ORIGINAL ARTICLE

Glaucoma Drug Prescription Pattern in North India: Public vs Private Sector Hospitals

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Abstract

Background: Glaucoma is an optic neuropathy associated with characteristic structural damage to the optic nerve and associated visual dysfunction that may be caused by various pathological processes. A number of pharmacological agents are used to reduce the intraocular pressure (IOP), involving the usage of two or three medications concurrently. Literature is sparse regarding prescription patterns of antiglaucoma drugs, especially regarding variability in public sector vs private sector hospitals. Drug utilization studies can add insight for crafting rational, affordable, and ocular surface friendly prescriptions.

Aim: This study assessed the prescription pattern in glaucoma patients of a public sector, tertiary care hospital vs a private sector tertiary care hospital.

Materials and methods: In this retrospective study, pertinent data of diagnosed and labeled glaucoma patients were reviewed. Data collected included demographic details, type of glaucoma, number and nature of drugs prescribed, whether innovator or generic drugs were prescribed, if fixed-drug combinations (FDCs) and preservative-free formulations were prescribed. The prescription patterns between the two sectors were compared, as were the prescription patterns between primary open-angle glaucoma (POAG) and primary angle-closure disease (PACD).

Results: A total of 336 prescriptions were evaluated (216 from public sector, group I; 120 from private sector, group II). Travoprost 0.004% was the most prescribed antiglaucoma medication in both group I (30.09%) and group II (38.33%). Brimonidine and brinzolamide (14.17%) was the most prescribed combination in group II, while Brimonidine with Timolol (7.87%) in group I. In group I, Timolol and Travoprost were the most prescribed medications for both PACD and POAG.

Conclusion: This study showed that both public sector as well as private sector tertiary care centers prescribe antiglaucoma medications in tune with current principles of rational drug use. Preservative-free drugs were preferred in both the groups for better adherence.

Keywords: Fixed-dose combinations, Generic drug, Glaucoma, Innovator drug, Prescription, Preservative free.

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Introduction

Drug utilization studies are a critical component of pharmacoepidemiology and are a real-world indicator of prescription patterns. The analysis of prescriptions helps promote the rational use of drugs and minimize their misuse.[1]

Medical management is the mainstay of glaucoma therapy, with several antiglaucoma drugs available, with innumerable brand names, at varying costs. The irrational and inappropriate use of medication is a major concern worldwide, across disciplines, and glaucoma is no exception.[2–6]

Even though polypharmacy is considered a major predictor of irrational drug use, several glaucoma patients require more than one drug, especially with increasing duration and severity of disease.[7,8] This affects all aspects of glaucoma management: quality of life, side effects, compliance, and economics.

Despite this, drug utilization studies in glaucoma are few.[9–12] To the best of our knowledge, there are no drug utilization studies in glaucoma that compare the prescription patterns of private and public hospitals in developing countries such as India.

Therefore, this study was carried out to determine and compare the prescription patterns in the real-world setting in two glaucoma clinics in North India: one in a public sector, state-sponsored tertiary care center, and the second in a tertiary care private hospital in the same region.

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Materials and Methods

This cross-sectional, prospective chart review was conducted in glaucoma clinics of a tertiary care, government sector hospital (group I) and a tertiary care, private sector hospital (group II) from June 2023 to July 2023. The study followed the tenets of the Declaration of Helsinki, 1964.

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Table 1: Descriptive data about the study participants

	Group I	*Group II*
Number of participants	216	120
Age (±SD; in years)	58.40 ± 15.46	59.72 ± 13.21
Gender		
Male	37.04% (80)	58.33% (70)
Female	62.96% (136)	41.66% (50)
Diagnosis		
POAG	59.72% (129)	34.17% (41)
PACG	15.74% (34)	32.50% (39)
PACS	1.85% (4)	–
PAC	1.39% (3)	–
OHTN	2.78% (6)	10.00% (12)
Secondary open-angle glaucoma (SOAG)	11.57% (25)	4.16% (5)
Secondary angle-closure glaucoma (SACG)	4.63% (10)	3.33% (4)
Juvenile open-angle glaucoma (JOAG)	0% (0)	5.83% (7)
NTG	1.39% (3)	5.00% (6)
Traumatic OHTN	–	1.67% (2)
Uveitic OHTN	–	1.67% (2)
Congenital glaucoma	0.93% (2)	0.83% (1)
Average number of medication prescriptions	1.98 ± 0.99	1.92 ± 1.11
Average number of bottles	1.41 ± 0.59	1.51 ± 0.64

