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A STUDY ON UTILIZATION PATTERN OF HIGHER GENERATION ANTIBIOTICS AMONG PATIENTS VISITING COMMUNITY PHARMACIES IN CHIDAMBARAM, TAMIL NADU AT SOUTH INDIA

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ABSTRACT

Infectious diseases are a prominent cause of death in developing countries. The antibiotic resistance caused by emergence of antibiotic resistant microorganisms, is a health problem leading to poor treatment outcomes and increased cost, increased mortality, morbidity and adverse drug reactions. The government of India proposed to introduce the New Drug Policy in 2011which calls for the making of a new schedule, Schedule HX, under the Drugs and Cosmetics Act. A cross-sectional and observational study was conducted in a private community pharmacy situated in Chidambaram, a city in rural South India to determine the appropriateness of the higher generation antibiotics (cephalosporin, flouroquinolone and coamoxiclav groups) in the out-patient department. The prescriptions were collected from the patients after they purchased the medicine from the pharmacy. All prescriptions containing higher generation antibiotics were assessed for the inappropriateness using a modified Medication Appropriateness Index. 300prescriptions containing higher generation antibiotics were analyzed. Out of the 77.66% of the prescriptions containing, 69.95% of prescriptions contained higher generation antibiotics. When assessed for the appropriateness of the prescription, 51%of the prescriptions containing higher generation antibiotics were prescribed inappropriately.

Keywords: Antibiotics, Medication Appropriateness Index (MAI), Prescribing Pattern, Rational Drug Use (RDU)

INTRODUCTION

In recent times, an infectious disease crisis of global proportion is threatening hard-won gains in health and life expectancy. Infectious diseases are now the world's biggest killer of people among children and young adults. They account for more than 13 million deaths per year i.e. about one in two deaths in developing countries. Every 1 h 1500 people a redying due to an infectious disease. Six deadly infectious diseases cause 90% of the deaths, namely; pneumonia, tuberculosis, diarrhea, malaria, and measles [1]. The infectious disease burden in India is among the highest in the world. Drug utilization has been defined as the "marketing distribution, prescription and use of drugs in a society with special emphasis on the resulting medical and social consequences".

Antibiotics are being the most commonly prescribed group of drugs in India. Drug misuse and drug over use is a global phenomenon. In India, the prevalence of use of antimicrobial agents varies from 24 to 67%. [2] Resistance to antibiotics is a health problem leading to poor treatment outcome and increased healthcare costs. [3] About 64% of total antibiotics prescribed are either not indicated or are inappropriately prescribed or prescribed with an incorrect dosage. It is estimated that in India, antibiotics account for over 50%of the total value of

drugs sold. [4] Inappropriate antibiotic consumption and emergence of antibiotic resistant microorganisms lead to increased mortality and morbidity and adverse drug reactions. This puts an excessive strain on already limited healthcare budget in low resource healthcare settings of [5-7] these findings provide compelling evidence of the need for more rational use of antimicrobial agents in all over the world. [8-11] In order to control the growing bacterial resistance to antibiotics, there must be restrictions on antibiotic prescribing which is becoming more widespread. [12] Antibiotic resistance is contributed by the interplay of various parties such as prescribers, patients, health settings, medicines used, dispensers, private parties, and animal husbandry.

The inappropriate antibiotic use, including use for wrong indications, mode of use, underuse or overuse, poor adherence, and poor quality of antibiotics prescribed, may also contribute to the antibiotic resistance. [13] Antibiotics are the most important drugs to fight against bacteria. Therefore, it is of utmost importance that they are prescribed judiciously or else Indians will continue becoming resistant to them. The higher generation antibiotic fewer available on the National List of Essential Medicines (NLEM 2011) is ciprofloxacin, norfloxacin and ofloxacin among fluoroquonolones, and ceftraixone, cephalaxin, cefotaxime,Ceftazidime and cefuroxime among cephalosporins and other antibiotics like co-amoxiclav combination are in NLEM .

