WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 6.805
Volume 5, Issue 8, 983-999. Research Article ISSN 2277– 7105

EVALUATION OF PRESCRIBING PATTERN OF ANTIMICROBIAL AGENTS IN A MULTISPECIALTY TEACHING HOSPITAL

Bandla Aswani[1]*, M. Vijitha[2], P. Yanadaiah[1], Purushothama Reddy K.[3], K. Yeswanthi[4], P. Vijayasanthi[4]

[1]Assistant Professor, Department of Pharmacy Practice, Narayana Pharmacy College, Nellore, Andhra Pradesh, South India. PIN - 524002.

[2]B. Pharmacy final year, Department of Pharmacy Practice, Narayana Pharmacy College, Nellore, Andhra Pradesh, South India. PIN - 524002.

[3]Associate Professor, Department of Pharmacy Practice, Narayana Pharmacy College, Nellore, Andhra Pradesh, South India.PIN – 524002.

[4]B. Pharmacy final year, Department of Pharmacy Practice, Narayana Pharmacy College, Nellore, Andhra Pradesh, South India. PIN - 524002.

Article Received on
02 June 2016,

Revised on 24 June 2016,
Accepted on 15 July 2016

DOI: 10.20959/wjpr20168-6757

***Corresponding Author**
Bandla Aswani
Assistant Professor, Department of Pharmacy Practice, Narayana Pharmacy College, Nellore, Andhra Pradesh, South India. PIN - 524002.

ABSTRACT

At presently number of various classes of antimicrobials is available at market for the infectious diseases and other chronic diseases treatment purpose. So that we need an awareness of antimicrobials usage and prescribing pattern. The present study was aimed to study the prescribing pattern of antimicrobial agents in a multispeciality teaching hospital, Nellore. A prospective observational study wascarried out for3 months using patient data collection proforma.The study began with the selection of the patients based on inclusion criteria followed by the collection of all the base line parameters of patient's demographic details, Medical and Medication history, Duration of hospitalization, Diagnosis, Prescription order. In prescriptions the number of antimicrobials prescribed, their dose, dosage formulations, route of administration, frequency and duration of treatment was observed. The number of defined daily doses (DDD) and prescribed daily doses (PDD) per patient was calculated for each antimicrobial prescribed. Descriptive statistics were applied to the collected data and analysed using Microsoft Excel software. A total of 155 patients were prescribed with antibiotics, out of them 33 % were male and 67 % were female. The average number of drugs per prescription

was 3.87%. The average number of antimicrobials per patient was 3.22%. The commonly prescribed antibiotics were Betalactams(63.83%). Injectable preparations (14%) and 15% of antimicrobials with fixed dose combinations were observed. DDD for Piperacillin and Tazobactum was more followed by Doxycycline.

KEYWORDS: Prescribing pattern ofAntimicrobials, Defined daily doses (DDD), Prescribed daily doses (PDD).

INTRODUCTION

Antibiotics or antibacterials are a type of antimicrobials used in the treatment and prevention of bacterial infection.[1,2,3] They may either kill or inhibit the growth of bacteria. Several antibiotics are also effective against fungi and protozoans, and some are toxic to humans and animals, even when prescribed in therapeutic range. Antibiotics are not effective against viruses such as influenza or common cold and may be harmful when taken inappropriately. Antibiotics revolutionized medicine in the 20thcentury, and have together with vaccination lead to the near eradication of diseases such as tuberculosis in the developed world. Their effectiveness and easy access lead to overuse, especially in livestock raising, prompting bacteria to develop resistance. This has leads to wide spread problems with antimicrobial and develop resistance to the particular antibiotics. The world health organization (WHO) classify antimicrobial resistance as a "serious threat is no longer a prediction for the future, it is happening right now in every region of the world and has the potential to affect anyone, of any age, in any country".[4] Overuse of antibiotics is a worldwide phenomenon[5,6] and it contributes to the emergence of antimicrobial resistance.[7,8,9] Unnecessary use of antibiotics also leads to an increased risk of side effects [10], increased medical care costs[11] and medicalising effects.[12] Strategies should be developed to control antibiotic use and this will reduce the antibiotic resistance. Strategies developed by WHO in collaboration with International Network for Rational Use of Drugs (INRUD) can identify the problems related to drug prescribing such as overuse of antibiotics or injections, prescribing out of formulary or essential drug list.[13,14] At present there is no proper policy to control antimicrobials resistance in India. Quality of treatment can be improved by setting proper standards at all levels of health care delivery system.Prescription analysisprovides insight into the nature of healthcare system.[15] A Defined Daily Dose (DDD) is a technical unit used to measure drug consumption.[16] The DDD is the assumed average maintenance dose per day for a drug used for its main indication in adults. The DDD is often a compromise based on a

