which will help the prescriber to select appropriate drug in the future while prescribing the antibiotic. There is a lack of guidelines and hospital formulary for the usage of antibiotics. Development of guidelines and protocols at the study site is utmost essential which in turn will help in reducing antibiotics prescription errors, drug-related problems, resistance level and total cost of antibiotics.

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CONFLICT OF INTEREST

None declared.

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