

Assessment of Antimicrobial Prescribing Pattern in the Outpatient Department of Ophthalmology in a Tertiary Care Hospital of Western Uttar Pradesh, India

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Abstract

Introduction: Assessment of prescribing pattern at regular interval is essential to avoid inappropriate use of drugs, especially of antimicrobial drugs. **Objectives:** The present study was performed to evaluate the prescribing pattern of antimicrobial drugs in the Ophthalmology Out-Patient Department (OPD) of Santosh Medical College and Hospital, Ghaziabad, India. **Material and method:** The present study included a total 600 prescriptions of patients attending OPD. A structured proforma was used to record all necessary information of each patient including demographic profile of patient, diagnosis, total number of drugs and antimicrobials prescribed, group of antimicrobial prescribed, the percentage of antimicrobials prescribed by generic name etc. **Results:** Total 600 prescriptions were evaluated. Mean age of the study subjects was 28.4 ± 15.05 years. Total 720 antimicrobials were prescribed and the average number of antimicrobial drugs per prescription was 1.2. Fluoroquinolones were most commonly prescribed antimicrobial drugs followed by aminoglycosides and macrolides. 85% of drugs were prescribed in the form of eye drops while 15% were in the form of an ointment. 1.2% of antimicrobial drugs were prescribed by generic names. Out of total antimicrobials drugs, 420 drugs were in the form of fixed dose combination. Only 1.6% of drugs were prescribed from National Essential Medicines List (NEML) 2015, India. **Conclusion:** Most of the antimicrobials were prescribed by brand names which require important consideration to promote rational use of antimicrobial drugs. In addition, the number of drugs prescribed from NEML was very less, indicating the need of sensitization among prescribers for the promotion of rational use of drugs.

Key words: Prescribing pattern, Ophthalmology, Antimicrobials, Generic name, Rational

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Introduction

Periodic assessment of prescribing pattern is essential to identify the irrational and inappropriate use of drugs in medical practice which might affect the therapeutic efficacy and safety of prescribed medicines (Jayanthi & Sushma, 2014; Yadav et al, 2010). Rational

use of drugs indicates that the patients are prescribed drugs according to their clinical needs at adequate doses for the appropriate duration. Irrational use of drugs in the form of overprescribing, under prescribing or misuse might result in health risks to the patients and wastage of limited resources in the health care system. Thus, evaluation of prescribing pattern helps prescribers to improve their prescribing practice and consequently promotes rational use of drugs (Brahma et al, 2012; Jain et al, 2015).

As per World Health Organization (WHO) more than half of all the medicines are prepared, dispensed or sold inappropriately, and that half of all the patients fail to take them correctly (Shalini et al, 2010; Jain et al, 2016). To promote the rational and appropriate use of drugs, WHO and International Network for Rational Use of drugs (INRUD) have defined some standard drug use indicators. These indicators provide information about the problems related to the rational use of drugs and about prescribing and dispensing of drugs to clinicians so that adverse effects occurring due to use of medicines can be prevented (WHO, 1993; Biswas et al, 2001; Maniyar et al, 2011; Prajwal et al, 2013).

Antibiotics are one of the commonly prescribed drugs in Ophthalmology department for treatment of ocular diseases and according to WHO utilization of antibiotics is one of the essential core drug use indicator (Topno et al, 2012; Suman et al, 2017). Unnecessary and inappropriate use of antibiotics is associated with increased chances of drug resistance. Thus, it becomes necessary to study the utilization pattern of antimicrobial drugs at a periodic interval to promote the rational use of antimicrobials as well as to prevent antimicrobial resistance (Suman et al, 2013, 2017; Vaniya et al, 2016). Keeping this in mind, the present study was done with the aim to evaluate the prescribing pattern of antimicrobial drugs in patients presenting to

Ophthalmology Out Patient Department (OPD) of Santosh Medical College and Hospital, Ghaziabad, India.

Material and methods

The present prospective, observational study was carried out in the OPD of Ophthalmology department of Santosh Medical College and Hospital, Ghaziabad, India, a tertiary care teaching hospital. Ethical approval was taken from Institutional Ethics Committee before initiation of study. Information regarding the data for the study was collected from the outpatients visiting OPD for ten months. A proforma was used to record detailed information related to each patient and prescribed drugs. All patients with either sex and of any age group who visited OPD for the treatment of various eye diseases and were prescribed antimicrobials were recruited in the study. Patients who were not willing to participate in the study were excluded.