review of the available information about doses used in different countries. Prescribed daily dose (PDD) is defined as the average dose prescribed according to a representative sample of prescriptions.[17] Doses for individual patients and patient groups may differ from the DDD as they must be based on individual characteristics (e.g. age and weight) and pharmacokinetic considerations.DDDs are most often presented as DDDs per 1000 inhabitants per day. This gives a rough estimate of the number of patients treated daily with a particular medicine or a group of medicines. For inpatients, DDDs per 100 bed-days may be applied. For medicines which are not used continuously but in short courses, e.g. antibiotics, DDDs per inhabitant per year may be a better indicator.[17] As per our literature review previously treatment pattern of antimicrobials was examined in different countries but the studies on prescribing pattern of antimicrobials in inpatienttertiary care setups, specifically in Andhra Pradesh is lacking and incomplete, thus we propose to study the evaluation of prescribing pattern of antimicrobials in our hospital (Narayana medical college and hospital, Nellore, AP) which is a 1400 beddedmultispeciality tertiary care teaching hospital.

MATERIALS AND METHODS

A prospective observational study was carried out for 3 months from February 2016 to April 2016. The study was conducted with the approval of the human ethical committee, Narayana medical institutions. Total sample size was 170 cases. During the study patients case records were observed and the data was recorded in the designed Patient data recording form. Pediatrics, pregnancy and lactation, patients who were recently diagnosed with chronic infectious diseases like HIV, STD's, TB, Hepatitis etc. were excluded from the study. The study began with the selection of the patients based on inclusion criteria followed by the collection of all the base line parameters of patients demographic details, Medical and Medication history, Duration of hospitalization, Diagnosis, Prescription order. In prescriptions the number of antimicrobials prescribed, their dose, dosage formulations, route of administration, frequency and duration of treatment was observed. Concomitant diseases as well as concurrently administered drugs will be collected from the patient. The prescribed antimicrobials were correlated with the Patients culture and sensitivity report. Drugs were classified into different groups according to the ATC classification of WHO's collaborating Centre for Drugs Statistics methodology for the prescription pattern analysis.[17] The number of defined daily doses (DDDs) administered per patient was calculated for each antimicrobials prescribed. Ration of PDD and DDD was calculated in the study population to study the trends of drug utilisation. Patient characteristics and other relevant data were computed using MS

Excel and SPSS statistical package. The results were presented as percentage and mean ± Standard deviation (SD).

RESULT

A total of 170 patients were admitted in medicine department over a period of 3 months. Of this, 155 patients including 50 males and 105 females were prescribed antimicrobials for various infections.

The age specific prevalence of antimicrobials usage for various infections were more observed in age group 41-60 years (40%), followed by >60 years of age group (29%) ,21-40 years of age group (28%) and <20 years of age group (3%). In the present study, most of the antimicrobials usage were observed in the General medicine female ward (49.6%) followed by male ward (31.6%) and General surgery female surgery ward (10.32%) followed by male surgery ward (8.38%).

Out of 170 patients, most of antimicrobials usage were observed in unmarried patients (70.96%), followed by married patients (29.03%) and in illiterate patients (58.6%) followed by literate patients (41.93%). We observed most of the antimicrobials usage in the patients of middle class (54.83%), followed by lower class (25.82%) and in upper class (19.35%) were showed in Table.1.

Table No. 1: Demographic profile wise distribution of inpatients receiving antimicrobial therapy during study period.

Sl. No.	Demographic profile of Inpatients		Total no. of patients (n=170) percentage	Total no. of patients receiving Antimicrobials (n=155)	Percentage of study population with Antimicrobials
I.	**Gender**				
1.	Male		66%	50	33%
2.	Female		34%	105	67%
II.	**Age groups in Years**				
1.	< 20		6.8%	5	3%
2.	21 – 40		23%	44	28%
3.	41 – 60		42%	62	40%
4.	> 60		31%	45	29%
III.	**Department**				
1.	General Medicine	MMW	55%	49	31.6%
		FMW	31%	77	49.6%
2.	General Surgery	MSW	6%	13	8.38%
		FSW	8%	16	10.32%
IV.	**Marital Status**				

1.	Married	90%	45	29.03%
2.	Un-married	10%	110	70.96%
V.	**Literacy**			
1.	Literate	42%	65	41.93%
2.	Illiterate	58%	90	58.06%
VI.	**Socioeconomic status**			
1.	Lower class	32%	40	25.82%
2.	Middle class	54%	85	54.83%
3.	Upper class	14%	30	19.35%

Out of all the case records and prescriptions reviewed it was found that most of the patients affected with various infections related to cardiovascular system (0.6%), GIT (0.6%), Genitourinary system (1.3%), Respiratory system (10.75%), Generalized – Blood (20.92%), Renal system (16.12%), skeletal muscles (8.38%) and others (41.93%) were showed in Table no.2.

