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Research Article

DRUG UTILIZATION PATTERN IN OPTHALMOLOGY DEPARTMENT AT A TERTIARY CARE HOSPITAL

Pooja Prajwal*, Mohandas Rai, Sharath Kumar K, Srinivas Bhat U, Floyd Vernon Dsouza

A.J Institute of Medical Sciences, Kuntikana, Mangalore, Karnataka, India

*Corresponding Author Email: poojaprajwalrao@gmail.com

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ABSTRACT

The objective of the study is to assess the average number of drugs per prescription, formulations being prescribed, various categories of drugs being prescribed and the category most often used in ophthalmology. This is a retrospective hospital based study carried out in the department of ophthalmology at A.J institute of medical sciences, Mangalore, India. The study period was from July 2012 to July 2013. Total number of prescriptions analyzed were 3543, in which total of 15,324 drugs were prescribed. Analysis of the prescriptions showed that average number of drugs per prescription was 4.325. The maximum number of drugs prescribed were in the form of eye drops (67.65 %), followed by ointments (11.66 %), tablet (7.8 %), capsules (7.23 %), syrup (3.54 %) and injection (2.12 %). The dosage form was indicated for 91 %, frequency of drug administration for 97 % drugs and duration of treatment for only 69 % of the drugs prescribed. Around 56.44 % of diagnosis accounted for senile immature cataract. Rest 15.33 % and 9.81 % acconting for pseudophakia and senile mature cataract respectively. The number of antibiotics prescribed was 8,955 (58.43 %), out of these 5,981 (66.79 %) antibiotics were prescribed in the form of drops, 2,782 (31.06 %) as ointment and 191 (2.13 %) orally. Number of encounters with anti-inflammatory and anti allergic drugs was 1,547 (10.1 %), mydriatics and cycloplegics 1,317 (8.6 %), miotics 474 (3.1 %), lubricant and miscellaneous eye drops 2,869 (18.72 %) and multivitamins 161 (1.05 %). Prescription writing errors were at its minimum thereby avoiding irrational prescriptions. Duration of treatment and prescribing by generic name were very low.

Keywords: Drug utilization, ophthalmology, formulations, prescription analysis, generic name

INTRODUCTION

Drug utilization has been defined as the marketing, distribution, prescription and use of drugs in a society with special emphasis on the resultant medical, social and economic consequences[1]. A third world country spend 30–40 % of their total health budget on drugs, some of which are useless and expensive and doubles their expenditure on drugs every 4 years while GNP (Gross National Product) doubles every 16 years[2]. Drug utilization pattern needs to be evaluated from time to time so as to increase therapeutic efficacy and decrease adverse effects. Hence periodical auditing of drug utilization pattern is vital for promotion of rational use of drugs, for increasing the therapeutic efficacy and the cost effectiveness, for decreasing the adverse effects and to provide feedback to the prescribers[3]. It is important to realize that inappropriate use of drugs represent a potential hazard to the patients and an unnecessary expense[4]. Historically the pharmaceutical and medical profession has devoted considerable time and efforts to the development and rational utilization of safe and effective drugs for the treatment and prevention of illness. Studies on the process of drug utilization focus on the factors related to the prescribing, dispensing, administering, and taking of medication, and its associated events, covering the medical and non-medical determinants of drug utilization, the effects of drug utilization, as well as studies of how drug utilization relates to the effects of drug use, beneficial or adverse. Drug utilization studies are particularly interesting if they are focused on the most frequently used group of therapeutic drugs, such as antibiotics, NSAIDs or those that constitute important therapeutic innovation. The drug utilization 90 % (DU 90 %) index was introduced as a simple, inexpensive and flexible method for assessing the quality of the drug prescriptions. It identifies the drugs accounting for 90 % of the volume of the prescribed drugs after ranking the drug used by volume of defined daily dose (DDD)[5]. The remaining 10 % may contain specific drugs which are used for rare conditions in patients with a history of drug intolerance or adverse effects[6]. Use of medicines constitutes an important part of many medical treatments and disease prevention interventions. Some studies on drug utilization in Spain have observed that immigrants consume fewer medicines and have much lower expenditures on pharmaceuticals compared to the autochthonous population[7,8]. Another aspect modulating drug utilization patterns of migrants is the possible lack of trust in the proposed treatment and as a consequence, poor compliance. There has been development of many new therapeutic agents which have made it possible to cure or provide the symptomatic control of many clinical disorders. However in many circumstances drugs are not used rationally for optimal benefits and safety[9]. A study has been conducted in the apex institution of our country highlighting the rationale of drug use[10]. This necessitates a periodic review of pattern of drug utilization to ensure safe and effective treatment. To improve the overall drug use, especially in developing countries, international agencies like World Health Organization (WHO) and International Network for Rational Use of Drugs (INRUD) have applied themselves to evolve standard drug use indicators[11]. These indicators help us to know the shortcomings in our prescription writing and allow us to improve our performance from time to time. Therefore there was a need to conduct a similar study in our hospital. Moreover we are also highlighting the incidence of various drugs used. The present study was undertaken to assess the patterns of prescription and drug utilization by measuring WHO delineated drug use indicators in the Department of Ophthalmology. Drug utilization studies are the powerful exploratory tools to ascertain the role of drugs in the society and have become an essential part of pharmacoepidemiology providing the insights into various aspects of drug prescribing and drug use like pattern of use, quality of use, determinants of use and outcomes of use. Therefore the principal aim of drug utilization research is to facilitate the rational use of drugs in population and generate

