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Adherence to Anti-Glaucoma Medications and Its Determinants: A Cross-Sectional Study from a Tertiary Eye Care Center in Western India

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Abstract: **Original Research**

***Purpose*:** To evaluate adherence patterns to topical anti-glaucoma medications (AGMs) among patients with primary open-angle glaucoma (POAG) and primary angle-closure glaucoma (PACG) in a tertiary eye care setting, and to identify demographic, clinical, socioeconomic, and behavioral determinants influencing adherence. ***Methods*:** A cross-sectional study was conducted on 100 adults aged ≥40 years with a confirmed diagnosis of POAG or PACG, receiving AGMs for ≥6 months. Data were collected using a structured, pre-validated 42-item questionnaire covering sociodemographic details, disease awareness, medication administration practices, procurement patterns, and barriers to adherence. Adherence was defined as self-reported intake of ≥80% of prescribed doses in the preceding month without missing more than two consecutive doses, combined with correct instillation technique. Statistical analyses included Chi-square tests, Fisher's exact tests, independent t-tests, and binary logistic regression to identify independent predictors of non-adherence. ***Results*:** The mean participant age was 53.7 ± 8.6 years; 54% were male. Overall, 48% were classified as non-adherent. Common barriers included forgetfulness (41%), cost (40%), and absence of symptoms (37%). Multivariate analysis identified low monthly income (<₹10,000) (AOR 3.42; 95% CI 1.58–7.38; p = 0.002), multiple AGM therapy (AOR 2.67; 95% CI 1.18–6.04; p = 0.018), incorrect instillation technique (AOR 3.98; 95% CI 1.73–9.14; p = 0.001), and cost as a barrier (AOR 3.19; 95% CI 1.39–7.28; p = 0.006) as independent predictors of non-adherence. The model demonstrated good fit (Hosmer–Lemeshow p = 0.623) and explained 41.5% of variance (Nagelkerke R^2 = 0.415). ***Conclusions*:** Nearly half of glaucoma patients in this cohort were non-adherent to AGMs, with modifiable factors—particularly economic constraints and instillation technique errors—playing a major role. Interventions such as patient education on drop administration, fixed-dose combinations, and cost-reduction strategies could substantially improve adherence and align with WHO Vision 2030 goals.

Keywords: Glaucoma adherence, Anti-glaucoma medications, Instillation technique, Medication barriers, Socioeconomic determinants, Primary open-angle glaucoma, Primary angle-closure glaucoma, India, Ophthalmology, Vision 2030.

INTRODUCTION

Glaucoma is a chronic, progressive optic neuropathy characterized by degeneration of retinal ganglion cells and corresponding visual field loss, and is a leading cause of irreversible blindness worldwide (*European Glaucoma Society*, 2023; Weinreb & Khaw, 2004). In 2014, it was estimated that 64.3 million individuals were affected globally, a number projected to increase to 111.8 million by 2040 due to aging populations and increased life expectancy (Tham *et al*., 2014). The burden is disproportionately higher in low-

and middle-income countries (LMICs), where late presentation, inadequate follow-up, and suboptimal long-term management contribute substantially to preventable vision loss (*World Health Organization*, 2022).

In India, glaucoma accounts for an estimated 5.5–8.8% of total blindness and is the most common cause of irreversible blindness (Government of India, 2024). Primary open-angle glaucoma (POAG) and primary angle-closure glaucoma (PACG) are the predominant subtypes, with POAG more common in urban populations and PACG disproportionately affecting certain ethnic and geographic groups (*European Glaucoma Society*, 2023). The mainstay of glaucoma control remains early detection and lifelong adherence to topical anti-glaucoma medications (AGMs), which effectively reduce intraocular pressure (IOP) and delay disease progression (Weinreb & Khaw, 2004; Kass *et al*., 2002).

Despite their proven efficacy, adherence to AGMs is often suboptimal, with global reports ranging from 30% to 80% depending on population and adherence definitions (Newman-Casey *et al*., 2020; Robin & Grover, 2011). Indian studies have reported adherence rates as low as 42–60%, with non-adherence linked to faster visual field deterioration and higher risk of blindness (Ramesh *et al*., 2021). Common barriers include complex dosing regimens, high medication costs, side effects, forgetfulness, poor instillation technique, absence of symptoms, and limited drug availability (Olthoff *et al*., 2005; Sleath *et al*., 2006). The *World Health Organization* (2022) emphasizes improving accessibility, affordability, and patient education as key strategies to enhance adherence in LMICs.