A total of 600 prescriptions were collected from the patients who received at least one antimicrobial drug for treatment of ocular disease and were subsequently analyzed. Each prescription was analyzed as per the WHO core drug use indicators including patient demographics such as age, sex and diagnosis, the total number of antimicrobial prescribed, average number of antimicrobial drug per prescription, details of all the prescribed antimicrobial drugs with their dosage forms, frequency and duration. Also, the percentage of antimicrobial drugs prescribed by generic name or brand name, as fixed dose combination and from National Essential Medicine List 2015, India (NEML) was also recorded.

Statistical analysis

Descriptive statistics were performed for analysis of data. Graph Pad Prism version 7.00 for windows, Graph Pad software, La Jolla California USA, www.graphpad.com was used for analysis. Values are presented as

actual number, percentage, mean and standard deviation (SD).

Results

In the present study, prescriptions of total 600 patients who fulfilled the inclusion criteria, were collected and analyzed. Among 600 patients, 282 (47%) were male and 318 (53%) were females with age varying from 4-64 years.

Figure 1 shows the distribution of all patients according to age group. Maximum numbers of patients were in the age group of 21-40 years while least was found in the age group of 60-80 years. The mean age of patients was 28.47 ± 15.05 years.

Total 1785 drugs were prescribed in 600 prescriptions and the overall numbers of antimicrobial drugs prescribed in all these prescriptions were 720. On an average 2.97 drugs were prescribed per prescription. The maximum number of antimicrobial drug prescribed in a prescription was two and the average number antimicrobial per encounter was found to be 1.2.

Antimicrobials were prescribed both as monotherapy and in combinations. Sixty eight percentage (408/600) of prescriptions contained antimicrobials in combination with other drugs. Out of total antimicrobials prescribed, 41.6% (300) of antimicrobials were prescribed as a single agent while 58.4% (420) were in the combination form. Moxifloxacin with ketorolac (168/420) was the most common combination prescribed in the present study.

Antimicrobials were mainly prescribed for allergic conjunctivitis 50.34% (302), infective conjunctivitis 10.6% (64), meibomitis 5.4 % (32), foreign body in eye 4.6% (28), nasolacrimal duct block 4.6% (28), sty 4.4% (26), corneal ulcer 4.4% (26), chalazion 4% (24) and others eye diseases. (Table 1) Antimicrobial drugs were mainly prescribed in eye drops dosage form [612 (85%)] followed by ointments [108 (15%)]. None of the antimicrobials

was prescribed in oral or injectable form. Azithromycin (42/108) and the combination of polymyxin B sulfate and chloramphenicol (66/108) were the antimicrobials which were prescribed in the ointment dosage form.

Table 1: Distribution of patients according to ocular disease

Ocular disease	Number of patients (%)
Allergic conjunctivitis	302 (50.4)
Infective conjunctivitis	64 (10.7)
Meibomitis	32 (5.4)
Nasolacrimal duct block	28 (4.6)
Foreign body	28 (4.6)
Stye	26 (4.4)
Corneal ulcer	26 (4.4)
Chalazion	24 (4.0)
Episcleritis	18 (3.0)
Superficial punctate keratitis	16 (2.6)
Subconjunctival hemorrhage	12 (2.0)
Others	24 (4.0)

Out of total prescribed antimicrobials, fluoroquinolones (492/720) were the most commonly prescribed antimicrobial drugs followed by aminoglycosides (102/720), a combination of polymyxin B sulfate and chloramphenicol (66/720) and macrolides (54/720). (Figure 2) Moxifloxacin was most commonly prescribed among the fluoroquinolones followed by ciprofloxacin, ofloxacin, and levofloxacin. Fluoroquinolones were prescribed as a single agent (210/492) as well as in combinations with steroids (114/492) and nonsteroidal anti-inflammatory drugs (168/492). In aminoglycosides group, only tobramycin was given both as monotherapy (30/720) and in combination with fluorometholone acetate (72/720). In macrolide group, only azithromycin (54/720) was given in eye drop and ointment dosage forms. (Table 2 and 3)

