



Research Article

PRESCRIBING PATTERN OF ANTIBIOTICS AT THE GENERAL PRACTICE CLINIC OF A HEALTH CARE CENTREK.G.Parthiban^{1*}, Krishnamurthy Mahalakshmi², G.Mydhili¹, N.Senthil Kumar¹
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Abstract: To study the prescribing pattern of antibiotics used in the treatment of prevalent diseases in the general practice clinic, (GPC) of Maruthi Medical Centre Hospital (Mmch) Erode. A retrospective study of 300 case notes of patients who had an antibiotic prescription and attending the GPC for the first time between March 1 and June 30, 2012 was carried out. Demographic data, patient's complaints, physician's diagnosis and antibiotic prescription was loaded into Microsoft Office Excel 2007 and the descriptive statistics reported. The total number of antibiotics prescribed for the 300 patients involved in the study was 327 with an average number of 1.09 per patient. Two hundred and fifty one (83.67%) patients were prescribed a single antibiotic, 44 (14.66%) had two antibiotic prescriptions while the remaining five (0.16%) were prescribed three antibiotics. Penicillin was the most prescribed class of antibiotics 165(50.45%). Among the penicillin, amoxicillin was used most (24.65%) followed by amoxicillin plus clavulanic acid combination (23.31%). Of the 327 patient antibiotics prescribed, 219 (73.00%) were prescribed using brand names. No parenteral antibiotic was prescribed, and there was no microbiological evaluation carried out before the prescription of antibiotic in any of the cases. There was a high prevalence of empiric treatment with orally administered antibiotics in this study.

Key words: Antibiotics, General Practice Clinic, Pattern, Prescription..

INTRODUCTION

The discovery of compounds with antimicrobial activity was a major advancement in medicine and patient care. These compounds provide doctors with an adjunctive therapy to patients own immune system the principal and perhaps best defense for fighting infectious diseases¹ Antibiotics are the most frequently prescribed drugs among hospitalized patients^{2,4} Not too long after the first discovery of penicillin, resistance to the drug emerged and as more antibiotics were discovered and used more resistant bacteria evolved. Over the past 3 decades the problem of bacteria resistance has grown worldwide and has been documented by many authors⁵⁻⁸.

Extravagant use of antibiotics without careful considerations of their appropriate indications leads more rapidly to the emergence of resistant strains.⁹ The recent emergence of antibiotic resistance in bacterial pathogens both nosocomially and in the community is a very serious development that threatens antibiotic use.¹⁰ The rampant spread of antibiotic resistance mandates a more responsible approach to antibiotic use, though it is often difficult to quantify the role of inappropriate antibiotic use in the emergence of antibiotic-resistant bacteria. However, the selection pressure of high levels of exposure to these drugs is probably the factor leading to bacterial mutations responsible for many mechanisms of resistance¹¹. It

is important to note that the development of resistance is not necessarily related to the choice of a specific antibiotic or antibiotic class. Even when antibiotic use is appropriate, the choice of particular agents has been shown to promote the development of resistance¹². Information about antibiotic use patterns are therefore necessary for constructive approach to problems that arise from indiscriminate use of multiple antibiotics available.¹³ such information on antibiotic use pattern and the illnesses for which they are prescribed are generally lacking in hospitals in developing countries. Hence this study was carried out to evaluate prescribing patterns of general practitioners to ascertain whether or not antibiotics are properly utilized.

METHODS**SETTING**

The study was carried out at the General Practice Clinic (GPC) of the Maruthi Medical Centre Hospital, Erode, and Tamilnadu State. The hospital serves as a referral centre for other hospitals.

STUDY POPULATION AND SAMPLE SIZE

All patients that visited the GPC from March 1 to June 30, 2012 constituted the study population. A total of 300 case notes of patients

having at least one antibiotic in their prescription were used in the study.

- **Inclusion criteria:** Patients included in the study were those who came to the hospital for the first time from March 1 to June 30, 2012.
- **Exclusion criteria:** Patients excluded from the study were those that had antibiotic prescriptions but were not first timers at the clinic.

First time patients at the hospital with antibiotic prescriptions but having in complete data on case-notes were also excluded from the study.