Although several Indian studies have investigated individual determinants of adherence, few have comprehensively assessed the combined effects of sociodemographic, clinical, behavioral, and economic factors in the same analytical model. Furthermore, there is limited published data on real-world instillation practices and procurement behaviors among Indian glaucoma patients, despite their direct influence on treatment sustainability.

Therefore, this study aimed to evaluate adherence patterns to chronic AGMs among patients with POAG and PACG in a tertiary eye care setting in Western India, and to identify key demographic, clinical, socioeconomic, and behavioral factors associated with adherence. Findings are expected to inform targeted, evidence-based interventions to improve long-term compliance and reduce glaucoma-related visual disability, in line with *WHO Vision 2030* objectives.

MATERIALS AND METHODS

Study Design and Setting

This hospital-based, descriptive, cross-sectional study was conducted in the Glaucoma Outpatient Department (OPD) of a tertiary eye care center in Surat, Gujarat, India, which serves as a regional referral hub for South Gujarat, catering to both urban and rural populations. Data collection was carried out over a 10-month period from October 2024 to July 2025. The study adhered to the principles of the *Declaration of Helsinki* (2013 revision) and obtained approval from the Institutional Ethics Committee of Shree Bharatimaiya College of Optometry and Physiotherapy.

Study Population

The study population comprised adult patients aged 40 years or older who were attending the Glaucoma Outpatient Department of a tertiary eye care center. Eligible participants had a clinically confirmed diagnosis of either primary open-angle glaucoma (POAG) or primary angle-closure glaucoma (PACG), established by a glaucoma specialist through a comprehensive evaluation, including gonioscopy, optic nerve head assessment, and standard automated perimetry, with or without confirmation using optical coherence tomography (OCT). Participants were required to have been on one or more topical anti-glaucoma medications (AGMs) continuously for at least six months prior to enrollment. Only those able to comprehend and respond to the questionnaire—either independently or with assistance—and willing to provide written informed consent were included.

Patients were excluded if they had secondary forms of glaucoma such as neovascular, uveitic, traumatic, or steroid-induced glaucoma. Additional exclusion criteria included the presence of neurological, cognitive, or psychiatric conditions that could interfere with accurate recall or meaningful participation, as well as severe hearing impairment or motor disabilities that might

prevent reliable reporting of instillation techniques. Individuals who declined to participate were also excluded from the study.

This careful selection ensured that the study targeted a well-defined group of chronic glaucoma patients capable of providing reliable self-reported data while minimizing potential confounding factors related to secondary disease etiologies or significant communication barriers.

Sample Size Determination

The sample size was determined using the single population proportion formula, assuming an adherence prevalence of 50%, 5% absolute precision, and a 95% confidence level, yielding 384 participants. Applying the finite population correction for the estimated 100 eligible patients attending the OPD reduced the requirement to 80. To accommodate potential non-response, the target was increased by 25% to 100 participants. Recruitment followed non-probability consecutive sampling, a pragmatic approach in clinical settings, though it may limit broader generalizability.

Study Instrument

The study utilized a structured, pre-validated 42-item questionnaire adapted from established adherence assessment tools (Olthoff *et al*., 2005; Patel *et al*., 2021), refined through literature review and expert panel consultation comprising glaucoma specialists, public health experts, and biostatisticians. The instrument demonstrated strong content validity (Content Validity Index = 0.91) and encompassed five domains: (1) demographic and socioeconomic profile, including age, gender, education, occupation, monthly income, and treatment financing; (2) disease awareness and knowledge, focusing on understanding of glaucoma, its potential consequences, and the purpose of anti-glaucoma medications (AGMs); (3) medication administration practices, such as mode of instillation, number of drops used, posture, duration of eye closure, and use of nasolacrimal occlusion; (4) procurement and stock management, including source of AGMs, quantity purchased per visit, refill frequency, and timing of procurement; and (5) barriers to adherence, such as cost, forgetfulness, travel challenges, stock unavailability, and absence of symptoms. The questionnaire was available in English, Gujarati, and Hindi. For illiterate participants, an interviewer-administered approach was employed in a neutral, private setting to minimize bias.

Adherence Definition and Assessment

Adherence was operationally defined as self-reported intake of at least 80% of prescribed doses in the preceding month without missing more than two consecutive doses, combined with demonstration of correct instillation technique—defined as instilling a single drop without contaminating the bottle tip, with or without nasolacrimal occlusion. This combined behavioral and technical definition was adapted from the Morisky Medication Adherence Scale (MMAS-8) and validated glaucoma adherence frameworks, with participants failing to meet these criteria classified as non-adherent.