The study participants included 336 consecutive glaucoma patients who had attended the glaucoma clinics between January 1, 2023 and June 30, 2023, in both hospitals. Patients with a confirmed diagnosis of glaucoma were included in the study. Those with any other ophthalmic comorbidities were excluded from this retrospective chart review.

Data collected included demographic details, type of glaucoma, number and nature of drugs prescribed, whether innovator or generic drugs were prescribed, if fixed-drug combinations (FDCs) were prescribed, and if preservative-free formulations were prescribed.

An innovator drug refers to a branded drug under patent protection, while a generic drug refers to drug formulations manufactured by companies other than the parent company, once the patent and in turn the market exclusivity rights for the company expire.[13]

Preservative-free drugs in our study referred to benzalkonium chloride (BAK)—free preserved antiglaucoma medicines (using alternative preservatives to BAK).

Statistical Analysis

Data were presented as mean [standard deviation (SD)] or percentage (%). Outcomes included the number of patients on monotherapy, polytherapy, or fixed-dose combinations; number of patients prescribed generics, branded or both; and the number of patients prescribed preservative-free formulations. Data was analyzed using Microsoft Excel and R.

The prescription patterns between the two sectors were compared, as was the prescription patterns between primary open-angle glaucoma (POAG) and primary angle-closure disease (PACD). PACD referred to an umbrella term for patients classified as primary angle-closure suspect (PACS), primary angle closure (PAC), and primary angle-closure glaucoma (PACG) using the Foster's classification cited in the American Academy of Ophthalmology Preferred Practice Guidelines.[14]

Results

A total of 336 prescriptions were evaluated, comprising 216 from the tertiary care public (government) sector hospital (group I) and 120 from a tertiary care private sector hospital (group II). The mean age of the patient cohort was comparable, 58.40 ± 15.46 years in group I compared to 59.72 ± 13.21 years in group II.

There was a female preponderance, 62.96%, in group I compared to only 41.66% of the patients in group II. The most common patient presentation in both sectors was POAG followed by PACD. These patient characteristics have been summarized in Table 1.

While comparing the prescription patterns between the two sectors, travoprost 0.004% was the most prescribed antiglaucoma medication in both group I (30.09%) and group II (38.33%). It was closely followed by timolol (29.63%) and dorzolamide (9.72%) in group I and bimatoprost (37.50%) and brinzolamide (37.50%) in group II. Furthermore, a significantly higher number of bimatoprost, latanoprost, brimonidine, and brinzolamide were prescribed in group II compared to group I ($p < 0.05$). In group I, bimatoprost and brimonidine were predominantly prescribed as branded formulations, whereas dorzolamide and latanoprost were predominantly prescribed as generic formulations. In comparison, in group II, brimonidine, bimatoprost, and brinzolamide were primarily prescribed as branded formulations, and Tafluprost and Dorzolamide were mainly prescribed as generic ones. A significantly higher number of branded formulations of latanoprost were prescribed in group II ($p = 0.023$), and a significantly higher number of generic formulations of travoprost were prescribed in group I ($p = 0.043$). Preservative-free drugs were exclusively prescribed in group I. Among them, travoprost and timolol were the most prescribed medications (27.31% each).