Table. No. 2: Based on System diagnosed as focus of Infections (Indications) & Percentage of Antimicrobials Prescribed

SL. NO.	System diagnosed as focus of Infections (Indications)		No. Patients receiving Antimicrobials (n= 155)	Percentage of Antimicrobials used
1.	Cardiovascular system (CVS)		1	0.6%
2.	Central nervous system (CNS)		0	0%
3.	Ear Nose & Throat (ENT)	Otitis media	0	0%
		Oral Mucositis	0	0%
4.	Gastrointestinal Tract (GIT)	Acute GE	0	0%
		Abdominal Pain	0	0%
		Diarrhea	0	0%
		Others	1	0.6%
5.	Genitourinary system		2	1.3%
6.	Generalized – Blood	Viral fever	10	6.45%
		Enteric fever	0	0%
		Dengue fever	14	9.03%
		Malarial fever	8	5.16%
		Others	1	0.6%
7.	Respiratory tract	URTI Cold & Cough	1	0.6%
		LRTI -	-	-
		Other RTI	10	6.45%
		Allergy - BA	4	3%
8.	Renal system	ARF	0	0%
		CKD	15	9.67%
		Others	10	6.45%
9.	Skeletal Muscles		13	8.38%
10.	Others		65	41.93%

The present study showed that number of comorbidities associated with patients were Diabetes mellitus (22.58%)followed by Hypertension (10.32%), Bronchial asthma and COPD (1.93%), Liver diseases (2.58%), Heart diseases (1.29%), Joint diseases (3.22 %), Infectious diseases (9.677%) and others (48.38%) were showed in Table no: 9.

Table.No.3: Prescribing patterns of Antimicrobials based on Co-morbidities associated with patients.

Sl. NO.	Co-morbidities associated with patients	No. of patients (n=170) %	No. patients receiving Antimicrobials (n=155) %
1.	DM	19%	22.58%
2.	HTN	17%	10.32%
3.	BA & COPD etc.,	5%	1.93%
4.	Liver diseases	19%	2.58%
5.	Heart diseases	5%	1.29%
6.	Joint diseases	3%	3.22%
7.	Infectious diseases	20%	9.677%
8.	Any other	12%	48.38%

A total of 155 antimicrobials were prescribed for 170 patients and of this the most common prescribed antimicrobials were aminoglycosides (8.38%), antiameobics (1.29%), anthelminthic (2.58%), antituberculars (0.645%), antifungal (0.645%), penicillin's (32.24%), cephalosporin's (31.59%), carbapenams (0.645%), macrolides (5.16%), Quinolones and fluoroquinolones (10.96%), tetracycline's (5.80%) were showed in Table no.4

Table No. 4: Prescribing frequency of Antimicrobials during study period

Sl. No.	Class	Name of the Antimicrobial agent	No. of patients (n=155)	% of usage
1.	Amino glycosides	Amikacin	11	7.09
		Streptomycin	2	1.29
2.	Antiameobics	Metronidazole	2	1.29
3.	Anthelminthic	Albendazole	4	2.58
4.	Anti TB	Isoniazid	1	0.645
5.	Antifungal (Azoles)	Fluconazole	1	0.645
6.	Penicillins	Piperacillin+Tazobactum	12	7.74
		Amoxicillin+clavulanic acid	10	6.45
		Aminopenicillin	15	9.67
		Penicillin-G	8	5.16
		Piperacillin	5	3.22
7.	Cephalosporin's	Cefotaxime	15	9.67
		Ceftriaxone	12	7.74
		Cefuroxime	11	7.09
		Cefaperazone	6	3.87
		Cefglobe	2	1.29
		Cefalexin	1	0.645

		Cefixime	1	0.645
		Ceftazidime	1	0.645
8.	Carbapenems	Imipenam/Cilastatin	1	0.645
9.	Macrolides	Azithromycin	4	2.58
		Clindamycin	4	2.58
10.	Quinolones and Fluoroquinolones	Ciprofloxacin	14	9.03
		Ofloxacin	3	1.93
11.	Tetracycline's	Tetracycline	1	0.645
		Doxycycline	8	5.16

Out of the 170 patients antimicrobials were prescribed in different formulations, in the forms of tablets (60%), capsules (25%), injections (14%), topical applications (1%) were showed in Table no.5.