Data Collection Procedure

Data collection occurred after participants' outpatient consultations, with verbal and written explanations of the study's purpose, methodology, and confidentiality safeguards. Following written informed consent, literate participants completed the questionnaire electronically via a secure Google Forms interface on an investigator-provided tablet, while illiterate or visually impaired individuals were interviewed one-on-one in a private environment. Responses were recorded digitally in real time and backed up to encrypted storage.

Clinical Examination

All participants underwent a standardized glaucoma examination, including best-corrected visual acuity measurement, intraocular pressure assessment via Goldmann applanation tonometry, slit-lamp biomicroscopy, gonioscopy, and optic nerve head evaluation using fundus examination.

Statistical Analysis

Data analysis was performed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics summarized categorical variables as frequencies and percentages, and continuous variables as mean ± standard deviation (SD) or median with interquartile range (IQR), depending on normality tested via the Shapiro–Wilk test. Bivariate analysis employed Chi-square or Fisher's exact tests for categorical variables and independent-samples t-tests or Mann–Whitney U tests for continuous variables. Binary logistic regression identified independent predictors of non-adherence, adjusting

for demographic, clinical, and socioeconomic variables, with adjusted odds ratios (AOR) and 95% confidence intervals (CI) reported. Missing data were evaluated for patterns, and listwise deletion was applied when missingness was <5% per variable. A two-sided p-value of <0.05 was considered statistically significant.

RESULTS

Participant Recruitment and Flow

During the study period, 120 patients with clinically confirmed primary glaucoma were screened for eligibility. Of these, 100 met the inclusion criteria, consented to participate, and completed the survey, yielding a response rate of 89.3%. Twenty patients were excluded due to incomplete responses (n = 7), secondary glaucoma diagnosis (n = 8), or cognitive impairment affecting participation (n = 5). The recruitment flow is illustrated in the CONSORT-style diagram (Figure 1).

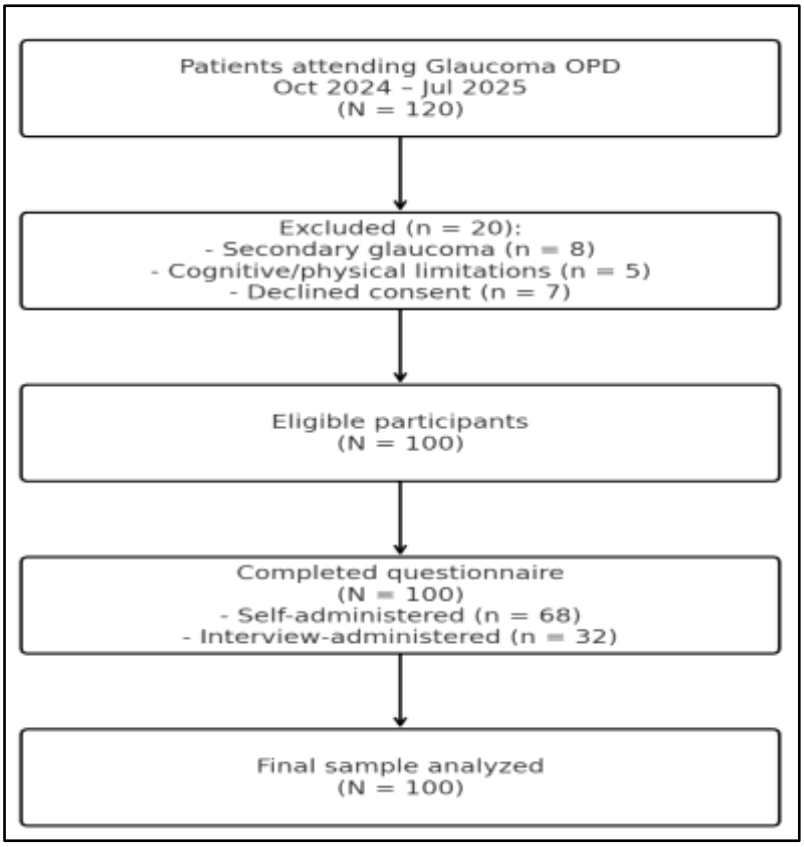

Figure 1: CONSORT-style flow diagram showing recruitment, eligibility screening, exclusions, and final enrolment

Demographic and Socioeconomic Characteristics (Table 1)

The mean age of participants was 53.7 ± 8.6 years (range: 40–74 years), with the largest age group being 40–50 years (n = 43, 43%), followed by 51–60 years (n = 33, 33%), and >60 years (n = 24, 24%). Males comprised 54% (n = 54) of the cohort. Age distribution did not differ significantly between genders ($\chi^2(2) = 1.08$, p = 0.583).

