Utilization and Adverse Drug Reactions of drugs in ophthalmic outpatient and inpatient department of a tertiary care hospital: A Pharmacoepidemiological Study

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Abstract

Introduction: Pharmacoepidemiology refers to the epidemiological methods to study the clinical use and effects of drugs in large number of people with the purpose of supporting the rational and cost effectiveness use of drugs.

Objective: To study the prescribing patterns of drugs in Ophthalmology and to evaluate prescriptions according to WHO Drug Use Indicators.

Materials & Methods: A cross sectional, observational study was conducted in the department of Ophthalmology. Data was collected from the prescriptions of patients in OPD & IPD. Various parameters of utilization pattern were evaluated.

Results: Total number of prescriptions analysed were 744 in which 2478 drugs were prescribed. Analysis of prescriptions showed that average number of drugs per prescription was 1.34 in OPD & 5.32 in IPD. The maximum numbers of drugs were prescribed in form of eye drops (68.14%) in OPD and tablets (39.31%) in IPD. Majority of drugs in OPD were prescribed by brand name (61.22%) while in IPD majority were generic (61.75%). Polypharmacy was commonly seen in IPD group (10.86%) as compared to OPD(0.20%) 83.97% of drugs from OPD and 93.08% from IPD were prescribed from National List of Essential Medicines. Average total cost per prescription was Rs 45.60 in OPD and Rs 20.04 in IPD. No adverse drug reactions were reported.

Conclusion: It is necessary to make prescribers aware about the importance prescribing and the factor of cost effectiveness in patient's point of view. Also there is a need for the development of prescribing guidelines and educational initiatives to encourage the rational and appropriate use of drugs.

Keywords: Pharmacoepidemiology, Drug utilization research, Ophthalmology.

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1. Introduction

Pharmacoepidemiology refers to the epidemiological methods to study the clinical use and effects/side-effects of drugs in large numbers of people with the purpose of supporting the rational and cost-effective use of drugs in the population. It may be drug-oriented, emphasizing the safety and effectiveness of drugs as well as utilization-oriented aiming to improve the quality of drug therapy through educational interventions. So the drug utilization studies (DUS) are the powerful exploratory tools to ascertain the role of drugs in the society. Drug utilization research provides insights into various aspects of drug prescribing and drug use like pattern of use, quality of use, determinants of use and outcomes of use [1].

The World Health Organization (WHO) has defined DUS as the marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resulting

medical, social, and economic consequences.[2] Drug utilization pattern needs to be evaluated from time to time so as to increase therapeutic efficacy and decrease adverse effects.[3].

With this background, the present study was undertaken to investigate the patterns of prescriptions and drug utilization by measuring WHO drug use indicators in the Department of Ophthalmology. There are many studies done for the prescription or drug utilization pattern in various departments including the ophthalmology but most of them are restricted to outpatient department only. No data is available from the inpatient department. Keeping these facts in consideration, the present study was planned with the aim of pharmacoepidemiological analysis of the drugs to define the pattern of use, their availability in the hospital and to evaluate their cost analysis in each prescription of ophthalmic OPD and IPD of a tertiary care hospital attached to study institute.

1.1 Aims and Objectives

 i. To study the prescribing patterns of drugs in Department of Ophthalmology (Inpatients and Outpatients)
 ii. To evaluate the prescriptions according to WHO drug use indicators
iii. To observe and report the occurrence of adverse drug reactions to drugs, if any.

2. Methodology

2.1 Selection Criteria
2.1.1 Inclusion criteria

Patients from Ophthalmology OPD and IPD (all ages of either sex) receiving Ophthalmology medication.

2.1.2 Exclusion Criteria:

Patients not willing to be a part of study/refusing to sign informed consent form (ICF).

The study was a descriptive cross sectional study conducted at the Department of Pharmacology in collaboration with the Department of Ophthalmology. Permission was obtained from the Institutional Ethics Committee (IEC). The Ophthalmology OPD and IPD patients were considered as the sampling unit while data was collected prospectively. The prescriptions for all patients attending the OPD and IPD for the first time were included in the study and audited prospectively using WHO prescribing indicators. Patients were explained about the study and ICF had been taken. The Case Record Form (CRF) was filled and the data obtained was compiled in tabular form and analysed.

Statistics were used to present data in tabular and graphical forms and suitable statistical tests were applied.