Table No.5: Based on prescribing pattern Antimicrobial Dosage form's used in the Study

SL. NO.	Type of Antimicrobial Dosage form's		No. of Patients with different Antimicrobial Dosage form's (%)
1.	Tablets		60%
2.	Capsules		25%
3.	Injections	IV – bolus	13%
		IV – Infusion	1%
4.	Oral Liquid dosage form's	Syrup	0%
		Suspension	0%
5.	External or Topical or Local applications		1%
6.	Other's		0%

In present study, amoxicillin and clavulanic acid (44%) was most commonly prescribed in viral fever among all antibiotics followed by doxycycline (16%), Cefixime (8%) and other antibiotics (2%). Cefuroxime (56%) was most commonly prescribed in thyroid among all antibiotics followed by Albendazole (40%) and other antibiotics (1%).

Amoxicillin and Clavulanic in hydroureternephrosis among all antibiotics followed by Ceftriaxone (35%), Ofloxacin (18%), Doxycycline (3%) and other antibiotics (4%).Cefixime (50%) was most commonly prescribed in upper respiratory tract infections among all antibiotics followed by amoxicillin and clavulanic acid (45%) and other antibiotics (5%).

Amoxicillin and clavulanic acid (45%) was most commonly prescribed in Dengue fever among all antibiotics followed by Ceftriaxone (45%), Cefixime(10%) and other antibiotics (3%). Cefuroxime (50%) was most commonly prescribed in ulcer among all antibiotics followed by Ofloxacin (48%) and other antibiotics (2%). Piperacillin and Tazobactum (60%) most commonly prescribed in acute pancreatitis among all antibiotics followed by other antibiotics (40%).

Cefixime (50%) was most commonly prescribed in pneumonia among all antibiotics followed by Ceftriaxone (35%) and other antibiotics (15%). Piperacillin and Tazobactum (40%) most commonly prescribed in other diseases among all antibiotics followed by Ceftriaxone (10%), doxycycline (10%), Cefixime (10%), Cefuroxime (7%), ciprofloxacin (2%), amoxicillin and clavulanic acid (5%), Ofloxacin (4%), Albendazole (2%) and other antibiotics (10%) were showed in Table.no. 6.

Table No.6: Based on Prescribing Frequency (%) of individual Antimicrobials for specific diagnosis (Different diseases).

Diagnosis	Name of the Antimicrobials (%)									
	Piperacillin + Tazobactum	Amoxicillin + clavulanic acid	Ceftriaxone	Cefuroxime	Ciprofloxacin	Ofloxacin	Albendazole	Doxycycline	Cefixime	Others
Viral fever	0	44	0	30	0	0	0	16	8	2
Thyroid	0	0	0	56	0	0	43	0	0	1
Hydroureternephrosis	0	40	35	0	0	18	0	3	0	4
Upper respiratory tract infection	0	45	0	0	0	0	0	0	50	5
Dengue	0	45	42	0	0	0	0	0	10	3
Ulcer	0	0	0	50	0	48	0	0	0	2
Acute pancreatitis	60	0	0	0	0	0	0	0	0	40
Pneumonia	0	0	35	0	0	0	0	0	50	15
Others	40	5	10	7	2	4	2	10	10	10

In the present study average no. of drugs per prescription was 3.87,average no. of antimicrobials per prescription was 3.22, percentage of antimicrobials prescribed by generic name (15.5%), percentage of antimicrobials prescribed by brand name (84.5%), percentage of antimicrobials with fixed dose combinations (15%), percentage of antimicrobials from essential drug list was (75%), percentage of antimicrobials with injectables (14%), percentage of antimicrobials with monotherapy (2%), percentage of antimicrobials with double therapy (80%), percentage of antimicrobials with triple therapy (8%) percentage of antimicrobials with multiple therapy (9.67%) were showed in Table.no.7.

Table No.7: Based on Prescribing Indicators

SL. NO.	Characters of the Prescribing Indicators	Average /Percentage
1.	Average number of drugs per prescription	3.87
2.	Average number of Antimicrobials per prescription	3.22
3.	Percentage of Antimicrobials prescribed by Generic name	15.5%
4.	Percentage of Antimicrobials prescribed by Brand name	84.5%
5.	Percentage of Antimicrobials with fixed dose combinations	15%
6.	Percentage of Antimicrobials with Essential drug list	75%
7.	Percentage of Antimicrobials prescribed with Injectables	14%
8.	Percentage of Antimicrobials prescribed as Monotherapy	2%
9.	Percentage of Antimicrobials prescribed as Double combinations	8%
10.	Percentage of Antimicrobials prescribed as Triple combinations	18%
11.	Percentage of Antimicrobials prescribed as Multiple combinations	9.677%

It was observed that, Antimicrobials were prescribed based on total drug use in DDD (gms) and DDD/HPD (gms) respectively for Amikacin (16.2gms & 1.5 gms), Cefotaxime (10 gms & 1 gm), Ceftriaxone (1.25 gms & 0.125 gms), ciprofloxacin (10.5 gms & 1.5 gms), streptomycin (3.5 gms & 0.5 gms), Albendazole (40 gms & 2 gms), Mebendazole (8 gms & 1 gm), Piperacillin and Tazobactum (36.5gms&4.5 gms),doxycycline (24gms & 2gms), clindamycin (6gms & 0.75gms), azithromycin (8.33gms & 1.66gms) were showed in Table.no.8.