New drug policy in India-The Union Health Ministry, Government of India, is all set to launch a national antibiotics policy by incorporating a new Schedule namely, HX, in the Drugs & Cosmetics Act in a bid to prevent large scale of misuse of antibiotics in the country. The Schedule HX has Part A and Part B. According to this schedule, 16 antibiotics in Part A can be sold directly by drug manufacturers to the tertiary care hospitals, and 74 drugs in Part B can be sold by the chemist only on the prescription of Registered Medical Practitioners provided they maintain copy of prescription .

The duplicate copy of the prescription should be kept with the chemist for a further 2 years. A Schedule HX drug would come with a label warning, “Dangerous to take this preparation except in accordance with medical advice and not to be sold on retail without prescription of a registered medical practitioner.” Violations under the new Schedule may be punishable with a fine of Rs. 20000 or up to two years of imprisonment. [14-15] To determine the appropriateness of the higher generation antibiotics like cephalosporin, flouroquinolone and coamoxiclav prescribed in community pharmacies in rural India.

MATERIALS AND METHODS

A cross sectional study was carried out in community pharmacies in the town of Chidambaram, situated in rural south India, over a period of two months (September to October), 2011. Antimicrobial data was collected from well stocked licensed retail pharmacies located in Chidambaram. Out of forty pharmacies, six pharmacies were randomly selected for the study. Sample size calculation was done to determine the population required for the study. Community pharmacy customers who bought the antibiotics with a prescription were included in the study. Patients/persons buying any antimicrobial drug for outpatients (OPD) were interviewed after they purchased the antibiotics from the pharmacy.

The outpatient prescriptions had the following details: patient details, clinical signs and symptoms, laboratory results, medications prescribed, and directions provided for medication intake. All prescriptions containing antibiotics were collected directly from the prescriber and from the pharmacy units during the study period. In 1993, Hanlon et al. developed a Medication Appropriateness Index (MAI). [13] The MAI requires clinicians or clinical pharmacist to rate ten explicit criteria to determine whether a given medication is appropriate for an individual. The MAI has shown good reliability in settings where patient medical data are easily accessible from medical charts. In the present study, WHO guidelines and other were taken into consideration for evaluating the rationality of the prescriptions. [4,13,16-19]

The prescriptions were used to determine the appropriateness of the medication as per the following ten criteria:

1. Indication
2. Effectiveness
3. Dosage correct
4. Directions correct
5. Any clinically significant drug-drug interactions
6. Any clinically significant drug-disease interactions
7. Practicality of the directions
8. Presence of least expensive alternative compared to others of equal utility
9. Unnecessary duplication with other drugs
10. Acceptability of the duration of therapy

Each criterion was scored as either: appropriate, marginally appropriate and inappropriate. The clinical pharmacists made their decision based on the above mentioned ten criteria. The selected 300

prescriptions were analyzed based on the above criteria.

RESULTS

Characteristics of the prescriptions for patients are shown in Table 1. 77.66 % of the prescriptions were prescribed with minimum of one antibiotic; out of which 69.95 % prescriptions had higher generation of antibiotics. Each prescription had an average of 3.8 (total no. of drugs=1140) drugs per prescription. 14.7% of patients had co-morbidities. 60% patients had prescriptions with antibiotics prescribed on the first day of their visit and dispensed from the hospital. 2.33% of the prescriptions were prescribed after a culture sensitivity test. 22.66% of the prescriptions had antibiotics that did not belong to the higher generation.

The cost-per-prescription of higher generation antibiotic was Rs. 84.5 and in our study only 33.33% prescriptions had generic names written on them. Table 2 shows percentage score according to medication appropriateness index. 49% of prescriptions were prescribed appropriately, 4.8 % antibiotics prescribed had marginal appropriateness, 37.83% antibiotics were inappropriately prescribed and 8.36% were unknown. The findings for correctness of dosage, duration of therapy, interactions, and cost effectiveness were decided.

The Table 3 shows the number of drugs/prescriptions issued by physicians, Ayush doctors and pharmacists and prescriptions taken as self medication.53% (158 prescriptions) of the prescriptions were higher generation antibiotics prescribed by registered medical practitioners,) 26.66% (80 prescriptions) were taken after consulting with other Ayush doctors, 14 % (42 prescriptions) were taken after consulting with pharmacists and only 6.66% (20) were taken by patients as self medication.