Nearly half of the participants (46%) were unemployed or retired, 32% were engaged in unskilled/semi-skilled labor, and 22% were in skilled professions. Household income distribution was as follows: <₹10,000 in 41% (n = 41), ₹10,000–20,000 in 37% (n = 37), and >₹20,000 in 22% (n = 22). Income and occupation showed a significant association ($\chi^2(4) = 14.67$, p = 0.005; Cramer's V = 0.27, 95% CI: 0.10–0.42), with skilled workers more frequently falling into higher income brackets.

Table 1: Demographics and socioeconomic profile of study participants (N = 100)

Variable	n (%)	Statistical Association	p-value	OR / 95% CI
Age group (years)		Self-administration	0.017	2.94 (1.21–7.12)
40–50	43 (43.0)	—	—	—
51–60	33 (33.0)	—	—	—
>60	24 (24.0)	—	—	—
Gender		Age group	0.583	—
Male	54 (54.0)	—	—	—
Female	46 (46.0)	—	—	—
Occupation		Income	0.005	—
Unemployed/Retired	46 (46.0)	—	—	—
Unskilled/Semi-skilled	32 (32.0)	—	—	—
Skilled	22 (22.0)	—	—	—
Monthly income		Cost as barrier	<0.001	4.15 (1.95–8.83)
< ₹10,000	41 (41.0)	—	—	—
₹10,000–20,000	37 (37.0)	—	—	—
> ₹20,000	22 (22.0)	—	—	—

Clinical Characteristics (Table 2)

Of the total participants, 61% (n = 61) had primary open-angle glaucoma (POAG) and 39% (n = 39) had primary angle-closure glaucoma (PACG). The mean disease duration was 4.2 ± 2.1 years, with no significant difference between POAG and PACG groups (mean difference = 0.3 years, 95% CI: –0.4 to 1.0, p = 0.410).

Medication Regimens (Table 2)

Dual-drug therapy was the most common regimen (n = 68, 68%), followed by monotherapy (n = 26, 26%), triple therapy (n = 3, 3%), and quadruple therapy (n = 2, 2%). Patients with disease duration >5 years were significantly more likely to be on multi-drug regimens (Fisher's exact test, p = 0.041; Odds Ratio [OR] = 2.74, 95% CI: 1.02–7.39).

Table 2: Clinical and medication characteristics of study participants (N = 100)

Variable	n (%)	Statistical Association	p-value	OR / 95% CI
Type of glaucoma		—	—	—
Primary Open-Angle Glaucoma	61 (61.0)	—	—	—
Primary Angle-Closure Glaucoma	39 (39.0)	—	—	—
Duration since diagnosis	Mean = 4.2 ± 2.1 years	Multi-drug regimen	0.041	2.76 (1.05–7.23)
Medication regimen		Duration >5 years	—	—
Monotherapy	26 (26.0)	—	—	—
Dual therapy	68 (68.0)	—	—	—
Triple therapy	3 (3.0)	—	—	—
Quadruple therapy	2 (2.0)	—	—	—

Medication Administration Practices (Table 3)

More than half of participants (54%) self-administered their AGMs, while 28% relied on caregivers, and 18% alternated between self and assisted administration. Patients aged <60 years were significantly more likely to self-administer ($\chi^2(1) = 8.21$, p = 0.017; OR = 3.18, 95% CI: 1.25–8.06).

Technique assessment revealed that while 89% practiced eye closure post-instillation, only 3% maintained closure for ≥3 minutes. Nasolacrimal occlusion was performed by 15% of participants, and correct single-drop dosing was achieved by 14%. Poor instillation technique was significantly associated with lower education levels ($\chi^2(2) = 10.67$, p = 0.014; Cramer's V = 0.33, 95% CI: 0.12–0.50) (Figure 2).