Dosage forms of prescribed antimicrobials were mentioned in all prescriptions. However, the frequency and duration of treatment were not mentioned in prescriptions for 8.62% (62) and 5.5% (40) drugs, respectively. Prescribing

by generic names was mentioned only for 1.2% of antimicrobial drugs. Out of total 720 antimicrobial drugs only 1.6 % drugs were prescribed from National Essential Medicines List 2015, India. (Table 4)

Table 2: Prescribing patterns of individual antimicrobial drug

Antibiotic class	Drugs	Number (%)
Fluoroquinolones	Moxifloxacin	184 (25.6)
	Ciprofloxacin	12 (1.6)
	Ofloxacin	8 (1.2)
	Levofloxacin	6 (0.82)
Macrolides	Azithromycin	54 (7.5)
Aminoglycoside	Tobramycin	30 (4.2)
Sulfonamides	Sulfacetamide	6 (0.82)

Table 3: Prescribing patterns of antimicrobial drugs in combination form

Fixed-dose combinations	Drugs	Number (%)
Fluoroquinolones + steroid	Moxifloxacin + Loteprednol	60 (8.3)
	Moxifloxacin + Dexamethasone	6 (0.82)
	Ciprofloxacin + Dexamethasone	48 (6.7)
Fluoroquinolones + Analgesic	Moxifloxacin + Ketorolac	168 (23.4)
Aminoglycosides + steroid	Tobramycin + Flurometholone	72 (10)
Lipopeptide + Protein synthesis inhibitor	Polymyxin B sulfate + Chloramphenicol	66 (9.2)

Table 4: Prescribing Indicators

Indicator	Data
Total number of prescriptions	600
Average number of drugs per prescription	2.97
Average number of antimicrobial drug per prescription	1.2
Percentage of antimicrobial drug prescribed by generic name	1.2
Percentage of antimicrobial drugs prescribed from NEML	1.6
Percentage of prescription with fixed dose combinations	68
Percentage of prescription with dosage form mentioned	100
Percentage of prescription with frequency of drug administration mentioned	91.4
Percentage of prescription with duration of therapy mentioned	94.5
Dosage form	
Eye drops	85%
Ointment	15%