Among the FDCs, brimonidine and brinzolamide (14.17%) were the most prescribed combination in group II and brimonidine with timolol (7.87%) in group I. Significantly higher numbers of travoprost with timolol combinations were prescribed in group I compared to significantly higher numbers of brimonidine with brinzolamide prescriptions in group II ($p < 0.05$). Preservative-free fixed-dose combinations were exclusively prescribed in group I, with brimonidine with timolol being the most common prescription. The descriptive and comparative data on the prescription patterns are summarized in Table 2.

We further compared the prescription patterns between the two most common patient presentations, PACD and POAG, in both the groups separately. In group I, timolol and travoprost were the most prescribed medications for both PACD and POAG. Among the innovator (branded) formulations, travoprost, brimonidine, and bimatoprost were the most prescribed ones in both the groups. In patients with PACD, timolol, latanoprost, dorzolamide, and pilocarpine were exclusively prescribed as generic formulations, similarly in patients with POAG, ripasudil, dorzolamide, and timolol were only prescribed as generic formulations.

Timolol was the most prescribed preservative-free drug for PACD and was significantly more prescribed when compared to patients with POAG ($p = 0.048$). Latanoprost was the most prescribed preservative-free medication for POAG in this sector. Brimonidine with timolol (19.51%) was the most prescribed preservative-free fixed-dose combination in patients with PACD

Table 2: Comparison of the overall prescription patterns between the two groups

Name of topical medication	*Group I (n = 216) % (No. of patients)*	*Group II (n = 120) % (No. of patients)*	*p-value*
Bimatoprost	7.87% (17)	37.50% (45)	<0.0001
Latanoprost	6.02% (13)	15% (18)	**0.0114**
Travoprost	30.09% (65)	38.33% (46)	**0.1562**
Tafluprost	0.46% (1)	0.83% (1)	1
Timolol	29.63% (64)	30% (36)	1
Brimonidine	6.48% (14)	26.67% (32)	**<0.0001**
Brinzolamide	3.70% (8)	37.50% (45)	**<0.0001**
Dorzolamide	9.72% (21)	4.17% (5)	0.1067
Netarsudil	–	0.83% (1)	1
Ripasudil	1.39% (3)	–	1
Pilocarpine	0.46% (1)	–	1
Branded (innovator) drug/total number of drug users			
Bimatoprost	88.23% (15/17)	97.77% (44/45)	0.7723
Latanoprost	7.69% (1/13)	77.77% (14/18)	**0.0231**
Travoprost	46.15% (30/65)	97.82% (45/46)	0.0416
Tafluprost	100% (1/1)	0% (0/1)	–
Timolol	0% (0/64)	72.22% (26/36)	–
Brimonidine	78.57% (11/14)	90.62% (29/32)	0.6234
Brinzolamide	37.5% (3/8)	71.11% (32/45)	0.5521
Dorzolamide	0% (0/21)	20% (1/5)	–
Netarsudil	–	0% (0/1)	–
Ripasudil	0% (0/3)	–	–
Pilocarpine	0% (0/1)	–	–
Generic molecule/total number of drug users			
Bimatoprost	11.76% (2/17)	2.22% (1/45)	0.4186
Latanoprost	92.31% (12/13)	22.22% (4/18)	0.1102
Travoprost	53.84% (35/65)	2.17% (1/46)	**0.0431**
Tafluprost	0% (0/1)	100% (1/1)	–
Timolol	100% (64/64)	27.77% (10/36)	0.2213
Brimonidine	21.43% (3/14)	9.37% (3/32)	0.6585
Brinzolamide	62.5% (5/8)	28.88% (13/45)	0.6623
Dorzolamide	100% (21/21)	80% (4/5)	0.8234
Netarsudil	–	100% (1/1)	–
Ripasudil	100% (3/3)	–	–
Pilocarpine	100% (1/1)	–	–
Preservative free/total number of drug users			
Bimatoprost	35.29% (6/17)	93.33% (42/45)	1
Latanoprost	76.92% (10/13)	55.55% (10/18)	1
Travoprost	76.92% (50/65)	86.95% (40/46)	1
Tafluprost	100% (1/1)	100% (1/1)	–
Timolol	31.25% (20/64)	72.22% (26/36)	1
Brimonidine	100% (13/13)	100% (32/32)	1
Brinzolamide	40% (2/5)	28.88% (13/45)	1
Dorzolamide	0% (0/21)	0% (0/5)	1
Netarsudil	–	0% (0/1)	–
Ripasudil	0% (0/3)	–	1
FDC without preservative			
Bimatoprost + timolol	6.94% (15)	10% (12)	0.4367
Travoprost + timolol	7.40% (16)	1.67% (2)	**0.0469**