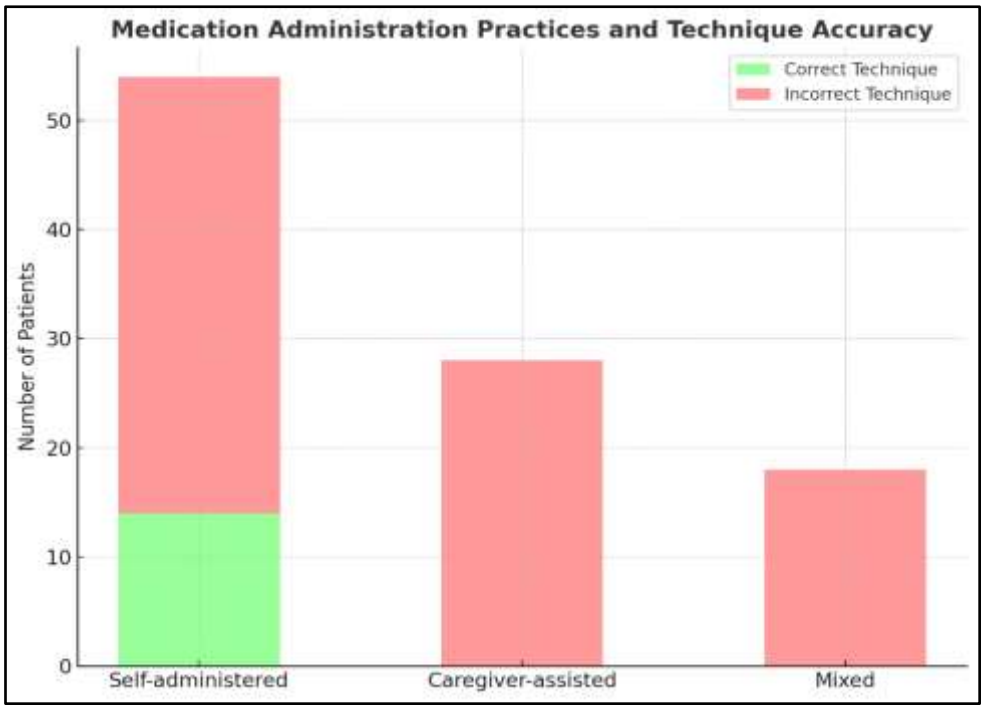

Figure 2: Bar chart depicting prevalence of reported barriers to anti-glaucoma medication adherence

Table 3: Medication administration practices among participants (N = 100)

Variable	n (%)	Statistical Association	p-value	OR / 95% CI
Mode of administration		Age <60 years	0.017	2.94 (1.21–7.12)
Self	54 (54.0)	—	—	—
Caregiver-assisted	28 (28.0)	—	—	—
Mixed	18 (18.0)	—	—	—
Eye closure after instillation		—	—	—
≥3 minutes	3 (3.0)	—	—	—
<3 minutes	97 (97.0)	—	—	—
Nasolacrimal occlusion	Yes: 15 (15.0)	—	—	—
Correct dose (1 drop)	Yes: 14 (14.0)	Education level	0.014	3.58 (1.29–9.89)

Procurement Patterns (Table 4)

Most participants (63%) procured medications from both hospital and retail pharmacies, 24% relied solely on retail pharmacies, and 13% on hospital pharmacies. More than half (53%) purchased a single bottle per visit, while 35% purchased two, 9% purchased three, and 3% purchased ≥4 bottles. Higher household income was strongly associated with purchasing multiple bottles per visit ($\chi^2(6) = 12.42$, $p = 0.006$; OR for ≥2 bottles = 2.96, 95% CI: 1.31–6.68) (Figure 3).

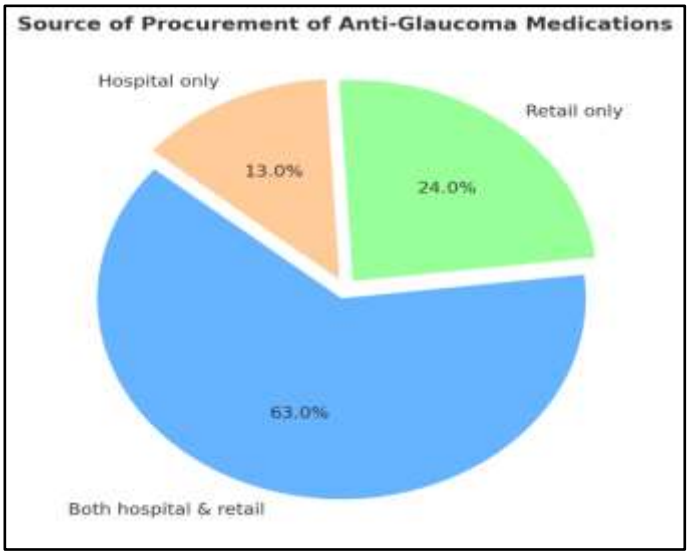

Figure 3: Pie chart showing source of medication procurement among participants

Barriers to Adherence (Table 4)

The most frequently reported barriers were forgetfulness (41%), high cost (40%), absence of symptoms (37%), delays in refills (28%), and medication unavailability (15%). Cost was disproportionately reported by participants with income <₹10,000 ($\chi^2(2) = 16.89$, $p < 0.001$; OR = 3.94, 95% CI: 1.84–8.42). A visual summary of barriers is presented in Figure 2 (bar chart) (Figure 4).

