



International Journal of Research in Pharmacology & Pharmacotherapeutics



ISSN Print: 2278-2648

IJRPP | Vol.10 | Issue 2 | Apr - Jun - 2021

ISSN Online: 2278-2656

Journal Home Page: www.ijrpp.com

Research article

Open Access

Prescribing pattern of antimicrobial agents In-patient admitted in ophthalmology at a tertiary care hospital

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ABSTRACT

Background: Emergence of antimicrobial resistance in pathogens has become a matter of great public health concern. Several ophthalmic infections are treated effectively by usage of appropriate antimicrobial drug. So that rational prescribing of drugs will improve efficacy and slow resistance development.

Objectives: To analyze the prescription pattern based on WHO indicators in patients admitted in ophthalmology department.

Materials and methods: An observational, prospective study conducted in patients admitted in ophthalmology department for a period of 18 months. A total of 600 prescriptions were analyzed by collecting data according to WHO indicators. The data was analyzed by using Descriptive statistics.

Results: Out of 600 prescriptions, a total of 1960 drugs were prescribed in patients among which three drugs per prescription were maximum. Average number of drugs per prescription was 3.2 in patients. Maximum drugs prescribed were in the form of eye drops (54%). The commonly prescribed drugs were antimicrobials, of which antibacterial were common which accounts for 35.25% and common aminoglycoside prescribed was tobramycin (69%) followed by gentamicin (31%). Percentage of drugs prescribed by generic name was 11% and percentage of drugs prescribed from National List of Essential Medicine (2016) was 71.27%.

Conclusion: Treatment of ocular infections commonly by topical antimicrobial agents. WHO core prescribing indicators of drugs used to evaluate the number of drugs prescribed by generic names as well as NLEM showed lower results in our study. The implementation and establishment of suitable clinical strategies helps rational drug use and strengthening of hospital drug supply, so that apt drugs in appropriate formulations are accessible in acceptable quantities to meet the needs of the patients.

Key words: Antimicrobial agents (AMAs); Generic names; Ophthalmology; Prescribing pattern; WHO

INTRODUCTION

Normally the eye is impermeable to most environmental agents. Continuous tear flow, aided by the blink reflex, mechanically washes substances from the ocular surface and prevents the accumulation of microorganisms. In addition, lysozyme, lactoferrin, secretory immunoglobulins, and defensins, which are present at high levels in tears, can specifically reduce bacterial colonization of the ocular surface.¹

However, in some circumstances, infectious agents gain access to the posterior segment of the eye following an

intraocular surgery, a penetrating injury of the globe or from haematogenous spread of bacteria to the eye from a distant anatomical site.² Although uncommon, endophthalmitis can also result from keratitis, an infection of the cornea with potential complications.³

During the "pre-antibiotic era", infection is a major concern for the high morbidity and mortality in humans. Some of the virulent organisms with the potential to spread infection from one infected person to another at a very rapid rate may cause worldwide pandemics, epidemics or outbreaks. With the discovery of the first antibiotic, "the magic bullet" Penicillin in the year 1943, patients could be effectively

cured of many life-threatening infections. This gave a huge relief to the medical practitioners. Next three decades saw the development and discovery of a wide variety of antimicrobial agents.⁴ However, the widespread use of broad-spectrum Antimicrobial agents (AMAs) results in global rise in resistance bacteria to a number of antibiotics.⁵ Thus, 'post antibiotic era' is reported to be "discovery void"; antimicrobial resistance is considered to be the most serious health threats⁴

Infections caused by antimicrobial-resistant microorganisms in hospitals are associated with increased morbidity, mortality and healthcare costs. The resilience of viruses and the tenacity of bacteria have led to the evolution of old diseases and the emergence of new infections. Continuous search for new AMAs for the treatment of infectious diseases is, therefore, highly desirable. Selection and spread of resistant microorganisms in the presence of antimicrobials is facilitated by number of factors like irrational use of drugs, self-medication and misuse of drugs.⁶ Hence, emergence of antimicrobial resistance in pathogens has become a matter of great public health concern. There is a need to improve drug's therapeutic efficacy, minimize adverse effects and delay development of resistance, thus the drug utilization studies and patterns to be evaluated periodically.⁷ Hence the current study was designed to analyze the pattern of antimicrobials drug use and prescription pattern based on WHO indicators among patients admitted in the department of ophthalmology.