Table No.8: Prescribing pattern of Antimicrobials use based on DDD's.

Sl. No.	Name of the Antimicrobial agent	ATC classification	Total drug use in DDD (g)	DDD/100 patient day
1.	Amikacin	J01GB06	16.2	1.5
2.	Cefotaxime	J01DD01	10	1
3.	Ceftriaxone	J01DD04	1.25	0.125
4.	Ciprofloxacin	J01MA02	10.5	1.5
5.	Streptomycin	J01GA01	3.5	0.5
6.	Albendazole	P02CA03	40	2
7.	Mebendazole	P02CA01	8	1

8.	Piperacillin + Tazobactum	J01GA01	36.5	4.5
9.	Doxycycline	J01AAO2	24	2
10.	Amoxiclav	J01CR02	9	1
11.	Clindamycin	J01FF01	6	0.75
12.	Azithromycin	J01FA10	8.33	1.66

Antimicrobials prescribed based on DDD and PDD. DDD and PDD for Amikacin (16.5gms,1.5gms), Cefotaxime (10gms,4gms), Ceftriaxone (1.25gms,0.25gms), Ciprofloxacin (10.5gms,1.5gms),Streptomycin (13.5gms, 0.5gms), Albendazole (40gms,0.8gms), Mebendazole (8gms,0.2gm),Piperacillin and Tazobactum (36.5gms,18gms), Doxycycline (24gms, 0.2gms), Amoxicillin (9gms,1.5gms), Clindamycin (6gms,1.2gms), Azithromycin (8.33gms, 0.5gms) were showed in table no.9.

Table No. 9: Top 10 Commonly prescribed Antimicrobials use DDD's & PDD's.

Sl. NO.	Name of the Drug (Antimicrobial)	Drug use in DDD's	Drug use in PDD's
1.	Amikacin	16.2	1.5
2.	Cefotaxime	10	4
3.	Ceftriaxone	1.25	0.25
4.	Ciprofloxacin	10.5	1.5
5.	Streptomycin	3.5	0.5
6.	Albendazole	40	0.8
7.	Mebendazole	8	0.2
8.	Piperacillin + Tazobactum	36.5	18
9.	Doxycycline	24	0.2
10.	Amoxiclav	9	1.5
11.	Clindamycin	6	1.2
12.	Azithromycin	8.33	0.5

In our study for the170 patients antimicrobials were prescribed based on DDD/PDD ratio. DDD/PDD ratio for Amikacin (4.6), Cefotaxime (6.25), Ceftriaxone (26), Ciprofloxacin (15), Streptomycin (25), Albendazole (18.75), Mebendazole (37.5), Piperacillin and Tazobactum (2.5), Doxycycline (50), Amoxicillin (6.66), Clindamycin (3.12), Azithromycin (4.16) was showed in Table no.10.

Table No.10: Calculation of DDD/PDD for antimicrobials.

Sl. No.	Name of the drug	DDD	PDD	DDD/PDD
1.	Amikacin	12.5	1.5	4.6
2.	Cefotaxime	25	4	6.25
3.	Ceftriaxone	6.5	0.25	26
4.	Ciprofloxacin	22.5	1.5	15
5.	Streptomycin	12.5	0.5	25
6.	Albendazole	15	0.8	18.75
7.	Mebendazole	7.5	0.2	37.5

8.	Piperacillin + Tazobactum	45	18	2.5
9.	Doxycycline	10	0.2	50
10.	Amoxicillin	10	1.5	6.66
11.	Clindamycin	3.75	1.2	3.12
12.	Azithromycin	8.33	0.2	41.6

In our study, antimicrobials were prescribed on empirical therapy (85.16%), non-empirical therapy (14.83%) in Table no.11.

TableNo.11: Percentage of Antimicrobials prescribed based on microbial culture & sensitivity test reports

Sl. No.	Type of Antimicrobial therapy	No. of Antimicrobials	%
1.	Empirical therapy	132	85.16%
2.	Non – empirical therapy	23	14.83%
3.	Total	155	100%

On prescription analysis, Completeness of prescription was seen in 75% of cases. In 45% of cases dose was mentioned, in only 38% cases the duration of treatment was written. 60% of prescriptions contained name of the drug and Frequency (48%), route of administration (52%), Dosage form of the drug (55%) and instructions like sos basis (30%) were showed in Table no.12.

