

FREQUENCY, PREFERENCES AND PRESCRIBING PATTERN OF ANTIMICROBIALS  
IN OUTPATIENT DEPARTMENT OF A TERTIARY CARE SGM HOSPITAL AT  
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## ABSTRACTS

**Aims and Objectives:** The aim of study is to determine the prescribing pattern and utilization trend of antimicrobials in a tertiary care hospital. **Material and methods:** Study was conducted in the department of Pharmacology SS Medical College and SGM. Hospital, Rewa, MP, from September 2013 to June 2014. The prescriptions were collected randomly, after taking the consent from patients who attending outpatient department of SGM Hospital. The prescription slips were taken in form of Xerox copy and analyzed. **Results:** The result of study showed that most of the prescriptions (43.57%) were belongs to 33-42yrs of age group with their mean age ( $\pm$ SD)  $37.78 \pm 13.36$  yrs, of these 59.25% were females. Amongst the antimicrobials, fluoroquinolones were the most frequently prescribed group (25.10%) followed penicillin (18.31%), fixed dose combination of ciprofloxacin plus tinidazole (14.57%) and amoxicillin plus cloxacillin (8.40%), anti-amoebs (7.38%), tetracycline (6.59%). The total 3047AMAs were prescribed in 3587 prescriptions; the average number of drugs and AMAs per prescriptions is 2.27 and 0.82 respectively. 98% of AMAs were prescribed from essential medicine list of India and 100% from EML of WHO. In these AMAs, 88.05% were prescribed by generic and 11.94% by brand names. **Conclusions:** Rational prescription of antibiotic is very important to prevent antimicrobial resistance. In this study fluoroquinolones is the most frequently prescribed group which is principally act on gram negative bacteria, especially enterobacteriaceae; hence it is necessary to make formulation policy for hospital antibiotic use and an educational programme especially for prescribing doctors.

**KEYWORDS:** Prescriptions; Outpatient Department (OPD); Antimicrobials; Polypharmacy.

## INTRODUCTION

A drug prescribing is an important skill which needs to be continuously assessed and refined. It not only reflects physician's knowledge of pharmacology and pathophysiology but also his or her skills in diagnosis and attitude towards selecting the most appropriate cost effective treatment.<sup>[1]</sup> Many factors are adversely affects prescribing behavior such as unethical drug promotion, direct to consumer advertising, lack of knowledge and non availability of drugs.<sup>[2]</sup> This could be countered to a great extent by drawing up an essential drug list, preparation of treatment guidelines, conducting periodic prescription audits and continuing medical education.<sup>[3]</sup> The prescribing patterns at tertiary levels may help to draw up guidelines on rational drug therapy and delineates the difference in prescribing patterns of different levels Indian health care delivery system.<sup>[4]</sup> **Essential medicines**, as defined by the World Health

Organization (WHO) are "those drugs that satisfy the health care needs of the majority of the population; they should therefore be available at all times in adequate amounts and in appropriate dosage forms, at a price the community can afford." Health authorities of India have published an exhaustive national essential drug list of 279 items, consisting of 162 universal drugs (24 complimentary agents) and 117 items for secondary health care.<sup>[5]</sup> Indian markets are flooded with over 70,000 formulations, as compared to about 350 listed in the WHO essential drug list, the pharmaceutical companies encourage doctors to prescribe branded medicines, often in exchange for favors.<sup>[6]</sup> Quality of life can be improved by enhancing standards of medical treatment at all levels of the health care delivery system. Antibiotics are widely used medicines to treat both life threatening and trivial infections. Their indiscriminate use increases the risk of bacterial drug resistance.<sup>[7,8]</sup>

Rising rates of bacterial resistance is increasingly seen as a global problem.<sup>[910]</sup>

## MATERIAL METHODS

This observational study “*Frequency, preferences and prescribing pattern of antimicrobials in Outpatient Department of a tertiary care SGM Hospital at Central India, Rewa Madhya Pradesh*” was carried out in the Department of Pharmacology, SS Medical College and associated SGM Hospital, Rewa (MP.) from September 2013 to June 2014. For study prescriptions were collected randomly from the patients visiting Outpatient departments and taking medications from SGM Hospital pharmacy and Red Cross pharmacy situated in hospital campus. After taking the patients consent prescriptions slip were taken in form of Xerox copy. Total 3587 prescriptions were collected and analyzed for parameters like age and sex of patient; percentage of antimicrobials prescribed, average number of antimicrobials per prescription and their prescribing preferences.

