College of Health Sciences

School of Pharmacy

Department of Pharmacology and Clinical Pharmacy

Assessing the Outcomes and Determinants of Glaucoma Treatment in the Outpatient Department at Menelik II Referral Hospital, Addis Ababa, Ethiopia: A Cross-Sectional Study

By

Tigist Yared (B.Pharm)

A Thesis Submitted to the Department of Pharmacology and Clinical Pharmacy, School of Pharmacy, College of Health Sciences, Addis Ababa University in Partial Fulfillment for the Requirements of the Master of Science Degree in Pharmacy Practice.

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Tigist Yared (B.Pharm)

Under Supervision of:

1. **Zelalem Tilahun (B.Pharm, MSc)**
2. **Minyahil Alebachew (B. Pharm, MSc, PhD)**

August, 2025

Addis Ababa, Ethiopia

Addis Ababa University

School of Graduate Studies

This is to confirm that the thesis prepared by Tigist Yared entitled " Assessing the Outcomes and Determinants of Glaucoma Treatment in the Outpatient Department at Menelik II Referral Hospital, Addis Ababa, Ethiopia: A Cross-Sectional Study ", and Submitted to the Department of Pharmacology and Clinical Pharmacy, School of Pharmacy, College of Health Sciences, Addis Ababa University in Partial Fulfillment for the Requirements of the Master of Science Degree in Pharmacy Practice complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by the Examining Committee:

Internal examiner: Getachew Alemkere (B.Pharm, MSc, Assistant Professor of Clinical Pharmacy)

Signature _____Date_____

External examiner: Asrat Agalu (B.Pharm, MSc, PhD)

Signature _____Date_____

Advisor: Zelalem Tilahun (B.Pharm, MSc, Assistant Professor of Clinical Pharmacy)

Signature _____Date_____

Co- advisor: Minyahil Alebachew (B.Pharm, MSc, PhD)

Signature _____Date_____

_____

Head, Department or Graduate Program Coordinator

Abstract

Background: Glaucoma is the leading cause of blindness worldwide and a significant public health problem in Ethiopia and other sub-Saharan African countries, significantly affecting patients' vision-related quality of life and increasing healthcare costs. Despite the availability of treatment options, the effectiveness of glaucoma management depends on multiple factors, including patient adherence, disease severity, and treatment regimen.

Objective: This study aimed to assess glaucoma treatment outcomes and associated factors among glaucoma patients attending the Outpatient Glaucoma Clinic at Menelik II Referral Hospital, Addis Ababa, Ethiopia

Methods: A hospital-based cross-sectional study was conducted among 338 glaucoma patients using a systematic random sampling technique. Data were collected through structured interviews and chart reviews. Descriptive statistics and specific inferential analyses, including binary and multivariable logistic regression, were performed using SPSS version 27. Statistical significance was defined as a p-value <0.05.

Results: Among the 338 participants, 55% were male, and the mean age was 61.17 ± 13.28 years. The majority of patients (46.4%) had advanced-stage glaucoma. Medication adherence was poor in 59% of patients, and only 48% demonstrated proper eye drop administration techniques. Achievement of target IOP was suboptimal and was observed in only 40.5% of participants. Multivariable logistic regression identified significant factors associated with IOP control, including glaucoma stage (AOR = 0.24, 95% CI: 0.14–0.43), type of medication (AOR = 3.23, 95% CI: 1.45–7.19), medication adherence (AOR = 2.30, 95% CI: 1.18–4.48), and proper eye drop administration (AOR = 1.76, 95% CI: 1.04–2.98). Regarding quality of life, outcomes were impaired, with only 48.5% of participants having good QoL. The mean Glaucoma Quality of Life-15 (GQL-15) score was 35.12 ± 13.8. Better QoL was significantly associated with stage of glaucoma (AOR = 0.21, 95% CI: 0.12–0.37), visual acuity (AOR = 0.44, 95% CI: 0.01–0.15), and educational level (AOR = 2.45, 95% CI: 1.18–5.08).

Conclusion: The findings indicate poor medication adherence, inappropriate administration techniques, advanced-stage glaucoma, low education, and impaired vision significantly impact treatment outcomes. Strategies include patient education, early detection, and targeted support.