MATERIALS AND METHODS

A prospective observational study was conducted in the patients admitted in the Department of Ophthalmology at Minto Hospital attached to BMCRI, Bangalore for duration of eighteen months after obtaining the approval from Institutional Ethics Committee. A total of 600 prescriptions were analyzed who was admitted in the Ophthalmology

wards. The data was collected from patients of all age groups, of either gender and patients who gave written informed consent were included in the study. Their data was recorded in a proforma containing patient's demographic profile, diagnosis of disease and drug regimen and name of the Antimicrobial drug, dose, dosage form, frequency, duration and route of administration, instruction to the pharmacist & patient.

Prescription Pattern were analyzed by collecting data according to WHO/International Network of Rational Use of Drugs (INRUD) indicators.⁶ Assessment of Indicators were as follows: Average number of drugs per encounter, percentage of encounters with an injections, encounters with an antibiotic prescribed and drugs prescribed by generic name and percentage of drugs prescribed from national essential drug list/ formulary. The collected data was formulated to calculate average numbers of drug per prescription.

STATISTICAL ANALYSIS

Data were analyzed using descriptive statistics namely mean, standard deviation and percentage wherever applicable.

RESULTS

During the study period, a total of 600 prescriptions were analysed from the patients admitted in ophthalmology wards. Patients were categorized based on their age, gender and area wise.

Based on the age distribution, three groups were made i.e. <40 years that accounts for 27%, 41-60years that accounts for 44% & >60years that accounts for 29% as depicted in

Table 1.

Table 1: Age distribution

AGE (years)	TOTAL n=600	PERCENTAGE (%)
<40	147	24.5
41-60	254	42.33
>60	199	33.16

Out of 600 patients, the gender distribution was found to be 363 (60%) of Males and 237 (40%) of Females as depicted in Figure 1.

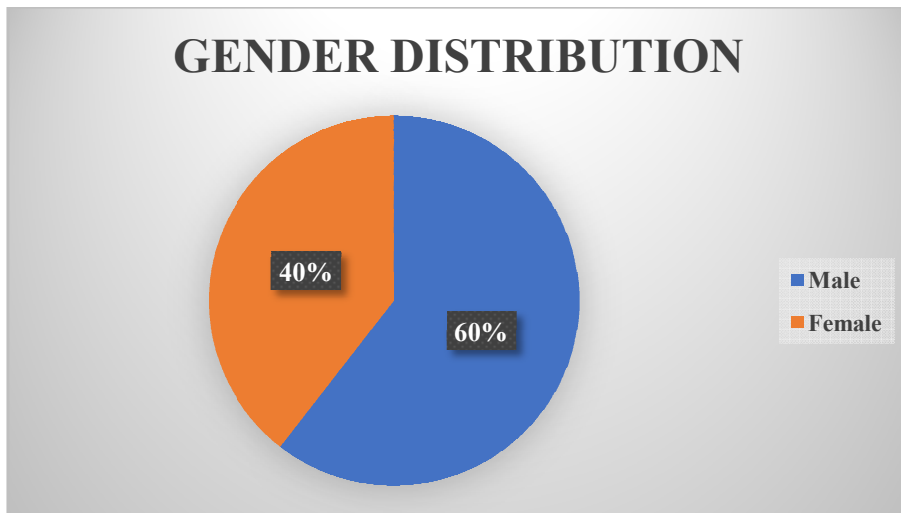


Figure 1: Gender distribution

In patients admitted to wards, 43.67% were from the urban and 56.33% from the rural area as depicted in Table 2.

Table 2: Area wise distribution

AREA WISE	TOTAL n=600	PERCENTAGE (%)
URBAN	262	43.67
RURAL	338	56.33

Among the patients admitted in hospital, the most common ocular disease encountered were cataract which accounts for 52.16% followed by pterygium which accounts for 14.5%.