hypotheses that set the agenda for further investigations and thus avoid prolonged irrational use of drugs. The irrational use of drugs is a common occurrence throughout the world[12]. Average number of drugs per prescription is an important index of the scope for review and educational intervention in prescribing practices. It is preferable to keep the number of drugs per prescription as low as possible since higher figures lead to increased risk of drug interactions, errors of prescribing increased hospital cost[13-15]. Other hospital based studies in India reported figures of 3–5 drugs per prescription. Studies conducted by Rehana HS *et al* and Minocha KB *et al* have reported that only 29.3 % and 19 % of drugs respectively, prescribed in generic name[16,17]. According to the study prescriptions of generic drugs could facilitate cheaper treatment for patients and periodical auditing of the prescriptions would help to measure the impact of intervention. Mohanty M. *et al* had conducted a study to assess drug utilization pattern of topical ocular antimicrobial where the dosage forms of antimicrobials used were eye drops 96.3 % and ointment 3.7 %. Antimicrobials were prescribed in 32.36 % prescriptions, in the form of eye drops, eye ointment as well as orally. In our study 97.85 % of antimicrobials were given topically as drops and ointment and only 2.15 % were given orally, thus minimizing adverse effects. The frequency of drug use and dosage form has been noted for 97 % and 91 % of the drugs respectively. The duration of therapy has been recorded in 69 % of the drugs prescribed which could result in indiscriminate use of drugs by the patient and an unnecessary expense[18]. Meenakshi Nehru conducted a study on drug utilization in outpatient ophthalmology department of Government Medical college, Jammu, India where a total number of about 440 prescriptions were analyzed, in which total of 822 drugs were prescribed which showed that average number of drugs per prescription was 1.87. The maximum number of drugs prescribed were in the form of eye drops (66.18 %), followed by ointments (16 %), capsules (9.5 %), tablet (6.57 %), syrup (0.73 %), injection (0.73 %) and lotion (0.24 %). The number of antibiotics prescribed was 266 (32.26 %), out of these 160 (60.15 %) antibiotics prescribed in the form of drops, 100 (37.59 %) as ointment and 6 (2.26 %) orally. Number of encounters with anti-inflammatory and anti allergic drugs was 92 (11.2 %), mydriatics and cycloplegics 64 (7.9 %), miotics 20 (2.4 %), multivitamins 58 (7.05 %) and others used were lubricant and miscellaneous eye drops 322 (40 %). Common prescription writing errors were minimum and there was no evidence of polypharmacy. However, duration of treatment and prescribing by generic name was very low[19]. Biswas NR *et al* assessed patterns of prescription and drug use in ophthalmology showing that out of 1017 prescriptions average number of drugs per prescription was 3.03 and the range of drugs per prescription varied from 1 to 10. The duration of therapy were recorded for only 26.4 % of the drugs prescribed. Drugs prescribed were present in eight different dosage forms. Eye drops were the most commonly prescribed (76 %), followed by tablets (10. 9%), ointment (6.4 %), syrup (1 %), capsules (0.7 %), lotion (0.3 %); injections contributed 0.1 % of all the dosage forms prescribed. The frequency of drug administration was recorded for 77.9 % of the drugs prescribed. Antibiotics constituted 34.2 % of the total number of drugs prescribed. Study also revealed that brand prescribing clearly dominating generic prescribing (65 % vs 35 %). The study showed a need for improvement in prescription writing as evidenced by the large number of cases in which information about frequency of administration and duration of therapy were missing. This coupled with low generic prescribing could result in less safe and more expensive prescribing[20]. Isabella Topno *et al* study was designed with the aim to investigate the antibiotics utilization pattern in a tertiary care hospital where common prescription writing errors were minimum and there was no evidence of poly pharmacy. He opined that errors of omission and commission if correctly dealt with in prescription writing the outcome of therapy could be improved and also would reduce the development of antibiotic resistance[21]. Keeping these facts in consideration, the present study was planned with the aim of prescription analysis of the drugs to define the pattern of use, their availability in the hospital by analyzing each prescription of ophthalmic department of a tertiary care hospital at AJIMS.