Contd…

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Name of topical medication	*Group I (n = 216) % (No. of patients)*	*Group II (n = 120) % (No. of patients)*	*p-value*
Latanoprost + timolol	–	–	–
Tafluprost + timolol	–	–	–
Brimonidine + timolol	7.87% (17)	9.17% (11)	1
Brinzolamide + timolol	0.46% (1)	1.67% (2)	1
Brimonidine + brinzolamide	1.85% (4)	14.17% (17)	**<0.0001**
Dorzolamide + timolol	3.70% (8)	3.33% (4)	1
FDC with preservative			
Bimatoprost + timolol	6.02% (13)	–	1
Travoprost + timolol	14.81% (32)	–	1
Latanoprost + timolol	2.31% (5)	–	1
Tafluprost + timolol	–	–	–
Brimonidine + timolol	17.13% (37)	–	1
Brinzolamide + timolol	1.85% (4)	–	1
Brimonidine + brinzolamide	7.41% (16)	–	1
Dorzolamide + timolol	6.02% (13)	1.67% (2)	1

Bold values indicate statistically significant values

compared to travoprost with timolol (17.83%) in patients with POAG. The comparative data of the prescription patterns in patients with PACD and POAG in group I have been summarized in Table 3.

In group II, travoprost (41.03%) was the most prescribed medication for PACD followed by timolol (35.90%), whereas bimatoprost and travoprost (41.46%) were the most prescribed medications for POAG. A significantly higher proportion of the drugs prescribed in group II were branded formulations. Bimatoprost, travoprost, and brimonidine were the most prescribed branded formulations in both PACD and POAG patients. There was a significantly higher number of brimonidine with timolol fixed-dose combination prescriptions for PACD compared to POAG ($p = 0.0412$). Comparative analysis of the prescription patterns for PACD and POAG in group II have been summarized in Table 4.

Discussion

Drug pattern monitoring studies for glaucoma are critical in promoting rational drug usage, and also provide a real-world evaluation of prescription patterns. In this study, we also aimed to compare the differences in prescription patterns in two superspeciality glaucoma clinics, given that access to healthcare, as well as health-seeking behavior is presumably different between those who are served by public and private sector hospitals.

In our study, we found a preponderance of POAG, with 60% of patients from the public sector hospital having POAG and 23% having PACD (PACG 16%). The private sector hospital, on the other hand, reported almost equal numbers of POAG and PACG (34 and 32.5%, respectively) cases. Interestingly, more men (58%) visited private hospitals, while more women visited the public sector hospital (63%). The incidence of normal tension glaucoma (NTG) and ocular hypertension (OHTN) was 1.4 and 5%, and 2.8 and 10%, in the public and private sector cohorts, respectively.

The average number of drugs per prescription is a key indicator of rational drug use. Even though most glaucoma patients require more than one drug in their clinical lifetime, polypharmacy increases the risk of adverse drug reactions and an increased incidence of ocular surface diseases (OSD). It, consequently, also adversely impacts adherence and persistence because of increasing cost of therapy as well as schedule complexity.

In our study, we found that the mean drugs in the prescriptions from both centers were comparable: 1.98 ± 0.99 and 1.92 ± 1.11, in 1.41 ± 0.59 and 1.51 ± 0.64, from the public and private hospitals, respectively. In a naturalistic evaluation of glaucoma prescription patterns from the glaucoma clinic of a tertiary care hospital in the same region, Niraj et al.[6] had reported that the mean drugs in the prescriptions from their hospital was 2.18 ± 1.68, while the same was 5.04 ± 1.52 in cases referred to their center from other hospitals. While the five drugs to a prescription may be explained by the fact that only those patients who are not controlled on maximal medical therapy (MMT) are referred to a tertiary care center, it may be interesting to compare the prescription patterns of glaucoma specialists with those from general ophthalmologists to better understand drug utilization patterns in the region.