The other conditions were chronic dacryocystitis (7.8%), corneal ulcer (6.6%) and acute congestive glaucoma (4.6%) as depicted in Figure 2.

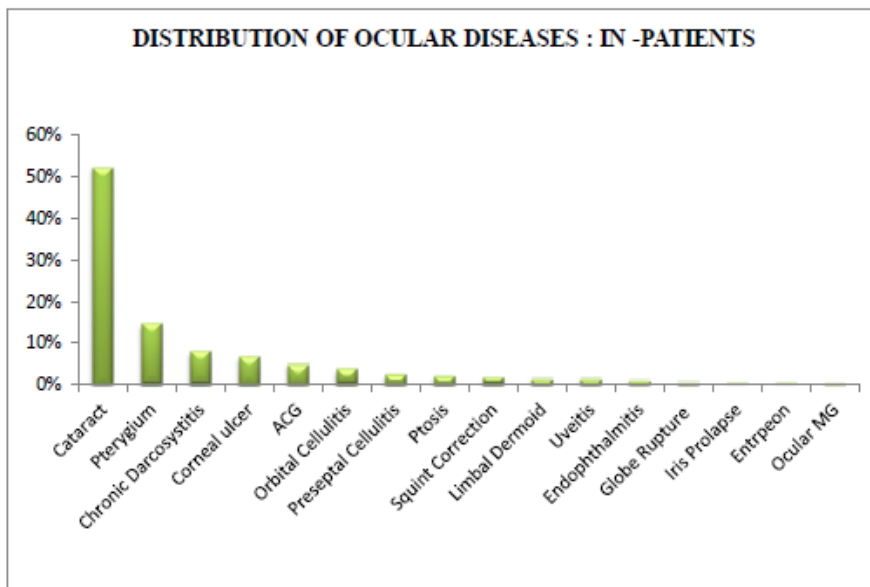


Figure 2: Distribution of ocular diseases

Percentage of drugs which were commonly encountered in patients were AMAs which accounts for 42.18% followed by FDC 24.33% as depicted in Figure 3.

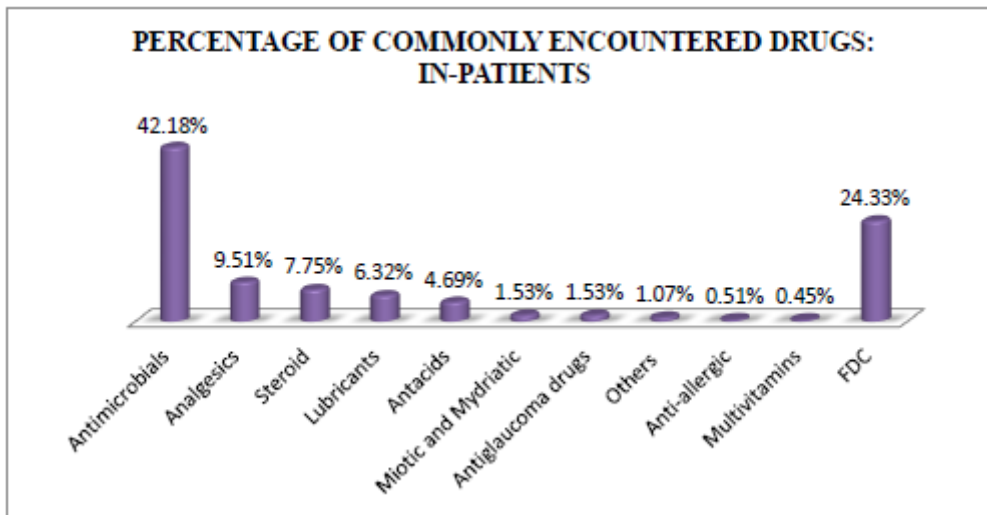


Figure 3: Percentage of commonly encountered drugs

A total of 600 prescriptions of patients admitted in hospital were analyzed by using WHO delineated drug use indicators as depicted in Table 3.