The data was collected after getting approval from IEC of study institute for a continuous period of one year from the date of approval of study.

The prescriptions were analysed for following parameters:

A. Demographic Details:- The variables that were assessed from the prescriptions included the demographic profile-
   – Gender
   – Age

B. WHO Drug Use Indicators[4]:
1) Prescribing Indicators:
   a) Total number of prescriptions
   b) Average number of drugs per prescription
   c) Percentage of dosage forms recorded
   d) Percentage of encounters with an injection prescribed
   e) Percentage of drugs prescribed from the National List of Essential Medicines (NLEM)
   f) Percentage of drugs prescribed by generic name and branded name
   g) Percentage of drugs dispensed from hospital pharmacy
   h) Percentage of fixed dose combination (FDC)
   i) Percentage of polypharmacy
   j) Cost analysis per prescription.

2) Patient Indicators:
   a) Total number of female & male patients.
   b) Average age of male & female patients.

3) Adverse Drug Reaction(ADR) Profile:
   a) Incidence & type of ADR
   b) Drug(s) most commonly causing ADR.

3. Results

In the present study total 372 prescriptions were studied in both the OPD and IPD group with a total of 744 and among them total 499 drugs in OPD and 1979 drugs in IPD were studied respectively. Average number of drugs per prescription among OPD and IPD group was 1.34 and 5.32 drugs respectively.

It was seen that majority of the patients in OPD group (36.02%) were in the age group of 21-30 years of age while in the IPD group majority of the patients (35.22%) were in the age group of 61-70years. The mean age of patients in OPD group was 36.17±17.12yrs and in IPD group was 57.38±16.69yrs.

It was seen that majority of the patients among OPD and IPD group were male (55.11% and 52.15% respectively).

Table 1: No of drugs prescribed per prescription in OPD and IPD

No of drugs / prescription	OPD (%)	IPD (%)	Total (%)
One	282 (75.81)	31 (8.33)	313 (42.07)
Two	66 (17.74)	82 (22.04)	148 (19.89)
Three	18 (4.84)	19 (5.11)	37 (4.97)
Four	4 (1.08)	1 (0.27)	5 (0.67)
Five	0	1 (0.27)	1 (0.13)
Seven	1 (0.27)	193 (51.88)	194 (26.08)
Eight	1 (0.27)	41 (11.02)	42 (5.65)
Nine	0	2 (0.54)	2 (0.26)
Ten	0	1 (0.27)	1 (0.13)
Eleven	0	1 (0.27)	1 (0.13)
Total	372 (100)	372 (100)	744 (100)

It was seen that majority of the patients (61.29%) attending OPD were of refractive errors followed by Mucopurulent Conjunctivitis (15.86%). While most common diagnosis among IPD patients was cataract (60.75%) followed by Pterygium (12.36%) and Glaucoma (11.56%).

Figure 1: Bar diagram showing diagnosis wise distribution of OPD and IPD
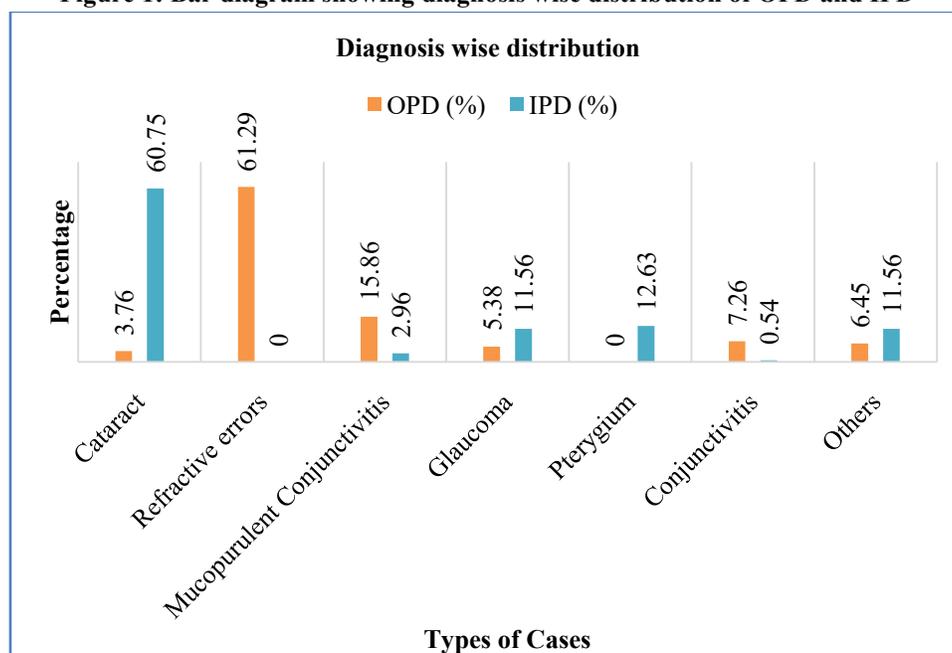
Among the OPD group most common class of drug prescribed was Mydriatics (45.69%) followed by Antibiotics (38.48%). The most common mydriatic was Phenylephrine and Tropicamide. However in the IPD group most common class of drug prescribed was Antibiotics (33.65%). The most common antibiotic prescribed was Ciprofloxacin in IPD and Moxifloxacin & Polymyxin + Chloramphenicol in OPD.