The most prescribed drops in both groups were prostaglandin analogs (PGAs), with travoprost being the most commonly prescribed PGA (30.09% in group I and 38.33% in group II). The next most prescribed drugs were bimatoprost and brinzolamide in group II (37.50% each) and timolol in group I (29.63%). However, the prescriptions from the two hospitals were not similar in this regard: timolol (29.63%) and dorzolamide (9.72%) were second and third in the public hospital, while bimatoprost (37.50%) and brinzolamide (37.50%) in the private hospital.

The use of FDCs is recommended in chronic diseases whenever polypharmacy is required. In glaucoma, FDCs decrease schedule complexity and the burden of preservatives, thereby increasing adherence. Interestingly, brimonidine and brinzolamide (14.17%) was the most prescribed FDC in the private sector hospital, while brimonidine with timolol (7.87%) in the public sector hospital. Moreover, significantly higher numbers of travoprost with timolol FDCs were prescribed in the latter compared to significantly higher numbers of brimonidine with brinzolamide prescriptions in the former ($p < 0.05$). Preservative-free FDCs, the most common being brimonidine with timolol, were exclusively prescribed in the public hospital. Given the preponderance of prescriptions of innovator drugs in the private hospital (group II), this could be explained by the fact that no preservative-free innovator brands are currently available in the region.

Table 3: Comparison of the prescription patterns between PACD and POAG in group I (government sector)

Name of the medication	*PACD (n = 41)*	*POAG (n = 129)*	*p-value*
Bimatoprost	4.88% (2)	7.75% (10)	0.6129
Latanoprost	4.88% (2)	5.42% (7)	0.9713
Travoprost	26.83% (11)	30.23% (39)	0.7242
Tafluprost	–	0.78% (1)	1
Timolol	39.02% (16)	21.70% (28)	0.6142
Brimonidine	12.20% (5)	4.65% (6/129)	0.1383
Brinzolamide	2.44% (1)	5.43% (7/129)	0.7162
Dorzolamide	9.76% (4)	5.43% (7/129)	0.537
Ripasudil	–	2.33% (3/129)	1
Pilocarpine	2.44% (1/41)	–	1
Innovator (branded drugs)/total number of drug users			
Bimatoprost	100% (2/2)	80% (8/10)	0.6813
Latanoprost	0% (0/2)	14.28% (1/7)	–
Travoprost	54.54% (6/11)	51.28% (20/39)	0.9672
Tafluprost	–	100% (1/1)	–
Timolol	0% (0/16)	0% (0/28)	–
Brimonidine	60% (3/5)	83.33% (5/6)	0.6284
Brinzolamide	100% (1/1)	28.57% (2/7)	0.1362
Generic molecule/total number of drug users			
Bimatoprost	0% (0/2)	20% (2/10)	–
Latanoprost	100% (2/2)	85.71% (6/7)	0.7821
Travoprost	45.45% (5/11)	48.71% (19/39)	0.8612
Timolol	100% (14/14)	100% (28/28)	1
Brimonidine	40% (2/5)	16.67% (1/6)	0.1052
Brinzolamide	0% (0/1)	71.43% (5/7)	–
Dorzolamide	100% (4/4)	100% (7/7)	1
Ripasudil	–	100% (3/3)	–
Pilocarpine	100% (1/1)	–	–
Preservative free			
Bimatoprost	4.88% (2)	3.88% (5)	1
Latanoprost	2.44% (1)	6.98% (9)	0.4872
Travoprost	21.95% (9)	33.33% (43)	0.2367
Timolol	36.59% (15)	22.48% (29)	**0.0485**
Brimonidine	7.32% (3)	3.88% (5)	0.629
Brinzolamide	–	3.10% (4)	1
Dorzolamide	4.88% (2)	3.88% (5)	1
Ripasudil	–	3.10% (4)	1
FDC without preservative			
Bimatoprost + timolol	9.76% (4)	4.65% (6)	0.407
Travoprost + timolol	4.88% (2)	9.30% (12)	0.5676
Brimonidine + timolol	9.76% (4)	5.43% (7)	0.537
Brinzolamide + timolol	–	0.78% (1)	1
Brimonidine + brinzolamide	2.44% (1)	2.33% (3)	1
Dorzolamide + timolol	2.44% (1)	3.10% (4)	1
FDC with preservative			
Bimatoprost + timolol	9.76% (4)	4.65% (6)	0.407
Travoprost + timolol	7.32% (3)	17.83% (23)	0.1696
Latanoprost + timolol	–	3.88% (5)	1
Brimonidine + timolol	19.51% (8)	12.40% (16)	0.3781
Brinzolamide + timolol	2.44% (1)	2.33% (3)	1
Brimonidine + brinzolamide	7.32% (3)	6.98% (9)	1
Dorzolamide + timolol	7.32% (3)	4.65% (6)	0.792