Table 3: Who prescribing indicators

WHO PRESCRIBING INDICATORS	TOTAL
Average number of drugs per prescription	3.2
Percentage of encounters with injection	5%
Percentage of encounters with antibiotic	35.25%
Percentage of drugs prescribed by generic name	11%
Percentage of drugs prescribed from essential drug list formulary (2016)	71.27%

Commonest dosage form prescribed was topical formulations in the form of eye drops 54% and ointments 18% followed by oral formulations 23% and injectables were 5% as depicted in the Figure 4.

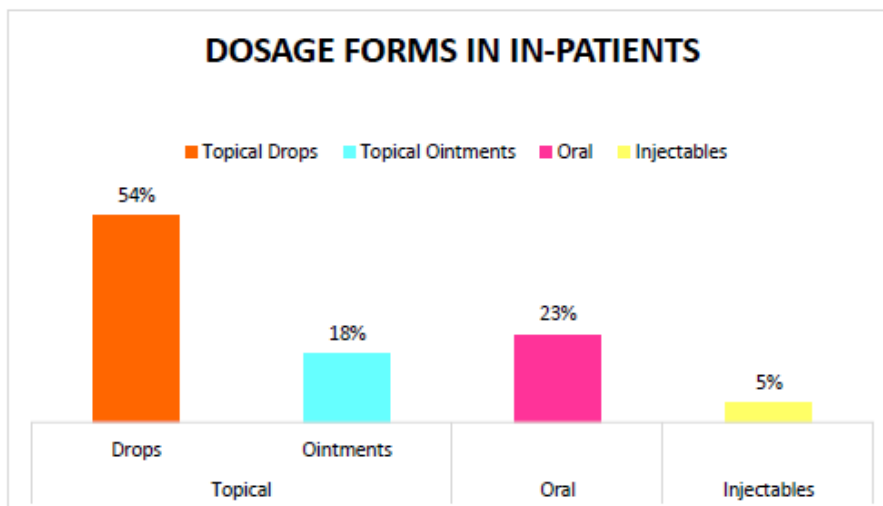


Figure 4: Dosage forms prescribed in patients

Among the pattern of antimicrobial therapy in the present study, AMAs were the commonly prescribed drugs. In AMAs, antibacterial, antiviral and antifungal which accounts for 35.25%, 7% and 4% respectively as depicted in Figure 5.

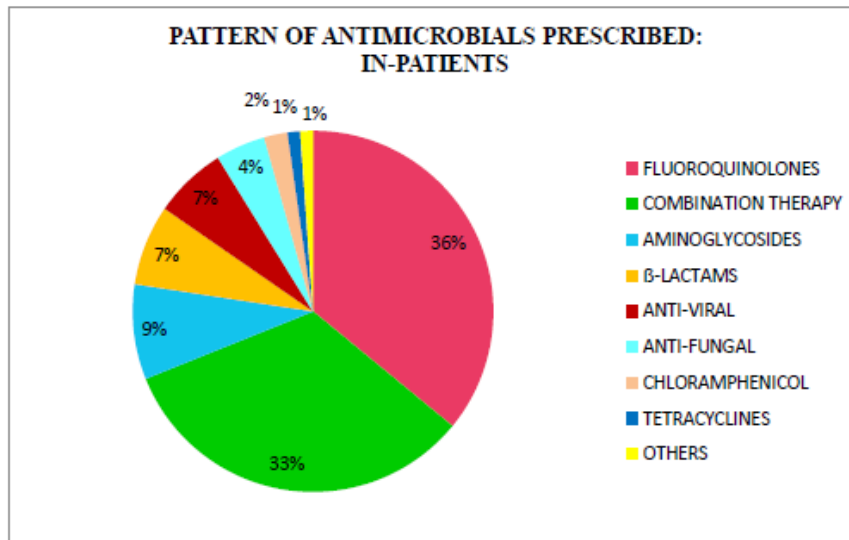


Figure 5: Pattern of antimicrobials prescribed in patients

In the present study, the commonest Amino glycosides prescribed was tobramycin (69%) followed by gentamycin (31%) as depicted in Figure 6.