DATA COLLECTION

The medical record of each patient included in the study was reviewed and information pertinent to the objective of the study was collected. Patient characteristics such as age, sex, body weight (in pediatrics), presenting complaints

and physician's diagnosis were noted. Drug data including name of antibiotic prescribed, dosage regimen (form, route, frequency and duration of administration), use of antibiotic combination, and generic, and brand names were also noted.

DATA ANALYSIS

The data obtained was carefully fed into the computer and analyzed using Microsoft Excel Office, 2007. Results were expressed using descriptive statistics (frequency and percentages).

RESULTS AND DISCUSSION

Of the 300 patients involved in this study, 132 (44%) were males and 168 (56%) females with mean age of 22.3. Patients aged 1-10 constituted the largest group. The total number of antibiotics prescribed was 327. Of this number 292 (97.33%) were prescribed from drugs contained in the hospital's formulary.

Table-1: Prescription of antibiotics according to classes based on disease

Disease	N=300 freq (%)	Average no antibiotics	Pen	Cepha	Macro	Quino	Sulpha
Upper respiratory tract infection	102(34.00)	1.01	56(17.12)	20(6.11)	12(3.66)	10(3.05)	6(1.83)
Skin and soft tissue	51(17.00)	1.01	32(9.8)	10(3.05)	3(0.92)	2(0.61)	0(0)
Gastro intestinal tract	48(16.00)	1.45	4(10.39)	0(0)	0(0)	8(2.44)	2(0.61)
Lower respiratory tract infection	26 (8.66)	1	10(3.05)	7(2.14)	2(0.61)	2(0.61)	0(0)
Urinary tract infection	9(3.00)	1.07	4(1.22)	0(0)	0(0)	7(2.14)	0(0)
Pulmonary tuberculosis	6(2.00)	1	2(0.61)	1(0.31)	0(0)	1(0.31)	0(0)
Bone and joint infection	4(1.33)	1	2(0.61)	0(0)	0(0)	2(0.61)	0(0)
Others	24(8.00)	1	14(4.33)	0(0)	2(0.61)	5(1.52)	0(0)
TOTAL	300(100)	1.09	165(50.4)	37(11.31)	20(6.11)	49(14.9)	10(3.05)

KEY: Pen: Penicillin, **Cepha:** Cephalosporin, **Macro:** Macrolide, **Quino:** Quinolone, **Sulfo:** Sulphonamide, **Tetra:** Tetracycline, **Metro:** Metronidazole.

Two hundred and fifty one (83.67%) patients were prescribed a single antibiotic, 44(14.66%) had two antibiotic prescriptions while the remaining two (0.49%) were prescribed three antibiotics.

The most common condition for which an antibiotic was prescribed was upper respiratory tract infection (URTI) 102 (34.00%), (Table 1).

Of the URTIs, the most frequent presenting complaint was cough and catarrh

accounting for 98 (65.8%) cases and the highest occurrence of this was in children aged 0-10 years with 62 (63.3%) of the 98 episodes. The most frequently prescribed antibiotic for this case was a penicillin 45(50.45%) of which amoxicillin accounted for 24.6% of the 99 antibiotics prescribed. Other antibiotics used were cephalosporins 20 (20.2%), macrolides 13 (13.1%), quinolones 10(10.1%), sulphonamides 9 (9.1%), and metronidazoles 2 (2.0%). The other common

infections were skin and soft tissue infections 69 (17%), gastrointestinal infections 67(16.5%) and lower respiratory tract infections 34(8.4%), (Table 1). Thirty-five (52.2%) of the 67 episodes of gastrointestinal infections were peptic ulcer disease, 27 (77.1%) of which were treated with combination of metronidazole and penicillins. Antibiotics were prescribed for malaria in 19 cases and here again the penicillins were the most commonly used.

Overall, the penicillin antibiotic was the most prescribed class of antibiotics 165(50.45%). Among the penicillins, amoxicillin was used most frequently (24.65%) followed by amoxicillin plus clavulanic acid combination (23.3%), (Table 2).