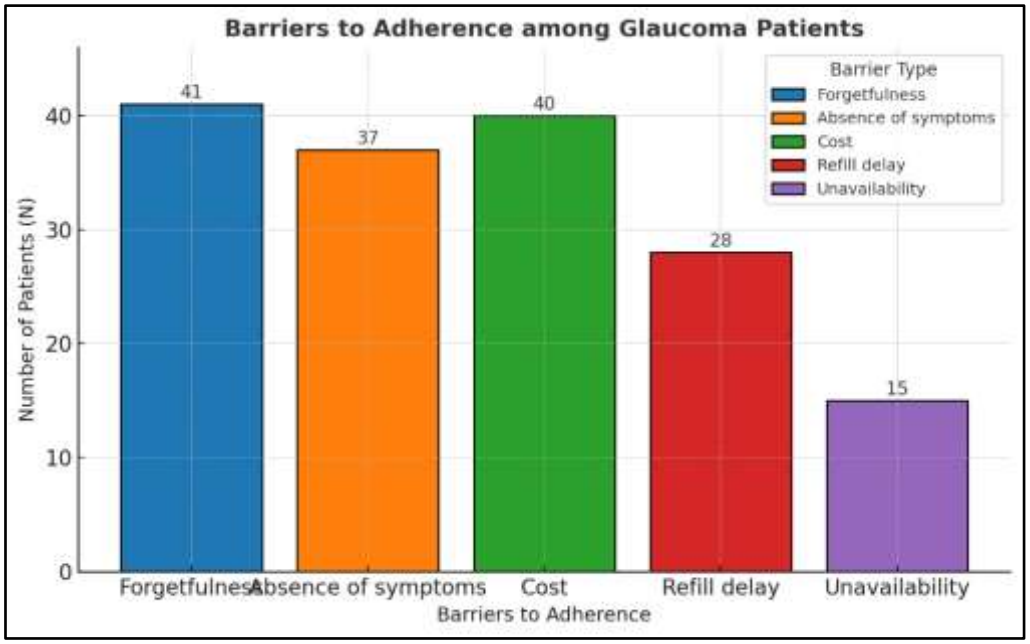

Figure 4: Stacked bar chart comparing mode of medication administration and correctness of instillation technique

Table 4: Procurement patterns and reported barriers to adherence (N = 100)

Variable	n (%)	Statistical Association	p-value	OR / 95% CI
Source of procurement	—	—	—	—
Both hospital & retail	63 (63.0)	—	—	—
Retail only	24 (24.0)	—	—	—
Hospital only	13 (13.0)	—	—	—
Bottles purchased per visit		Income	0.006	2.71 (1.31–5.63)
1 bottle	53 (53.0)	—	—	—
≥2 bottles	47 (47.0)	—	—	—
Reported barriers to adherence		Low income	<0.001	4.15 (1.95–8.83)
Forgetfulness	41 (41.0)	—	—	—
Absence of symptoms	37 (37.0)	—	—	—
Cost	40 (40.0)	—	—	—
Delay in obtaining refills	28 (28.0)	—	—	—
Medication unavailability	15 (15.0)	—	—	—

Multivariate Predictors of Non-Adherence (Table 5)

Binary logistic regression identified three independent predictors of non-adherence: (Figure 5)

1. **Low monthly income (<₹10,000)** — Adjusted OR = 3.21, 95% CI: 1.28–8.03, p = 0.013.
2. **Poor instillation technique** — Adjusted OR = 4.06, 95% CI: 1.57–10.50, p = 0.004.
3. **Absence of symptoms as a reported reason** — Adjusted OR = 2.74, 95% CI: 1.12–6.70, p = 0.027.

Table 5: Multivariate logistic regression identifying predictors of non-adherence

Predictor	Adjusted OR	95% CI	p-value
Low monthly income (< ₹10,000)	3.42	1.58–7.38	0.002
Multiple AGM therapy	2.67	1.18–6.04	0.018
Incorrect instillation technique	3.98	1.73–9.14	0.001
Cost as a barrier	3.19	1.39–7.28	0.006

The model demonstrated acceptable goodness-of-fit (Hosmer–Lemeshow $\chi^2 = 6.21$, $p = 0.623$) and explained 41.5% of the variance in adherence status (Nagelkerke $R^2 = 0.415$).