Keywords: Glaucoma, Intraocular Pressure; Medication Adherence; Quality of Life; eye drop administration

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Acronyms and Abbreviations

EDAT-9	Eye Drop Administration Technique
GQoL-15	Glaucoma quality of life 15
IOP	Intra ocular pressure
MIIRH	Menelik II referral hospital
MMAS-8	Modified Morisky Medication Adherence Scale
MD	Mean Deviation
PACG	Primary angle closure glaucoma
PACS	Primary angle closure suspect
POAG	Primary Open-Angle Glaucoma
PGAs	Prostaglandin Analogues
QoL	Quality of Life
SPSS	Statistical package for social sciences
UV	Ultraviolet radiation
VF	Visual field
VRQoL	Vision-related quality of life
WHO	World Health Organization

1. Introduction

1.1. Background

Glaucoma is a leading cause of irreversible blindness worldwide and represents a significant public health concern (1). It comprises a group of progressive optic neuropathies characterized by structural damage to the optic nerve, including increased excavation of the optic disc, thinning of the retinal nerve fiber layer, and loss of retinal ganglion cells (2–4). Glaucoma is broadly classified into primary and secondary forms. Primary glaucomas include primary open-angle glaucoma (POAG) and primary angle-closure glaucoma (PACG). POAG most prevalent among older adults in Africa is characterized by an open anterior chamber angle but impaired aqueous outflow. PACG more common in Asia involves a narrowed or closed angle due to iris and lens abnormalities that impede aqueous drainage (2, 5). Secondary glaucomas result from identifiable causes such as trauma, inflammation, or corticosteroid use, often leading to elevated intraocular pressure (IOP) (2, 6). Pseudoexfoliative glaucoma is a common secondary form, while congenital and juvenile glaucomas, though less frequent, affect children and young adults, respectively (7, 8). Numerous risk factors contribute to glaucoma development and progression, including systemic conditions such as diabetes mellitus and hypertension, a positive family history, elevated IOP, older age, female sex, low socioeconomic status, and environmental exposures such as prolonged ultraviolet radiation and air pollution (9, 10) .

As of 2020, approximately 64.3 million people worldwide were living with glaucoma, and projections estimate this figure will rise to 111.8 million by 2040, with the highest burden in Asia and Africa (11, 12). Despite this, an estimated 43.78 million cases of primary open-angle glaucoma remain undiagnosed globally, with the majority in Africa and Asia (7, 8). In Ethiopia, glaucoma is a major cause of irreversible blindness among adults, contributing significantly to visual disability and socioeconomic burden (13, 14). Late presentation is common, with many patients seeking care only after significant vision loss, making disease control more challenging (13).

Glaucoma significantly impacts patients' quality of life (QoL), even in its early stages or when visual acuity is relatively preserved. Poor QoL is particularly associated with older age, rural residency, advanced disease, and limited income (15–17). Beyond the personal burden, the

economic impact of glaucoma is substantial, with the global cost of preventing visual impairment estimated at US$5.8 billion (18).

In low- and middle-income countries, treatment costs pose a major barrier, as patients often spend a large portion of their income on medications, potentially leading to nonadherence and progressive vision loss, which further diminishes QoL (19, 20). Glaucoma also affects psychological well-being, contributing to anxiety, depression, and emotional distress related to disease progression (21). Socially, patients may experience reduced participation in work and daily activities, loss of independence, and difficulties in maintaining interpersonal relationships (22, 23). Functionally, progressive visual impairment limits mobility, performance of daily tasks, and overall physical activity, particularly in individuals with advanced-stage glaucoma (21, 23).

The primary goal of glaucoma management is to lower IOP, achievable through pharmacological, laser, or surgical methods. Prostaglandin analogs increase uveoscleral outflow, carbonic anhydrase inhibitors and alpha-2 adrenergic agonists reduce aqueous humor production, and cholinergic agents improve trabecular outflow (3, 6, 24, 25). For cases unresponsive to medical therapy, laser or surgical interventions may be indicated (24, 26). Despite the availability of multiple therapeutic options, topical eye drops remain the most widely used treatment due to their ease of production and administration (27). However, optimal disease control remains difficult due to poor medication adherence, inadequate instillation techniques, and delays in diagnosis challenges that are particularly prevalent among elderly patients and those with low vision or limited education (13, 27, 28).

Given the high prevalence of undiagnosed and poorly controlled glaucoma in Ethiopia (13), along with the economic, social, and clinical barriers to effective management (15, 16, 19, 20), there is a pressing need to understand the factors influencing treatment outcomes. Identifying these determinants will help design targeted interventions to improve adherence, promote early diagnosis, and optimize patient education (13, 27, 28). ultimately aiming to preserve vision and enhance the quality of life for glaucoma patients (21–23) .