Table No.12: Based on Prescription analysis.

SL. NO.	Content of prescription analysis	No. of Prescriptions (%)
1.	Completeness of prescription contents	75%
2.	Name of the drug	60%
3.	Dosage form of the drug	55%
4.	Dose of the drug	45%
5.	Frequency of the drug	48%
6.	Route of administration of drug	52%
7.	Duration of treatment	38%
8.	Instructions like sos basis etc.,	30%

DISCUSSION

Successful use of antibiotics has brought a revolutionary change in management of infectious diseases but it also resulted over use and misuse of antibiotics. Antibiotics today are commonly prescribed drugs in hospital setup. Indiscriminate and in appropriate use of antibiotics not only increase treatment expenditure, cause adverse drug reaction but also responsible for emergence of antibiotics resistance and treatment failure.[18] Antimicrobial resistance is one of the major global preventable problems. The causes of antimicrobial

resistance are unnecessary use, inappropriate doses, inadequate duration of therapy and irrational fixed dose drug combinations. Hence this study was undertaken to improve the quality of medication and to promote the prescription of drugs.[19]

Among the 170 patients admitted in medicine department during the study period, 91.17 % (n=155) were prescribed antimicrobials. In a similar north Indian study conducted by ***Pathak et al.,*** it was reported that 92% of patients were prescribed antimicrobials for various infection.[20] This deviates from the results of study conducted by ***Muniza Bai et al.,*** showing only 64.8% of total patients were started on antimicrobial therapy.[21] These findings suggest the diverse nature of antimicrobial prescription in various parts of the region.

In addition, variation in antimicrobial prescribing according to gender was also observed in this study. In our study we observed the number of female patients was comparatively more than number of male Patients. This contraindicates the results of study by ***Palikhe N et al.,***[22] Variation in antimicrobial prescribing according to age groups was also observed in this study.40% of study patients fell under the adult category which was in accordance with the study by ***Pathak et al.,*** [20] ***and Bai M. etal.,***[21]

The present study found that higher percentage of the patients who receives tablets (60%) comparatively more than parenteral dosage forms because in our study more number of patients is capable to take oral dosage forms. This contraindicates with the results study by ***Bai M et al.,***[21]In the present study we observed that renal failure patients are mostly prescribed with antimicrobials. This is in accordance with similar studies by ***Khan et al.,***[23]
In our study percentage of antimicrobials prescribed to co-morbidities associated with patients were noted.Among that higher percentage of antimicrobials prescribed to diabetes was observed.

In our study average number of drugs per prescription was found to be 3.87% and in addition the number of antibiotics per prescription was 3.22% in accordance with ***Bai M. etal.***[21] Average number of drugs per person is an important index of prescription audit. It is preferable to keep the mean number of drugs per prescriptions low as possible, since higher figures always lead to increased risk of adverse drug reactions, drug interactions, development of bacterial resistance, increased hospital cost. In present study 15.5% of generic name antibiotics were prescribed, this percentage is less compared to ***Kanish et al***[24] study (58%) and 84.5% of brand name antibiotics were prescribed this percentage is less compared to

Kanish et al study (42%).[24] The multiple antibiotics were prescribed in 9.67% patients and this is less compared to ***Choudhury DK etal.,***(29%).[25] This indicates severity of disease or failure of treatment with one antibiotic. In present study only one antibiotic was prescribed in 2% of patients and 2 antibiotics were prescribed in 80% percent of patient. In ***Palikhe N et al.,***[22] study 79% of patients received multiple of antibiotics and 21% of patients received only one antibiotic.

ATC classification can be helpful in adverse drug monitoring which is the need of the hour and also, it has a role in drug utilization studies. Prescribed drugs with ATC codes Amikacin (J01GB06), Cefotaxime (J01DD01), Ceftriaxone (J01DD04), Ceftriaxone (J01DD04), Amoxiclav (J01CR02), Clindamycin (J01FF01), Albendazole (P02CA03) and Streptomycin (J01GA01).In our study, the most commonly prescribed Antimicrobials were Beta lactams (63.83%), Quinalones and Fluoroquinolones (10.96%) and Aminoglycosides (8.38%).This is in accordance with similar studies by ***Khan etal.,***[23] and ***Bai M etal.,***[21] In a study by ***khan et.al***[23], beta lactams was mostly prescribed.In a study by ***Bai M etal.,***[21], Aminoglycosides was mostly prescribed. The most commonly used agents among these classes found to be Cefotaxime (J01DD01), Ceftriaxone (J01DD04), Piperacillin+ Tazobactum (J01GA01), Amoxiclav (J01CR02) and Amikacin (JO1GB06).In a study by ***Khan etal.,***[23], Amoxicillin with Clavulanic acid combination was mostly prescribed, followed by Ceftriaxone, Cefotaxime in the beta lactams group and Amikacin. In a study by ***Bai M etal.,***[21] Piperacillin Tazobactum was mostly prescribed followed by Ceftrixaone, Cefotaxime, Ciprofloxacin and Amikacin.