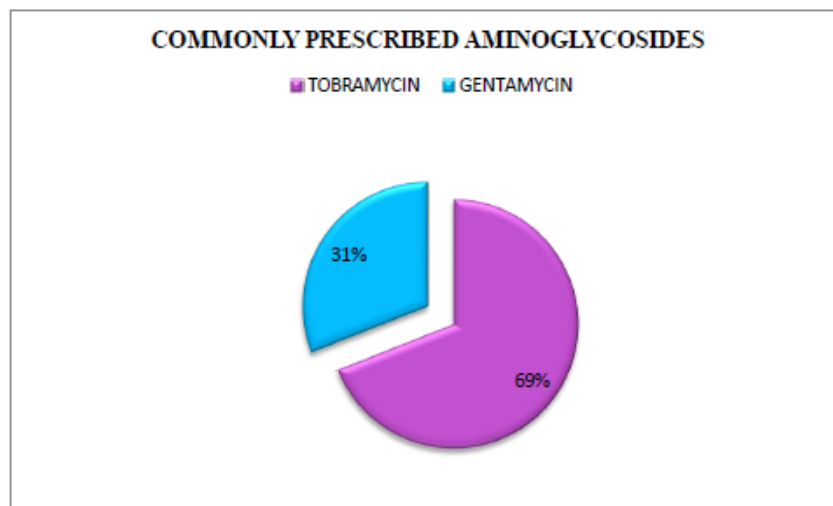


Figure 6: Commonly prescribed aminoglycosides

The drug nomenclature used in prescriptions in patients admitted to hospital as depicted in Figure 7. The percentage of drugs prescribed by generic name was 11% and rest was brand names.

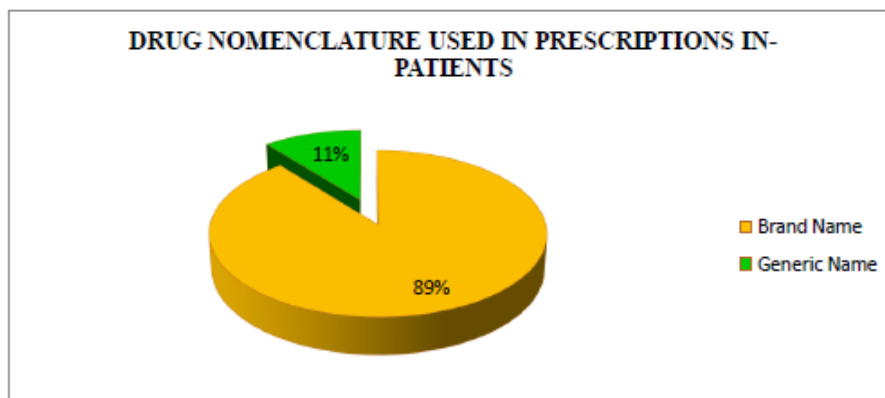


Figure 7: Drug nomenclature used in prescriptions

Drugs prescribed from National List of Essential medicine in the patients are as depicted in the Figure 8. Percentage of drugs prescribed from NLEM was 71.27%.