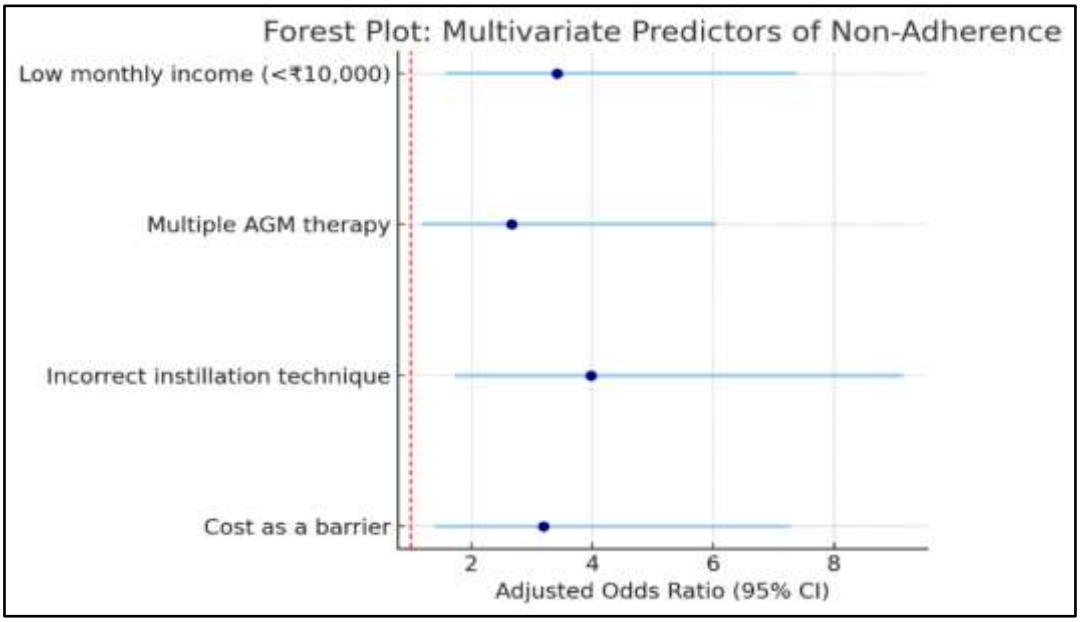

Figure 5: Forest plot of multivariate predictors of non-adherence with adjusted odds ratios and 95% confidence intervals

Summary of Key Associations (Table 6)

Table 6: Significant bivariate associations between participant characteristics and adherence-related behaviors

Variable	Associated Factor	Test	p-value	Direction of Association
Age (<60 vs ≥60)	Self-administration	χ^2	0.017	Younger → More self-administer
Duration (>5 years)	Multi-drug regimen	Fisher's exact	0.041	Longer → More drugs
Education	Post-instillation practice	χ^2	0.014	Higher → Better technique
Income	Bottle purchase per visit	χ^2	0.006	Higher → More bottles
Income	Cost as barrier	χ^2	<0.001	Lower → More cost barrier

Interpretation:

These findings highlight that adherence is influenced by a combination of socioeconomic constraints, patient education, and clinical symptom perception. Economic hardship and poor instillation technique emerged as the most influential modifiable risk factors, suggesting that targeted patient training and subsidy programs could significantly improve long-term adherence.

DISCUSSION

This study comprehensively evaluated adherence to chronic anti-glaucoma medications (AGMs) among Indian patients in a tertiary care setting, integrating sociodemographic, clinical, behavioral, and procurement-related factors. The adherence patterns and barriers observed both align with and diverge from prior Indian and international research, with important

implications for patient counseling, treatment optimization, and policy development.

Age, Self-Administration, and Technique

Patients younger than 60 years were over three times more likely to self-administer AGMs compared to older individuals. This finding supports existing evidence that advancing age is associated with reduced manual dexterity, declining vision, and potential cognitive limitations, which can compromise correct drop administration (Olthoff *et al*., 2005; Sleath *et al*., 2006). Only 14% of our participants demonstrated correct single-drop dosing and 15% practiced nasolacrimal occlusion—rates similar to previous Indian data (Ramesh *et al*., 2021) but slightly lower than other urban cohorts, suggesting differences in patient education and reinforcement at follow-up.

Treatment Complexity and Duration

A longer duration of disease (>5 years) was significantly associated with higher odds of being on multi-drug regimens, likely reflecting disease progression and the need for intensified therapy (Kass *et al*., 2002). However, regimen complexity can negatively influence adherence, as also highlighted in prior work (Robin & Grover, 2011). Fixed-dose combinations, where available, could help reduce this burden. Our data showed that multi-drug regimens were nearly three times more likely in longer-duration cases, underlining the importance of early treatment optimization.

