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## Assessment of Prescribing Trends and Rationality of Drug Prescribing

T.M. Vijayakumar, D. Sathyavati, T. Subhashini, G. Sonika and M.D. Dhanaraju  
Research Lab, GIET School of Pharmacy, NH-5, Chaitanya Nagar, Rajahmundry-533 294, India

**Abstract:** Medically inappropriate and economically inefficient use of medicines is observed throughout the world. This study was carried out to evaluate the prescription rationality and drug prescribing practice of physicians in East Godavari District, Andhra Pradesh, India. Prescriptions of 690 patients were collected over a period of three months. Average number of drugs per prescription was found to be 3.01. Only 27.3% of drugs were prescribed in generic names. More than four drugs were prescribed in 208 prescriptions. The 17.3% of cardiovascular drugs were prescribed commonly. A total of 26 drug-drug interactions were detected in 18 of the prescriptions. The 41.6% drugs were not in accordance with WHO essential drug list. Approximately 32% of Prescriptions were not mentioned about strength, dose, frequency and duration of administration of the drugs. The 16.8% of prescriptions contain Fixed Dose Combination (FDC). Majority of fixed dose combinations were prescribed for cardiovascular patients and diabetic patients. The drugs prescribed in the generic names were remarkably lower. Majority of the prescribed drugs were not followed the WHO model essential list. Irrational prescribing can be avoided by sticking to the ideal prescription writing. This study revealed that a lot of scope for prescriber education to improve prescribing patterns.

**Key words:** Prescribing behavior, fixed dose combination, generic name, rational drug use, polypharmacy

### INTRODUCTION

Prescription writing is a science and an art, as it conveys the message from the prescriber to the patient (Kumari *et al.*, 2008). The rationality of drug prescriptions has been studied in various developing countries; however most of the studies have limited their evaluation on numeric analysis of certain indicators such as number of drugs per prescription, percentage of antibiotics prescribed etc. (Krause *et al.*, 1999). Rational drug prescribing is defined as the use of the least number of drugs to obtain the best possible effect in the shortest period and at a reasonable cost (Gross, 1981). Inappropriate drug prescribing is a global problem (Enwere *et al.*, 2007). The irrational use of drugs is a major problem of present day medical practice and its consequences include ineffective treatment, unnecessary prescription of drugs-particularly antimicrobials and injections, development of resistance to antibiotics, adverse effects and economic burden on patients and the society (Salman *et al.*, 2008). The five important criteria for rational drug use are accurate diagnosis, proper prescribing, correct dispensing, suitable packing and patient adherence (Alam *et al.*, 2006). The assessment of medicine utilization is important for clinical, educational and economic purposes (Nazima *et al.*, 2009). Rational prescribing forms the corner stone of successful

implementation of the rational use of drugs (Ansari *et al.*, 1998). The study of prescribing patterns seeks to monitor, evaluate and if necessary, suggest modifications in prescribing patterns so as to make medical care rational and cost effective (Shankar *et al.*, 2004). The aim of this study was to describe the prescribing pattern of physicians and rationality of Prescriptions in East Godavari District, Andhra Pradesh. Our focus was not on to the drugs that are indicated for the patient's illness, but on the layout and content of the prescription. In particular, we wished to study the quality of the prescriptions in terms of the adequacy and clarity of the information contained and to describe the types and number, of medicines prescribed by doctors. The study can increase awareness of problems and thereby assist to develop interventions for improving patient care by rational use of drugs.

### MATERIALS AND METHODS

A prospective study (Vijayakumar *et al.*, 2010) was carried out over three months Feb 2010-May 2010 in out-patient department of private clinics and hospital around East Godavari District, Andhra Pradesh, India. Prescriptions were collected during the study period from the patients (690) attending community pharmacies near to the private clinics and hospitals taken for the analysis.

Prescriptions were collected by taking their image. The parameters of audit for prescribing pattern were patient details (patient's name and address and date of consultation). The following parameters are used to measure for assessment of rationality of the prescription,

- Total number of drugs prescribed
- Average number of drugs per prescriptions
- Number of drugs in generic name
- Duration of therapy
- Dosage of drug and dose strength
- Number of Antibiotics prescribed
- Number of injections prescribed in the prescription
- Number of fixed dose combination prescribed
- Any banned formulations in the prescription
- Percentage of drugs which were from the national list of essential drugs
- Cost of the prescription
- Monitoring of Drug-drug interactions

CIMS (Current Index of Medical Specialties) drug manual was used to decode the brand name of drugs to generic names for the purpose of analysis. Data was analyzed using statistical package for social sciences (SPSS 16.0) and Microsoft Excel. Descriptive statistics was used depending upon the objective of the study.