Bold values indicate statistically significant values

Table 4: Comparison of the prescription patterns between PACD and POAG in group II (private sector)

Name of the medication	*PACD*	*POAG*	*p-value*
Bimatoprost	33.33% (13/39)	41.46% (17/41)	0.3212
Latanoprost	15.38% (6/39)	12.20% (5/41)	0.8160
Travoprost	41.03% (16/39)	41.46% (17/41)	1
Tafluprost	–	2.44% (1/41)	1
Timolol	35.90% (14/39)	21.95% (9/41)	0.2110
Brimonidine	33.33% (13/39)	17.07% (7/41)	0.1171
Brinzolamide	28.21% (11/39)	39.02% (16/41)	0.6342
Dorzolamide	2.56% (1/39)	4.88% (2/41)	0.9811
Innovator (branded) drugs/total number of drug users			
Bimatoprost	92.31% (12/13)	100% (17/17)	0.7312
Latanoprost	83.33% (5/6)	80% (4/5)	0.8841
Travoprost	93.75% (15/16)	100% (17/17)	1
Tafluprost	–	100% (1/1)	1
Timolol	85.71% (12/14)	77.78% (7/9)	0.8344
Brimonidine	92.31% (12/13)	71.43% (5/7)	0.1071
Brinzolamide	72.72% (8/11)	93.75% (15/16)	0.7512
Dorzolamide	100% (1/1)	0% (0/2)	–
Generic molecule/total number of drug users			
Bimatoprost	7.69% (1/13)	0% (0/17)	–
Latanoprost	16.67% (1/6)	20% (1/5)	0.7223
Travoprost	6.25% (1/16)	0% (0/17)	–
Tafluprost	–	100% (1/1)	–
Timolol	14.28% (2/14)	22.22% (2/9)	0.7682
Brimonidine	7.69% (1/13)	28.57% (2/7)	0.3118
Brinzolamide	27.27% (3/11)	6.25% (1/16)	0.2461
Dorzolamide	0% (0/1)	100% (2/2)	–
FDC without preservative			
Bimatoprost + timolol	7.69% (3)	9.76% (4)	0.8145
Travoprost + timolol	2.56% (1)	2.44% (1)	1
Brimonidine + timolol	15.38% (6)	2.44% (1)	**0.0412**
Brinzolamide + timolol	2.56% (1)	–	1
Brimonidine + brinzolamide	12.82% (5)	12.20% (5)	1
Dorzolamide + timolol	2.56% (1)	7.32% (3)	0.5412
FDC with preservative: None			

Bold values indicate statistically significant values

The main limitation of this study is that the results may not be generalized to all tertiary care sectors of public or private sectors. Prospective studies with larger sample sizes and multiple sites with additional data on switch and addendum to the prescribed regimens can provide additional insight.