It was seen that eye drops (68.14%) were used commonly among the OPD group prescriptions while tablets and ointments were observed in 14.43% and 12.62% prescription. Among the IPD, most commonly tablets (39.31%) and eye drops (35.72%) were prescribed. Injections were seen in 20.57% prescription.

Figure 2: Bar diagram showing types of dosage form wise distribution of OPD and IPD
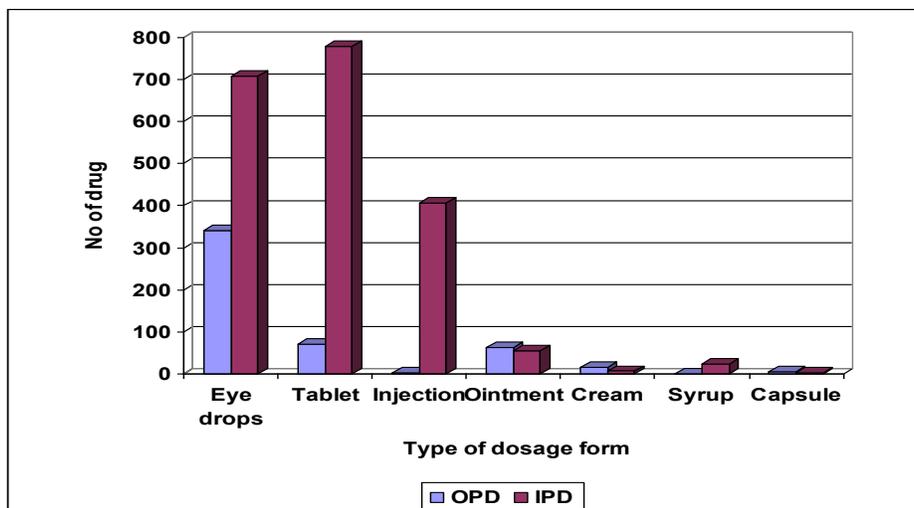
Table 2: Brand name verses generic name wise distribution of OPD and IPD

Name	OPD (%)	IPD (%)	Total (%)
Brand	309 (61.92)	757 (38.25)	1066 (43.02)
Generic	190 (38.08)	1222 (61.75)	1412 (56.92)
Total	499 (100)	1979 (100)	2478 (100)

Chi-square = 91.10, P < 0.0001*

The proportion of use of brand name was seen commonly among the OPD group prescriptions (61.22%) as compared to IPD group (38.25%) and the difference observed was statistically significant (P < 0.0001). It was observed that once a day (OD) (46.29%) therapy was seen most commonly among the OPD group followed by two times a day (BD) (29.21%). In the IPD group two times a day (BD) (46.69%) therapy was prescribed most commonly followed by once a day therapy (29.21%).