**RESULTS**

Total 690 prescriptions were collected during the study period. The average number of drugs per prescription was found to be 3.0. Out of 690 prescriptions, cardiovascular drugs were most commonly prescribed (17.3%). Followed by vitamins and minerals formulations

(14.4%), Gastrointestinal drugs (13.5%), Antimicrobials (9.6%), Central nervous system drugs (9.1%), Muscle relaxants (6.7%), Non-steroidal anti inflammatory drugs (5.3%), Anti-allergic drugs (5.3%), Respiratory drugs (5.3%), Steroidal drugs (4.3%), Antidiabetic drugs (4.3%), Antituberculosis (3.4%), Drugs acting on skin (1%) and Drugs acting on eye (0.5%) (Fig. 1).

Of the 690 prescriptions with the gender of the patient indicated, about half (50.4%) were for Females and the other half (49.6%) for males. In the total number of prescriptions (690), above four drugs were prescribed in 208 prescriptions. This may increase the risk of polypharmacy (Table 1).

Total 690 prescriptions contain 2080 drugs, in which 1513 (72.7%) drugs were prescribed in brand names. Only 567 (27.3%) drugs were prescribed in generic names. A total of 26 drug-drug interactions were detected in 18 of the prescriptions. Fifteen of these interactions could be classified as potentially hazardous and should be avoided if possible or appropriate monitoring and precautions should be taken.

Among 690 prescriptions, more numbers of prescription were prescribed for the age group of 51-60 years {147(21.3%)} followed by 61-70 years {90(13.0%)}, 31-40 years {88(12.8%)}, 71-80 years {86(12.5%)}, 51-60 years {82(11.9%)}, 81-90 years {32(4.6%)}, 1-10

Table 1: Incidence of polypharmacy

| No. of prescriptions | No. of drugs per prescriptions | Percentage |
|----------------------|--------------------------------|------------|
| 52                   | 1                              | 7.5        |
| 138                  | 2                              | 20.0       |
| 132                  | 3                              | 19.2       |
| 160                  | 4                              | 23.1       |
| 208                  | Above 4                        | 30.2       |
| Total 690            |                                | 100.0      |

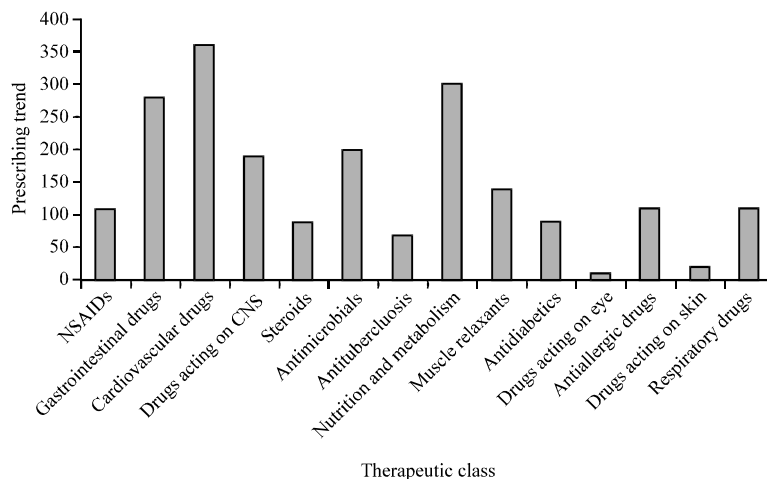


Fig. 1: Prescribing trend according to therapeutic class

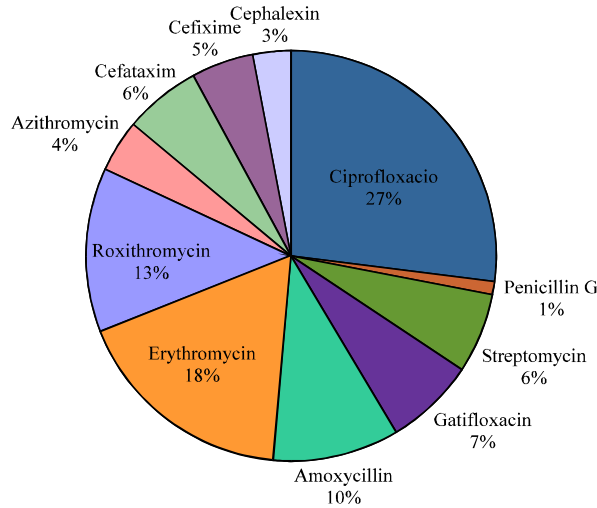


Fig. 2: Antibiotic prescribing pattern

Table 2: Prescribing pattern according to age group

| Age group (years) | No. of prescriptions | Percentage |
|-------------------|----------------------|------------|
| >1                | 2                    | 0.3        |
| 1-10              | 23                   | 3.3        |
| 11-20             | 15                   | 2.2        |
| 21-30             | 17                   | 2.5        |
| 31-40             | 88                   | 12.8       |
| 41-50             | 147                  | 21.3       |
| 51-60             | 82                   | 11.9       |
| 61-70             | 90                   | 13.0       |
| 71-80             | 86                   | 12.5       |
| 81-90             | 32                   | 4.6        |
| 90-100            | 8                    | 1.2        |