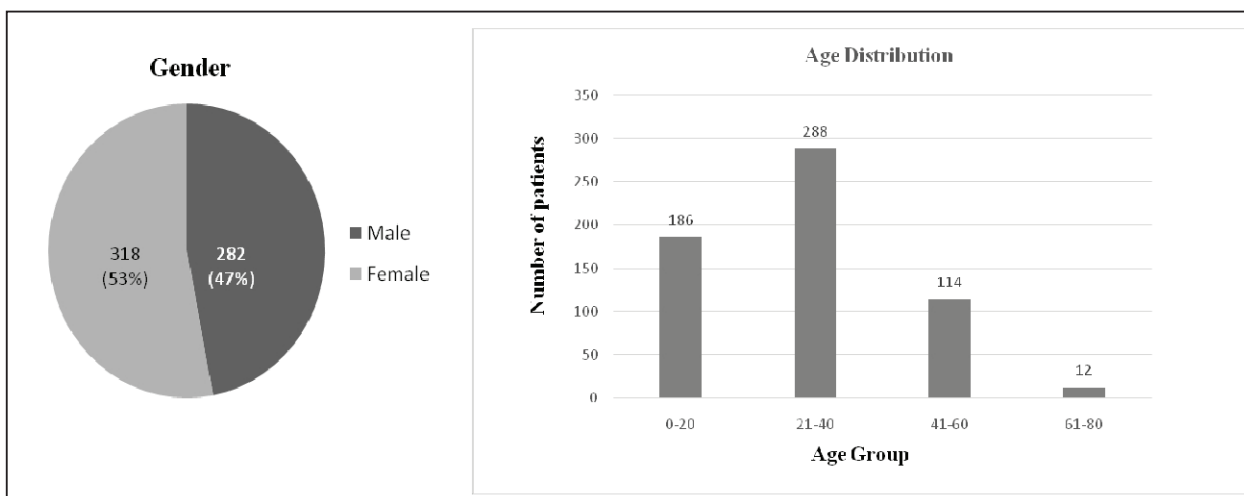


Figure 1: Baseline demographic characteristic of patients

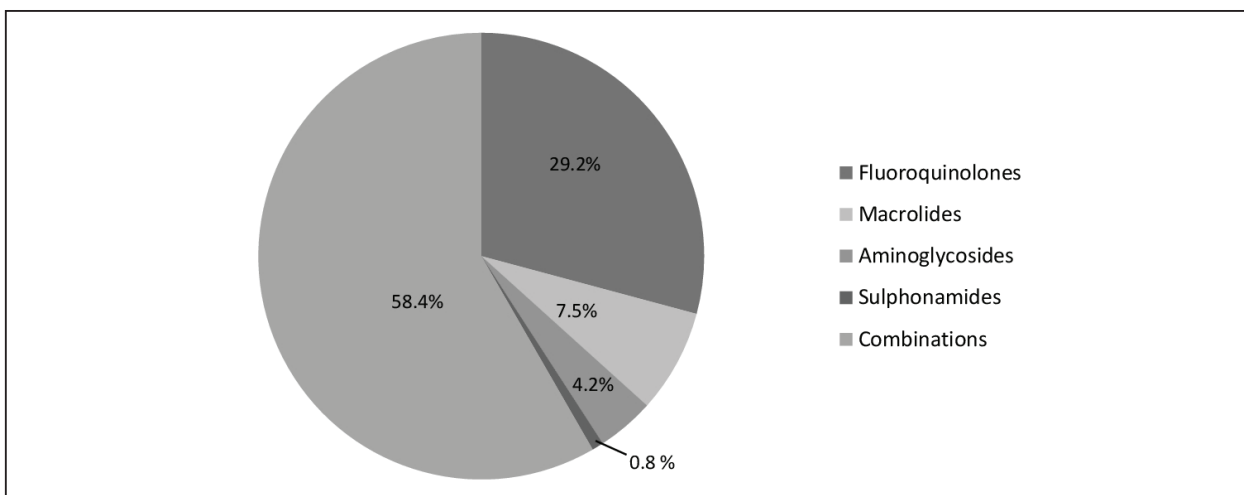


Figure 2: Prescription pattern of a different group of antimicrobial drugs

Discussion

Antimicrobials are one of the commonly prescribed drugs in the discipline of Ophthalmology for various ocular indications. It is well recognized that use of these drugs in inappropriate and imperceptive manner is resulting in the development of antimicrobial resistance, adverse effects, therapeutic failure as well as increased cost of therapy (Jadhav et al, Afshari et al, 2008, Asbell et al, 2008). In recent times, the study of drug utilization pattern has emerged as an essential tool for evaluation and monitoring of prescribing pattern of drugs in health care system so that

quality of medication therapy can be modified in a society for the benefit of recipients or patients (Sachdeva, 2010; Jhaveri et al, 2014). Thus, assessment of drug use pattern at periodic interval not only promotes rational use of drugs but also provide feedback to prescribers or clinicians about the drug utilization data and results so that prescription writing pattern can be improved to reduce adverse drug reaction, drug resistance and to increase therapeutic efficacy of drugs (Krishnaswamy et al, 1985; Pradhan et al, 1988; Marshner et al, 1994). The current study was aimed to know the current pattern of antimicrobial use in patients who

presented in OPD for treatment of eye diseases in a tertiary care teaching hospital.

In this study total, 600 prescriptions were analyzed comprising of 47% male and 53% female patients. However, other investigators have reported more percentage of male patients as compared to female patients in their studies (Topno et al, 2012; Dutta et al, 2014; Suman et al, 2015).

An average number of drugs per prescription is an important indicator to assess the practice of polypharmacy. It is recommended that number of drugs prescribed per patient must be kept as minimum as possible so that chances of adverse drug reaction, drug interactions, drug resistance can be minimized (Kuijpers et al, 2008; Vaniya et al, 2016; Bachewar et al, 2018). In present study total, 1785 drugs were prescribed in 600 prescriptions, out of which antimicrobials constitute 40.33% (720/1785) of total drugs prescribed. The average number of antimicrobial prescribed per prescription was 1.2. The percentage of antimicrobials prescribed in our study was comparable to study conducted by Suman et al (2003), i.e. 38.5% but was lower as compared to study conducted by Vaniya et al (2016) and Jadhav et al (2013), i.e. 45.7% and 43.11 %, respectively. In contrast to a study done by Suman et al (2003) the value of an average number of antimicrobial per prescription in our study was higher.