Table 3: WHO Drug Use Indicators of OPD and IPD

Type of prescribed doses	OPD	IPD	Total
Total number of prescriptions	372	372	744
Total number of drugs	499	1979	2478
Average no of drugs/ prescription	1.34	5.32	3.33
% of drugs dispensed from hospital pharmacy	26.25	67.21	58.96
% of frequency of therapy	100	100	100
% of poly pharmacy≥5 drugs	10.20	10.86	8.72
% of drug from NLEM	83.97	93.08	91.24
% of prescribed by brand name	61.92	38.25	43.01
% of prescribed by generic name	38.08	61.75	56.98
Average total cost / prescription(Rs)	45.60	20.04	25.19

Table 4: FDC wise distribution of OPD and IPD

FDC	OPD (%)	IPD (%)	Total (%)
Yes	293 (58.72)	341 (17.23)	634 (25.58)
No	206 (41.28)	1638 (82.77)	1844 (74.42)

Chi-square = 360.26, P<0.0001*

It was observed that FDC was used in 58.72% in OPD group while among the IPD group FDC was used in 17.23% and the difference observed was statistically significant. Most common FDC prescribed was phenylephrine and tropicamide in OPD and Gentamycin + Dexamethasone, Polymyxin B+Chloramphenicol + Dexamethasone in IPD. FDC are commonly prescribed for Glaucoma patients and allergic conditions of eye. Antibiotics and lubricating eye drops are commonly prescribed in non FDC polypharmacy.

Table 5: Antimicrobial Drug pattern utilization OPD and IPD

Dosage forms	Drugs	OPD (%) (n=499)	IPD (%) (n=1979)	Total (%) (n=2478)
Capsule	Amoxicillin	5 (1.002)	2 (0.10)	7 (0.28)
	Cotrimoxazole	4 (0.80)	4 (0.20)	8 (0.32)
	Flucinolone acetonide	3 (0.60)	0	3 (0.12)
	Framycetin	10 (2.004)	2 (0.10)	12 (0.48)
	Gentamycin + Dexamethasone	0	21 (1.06)	21 (0.84)
	Moxifloxacin	0	1 (0.05)	1 (0.04)
Ointment	Cotrimoxazole	1 (0.20)	0	1 (0.04)
	Polymyxin B + Chloramphenicol	59 (11.82)	31 (1.57)	90 (3.63)
	Polymyxin B + Chloramphenicol + Dexamethasone	0	23 (1.16)	23 (0.92)
Eye drops	Acyclovir	0	1 (0.05)	1 (0.04)
	Ciprofloxacin	32 (6.41)	273 (13.79)	305 (12.31)
	Fluorometholone +Tobramycin	0	47 (2.37)	47 (1.90)
	Moxifloxacin	59 (11.82)	32 (1.62)	91 (3.67)
	Natamycin	0	1 (0.05)	1 (0.04)
	Tobramycin Sulphate	0	1 (0.05)	1 (0.04)
	Polymyxin B + Chloramphenicol + Dexamethasone	0	22 (1.11)	22 (0.88)
	Voriconazole	0	1 (0.05)	1 (0.04)
Tablet	Acyclovir	7 (1.40)	5 (0.25)	12 (0.48)
	Amoxicillin + Clavulanic acid	5 (1.002)	7 (0.35)	12 (0.48)
	Ciprofloxacin	1 (0.20)	239 (12.08)	240 (9.68)
	Diethyl Carbamazine	5 (1.002)	1 (0.05)	6 (0.24)

The most common antibiotic prescribed was Ciprofloxacin in IPD and Moxifloxacin & Polymyxin + Chloramphenicol in OPD.

4. Discussion

By conducting DUS we obtain data about the patterns and quality of use, the determinants of drug use, and the outcomes. The WHO drug use indicators are highly standardized and are recommended for inclusion in DUS. [5] Our study was an attempt to describe the ophthalmic drug prescribing pattern in a tertiary care teaching hospital in Western India. The WHO core drug use indicators were used to primarily describe the drug use, particularly the prescribing indicators.

The indicators of prescribing practices measure the performance of health care providers in several key dimensions related to the appropriate use of drugs.

Of the 744 prescriptions containing 2478 drugs studied, number of drugs per prescription ranged from one to eleven. Average number of drugs per prescription among OPD and IPD group was 1.34 and 5.32 drugs respectively. Other hospital based studies in India also reported 1.49-3.03 drugs per prescription. [6-10] This serves as a measure of degree of polypharmacy. It is preferable to keep the number of drugs per prescription as low as possible, to reduce the risk of adverse effects, drug interactions, development of bacterial resistance and to decrease cost of therapy to the patient.[11]

It was seen that majority of the patients among OPD and IPD group were male (55.11% and 52.15% respectively). In Dutta *et al*. [12] study male patients were 53%, and females were 47%.