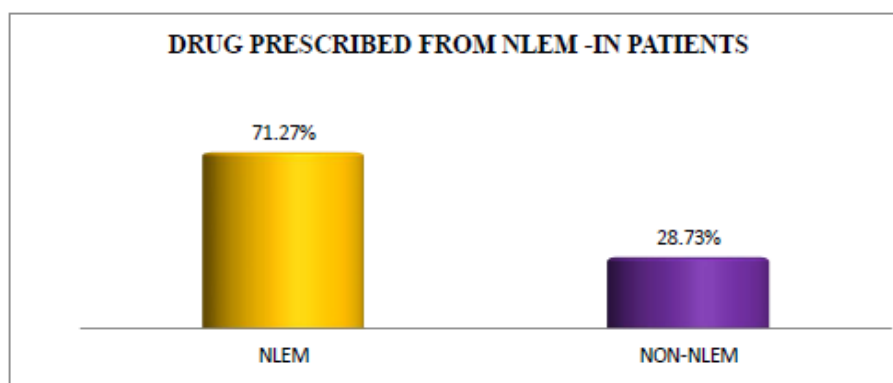


Figure 8: Drugs prescribed from nlem

DISCUSSION

Providing the right medicine to the right patient at right dose in the right route at the right time is a central priority of health care. This is ensured by effective implementation of the WHO's recommendation on rational drug policies.⁸ Drug prescriptions form a very important point of contact between the health care provider and the user. It provides an insight into the nature of health care delivery system and is a reflection of physicians' attitude towards the disease and the role of drug in its treatment.⁹ Historically the pharmaceutical and medical professions have devoted considerable time and efforts to the development and rational utilization of safe and effective drugs for the treatment and prevention of illness.¹⁰ There has been development of many new therapeutic agents which have made it possible to cure or provide symptomatic control of many clinical disorders. However, in many circumstances, drugs are not used rationally for optimal benefits and safety.¹¹

The WHO drug use indicators are recommended as well as standard tool in drug utilization studies. Such studies are vital in collecting data regarding the patterns and quality of drug use and to determine the outcomes of it. AMAsudit is same as drug utilization.^{6, 12}

Infections of the eye can rapidly damage important functional structures and lead to permanent vision loss or blindness. Appropriate AMAs should be administered to the appropriate site of infection as soon as a diagnosis is made. Topical drops are preferred for corneal and conjunctival infections. Parenteral antibiotics are recommended for infection in deep adnexal structures. Several therapeutic classes of antibiotic agents are available for ophthalmic indications.¹³

The current study describes the prescribing pattern of AMAs and utilization of drugs in patients admitted in Ophthalmology Department with the use of WHO core prescribing indicators. Empirical treatment in eye conditions is based on the likely etiology, the available medical treatment and the surgical intervention. Most of the patients needed surgical interventions but still they required drugs in form of preoperative or postoperative medications.

In the present study, a total number of 600 prescriptions were analyzed. Demographic data showed that a maximum number of patients belonged to the age group of 41-60 years (42.33%). Our study result is consistent with the study conducted by Shish G et al.¹⁴ of 43.2% which showed similar age distribution. The above finding can be explained by the fact that majority of the patients in the study sought medical

help for cataract which is the commonest ocular disease in this age group.

In the gender distribution, it was found that 60% (363) were Males as compared to 40% (237) of Females. The number of female patients admitted in ophthalmology department was less than males which could be due to the fact that the social inhibition and less awareness in our society. The result is similar to the study conducted by Banerjee I et al.¹⁵ Male and female ratio was equal which is in contrast to our study results by Ashish G et al.¹⁴ These results suggest that the eye diseases are not gender related but found to be age linked.

In the present study, majority of the patients were from rural background, 339 (56.33%) rural and 261 (43.67%) from urban population. The probable reason for the higher proportions of patients from rural background could be due to the regular health camps and health awareness program organized by the department and due to non-availability of super-speciality service in rural areas and our institute is also a referral centre.

The common ocular condition was cataract followed by pterygium. The common drugs prescribed were antibacterial (Ciprofloxacin) and antibacterial +steroids (Ciprofloxacin + Dexamethasone). The high use of antibacterial was mainly to prevent post-operative infection and to treat acute infective conditions (iridocyclitis) that require conservative management. Similarly, anti-inflammatory drugs were used for relief of pain, swelling and to prevent intra-operative miosis and post-operative inflammation following ocular surgery and mydriatics were used for fundus examination and surgery. Other drugs used were antivirals (acyclovir) for viral infections like herpes zoster ophthalmic us and viral keratitis, antifungal drugs (natamycin) for aspergillosis, antiallergics, lubricants and multivitamins.

Number of drugs per prescription varied from one to six and the average number of drugs per prescription was 3.2. Drugs were prescribed in either of dosage forms mentioned. Eye drops were the most commonly prescribed 54% followed by oral (Tablets+Capsules+Syrups) 23%, ointments 18% and injectables 5%. The dose, frequency and duration of drug therapy are the three important parameters and if not clearly recorded, can result in indiscriminate, injudicious use of drugs and therapeutic failure.¹⁴

This finding is comparable to the study conducted by Ashish G et al.¹⁴ was 3.2 drugs per prescription. The WHO recommends the average number of drugs per prescription to be 2. Hence to avoid over prescribing as well as polypharmacy, there is a need to follow the guidelines laid on drug prescription.¹²