MATERIALS AND METHODS

This retrospective hospital based study was conducted for 1 year duration i.e. from July 2012 to July 2013 at A J Institute of Medical Sciences Mangalore, India.

Method of Collection of Data

Prescriptions of patients treated during the course of the study were audited retrospectively using a specially designed form to record the required information from the case sheets of each patient. All the drugs prescribed were recorded including its dosage form, route of administration, frequency of administration, indications for which prescribed and duration of therapy. These forms were then used to analyze the average number of drugs per prescription, number of encounters with antibiotics, anti-inflammatory drugs and other agents, dosage form of drugs, the frequency of drug administration and the duration of therapy (recorded or not) and whether the drugs were prescribed in generic or proprietary names.

- The source data was collected between the periods of July 2012- July 2013. Both males and females were included in the study who were diagnosed and treated in the Department of Opthalmology at A. J Institute of Medical Sciences.
- Sample size: The number of case sheets that were assessed from July 2012 to July 2013.
- The following data were collected: Patient particulars, history, diagnosis, drugs- the dosage, frequency and duration of treatment, co-morbid condition, generic or brand prescription were obtained using the study Performa.

Selection Criteria

Inclusion Criteria

- Patients of any age group
- Patients of either gender
- Patients treated in ophthalmology department for any condition except refractive errors

Exclusion Criteria

Patients who were diagnosed with refractive errors.

Statistical Analysis

Analysis of the prescriptions was done from the case record form. Data collected were analyzed by frequency, percentage and Chi Square test using SPSSv16 software.