Based on DDD per 100 patient days, Piperacillin + Tazobactum were the most commonly used antimicrobial followed by Doxycycline, Azithromycin, Cefotaxime, Mebendazole and Amoxiclav. The increased DDD/PDD of doxycycline can be attributed to the longer duration of treatment, studies have shown that unnecessary use of antimicrobials that eliminates anaerobes promote intestinal overgrowth of noscomial pathogens.Substitution of antianerobic antimicrobials with equally efficacious alternatives with minimal antianerobic activity would further reduce the unnecessary use of this spectrum activity.[26,27]

Based on DDD/PDD ratios Doxycycline, Azithromycin, Mebendazole and Ceftriaxone prescribed in monotherapy and optimal utilization of these drugs was seen for Doxycycline, Azithromycin and Ceftriaxone. Among the combination therapy, Piperacillin Tazobactum and Amoxiclav Was mostly prescribed. The present study found that empirically stated

antimicrobials accounted for 85.16% of total number of antimicrobials prescribed. This is in accordance with ***khan et al.,***[23] study showed that empirically started antimicrobials contributing toward 83% of therapeutic antimicrobial use. The study also demonstrated that appropriate antimicrobial use was highest when prescribed based on culture reports have shown to improve health and economic outcomes.

The present study found that Completeness of prescription was seen in 75% of cases. In 45% of cases dose was mentioned, in only 38% cases the duration of treatment was written. 60% of prescriptions contained name of the drug and Frequency (48%),route of administration (52%),dosage form of the drug (55%) and instructions like sos basis(30%) these are more or less comparable with other studies.

The limitations of the study includes, it was conducted in General medicine department for a period of 3 months owing to time constraint as it was undergraduate student project. Intensive care unit patients were not included. The severity of the illness was not evaluated in the patients. The main strength of this study is that unlike the previous surveillance studies that simply collected the dispensing data at aggrevate levels,we collected information on individual patients as well as the antimicrobials actually administered to them. Nevertheless further studies including interventions to limit unnecessary use of antimicrobials are needed to provide a more accurate assessment of rational use of antimicrobials on clinical and economic outcomes.

CONCLUSION

Our Study Concluded that most commonly prescribing drugs for most common diseases are found to be antibiotics or antimicrobials. In our study physicians were prescribed antimicrobials more with brand names (84.5%) and few were more found in generic (15.5%). Most common antimicrobials used were Penicillin's (32.24%), Cephalosporin's (31.59%) and more than 1 antimicrobial were also prescribed in 98% of prescriptions. Physician's adherence to national essential medications list was found to be 75% and majority of the prescriptions were based on empirical therapy only (85.16%). So that the present study antimicrobial prescription pattern was not rational because polypharmacy, less use of generic drugs, inappropriate use, excessive oral formulation administrations etc. Rational practice of antimicrobials is largely influenced by knowledge, attitude and its importance has to be emphasized at the earliest for long term beneficial effects. Strict antibiotic prescribing policy, prescription pattern analysis or auditing types of studies or drug utilization studies making

more effective and helpful local policy for antimicrobial prescriptions were required to promote. Rational use of antimicrobials which not only prevents the antibiotics resistance but also improves the patient adherence, outcome of treatment, quality of care and reduction in treatment expenditure.There is a strong need of role of clinical pharmacist who makes guidelines and protocol for treatment of various diseases with antimicrobials at all levels of health care with respect to the regional and institutional policies.