Table 4 represents the classification of antibiotics, most commonly used and number of antibiotics prescribed. Among the fluoroquinolones class of antibiotics, 12.01% of ofloxacin which belongs to first generation and 6.43% of levofloxacin, which belongs to second generation of antibiotics, were prescribed. Whereas in the case of Cephalosporins class of antibiotics, cefixime (11.58%), third generation of antibiotics, was prescribed and much explored. Cephalexin (2.57%), first generation and cefotaxime (2.57%), third generation, were very rarely used. The coamoxiclav (4.29%) was also rarely used.

DISCUSSION

Drug utilization studies are important to measure the pattern and quality of drug use which facilitate the rational use of drugs. Rationalization of antibiotics requires appropriateness, safe and cost effective prescribing pattern. The use of drugs at our study site was found to be less rational and expensive. The essential drug list and standard treatment guidelines in different states of India specifically mention that higher generation antibiotics should be prescribed only by specialists In the near future, under the schedule HX launched by the Government of India, the private practitioners will not be able to prescribe higher generation antibiotics under schedule HX part A category.

Hence it will limit the access to antibiotics which are being covered by schedule HX part A. Indirectly it helps to prevent the antibiotic resistance and reduce unnecessary burden to the patient. Our study revealed that overall 51% (37.83% inappropriate, 4.81% marginally appropriate and 8.36% unknown) of the prescriptions containing higher generation antibiotics were prescribed inappropriately. Some previous reports have shown more than 50% prescription antibiotics being prescribed inappropriately. [2,4,20]

This indicates that the absence of an policy pertaining to prescribing antibiotics or the failure of the prescribers to follow the policies in place. National List of Essential Medicines (NLEM 2011) guideline states that all higher generation antibiotics must be prescribed only if there is evidence of resistance as indicated by culture sensitivity test and only specialists are authorized to prescribe the higher generation antibiotics. However, our study showed that more than 47% higher generation antibiotics taken by patients by self-medicating themselves or up on consulting with Ayush doctors and pharmacists. The Ayush physicians do not know much about the branded drugs, or their strength or the formulation or the dosage to be prescribed in specific conditions.

Clinical training for this group of doctors often focuses more on diagnostic rather than therapeutic skills. Pharmacological knowledge along with practical prescribing skills is required to prescribe antibiotics rationally. Physician are needed to prescribe the medications in accordance with the patients' condition. In some case, the pharmacist also isn't knowledgeable about proper medication use because presently, the qualification required to be a pharmacist in India is Diploma in pharmacy (2 year study plus 500 hour practical training in hospital),which does not provide sufficient

information and practice. The state of Tamil Nadu, in which our study site is located, has its own standards for treatment guidelines for hospitals and all other healthcare professionals. These guidelines are prepared after discussion with many experienced skilled stewardship to guide the prudent use of antibiotics and other medications, however looking at the study results, it is possible that these guidelines are not always followed.

Therefore, education and monitoring of all relevant people is necessary. Inappropriate use of antibiotics seems to be a universal problem. A study conducted in Bhutan showed that only 44.1% of the prescriptions prescribed for out-patients were rational. [23] Sandiumenge et al (2006) [12] studied the impact of different antibiotic strategies on acquisition of resistance to microorganisms, and found that of all prescriptions are prescribed for ventilator-associated pneumonia in Spain, cephalosporin and quinolones accounted for 11.3% and 8.4% resistance respectively, Various similar studies indicated about 30-75% higher generation antibiotics were prescribed inappropriately. [24-27] Our study has some limitations such as short duration of data collection, limited number of prescriptions, diseases and prescribers. In addition, some prescriptions did not contain all the required information especially on patient history to thoroughly determine the appropriateness.
There is an urgent need for effective interventions to halt this rampant practice of inappropriate prescribing of higher generation of antibiotics. We expect that the inappropriate use of antibiotics will reduce after implementation of schedule HX.