Other classes of antibiotics used include quinolone, cephalosporin, metronidazole, macrolide, sulphonamide and tetracycline accounting for 14.98%, 11.31%, 12.53%, 6.11%,

3.05% and 1.52% respectively, (Table 1). Aminoglycosides noticeably were not prescribed in any of the cases.

Of the 327 antibiotics prescribed, 219 (73.00%) were prescribed using brand names. The most commonly prescribed brand of antibiotic was augmentin which was prescribed in 91(19.6%) of the 327 prescriptions. It was encountered in 20 (60.6%) of the 33 cases of otitis media. It was also the most prescribed 21(30.4%) of the 51 cases of skin and soft tissue infections.

Two hundred and ninety two (97.33%) of the prescriptions were contained in the hospital formulary. No parenteral antibiotic was prescribed, and there was no microbiological evaluation carried out before the prescription of antibiotics in any of the cases.

Table -2: Profile of prescribed antibiotics

ANTIBIOTIC (N=464)	FREQUENCY(%)
Penicillin	165 (50.45)
Amoxicillin	80 (24.65)
Amoxicillin plus Clavulanic acid	77 (23.54)
Ampicillin	6 (1.83)
Ampicillin plus Cloxacillin	2 (0.61)
CEPHALOSPORIN	37 (11.31)
Cefaclor	2 (0.61)
Cefuroxime	15 (4.6)
Cephalexin	20 (6.11)
MACROLIDE	20 (6.11)
Erythromycin	17 (5.2)
Clarithromycin	3 (0.92)
QUINOLONE	49 (14.98)
Ciprofloxacin	29 (8.9)
Ofloxacin	20 (6.11)
SULPHONAMIDE	10 (3.05)
Cotrimoxazole	10 (3.05)

This study focused on the pattern of antibiotic prescription in the General Clinic of the Maruthi Medical Centre Hospital. A majority of the prescriptions were written from drugs contained in the hospital's formulary indicating, to a large extent, that physicians in this establishment complied with the recommendations of the hospital's formulary. However, most of these drugs were prescribed using brand names. The low rate of generic prescribing has been linked to pressure from patients,¹⁴ and high marketing strategy of the pharmaceutical companies¹⁵. Use of high cost broad spectrum antibiotics when the cheaper generic drug would have sufficed doesn't encourage compliance and this can lead to resistance¹⁴. The excessive use of injectable in

developing countries is very common. However, interestingly no parenteral antibiotic was prescribed during this study and this may be reflective of an improvement in this aspect of prescribing pattern as opposed to previous excessive use of injections by some physicians who hold the erroneous belief that injections are more effective and offer better patient satisfaction¹⁶. Aminoglycosides were not encountered at all in this study and this may be due to the fact that they are mainly available in parenteral forms. More so, being an outpatient centre, it may not be convenient and would not ensure compliance if the patient is placed on such medication which would require that they return for treatment repeatedly especially when there are available alternatives. The average number of drugs

per prescription is an important index of a prescription audit such as this study. It is preferable to keep the number of drugs per prescription as low as possible to minimize risk of interactions, development of bacterial resistance, and hospital costs.¹⁵ This study did not however look at co-prescribed drugs and hospital costs but concentrated on prescribed antibiotics. The average number of antibiotics prescribed was 1.09 The pattern of antibiotic combination i.e. (based on the number per prescription) was comparable to that obtained in a similar study in Netherland.¹⁷ The antibiotics frequently used in combination were Metronidazole and Penicillins 31 (7.64%) and they were used in treatment of peptic ulcer disease most probably in an attempt to eradicate *Helicobacter Pylori* (which is a major risk factor) if present¹⁸ Three antibiotics metronidazole, doxycycline, and ciprofloxacin were co-prescribed twice for the treatment of pelvic inflammatory disease (PID). This prescribing pattern does not, however, correspond with the recommended treatment guidelines (metronidazole + ofloxacin / metronidazole + ciprofloxacin/ metronidazole + doxycycline/ metronidazole + doxycycline + ceftriaxone IM).¹⁹⁻²¹ This is because both tetracyclines and quinolones have a similar spectrum of activity.