## RESULTS

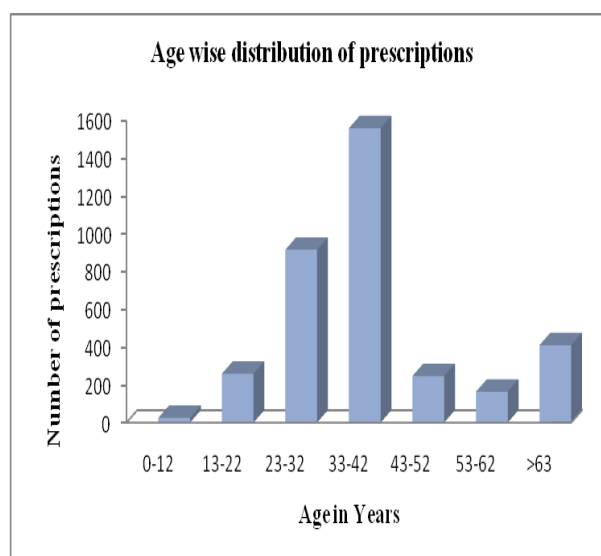
In present study total 3587 prescriptions were analyzed; most of the prescriptions were belongs to the age group of 33-42yrs (43.57%) followed by 23-32 (25.59%), >63 (11.45%), 13-22 (7.22%), 43-52 (6.88%), 53-62 (4.57%) and 0-12 (0.69%) yrs with their mean age ( $\pm$ SD) 37.78  $\pm$  13.36 yrs. **Fig.1** 40.74% (1460) of these were males and 59.25% (2127) were females. **Fig.2** Of these total 3587 prescriptions, maximum 34% were belong to department of medicine followed by 24% surgery, 14% orthopedics, 12% gynecology, 9% ENT and 7% pediatrics. **Fig.3** The total 8144 drugs were prescribed in 3587 prescriptions, the average number of drug per prescriptions was 2.27. Of total 8144 drugs; 37.41% (3047) were antimicrobials. The maximum (70.79%) percentage of AMAs was prescribed by the department of gynecology followed by (64.39%) pediatrics, (55.92%) surgery, (41.99%) otolaryngology and (31.40%) medicine. **Table No.1** Amongst antimicrobials fluoroquinolones were the most frequently prescribed group (25.10%) followed penicillin (18.31%), fixed dose combination of ciprofloxacin plus tinidazole (14.57%) and amoxicillin plus cloxacillin (8.40%), anti-amoebs (7.38%), tetracycline (6.59%) macrolides (5.48%), cephalosporins (4.56%), anti-fungals (3.38%), anti-malarials (1.37%) and sulphonamides (0.13%). **Table No.2.**

Amongst the prescribed AMAs, azithromycin is the most common 55.09% prescribed macrolides followed by erythromycin (25.74%); roxithromycin (11.97%) and clarithromycin (7.18%). Cefixime was the most common (48.92%) cephalosporins; followed by cefadroxil (27.33%); cephalexin (18.70%) and cefpodoxime (5.03%). Amongst penicillins; amoxicillin was the most common one prescribed (75.98%) followed by ampicillin (14.51%) and cloxacillin (9.49%). In tetracyclines and sulfonamide groups only doxycycline and cotrimoxazole were prescribed respectively. Ciprofloxacin was the most frequently prescribed in fluoroquinolones