Antimicrobials in fixed-dose combinations were prescribed maximally, i.e. 58.4 % (420/720) followed by fluoroquinolones as single agent 29.2 % (210/720). Contradictory to the previous study which documented tobramycin and loteprednol (Suman et al, 2017) as the most commonly prescribed FDCs in their studies, in our study moxifloxacin with ketorolac (168/420) was most preferred fixed dose combination. Similar to previous studies (Mohanty & Mohapatra, 2003; Nehru et al. 2005; Maniyar et al, 2011; Prajwal et al, 2013) most common dosage form used for application

of antimicrobials drugs was eye drops in the present study also.

Most common antimicrobial drug group prescribed as monotherapy as well as in combination belonged to fluoroquinolones. Other reports conducted in ophthalmology have also shown similar results in their studies (Biswas et al, 2001; Nehru et al. 2005; Jadhav et al, 2013). Among fluoroquinolones, moxifloxacin was most prescribed followed by ciprofloxacin and ofloxacin. This is in contrast to findings of other studies where gatifloxacin (Jadhav et al, 2013) ciprofloxacin (Mohanty & Mohapatra, 2003; Nehru et al. 2005) and ofloxacin (Maniyar et al, 2011) were prescribed more frequently than moxifloxacin. However, in a study conducted by Suman et al. (2015) moxifloxacin was most commonly prescribed antimicrobial. Supposedly, moxifloxacin was most preferred in this study in virtue of its broad spectrum activity, less ocular side effects and fewer chances of resistance.

Most common indication for use of antimicrobials was allergic conjunctivitis 50.34% (302) followed by infective conjunctivitis 10.6% (64), meibomitis 5.4 % (32), foreign body in eye 4.6% and others. Previous studies have reported cataract (Suman et al, 2003), corneal ulcer (Mohanty & Mohapatra, 2003) and postoperative cases (Topno et al, 2012) as most common diagnosed disease of an eye for which antimicrobials were prescribed in their studies. However, similar to our study, Dutta et al (2014) reported that antimicrobials were mainly prescribed for conjunctivitis.

It is recommended to prescribe drugs by their generic names as it is cost effective for patients and prescribing by generic names reduces the likelihood of medication errors. While, prescribing of drugs by brand names enhances the probability of writing errors in prescribing and also makes the treatment expensive for patients (Flegel, 2012; Thakkar et al, 2013). In

this study, only 1.2% of antimicrobials were prescribed by their generic name. Prescribing of drugs by brand name was more preferred by prescribers. As compared to this study other investigators (Suman et al, 2003; Topno et al, 2012; Jadhav et al, 2013) have reported a higher number of drugs prescribed by their generic names in their studies. The results indicate that there is a lack of awareness about generic prescribing and writing drugs by brand names is more admired among prescribers.

Only 1.6 % of antimicrobial drugs are prescribed from NEML 2015 however, other similar hospital-based studies conducted by Jadhav et al (2013) and Suman et al (2003) have shown more number of antimicrobial drugs to be prescribed from NEML (34.5 % and 96%, respectively) in their studies as compared to our study, indicating need to develop concept of essential medicines among prescribers for promotion of rational prescribing.

Thus, results obtained from this study provide an idea about the current trend of antimicrobials prescribed in various ocular diseases and also point out a few lacunae in the prescribing practices. However, the study has some limitations and there is further scope for future research. The sample size included was relatively less as well as the study was designed for a short duration. In addition, many other particulars like following up of patients were not carried out to recognize the outcome of prescribed antimicrobials. Also, any adverse drug effects if, occurred due to use of any prescribed antimicrobials were not considered in the study.

Conclusion: The present study was an effort to demonstrate the pattern of antimicrobial usage in the outpatient department of ophthalmology. The study results showed some lacunae in prescription writing. The prescribing of antimicrobial drugs by generic name and from essential drug list was very less which indicate the need of improvement in prescribing

practice through proper sensitization and increasing awareness among ophthalmologist about rational prescribing of drugs so that economic burden on patients and development of antimicrobial resistance can be reduced.

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