In Gangwar *et al* [13] study, the demographic profile of the IPD showed that a total of 462 patients were admitted among them 53.03%were males and 46.97% were females and among OPD patients 56.33% were male and 43.66% were female. Distribution of patients in OPD and IPD according to age showed that the maximum number of patients belonged to age group of 46-60 years both in OPD and IPD. Thus the findings were comparable with the present study.

It was seen that majority of the patients (61.29%) attending OPD were of refractive errors followed by Mucopurulent Conjunctivitis (15.86%). While most common diagnosis among IPD patients was cataract (60.75%) and Glaucoma (11.56%)

In Gangwar *et al*[13] study, the common eye conditions encountered in the ophthalmology OPD were refractive errors (29.67%) followed by cataract (21.17%), while in IPD, majority of the patients were admitted for cataract (65.37%) followed by glaucoma (15.37%), In the Dutta *et al*.[12] study the disease pattern in eye OPD was analysed and it was seen that 40% patients suffered from conjunctivitis followed by refractive errors (17.64%), Around 56.44% of diagnosis accounted for cataract in the Prajwal *et al* [14] study

While studying the number of drugs prescribed per prescription it was seen that 75.81% prescriptions from OPD group were of only one drug. Among the IPD group 51.88%

patients were prescribed seven drugs while two drugs were prescribed in 22.04% prescription. In the Prajwal *et al.*[14] study most commonly four drugs per prescription were seen in 48.32% followed by three drugs per prescription (30.34%).

Among the OPD group most common class of drug prescribed was mydriatics (45.69%) followed by antibiotics (38.48%). However in IPD group most common class of drug prescribed was Antibiotics (33.65%)

The high use of antibiotics in OPD reflect the condition of poor sanitation, nutrition and prevalence of various infections in the study region while their use in IPD was mainly to prevent post operative infection and for some other acute infective conditions which needs conservative management.

Most of the drugs have been prescribed topically, 68.14% in form of drops in OPD and 35.72% in IPD and 17.63% in the form of ointment in OPD and 12.62% in IPD. By giving the drugs topically for eye diseases adverse effects are minimised. In IPD most commonly tablets (39.31%) and eye drops (35.72%) were prescribed. Injections were seen 20.57% prescription. In the Gangwar *et al* [13] study, it was found that the most common dosage form of drug prescribed in OPD was also eye drops (81.92%) followed by ointment (17.63%), capsules (3.00%), tablets (5.33%) and syrups (0.75%) while in IPD injections (90.47%) were the commonest dosage forms followed by eye drops (86.15%), tablets (46.96%), ointment (12.12%), syrups (5.19%) and capsules (2.16%). In the Prajwal *et al.*[14] study 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 %).

In our study, prescriptions in OPD with generic name were just 38.08%, which suggests popularity of brand names. The likely reason could have been the predictable response based on earlier clinical experience with a particular brand product and lack of the same confidence in generic drugs. Lack of confidence in generic drugs is not uncommon considering the evidence that in the absence of a strong regulatory control some of the marketed drug formulations might not be adhering to the standards prescribed.[15,16] prescriptions in IPD with generic name were just 61.75%, Prescriptions of generic drugs facilitate cheaper treatment for the patient.

The average total cost / prescription was Rs. 45.60 in OPD group while in IPD group was Rs. 20.04. In Gangwar *et al* [13] study, the average total cost per prescription was 87.40 INR in OPD and 135.80 INR in IPD which was higher as compared to present study.

In the present study no patient experienced any ADR. Thus the incidence of ADR in the present study was zero. Majority of the drugs were given topically thus minimizing adverse effects. In the Safa Alizadeh [17] study out of 1631 patients only 5 cases of adverse drug reaction were recorded.

Ophthalmic adverse drug reactions may be induced by both ophthalmic and non-ophthalmic drugs. These reactions are rare and often unanticipated. [18,19]

There is a need to conduct many such studies in other departments as well, to audit large number of prescriptions and educate the prescribers on rational drug therapy for benefits and safety to the patient.

5. Conclusion

DUS has become a vital part of pharmacoepidemiology. It provides 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 periodical auditing of drug utilization pattern is crucial 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.

Limitation

Since this was a quantitative type of drug utilization study with the WHO/INRUD core prescribing indicators, determining the quality of diagnosis and the appropriateness of drug choices was beyond the scope of prescribing indicators.

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