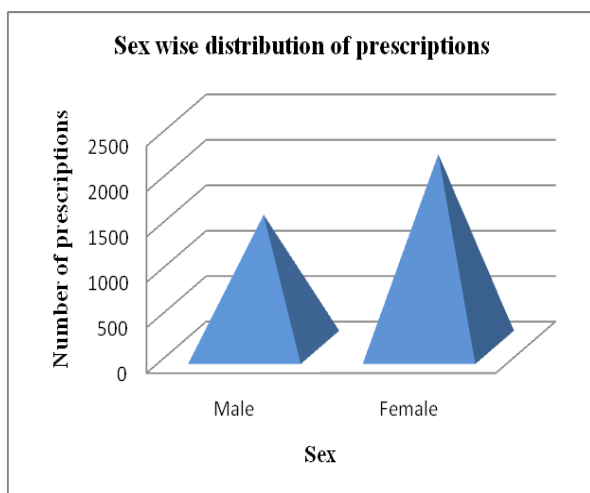
group (78.69%) followed by ofloxacin (16.86%), norfloxacin (2.74%) and levofloxacin (1.69%). Fluconazole was most common (57.27%) prescribed antifungal followed by ketoconazole (32.03%) and clotrimazole (10.68%). Metronidazole was the most frequently prescribed anti-amoebs (51.11%) followed by tinidazole (34.22%) and ornidazole (14.66%) and chloroquine was the most frequently (85.71%) prescribed antimalarials for malaria in OPDs cases followed by quinine (14.28%). Amongst fixed dose combinations (27.66%); ciprofloxacin plus tinidazole was most frequently (52.66%) prescribed followed by amoxicillin plus cloxacillin (30.36%); amoxicillin plus clavulanate combination (11.98%), norfloxacin plus tinidazole (2.72%), ofloxacin plus ornidazole (2.25%). Amongst overall; ciprofloxacin was the most frequently prescribed AMAs (19.75%) followed by ciprofloxacin plus tinidazole (14.57%), amoxicillin (13.91%), amoxicillin plus cloxacillin (8.40%), doxycycline (6.59%), metronidazole (3.77%) amoxicillin plus clavulanate (3.31%). **Table No.3** The total number of AMAs prescribed during study is 3047, and average number of AMAs per prescriptions is 0.82. 98% of AMAs were prescribed from essential medicine list of India and 100% from EML of WHO. In these AMAs, 88.05% were prescribed by generic and 11.94% by brand names. “Dose and dosage forms” and duration of therapy has not been mentioned in 0.86% and 0.22 % of prescriptions respectively. **Table No. 4.**

## OBSERVATIONS

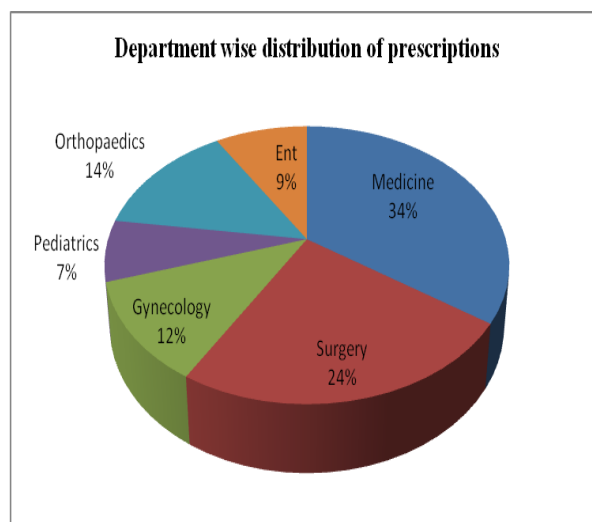
This study was conducted in the department of pharmacology, SS Medical College Rewa and associated S.G.M Hospital Rewa (M.P.) and following observations were made.