RESULTS

After screening prescriptions of patients it was found that out of the total 3543 prescriptions, 1,918 were males and 1,625 were females. In the 3543 analyzed prescriptions, 15,324 drugs were prescribed. Analysis of the prescriptions showed that average number of drugs per prescription was 4.325 (Table 1). The common eye conditions encountered in the ophthalmology were senile immature cataract which accounted for around 56.44 % of diagnosis. Rest 15.33 % and 9.81 % acconting for pseudophakia and senile mature cataract respectively. Rest 18.42 % were conjunctivitis / iridocyclitis, corneal ulcer, keratitis, open angle glaucoma, angle closure glaucoma, absolute glaucoma, endogenous endopthalmitis, lacrimal mucocele, chronic dacryocystitis, keratoconus, entropion, ptosis, corneal opacity, congenital cataract, optic atrophy, retinitis pigmentosa, lateral rectus palsy, ptosis, 3rd cranial nerve palsy, ocular hypertension, CRAO, failed DCR, vitreous hemorrhage, CRVO, corneal graft failure, chorioretinal atrophy, residual lens matter, lipodermoid, aphakia, leucomatous corneal opacity, seborrhoeic keratitis, squint, foreign body, posterior subcapsular cataract, pseudophakia, chalazion, diabetic retinopathy, macular holes, prosthetic eye, external hordeolum, blepharitis, anterior uveitis, leukocoria, retinoblastoma. Regarding the dosage forms (Figure 1), it was found that the maximum number of drugs prescribed were in the form of eye drops (67.65 %), followed by ointments (11.66 %), tablet (7.8 %), capsules (7.23 %), syrup (3.54 %) and injection (2.12 %) (Table 2). The number of antibiotics prescribed was 8,955 (58.43 %), out of these 5,981 (66.79 %) antibiotics prescribed in the form of drops, 2,782 (31.06 %) as ointment and 191 (2.15 %) orally. Number of encounters with anti-inflammatory and anti allergic drugs was 1,547 (10.1 %), mydriatics and cycloplegics 1,317 (8.6 %), miotics 474 (3.1 %), lubricant and miscellaneous eye drops 2,869 (18.72 %) and multivitamins 161 (1.05 %) (Figure 2). The dosage form was indicated for 91 %, frequency of drug administration for 97 % drugs and duration of treatment for only 69 % of the drugs prescribed. Similarly drugs prescribed by their generic names were 32.44 % and about 67.56 % of the drugs were prescribed by their brand names (Table 3).

Table 1: Number of Drugs Prescribed per Prescription

Number of Drugs per Prescription	Number of prescriptions n (%)
One	193 (5.45)
Two	398 (11.23)
Three	1,075 (30.34)
Four	1,712 (48.32)
Five	149 (4.2)
Six	16 (0.46)
Total	3543 (100)