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.¹⁶ The result of our study is slightly higher than the WHO recommendation. However, in the present study, since majority of the patients have undergone surgery and thereby increasing hospital stay, the average number of drugs per prescriptions is relatively higher. In such cases polypharmacy may be justifiable. The practice of polypharmacy should be strictly monitored to conditions/diseases, as many a times they are unnecessary, increasing the morbidity by pharmacokinetic and pharmacodynamic drug interactions and thereby increasing the cost of treatment.¹⁴ This emphasizes the need for periodic review and educational intervention in prescribing practices.¹⁵

In our study, the analysis of prescriptions showed topical formulations prescribed was 72% containing viz eye drops (54%), ointment (18%) which were high compared to oral preparation 23% containing tablets (16.94%), capsules (4.06%) and syrups (2%) and the least being prescribed were injectables (5%). Our finding was in contrast to the study conducted by Mondal K K et al.¹⁷ which showed higher prescriptions of oral preparations 54.05% followed by topical preparations 35.14% followed injectables 10.81%. This difference in our study is due to mobilization of the patients from rural area through camps and since it is a referral centre, higher number of cataract cases 53.89% are reported, operated and treated with eye drops, when compared to other ocular diseases, so that has led to the usage of topical preparations more compared to oral preparations.

In present study, the prescribed AMAs which accounts for 62.95%, out of which 42.18% were prescribed as single AMAs and 20.07% were prescribed as FDC i.e. AMAs with other drugs. Among AMAs, antibacterial agents were commonly encountered 35.25%. Among antibacterial agents, fluoroquinolones accounted for 36% followed by aminoglycosides 9%, β -lactams 7% and others. Ciprofloxacin being the commonest drug among fluoroquinolones. Antifungal prescription accounts for 4.13% and commonly prescribed was natamycin contributing to 1.78%. Antiviral prescription accounts for 2.83% and commonly prescribed drug was acyclovir in the form of topical and oral formulations.

In present study, fixed dose combinations (FDCs) prescribed was 24.33%. The study conducted by Ashish G et al.¹⁴ showed 67.29% which is high when compared to our study

which is also consistent with the study conducted by Dutta et al.¹⁸ which showed FDC usage of 35.29%.

In accordance to WHO (DTCs) prescribing indicators for AMA stakes into consideration the average number of AMAs prescribed by their generic name and the duration of antimicrobial therapy. In our study, all the prescriptions were containing AMAs, of which 11% were prescribed by their generic names and the average duration of antimicrobials therapy was 7 days.¹⁹ The results of our study, showed higher generic prescriptions when compared to study conducted by Ubedulla et al.²⁰ which showed 4.01% of prescription by generic name. Our study result signifies that our clinicians are inclined towards generic prescriptions and about its associated advantages. However, prescribing drugs by generic name makes the treatment cost effective and it avoids prescription writing errors.²¹ Hence, we should encourage generic prescribing by educational intervention methods and strict compliance to WHO drug policies.⁸

Percentage of drugs prescribed from the National List of Essential Medicine of India (NLEM) 2016 was 71.27% which is higher when compared to studies conducted by Dutta et al.¹⁸ reported 16.31% drugs were from NLEM 2011 and study conducted by Jadhav P R et al.²² reported 19.48% drugs were from NLEM 2011. The present study results when compared to above mentioned studies reported, use of drugs from NLEM 2016 is higher, this can further improved by giving feedback to prescribers. WHO recommends the drugs prescribed from essential medicine list (NLEM) to be 100% which is lower in the present study. There is a need to adhere the prescription of drugs to the Essential drug list of particular country as it does not only promote rational use of medicines considering the three important aspects i.e. cost, safety and efficacy but also promotes prescription by generic names.²³

CONCLUSION

Treatment of ocular infections commonly by topical antimicrobial agents. WHO core prescribing indicators of drugs used to evaluate the number of drugs prescribed by generic names as well as NLEM showed lower results in our study. The implementation and establishment of suitable clinical strategies helps rational drug use and strengthening of hospital drug supply, so that apt drugs in appropriate formulations are accessible in acceptable quantities to meet the needs of the patients.

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