**Figure No-1:** Age wise distribution of prescriptions of patients attending OPD during study in SGM Hospital.



**Figure No-2: Sex wise distribution of prescriptions of patients attending OPD during study in SGM Hospital.**



**Figure No-3: Department wise distribution of prescriptions of patients attending OPD during study in SGM Hospital.**

**Table No-1: Department wise distribution of no. of prescriptions, total no. of drugs and AMAs prescribed during study in SGM Hospital.**

S. no	Name of Departments	Total no of prescriptions		Total no of prescribed drugs		Average no. of drug per prescription	Total no of prescribed Antibiotics	
		NO	%	NO	%		NO	%
1.	Medicine	1239	34.54	3576	43.91	2.88	1123 (n=3576)	31.40
2.	Surgery	860	23.97	1554	19.08	1.80	869 (n=1554)	55.92
3.	Gynecology	416	11.59	517	6.34	1.24	366 (n=517)	70.79
4.	Pediatrics	256	7.13	469	5.75	1.83	302 (n=469)	64.39
5.	Orthopedics	500	13.93	1284	15.76	2.56	75 (n=1284)	5.84
6.	ENT	316	8.81	744	9.13	2.35	312 (n=743)	41.99
7.	<b>Grand total (n=)</b>	<b>3587</b>	<b>100</b>	<b>8144</b>	<b>100</b>	<b>2.27</b>	<b>3047 (n=8144)</b>	<b>37.41</b>

**Table No-2: Frequency of class wise prescribed antimicrobials by various departments during study in S.G.M. Hospital.**

S. No	Class of Antimicrobials	No of antimicrobials and percentage of antimicrobials													
		Medicine (n=1123)		Surgery (n=869)		Gynecology (n=366)		Pediatrics (n=302)		Orthopedic s (n=75)		ENT (n=312)		GRAND TOTAL (n=3047)	
		NO	%	NO	%	NO	%	NO	%	NO	%	NO	%	NO	%
1.	Sulfonamides	NIL	0	NIL	00	NIL	00	4	1.32	NIL	0	NIL	0	4	0.13
2.	Macrolides	133	11.84	7	0.80	3	0.82	18	5.96	3	4.0	3	0.96	167	5.48
3.	Cephalosporins	79	7.03	14	1.61	7	1.91	36	11.92	NIL	00	3	0.96	139	4.56
4.	Penicillin	137	12.19	216	24.85	7	1.91	72	23.84	7	9.33	119	38.14	558	18.31
5.	Tetracycline	119	10.59	18	2.07	57	15.57	NIL	00	7	9.33	NIL	00	201	6.59
6.	Quinolones	317	28.22	223	25.66	39	10.65	39	12.91	21	28.0	126	40.38	765	25.10
7.	Aminoglycosides	NIL	00	NIL	00	NIL	00	NIL	00	NIL	00	NIL	00	NIL	00
8.	Chloramphenicol	NIL	00	NIL	00	NIL	00	NIL	00	NIL	00	NIL	00	NIL	00
9.	Antimalarials	21	1.87	NIL	00	3	0.82	11	3.64	NIL	00	7	2.24	42	1.37
10.	Antifungals	43	3.82	NIL	00	57	15.57	3	0.99	NIL	00	NIL	00	103	3.38
11.	Antiamoebics	72	6.41	39	4.48	83	22.67	21	6.95	7	9.33	3	0.96	225	7.38
12	Fixed drug combinations	202	17.98	352	40.50	110	30.05	98	32.45	30	40.0	51	16.34	843	27.66
	<b>TOTAL</b>	<b>1123</b>	<b>100</b>	<b>869</b>	<b>100</b>	<b>366</b>	<b>100</b>	<b>302</b>	<b>100</b>	<b>75</b>		<b>312</b>	<b>100</b>	<b>3047</b>	<b>100</b>