Although a majority of common childhood diseases are caused by viruses which do not require antibiotic therapy²² this study reveals that most children presenting with such diseases as common cold, pharyngitis and tonsillitis were prescribed antibiotics. This may be a reason for the increased frequency of antibiotic prescription in children aged 10 and below in this study. This finding is different from other reports where elderly patients were seen to be prescribed antibiotics more frequently^{17, 23}.

In this study, it was found that the presence of fever seemed to increase the likelihood of prescribing an antibiotic. This may likely be due to the fact that some physicians tend to consider fever as a sign of bacterial infection which is not always the case. A similar occurrence was observed in a research carried out in India on factors affecting prescribing patterns in pediatrics.²² Standard guidelines recommend that treatment of most upper respiratory tract infections (such as pharyngitis, common cold, tonsillitis, otitis media) with antibiotics be delayed as most of them are viral (but there may be clinical overlap between viral and streptococcal infections), hence self limiting.^{19, 24, 25} Antibiotics have proven to be minimally beneficial and a recent study shows that they only shorten duration of symptoms by 8 hours.¹⁹ However, in severe cases and in patients with recurring episodes or with a history of otitis media, penicillin V or erythromycin may be prescribed

instead of broad spectrum antibiotics.¹⁹ From our study, this is obviously not the case at the GPC as antibiotics including cephalixin and cefuroxime (1st and 2nd generation cephalosporins respectively), and ciprofloxacin were prescribed for most cases of upper respiratory tract infections.

The high prescription of co-amoxiclav in the treatment of otitis media, does not also comply with recommended guidelines. It was prescribed for 20 of the 33 cases of otitis media. According to the Standard Medical Advisory Committee subgroup on antibiotic resistance, antibiotics are probably unnecessary in acute otitis media²⁵. This is also the conclusion of several studies geared towards providing evidence for health care decisions^{26, 27}. Except in chronic cases, reassurance, time and adequate pain relief using analgesics such as paracetamol is sufficient^{19, 24, 25} if antibiotics are indicated the first line drug should be amoxicillin.¹⁹

Penicillin was the most prescribed antibiotic 50.45%, and amoxicillin 24.65% was the most frequently prescribed penicillin. This is similar to a study that was carried out in India.²² Co-amoxiclav 23.31% was the second most used single antibiotic as observed in this study and this is comparable to results obtained from a similar study in western Nepal.¹³ Its use as a common broad spectrum antibiotic without prior bacteriological tests may result in increased resistance. For this reason, it is recommended that it should be reserved for those bacterial infections, likely or known to be caused by amoxicillin-resistant beta lactamase producing strains.¹⁹ For treatment of uncomplicated cystitis as the case in this study, limiting prescription to a three day course of trimethoprim rather than the combination of quinolone and metronidazole used would help reduce the selection pressure for resistance^{19, 21, 24}. The use of antibiotics in the treatment of malaria is not justified since this is not consistent with recommended treatment guidelines for treatment of malaria using appropriate antimalarial drugs to which the plasmodium parasite is susceptible. The only antibiotic class acceptable for use in treating malaria is the tetracycline as a combined therapy with quinine which was not used at all.

As opposed to similar studies in Western Nepal¹³ and Netherland¹⁷ where microbiological tests were carried out in nearly all cases, no microbiological tests were done before any prescription was given in this study. This practice which may be done in an attempt to take care of all possible infecting organisms at once could result in resistance to the prescribed antibiotics.

SUMMARY AND CONCLUSION

The present survey on antibiotic use on first time patients at the general practice clinic in MMCH, under the circumstances tested, provides four characteristics of antibiotic prescribing: (1) in the majority of cases treatment was empirical, with antibiotic prescription based on a clinical suspicion of infection without objective criteria of infection; (2) all antibiotics were administered orally and parenteral administration never occurred, (3) irrespective of the site of infection and the most likely pathogen causing that infection, a single broad-spectrum antibiotic, usually amoxicillin or amoxicillin-clavulanic acid, was prescribed and in most cases, brand names were used in prescribing; (4) Most of the drugs prescribed were drugs in the essential drug list however, treatment was not in accordance with standard prescribing guidelines. The trend that emerges from these observations is that antibiotic use is nonrestrictive.

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