years {23(3.3%)}, 21-30 years {17(2.5%)}, 11-20 years {15(2.2%)}, 90-100 years {8(1.2%)}, >1 year {2(0.3%)} (Table 2).

Cost analysis was done for all 690 prescriptions. Majority of prescriptions 468 (67.8%) had a price less than 100 INRs. The cost data of each drug was obtained from CIMS, Drug today and IDR medclick (Version 120.04.05.06 Comprehensive and Reliable drug reference).

Of the total antibiotics (200), Ciprofloxacin was prescribed most commonly [(27%)], followed by Erythromycin[(18%)], Roxithromycin[(13%)], Amoxicillin [(10%)], Gatifloxacin [(7%)], Streptomycin [(6%)], Cefataxim [(6%)], Cefixime [(5%)], Azithromycin [(4%)], Cephalixin [(3%)] and Penicillin [(1%)] (Fig. 2). Duration of therapy was not mentioned in 46% of Prescriptions. None of the drugs banned by drug controller of India were used in the prescriptions. It was also noted that out of the 690 prescriptions studied, 234 (33.9%) had at least one multivitamin, iron or tonic prescribed. The rationality of these formulations was still unclear.

According to WHO (2010) essential drug list 866 (41.6%) drugs were not in the list. None of the fixed dose combinations were present in the WHO essential list.

Approximately 32% of Prescriptions were not mentioned about strength, dose, frequency and duration of administration of the drugs. In total prescriptions, 116 (16.8%) prescriptions contain Fixed Dose Combination (FDC). Majority of fixed dose combinations were prescribed for cardiovascular patients and diabetic patients.

**DISCUSSION**

The different prescribing parameters and the distribution of different categories of drugs in the prescriptions analyzed in this study provided an insight into the prescribing behavior of the physicians in East Godavari District, Andhra Pradesh. Use of generic names in prescription eliminate the chance of duplication of drug products and also reduce the cost of the patient. In our study, most of the drugs were prescribed in generic names (26.3%). It was little higher than the similar type of study conducted in Nepal (Ghosh *et al.*, 2003).

Average number of drugs per prescription reported in this study was 3.01. Present study produced similar as like that of study conducted in rural Varanasi (Bhatnagar *et al.*, 2003). Since, WHO has recommended that average number of drug per prescription should be 2.0 (Sharif *et al.*, 2007) the results of our study reflects polypharmacy which may lead to adverse drug reactions, decrease adherence to drug regimens and unnecessary drug expenses. In contrast, since the medical department encountered highest number of prescriptions with a larger number of drugs prescribed for chronic clinical conditions like hypertension and diabetes, the patients can require more drugs than as stated by WHO. In such cases polypharmacy can be acceptable (Chobanian *et al.*, 2003) It was observed that the usage of antibiotics was less in the present study as compared to similar studies done in India. The majority of antibiotic usage was for upper respiratory tract infections and gastrointestinal tract infections (Biswas *et al.*, 2000). Present study revealed that majority prescriptions were in high cost. Increase in the cost may be because of low generic or higher brand prescribing and higher average number of drugs per prescription. The other contributing factors may be due to higher prescribing of costlier antimicrobials, antihistamines and multivitamin preparations. With the increase in cost of drug therapy, patient compliance will virtually decrease and the chronic drug users may not adhere to the drug therapy (Enwere *et al.*, 2007).

**CONCLUSION**

The finding of the present study indicates that the average number of drug per prescription was significantly

higher than recommended by WHO. The drugs prescribed in the generic names were remarkably lower. Majority of the prescribed drugs were not in accordance with the WHO model essential list. The results indicate a considerable scope for improving the prescribing pattern of drugs in the medical out-patient departments. Irrational prescribing can be avoided by sticking to the ideal prescription writing. There is some evidence that interventions such as short problem-based training course in phannacotherapy (Vries *et al.*, 1995) and rational use focused workshops (Thomas *et al.*, 1997) can improve prescription behavior and skills.

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