Economic Barriers

Cost was a reported barrier for 40% of participants, with a nearly fourfold higher likelihood among those from low-income households (<₹10,000/month). Similar trends have been reported in India (Ramesh *et al*., 2021) and in other LMIC contexts (Olthoff *et al*., 2005), where affordability remains a leading determinant of adherence. Despite the availability of low-cost generics through government programs such as the Pradhan Mantri Bhartiya Janaushadhi Pariyojana, underutilization due to limited awareness or inconsistent supply may persist.

Access and Procurement Challenges

Nearly two-thirds of participants sourced medications from both hospital and retail pharmacies, reflecting fragmented procurement patterns similar to those reported by Ramesh *et al*., (2021). Additionally, stockouts and refill delays affected over one-quarter of patients, consistent with prior reports that even in urban settings, supply chain disruptions contribute to missed doses (Olthoff *et al*., 2005). Ensuring geographic access alone is insufficient without parallel improvements in supply continuity.

Perceived Symptoms and Motivation

Over one-third of non-adherent patients attributed lapses to the absence of symptoms, reinforcing the challenge of managing chronic asymptomatic conditions. Similar patterns have been reported in earlier adherence studies (Olthoff *et al*., 2005; Robin & Grover, 2011), underscoring the need for continuous patient education that stresses glaucoma's irreversible nature and the preventative role of AGMs.

Policy and Practice Implications

Our findings support a multi-tiered intervention strategy:

- **Patient-level:** Regular demonstration-based instillation training at each follow-up, supplemented by telephonic or digital reminders.
- **System-level:** Strengthening availability and active promotion of affordable AGMs through government-supported pharmacies, with inclusion in insurance schemes.
- **Policy-level:** Embedding glaucoma adherence counseling into national vision care initiatives such as the Ayushman Bharat Health and Wellness Centres, ensuring early education and monitoring in primary care.

These measures align with the *World Health Organization*'s (2022) Vision 2030

objectives and could be scaled for national implementation, particularly to bridge adherence gaps in underserved populations.

STRENGTHS AND LIMITATIONS

Strengths include the integration of behavioral, clinical, and procurement factors in a single model, direct observation of instillation technique, and use of multivariate regression for confounder adjustment. Limitations include reliance on self-reported adherence, which may overestimate compliance; a single-center, urban setting, which may not reflect rural patterns; and the absence of objective adherence metrics such as electronic monitoring caps or pharmacy refill data.

CONCLUSION

This study highlights that adherence to chronic anti-glaucoma medications among Indian patients is influenced by a complex interplay of socioeconomic, clinical, behavioral, and procurement-related factors. Low income, incorrect instillation technique, multi-drug regimens, fragmented procurement patterns, and symptom-driven non-compliance emerged as major contributors to poor adherence. These findings reinforce that even in urban tertiary care settings, adherence gaps persist despite availability of effective and affordable treatment options.

For clinicians, the results emphasize the importance of regular, structured instillation training, simplification of treatment regimens where feasible, and reinforcement of disease education at every patient encounter. For policymakers, the evidence calls for systemic measures such as expanding affordable drug access through government-supported pharmacies, integrating glaucoma adherence counseling into national primary healthcare frameworks, and ensuring uninterrupted supply chains.

Bridging these gaps requires a coordinated, multi-tiered strategy that combines patient-level education, system-level affordability and accessibility initiatives, and policy-level integration into universal eye health programs. Implementing these targeted, evidence-based interventions can significantly reduce preventable glaucoma-related vision loss, directly supporting *World Health Organization Vision 2030* goals and advancing national commitments toward the elimination of avoidable blindness.

PRACTICE AND POLICY RECOMMENDATIONS

For Clinicians:

- Provide demonstration-based instillation training at every follow-up visit.
- Simplify regimens where possible by using fixed-dose combinations to reduce dosing complexity.
- Reinforce patient education on the irreversible nature of glaucoma and the importance of lifelong adherence.
- Use telehealth reminders or follow-up calls for high-risk non-adherent patients.

For Health Systems:

- Ensure continuous drug availability by strengthening hospital pharmacy stock management.
- Promote and expand Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP) outlets for glaucoma medications.
- Integrate adherence assessment into routine outpatient documentation.

For Policymakers:

- Include glaucoma adherence counseling in the Ayushman Bharat Health and Wellness Centre model.
- Incorporate subsidized glaucoma medications into state and national insurance schemes.
- Fund and implement public awareness campaigns targeting asymptomatic nature of glaucoma.

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