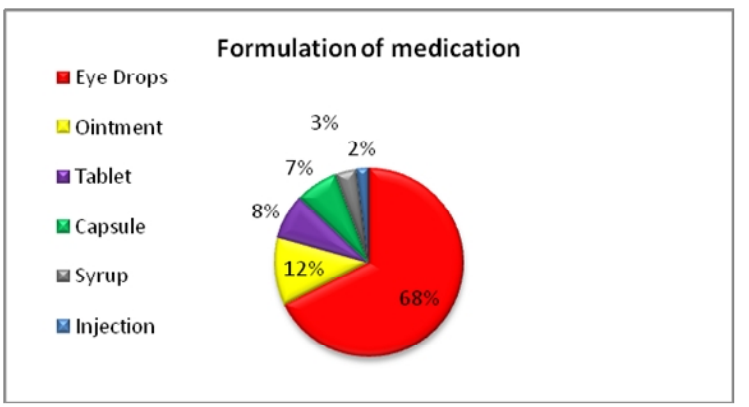

Figure 1

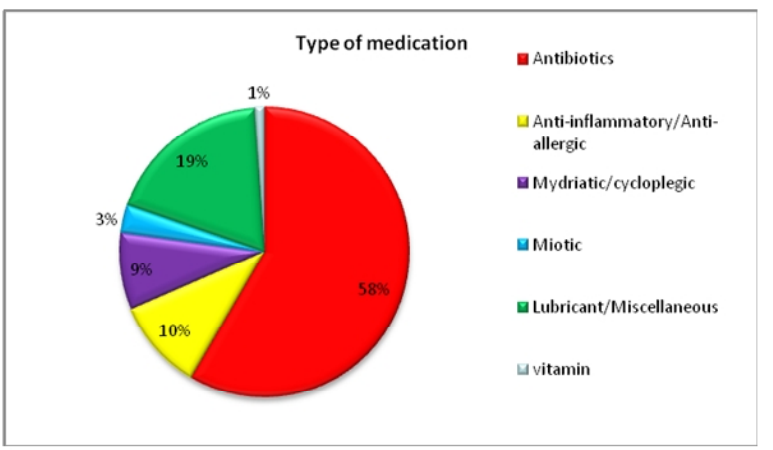

Figure 2

Table 2: Major Therapeutic Agents and Dosage Forms of Antimicrobials

Dosage form	Major therapeutic agent
Drops 2,396 (67.65 %)	Ciprofloxacin (Adiflox) Gatifloxacin (G-flotas D) Flurbiprofen (occuflur) Timolol (Iotim) Chloramphenicol Homatropine hydrobromide (Homide) Moxifloxacin (Moxiblu) Pilocarpine (Pilocar 2%) Sodium cromoglycate (Andre) Carboxyme cellulose Na (Ecotears) Lubricant(Hypromellose Nacl) (Lacrigel) Sodium chloride (soline 5%)
Ointment 413 (11.66 %)	Ciprofloxacin Gatifloxacin Atropine Acyclovir Steroid (Cortisone)
Oral 532 (15.03 %)	Ciprofloxacin Cefixime Ranitidine Dexamethasone

Table 3: Analysis of Prescriptions of Patients with Respect to Different Parameters

S. No	Drug use indicators	Results
1.	Total number of prescriptions	3543
2.	Average number of drugs per prescription	4.325
3.	Percentage of dosage forms recorded	91 %
4.	Percentage of frequency of therapy recorded	97 %
5.	Percentage of duration of therapy recorded	69 %
6.	Percentage of drugs prescribed by generic name	32.44 %
7.	Percentage of drugs prescribed by brand name	67.56 %

DISCUSSION

After screening of 3543 prescriptions, it was found that there was no sex preponderance (M : F = 1.2:1) among the patients and the maximum number of patients belong to age group of 46-60 years. These findings showed that the eye diseases are usually not sex linked but may be age related. Drug prescriptions form a very important point of contact between the health care provider and the user[22]. It provides an insight into the nature of health care delivery system and is a reflection of physician's attitude towards the disease and the role of drug in its treatment[23]. Average number of drugs per prescription is an important index of prescription audit. 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. There has been development of many new therapeutic agents which have made it possible to cure or provide the symptomatic control of many clinical disorders. However in many circumstances drugs are not used rationally for optimal benefits and safety[9]. Therefore drug utilization studies can be a powerful tool that can benefit patient and public health but only if used appropriately by providing the insights into various aspects of drug prescribing and drug uses. WHO organizes many drug utilization researches with the goal of rational prescription by various methods of auditing. The study was also a part of prescription audit. Around 56.44 % of diagnosis accounted for senile immature cataract. Rest 15.33 % and 9.81 % accounting for pseudophakia and senile mature cataract respectively. Empirical treatment in eye conditions is based on the likely etiology, the available medical treatment and the surgical treatment. Patients were treated by the various drugs in different dosage forms and ongoing medical treatment was modified according to clinical response and the most common drugs prescribed were antibiotics, mydriatics, antibiotics + steroids and anti-inflammatory. The high use of antibiotics reflect the condition of poor sanitation, nutrition, prevalence of various infections, post operative infection and certain acute infective conditions which needs conservative management. Similarly anti-inflammatory drugs were used for relief of pain and swelling and mydriatics were used for fundus examination and surgery and for conservative management of particular disease. It has been recommended that the limit of number of drugs prescribed per prescription should be two and that justification for prescribing more than two drugs would be required because of the increased risk of drug interactions[13]. In this study, the average number of drugs per prescription was 4.325 which are more than the current recommendation. Other hospital based studies in India reported 3-5 drugs per prescription almost in the same range as our study[11,24,25]. Therefore it is advisable to keep the number of drugs per prescription as low as possible since higher figures lead to increased risk of drug interactions, increased hospital cost and errors of prescribing[13-15]. The frequency, dosage and duration of drug therapy are the three important parameters, if not clearly recorded, can result in indiscriminate and injudicious use of drugs. The present study showed that the dosage and frequency were recorded in more than 90 % of prescriptions but the duration of therapy was recorded only in 69 % of prescriptions. When the various dosage forms were compared it was found that eye drops were commonly prescribed followed by ointments, tablets, capsules, syrups and injections. The results were similar to other studies in which the maximum numbers of drugs prescribed were in the form of eye drops, followed by tablets[10]. This finding supports the use of topical preparation for treating eye disease as they have site specific action, less systemic absorption resulting in fewer side effects and