**Table No-3: Frequency of antimicrobials prescribed during study in S.G.M. Hospital.**

S. No	Class of antimicrobials (n=3047)		Numbers and percentage of antimicrobials			
	Name of AMAs groups	Percentage	Names of AMAs	Number	Percentage in his group	Over all Percentage
1.	Sulfonamide	<b>0.13</b>	Cotrimoxazole	<b>04</b>	<b>100</b>	<b>0.13</b>
2.	Macrolides (n= 167)	<b>5.48%</b>	Erythromycin	43	25.74	1.41
3.			Roxithromycin	20	11.97	0.65
4.			Clarithromycin	12	7.18	0.39
5.			Azithromycin	92	<b>55.09</b>	3.01
6.	Cephalosporins (n=139)	<b>4.56%</b>	Cephalexin	26	18.70	0.85
7.			Cefadroxil	38	27.33	1.24
8.			Cefixime	68	<b>48.92</b>	2.23
9.			Cefpodoxime	7	5.03	0.23
10.	Penicillins (n=558)	18.31%	Ampicillin	81	14.51	2.65
11.			Amoxicillin	424	<b>75.98</b>	<b>13.91</b>
12.			Cloxacillin	53	9.49	1.73
14.	Tetracycline (n=201)	<b>6.59%</b>	Doxycycline	201	<b>100</b>	<b>6.59</b>
15.	Quinolones (n=765)	25.10%	Norfloxacin	21	2.74	0.68
16.			Ciprofloxacin	602	<b>78.69</b>	<b>19.75</b>
17.			Ofloxacin	129	16.86	4.23
18.			Levofloxacin	13	1.69	0.42
19.	Antifungals (n=103)	<b>3.38%</b>	Clotrimazole	11	10.68	0.36
20.			Ketoconazole	33	32.03	1.08
21.			Fluconazole	59	<b>57.27</b>	1.93
22.	Antiamoebics (n=225)	<b>7.38%</b>	Metronidazole	115	<b>51.11</b>	3.77
23.			Tinidazole	77	34.22	2.52
24.			Ornidazole	33	14.66	1.08
25.	Antimalarials (n=42) 42	<b>1.37%</b>	Chloroquine	36	<b>85.71</b>	1.18
26.			Quinine	6	14.28	0.19
27.	Fixed dose combinations (n=843)	11.71%	Amoxicillin+Cloxacillin	256	<b>30.36</b>	<b>8.40</b>
28.		15.95%	Amoxicillin+Clavulanate	101	11.98	3.31
29.			Ciprofloxacin+Tinidazole	444	<b>52.66</b>	<b>14.57</b>
30.			Norfloxacin+Tinidazole	23	2.72	0.75
31.			Ofloxacin+Ornidazole	19	2.25	0.62

**Table No-4: Analysis of prescriptions collected during study.**

S. No	Parameters	Number	Percentage
1.	Total number of prescriptions	3587	NA
2.	Total number of drugs used	8144	NA
3.	Average number of drugs per prescription	2.27	NA
4.	Average number of AMAs per prescription	0.84	
5.	Number of AMAs prescribed in fixed dose combinations (n=3047)	843	10.35
6.	Number of AMAs prescribed form * EML of India (n=3047)	2986	98
7.	Number of AMAs prescribed form EML of WHO (n=3047)	3047	100
8.	Total number of prescribed antimicrobials (n=8144)	3047	37.41
9.	Number of AMAs prescribed by generic name (n=3047)	2683	88.05
10.	Number of AMAs prescribed by brand name (n=3047)	364	11.94
11.	Number of prescriptions does not have mentioned "Dose and dosage forms" (n=3587)	31	0.86
12.	Number of prescriptions does not have mentioned "Duration of therapy" (n=3587)	08	0.22

**DISCUSSION**

Study of prescribing patterns seeks to monitor, evaluate and suggest modifications in practitioners' prescribing habits so as to make rational and cost effective medical care. Information about antibiotic use patterns is necessary for a constructive approach to problems that arise from the multiple antibiotics available.<sup>[11]</sup> In

developing countries the cost of health care is a matter of major concern.<sup>[12]</sup> Excessive and inappropriate use of antibiotics in hospitals, health care facilities and the community contributes to the development of bacterial resistance. In our study, maximum (43.57%) patients were belonged to 33-42 yrs of age group that visiting the OPD pharmacy as compared to study conducted in



Pokhara Valley.<sup>[13]</sup> Western Nepal where 54% patients were aged 20 to 39 years. The middle age groups constituted the highest number visiting OPD, the reason behind this might be greater health consciousness of this age group, that they represent higher proportion of the population.