CONCLUSION

The present study reveals that antibiotics are prescribed poorly with a rationale. Our findings indicate an urgent need for the establishment of proper guidelines, dissemination of information to practitioners and supervision of antibiotic usage in low and middle income countries (India). Educational interventions to promote rational use of antimicrobial agents and awareness of deleterious impact of irrational prescribing habit among the physicians, ayush doctors, community pharmacist and community and all members of the health care system are needed.

The time has now come to curb irrational use of antibiotics. Government of India will be able to ensure both rational and restricted use of antibitoics, with the implementation of schedule HX. As complementary service to physicians, pharmacists can also take part in promoting the rational use of antibiotics, which will give the healthcare field a more professional upliftment.

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Table 1: Characteristics of Prescriptions

Variables	No. of Prescription (n)	Prescriptions (%)
Prescription with antibiotics	233	77.66
Prescription with higher generations antibiotics out of these antibiotics	163	69.95
Prescriptions with culture sensitivity test	7	2.33
Prescription prescribed with higher generation antibiotics on first day	180	60
Prescription prescribed other antibiotics before higher generation antibiotics	68	22.66
Higher generation antibiotics prescription in generics	100	33.33
Higher generation antibiotics dispensed from hospital	180	60
Average cost of the higher generation antibiotics per prescription.	163	Per prescription cost 84.5 (INR)

Table 2: Percentage score according to medication appropriateness index

Criteria in the text	Inappropriate number (%)	Marginally appropriate number(%)	Appropriate number (%)	Unknown number (%)
1	100 (33.33)	40 (13.33)	160 (53.33)	0
2	100 (33.33)	39 (13)	161 (53.66)	0
3	94 (31.33)	6 (2)	199 (66.33)	1 (0.33)
4	105 (35)	16 (5.33)	60 (20)	119 (39.66)
5	111 (37)	3 (1)	65 (21.66)	121 (40.33)
6	132 (44)	2 (0.66)	162 (54)	4 (1.33)
7	95(31.66)	4 (1.33)	200 (66.66)	1 (0.33)
8	100(33.33)	0	200 (66.66)	0
9	99 (33)	2 (0.66)	195 (65)	4 (1.33)
10	199 (66.33)	32 (10.66)	68 (22.66)	1(0.33)
Total %	37.83%	4.8 %	49%	8.364%

Table 3: Number of Drugs/Prescription by Prescribed Physician, other Ayush Doctors and Consultation with Pharmacists.

No. of drugs	Physicians n=158 (52.66)	Other Ayush Doctors n=80 (26.66)	Self Medication n=20 (6.66)	Consultation with Pharmacists n=42(14%)	Total n= 300 (%)
1 drug	12 (4)	10 (3.33)	4 (1.33)	3 (1)	29 (9.66)
2 drug	22 (7.33)	18 (6)	9 (3)	5 (1.66)	54 (18)
3 drug	37 (12.33)	18 (6)	7 (2.33)	20 (6.66)	82 (27.33)
4 drug	61 (20.33)	20 (6.66)	Nil	8 (2.66)	89 (29.66)
5 drug	26 (8.66)	14 (4.66)	Nil	6 (2)	46 (15.33)
Total n (%)	158(52.66%)	80 (26.66 %)	20 (6.66 %)	42 (14 %)	300 (100%)

Table: 4 Classification and most commonly prescribed higher generation antibiotics

Class	Antibacterial agents	No. of agents prescribed (n)	Consumption in percentage (%)
Fluoroquinolones			
1st generation	Ofloxacin	28	12.01
	Ciprofloxacin	20	8.58
2nd generation	Norfloxacin	8	3.43
	Levofloxacin	15	6.43
	Sparfloxacin	4	1.71
Cephalosporins			
1st generation	Cephalexin	6	2.57
	Cefadroxil	10	4.29
2nd generation	Cefuroxime axetil	8	3.43
3rd generation	Cefotaxime	6	2.57
	Ceftriaxone	12	5.15
	Cefixime	27	11.58
	Cefpodoxime proxetil	9	3.86
Aminopenicillins+β-Lactamase inhibitors (Coamoxiclav)	Amoxicillin+ Clavulanic acid	10	4.29

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