BIBLIOGRAPHY

1. “Utilizing antibiotic agents effectively will preserve present day medication”. News Ghana. 21 November 2015.
2. "Antibiotics". NHS. 5 June 2014, Retrieved 17 January 2015.
3. "European Centre for Disease Prevention and Control. Retrieved 21 December 2014.
4. "WHO's first global report on antibiotic resistance reveals serious, worldwide threat to public health" (Press release). The World Health Organization 30 April 2014.
5. Wang EE, Einarson TR, Kellner JD, Conly JM: Antibiotics prescribing for Canadian preschool children: evidence of overprescribing for viral respiratory infections. Clinical Infectious Disease 1999; 29(1):155–160, 10.1086/520145.
6. Chung A, Perera R, Brueggemann A, Elamin AE, Harnden A, Mayon-White R, Smith S, and Crook DW, Mant D: Effect of antibiotic prescribing on antibiotic resistance in individual children in primary care: prospective cohort study, BMJ 2007; 335(7617): 429.
7. Belongia EA, Schwartz B: Strategies for promoting judicious use of antibiotics by doctors and patients. BMJ 1998; 317: 668–671.
8. Seppala H, Klaukka T, Vuopio-Varkula J, Muotiala A, Helenius H, Lager K, Huovinen P: The effect of changes in the consumption of macrolide antibiotics on erythromycin resistance in group A streptococci in Finland. N Eng J Med 1997; 337: 441–446.
9. Arroll B, Kenealy T: Antibiotics for the common cold. Cochrane Database Syst Rev 2000; (2): CD000247.
10. Mainous AG III, Hueston WJ: The cost of antibiotics in treating upper respiratory tract infections in a Medicaid population. Arch Fam Med 1999.
11. Little P, Gould C, Williamsen I, Warner G, Gantly M, Kinmonth AL: Reattendance and complications in a randomized trial of prescribing strategies for sore throat: the medicalising effect of prescribing antibiotics, BMJ 1997.
12. Dr.s.s.kadam., Dr.K.R.Mahadik., Dr.K.G.Bothara, (2007). Text book of “Principles of Medicinal Chemistry”,volume-1.,Nirali prakashan publications., Hyderabad.

13. Shanker RV, Praveen pardha, Nageshkumarshenoy, JoshyMaducolilEasow, Prescribing pattern of antibiotics and sensitivity pattern of common microorganisms in the internal medicine ward of a teaching hospital in western Nepal: A prospective study. Annual of clinical microbiology and antimicrobials, 2003; 2: 7-18.
14. Kafle K.K, Pradhan YMS. Drug use in PHC facilities of khatmandu.Journal of institute of medicine, 1992; 14: 318-26.
15. Tissot E, Henon T, Cornette C. Incomplete prescription: a potential medication error, Press med. 1999; 28(12): 625-8.
16. World Health Organization (WHO) Collaborating Centre. (2003) Introduction to Drug Utilization Research.
17. World Health Organization (WHO) Collaborating Centre. (2009) Use of ATC/DDD.
18. Admane PD, Hiware SK, Mahatme MS, Dudhgaonkar SD, Deshmukh SN and Mahajan MM.Prescription pattern of antimicrobials in tertiary care hospital in central India, International Journal of Pharmacological Research www.ssjournals.com ISSN: 2277-3312.
19. Pathak A,Mahadik K,Dhaneria SP,Sharma A,Eriksson B,Lundborg CS.Surveillance of antibiotic consumption using the focus of infection approach in 2 hospitals in Ujjain,India.plos one 2012; 7(6): 38641.
20. Muniza Bai,Sandhiyaselvarjan,sureshkumarSrinivasamurthy,TarunkumarDutta,Deepak GopalShewade, Pattern of use of antibiotics in hospitalized patients in the medicine department of a tertiary hospital. 2015 oct.; 4(5): 888-894.
21. Palikhe N.Prescribing pattern of antibiotics in pediatric hospital of Kathmandu valley D K Choudhury, B K Bezbaruah, Antibiotic prescriptions pattern in Paediatric In-patient department Guwahati medical college and hospital, Guwahati. Journal of Applied pharmaceutical science, 2013; 3(8): 144-148.
22. Kanish Ravika, Gupta Kanchan, JunejaShivani, Bains HS, KaushalSandeep, Prescribing pattern of antibiotics in the department of paediatrics in tertiary care medical college hospital in Northern India. Asian Journal of medical sciences, 2014; 5(4): 69-72.
23. Donskey CJ,Chowdry TK,Hecker MT,Hoyed CK,Hanrahan JA,Hajer AM etal., Effect of antibiotic therapy on the density of vancomycin-resistance enterococci in the stool of colonized patients, New England Journal Medicinal, 2003; 343: 1925-32.
24. Khan FA,Singh VK,Sharma s.singh P., A Prospective study on the antimicrobial usage in the medicine department of a tertiary care teaching hospital, Journal of clinical Diagnosis Research, 2013; 7(7): 1343-6.

25. Samonis G,Gikas A,Anaissae EJ,Vrenzos G,Maraki S,T selentis Y etal., Prospective evaluation of effects of broad spectrum antibiotics on gastrointestinal yeast colonization of humans, Antimicrob agents chemother, 1993; 37(1): 51-3.
26. Donskey CJ,Chowdry TK,Hecker MT,Hoyed CK,Hanrahan JA,Hajer AM et al., Effect of antibiotic therapy on the density of vancomycin-resistance enterococci in the stool of colonized patients, New England Journal Medicine, 2003; 343: 1925-32.
27. H. Vedavath, Shreenivas P. Revankar, Drug utilisation study on anti-diabetic medications at SIMS-Shimoga a tertiary care hospital, International journal of Basic and clinical pharmacology, 2015; 4(5): 946-950.