Additionally, only acetazolamide, mannitol, latanoprost, pilocarpine, and timolol are the antiglaucoma drugs listed in the National List of Essential Medicines (NLEM) 2022.[15] More prescription-related data may also result in the addition of other classes of antiglaucoma drugs to the NLEM.

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References

1. Montastruc JL, Benevent J, Montastruc F, et al. What is pharmacoepidemiology? Definition, methods, interest and clinical applications. Therapie 2019;74(2):169–174. DOI: 10.1016/j.therap.2018.08.001
2. World Health Organization (WHO) and International Network for Rational Use of Drugs. How to investigate drug use in health facilities: selected drug use indicators. Geneva, Switzerland: WHO; 1993. (WHO/DAP/93.1).
3. Hogerzeil HV. Promoting rational prescribing: an international perspective. Br J Clin Pharmacol 1995;39(1):1–6. DOI: 10.1111/j.1365-2125.1995.tb04402.x
4. Dinesh Kumar B, Raghuram TC, Radhaiah G, et al. Profile of drug use in urban and rural India. Pharmacoeconomics 1995;7(4):332–346. DOI: 10.2165/00019053-199507040-00007
5. Jadhav PR, Moghe VV, Deshmukh YA. Drug utilization study in ophthalmology outpatients at a tertiary care teaching hospital. ISRN Pharmacol 2013;2013:768792. DOI: 10.1155/2013/768792
6. Niraj N, Shafiq N, Kaushik S, et al. Naturalistic evaluation of prescription pattern in glaucoma clinic of a tertiary care hospital: a developing country's perspective. J Pharm Bioallied Sci 2021;13(1):83–87. DOI: 10.4103/jpbs.JPBS_324_20
7. Akbari MR, Kamalipour A, Pakroo M, et al. Prevalence and correlates of polypharmacy, and drug utilization pattern in a semi-urban population: results from the pars cohort study. Arch Iran Med 2023;26(3):156–165. DOI: 10.34172/aim.2023.24

8. Tanaka F, Shibatani N, Fujita K, et al. Polypharmacy-associated potential contraindications of drug prescriptions in patients with primary angle closure disease in a real-world setting. J Pharm Health Care Sci 2021;7(1):17. DOI: 10.1186/s40780-021-00196-w
9. Beck AD, Advanced Glaucoma Intervention Study. Review of recent publications of the Advanced Glaucoma Intervention Study. Curr Opin Ophthalmol 2003;14(2):83–85. DOI: 10.1097/00055735-200304000-00005
10. Meier-Gibbons F, Töteberg-Harms M. Struktur/Funktion/Behandlung beim Glaukom: Fortschritt in den letzten 10 Jahren. Ophthalmologie 2021;118(12):1216–1221. DOI: 10.1007/s00347-021-01505-2
11. Lichter PR, Musch DC, Gillespie BW, et al. Interim clinical outcomes in the Collaborative Initial Glaucoma Treatment Study comparing initial treatment randomized to medications or surgery. Ophthalmology 2001;108(11):1943–1953. DOI: 10.1016/s0161-6420(01)00873-9
12. Konstas AG, Schmetterer L, Costa VP, et al. Current and emerging fixed combination therapies in glaucoma: a safety and tolerability review. Expert Opin Drug Saf 2020;19(11):1445–1460. DOI: 10.1080/14740338.2020.1826928
13. Bhartiya S, Dhingra D. Generics versus brand-named drugs for glaucoma: the debate continues. Rom J Ophthalmol 2020;64(3):239–244. PMID: 33367157.
14. Foster PJ, Buhrmann R, Quigley HA, et al. The definition and classification of glaucoma in prevalence surveys. Br J Ophthalmol 2002;86(2):238–242. DOI: 10.1136/bjo.86.2.238
15. National List of Essential Medicines (NLEM), 2022. https://main.mohfw.gov.in/?q=newshighlights-104 (Section 21; Pg 71). [Accessed 11 December 2023].