In our study females were predominant (59.29%) to attend OPD pharmacy compare to males (40.7%), these higher numbers of female visitors were housewife's mainly residing in rural areas. It reflects the possibilities that females were acquiring greater number of infections or ailments than males, as they were probably unaware about their health and hygiene and less educated so they are more prone to infections. In our study it was observed that in OPD multivitamins are first and antimicrobials are second most commonly prescribed drug. Amongst antimicrobials; fluoroquinolones, ciprofloxacin (19.75%) is most commonly prescribed AMAs. The use of the fluoroquinolones had increased threefold in the United States between 1995 and 2002. Fluoroquinolones had become the most commonly prescribed class of antibiotics to adults in 2002; nearly half (42%) of these prescriptions were for the conditions that are not approved by the FDA, such as acute bronchitis, otitis media and acute upper respiratory tract infection, according to a study by the Agency for Healthcare Research and Quality.<sup>[14]</sup> In addition, they are commonly prescribed for medical conditions, such as acute respiratory illness, that are usually caused by viral infections.

In our study ciprofloxacin (19.75%) is most commonly prescribed AMAs which is somewhat less than that of *MacDougall et al study*<sup>[15]</sup> (in which it was prescribed to 24%) and dissimilar to *Yasin et al*<sup>[16]</sup> study (in which amoxicillin was (23.3%) most frequently prescribed followed by augmentin 14.3%, quinolones 12.7%, first and second generation cephalosporins, 9.4% and 12.7% respectively and macrolides 7.2%) and *Chandy et al*<sup>[17]</sup> in which two third of all prescribed antimicrobials were penicillin's and co-trimoxazole; however 40% of prescriptions from private sector were quinolones and cephalosporin's. Another study *Anteneh Assefa et al*<sup>[18]</sup> also showed dissimilar results to our study in which amoxicillin (16.4%), was most commonly prescribed antibiotics followed by ampicillin (15%), gentamicin (14.9%) and chloramphenicol (11.6%). On the other hand, the most commonly prescribed injections were ampicillin 21.4%, cloxacillin (13.4%), crystalline penicillin (12.4%), ceftriaxone (9.8%), gentamicin (9.8%), diclofenac (9.4%), and chloramphenicol (8.4%). In our study the average number of AMAs per prescriptions is 0.82, the 88.05% of drugs were prescribed by generic name and 100% were belong from the EML of WHO, this was dissimilar to study conducted in *Kerala India*<sup>[19]</sup> in which the average number of antibiotics per prescription were 1.5, only 10.5% antibiotics were prescribed by generic name and  $\beta$  (Beta)-lactams antibiotics were the most common

(60.2%) prescribed pharmacological drug class followed by fluoroquinolones and aminoglycosides. Of the  $\beta$  (Beta) lactams, cephalosporins comprised 51.7% and the 81% of antibiotics were prescribed from EML of WHO.

In our study amongst fixed drug combinations, ciprofloxacin plus tinidazole was most frequently prescribed followed by amoxicillin plus cloxacillin and amoxicillin plus clavulanate, this was similar to *Harmeet et al*<sup>[20]</sup> in which ciprofloxacin plus metronidazole most commonly prescribed combinations of antimicrobials. In present study sulfonamides is the least commonly prescribed drug, the reason may to its high allergic incidence or availability of better drugs.

## CONCLUSION

High incidence of infectious diseases and high usage of antibiotics are responsible for development of bacterial resistance, occurs mainly in low and middle income countries. The antimicrobials were more frequently prescribed for patients presenting with fever. Amongst AMAs, fluoroquinolones are the most commonly and sulfonamides are the least commonly prescribed drugs. The rational prescription of antibiotics is very important to prevent antimicrobial resistance. The healthcare facilities of public sector is regulated by state government and is obliged to follow the national prescribing guidelines; hence it is necessary to make formulation policy for use of antibiotics in hospitals and organization of an educational programme on regular basis for prescribing doctors.

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