convenient for patient use. Percentage of drugs prescribed by their generic names in our study were 32.44 % which was almost similar to one study (23 %) as well as contrast (53.6 %) to some other studies[26,27]. Few earlier studies have also reported to only 29.3 % and 19 % of drugs prescribed by generic name[16,17]. It suggests the popularity of brand names amongst the medical practitioners of the institute and the influence of pharmaceutical companies. Prescriptions by brand names could possibly result in prescribing errors because the brand names of many pharmacologically different drugs sound alike and spell similar. In general, generic drugs are less expensive as compared to the brands that contain the same active ingredient. So the prescriptions of generic drugs should be emphasized to facilitate cheaper and better treatment for the patient. 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[22]. Since, WHO has recommended that average number of drug per prescription should be two, result of our study reflects polypharmacy[28]. The recommendation by WHO is not applicable to patients who have undergone surgery, since majority of these patients the average length of stay would be higher which means more medication prescribed and administered. In such cases poly pharmacy can be justifiable. The practice of poly pharmacy should be restricted to conditions, as many a times they are unnecessary, increasing the morbidity by pharmacokinetic and pharmacodynamic drug interactions and increasing the cost of treatment. The common prescription writing errors were minimum and there was no evidence of poly pharmacy except in patients who underwent surgery. Prescriptions of generic drugs could facilitate cheaper treatment for patients. Hence, our study showed a remarkable restraint on prescribing and an awareness to avoid poly pharmacy and irrational drug combinations.

CONCLUSION

Prescription writing errors were at its minimum thereby avoiding irrational prescriptions. Duration of treatment and prescribing by generic name were very low. The study concludes with overall impression of rational prescription at maximum places. However it needs improvements in areas like duration of therapy which were missing in some cases. Generic prescribing was last seen which adds to the economic burden making the medications expensive as per the patient's perspective and would indirectly result in non compliance. It is thus necessary to make prescribers aware about the use of drugs, importance of prescribing drugs with generic names and in patient's point of view, the factor of cost effectiveness. Also, there is a need for the development of prescribing guidelines and educational initiatives to encourage the rational and appropriate use of drugs. This kind of studies where prescriptions are audited at regular intervals would make the prescribers more conscious and also would bring an end to the varied side effects encountered due to poly pharmacy. Improvement through continuous education is desired on the part of prescribers to ensure a good standard of care. Drug information services should be provided to the prescribers at constant time intervals. The essential drugs should also be readily available at the hospital set up. Other departments therefore should actively participate in conducting such studies for benefits and safety of the patient. The prescriptions can then be re-audited to measure the impact of intervention. This will help in rationalizing the prescription practices based on the feedback from these studies. Thus, periodical auditing of the prescriptions will help to measure the impact of intervention on the prescribing pattern.

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