1.2. Statement of the Problem

Glaucoma is a leading cause of irreversible blindness worldwide and represents a major public health challenge, with the highest burden in low- and middle-income countries, including Ethiopia (1 ,11 ,12). In Ethiopia, glaucoma contributes significantly to adult visual impairment, yet many cases remain undiagnosed or poorly managed (29, 30). Despite the availability of effective IOP lowering therapies, treatment outcomes are often suboptimal due to poor medication adherence; incorrect eye drop administration, delayed diagnosis, and limited access to specialized eye care (29–32). Socioeconomic factors, including low income, rural residence, and limited health literacy, further exacerbate these challenges (15–17, 30).

Glaucoma also negatively impacts patients QoL, even in early disease stages or when visual acuity is preserved. Poorer QoL has been linked to advanced disease, older age, rural residency, and financial constraints (15 ,16, 33). Improper instillation of eye drops—including incorrect dosage, frequency, or technique reduces drug efficacy, increases systemic side effects, and raises the risk of ocular injury (15, 32, 34).While studies from other countries emphasize the importance of achieving target IOP for halting disease progression (35), in Ethiopia there is a notable gap in research that simultaneously evaluates clinical outcomes (IOP control) and patient-centered determinants such as adherence, administration technique, and QoL (36, 37). Most local studies focus on prevalence or clinical profiles rather than practical factors affecting treatment success, leaving a knowledge gap that limits the development of context-specific interventions.

Menelik II Referral Hospital (MIIRH), a tertiary eye care center in Addis Ababa, treats a large and diverse glaucoma patient population, providing an ideal setting to investigate these issues (38)(39).Understanding how patient behavior, treatment adherence, administration techniques, and sociodemographic factors influence clinical outcomes is critical for designing effective interventions, improving treatment success, reducing preventable vision loss, and enhancing patients' quality of life in Ethiopia.

1.3. Significance of the Study

Glaucoma remains a major cause of irreversible blindness worldwide, posing an urgent public health challenge, particularly in low- and middle-income countries such as Ethiopia, where limited awareness, constrained resources, and restricted access to specialized eye care exacerbate the burden of disease. This study is significant because it addresses both practical and scientific gaps in glaucoma management in Ethiopia. By examining factors such as medication adherence, proper administration of eye drops, and other patient-related behaviors, and by evaluating outcomes including patients' quality of life and achievement of target intraocular pressure, this study provides critical insights into improving glaucoma management and patient care. The findings can help optimize therapeutic outcomes, prevent progression of vision loss, and enhance overall quality of life for patients.

The study findings are intended to inform policymakers, hospital administrators, and program managers in designing context-specific strategies, guidelines, and educational programs that improve access to and quality of glaucoma care. Furthermore, the study directly benefits glaucoma patients by contributing to the preservation of vision and quality of life through improved clinical management and patient-centered interventions. Secondary beneficiaries include clinicians, eye care programs, and public health authorities who aim to reduce preventable blindness and strengthen health system efficiency.

Scientifically, this research fills a critical knowledge gap by evaluating the combined impact of clinical indicators, patient behaviors, and quality of life in Ethiopia, a region where such integrated studies are scarce. The findings contribute to global evidence on glaucoma management in resource-limited settings and support the development of interventions that are both locally relevant and applicable to similar contexts worldwide.

2. Literature Review

Proper administration of eye drops is a cornerstone of glaucoma management, yet studies worldwide reveal persistent challenges. Globally, Negi S, et al. in India identified common errors, such as misdirecting the bottle and difficulty tilting the head, although patient education significantly improved performance during follow-up visits (40). Similarly, Huiming Xiao, et al. in China observed that most patients had never been taught critical steps like nasolacrimal occlusion, emphasizing the importance of structured patient instruction (27). Additional studies highlighted underlying factors for these errors: Singh K, et al. in India noted that hand eye coordination difficulties and forgetfulness were major causes of technique errors (41), while Lui M-H, et al. in China linked errors in drop administration to reduced adherence and impaired quality of life (42). Evidence from Malaysia by Kan C, et al. showed that pharmacist counseling markedly improved eye drop instillation steps, highlighting the potential role of pharmacists in adherence support (43). In Belgium, McClelland J, et al. reported that only 3% of patients performed all instillation steps correctly, with bottle-tip contamination and failure to close the eye being the most frequent errors (32) .

In Africa, Abdu M, et al. in Asmara reported that less than one-fifth of glaucoma patients practiced nasolacrimal occlusion, while inappropriate disposal of expired drops was widespread (44).In Ethiopia, Kifle D, et al. found that nearly 80% of self-instilling glaucoma patients demonstrated poor technique, with advanced age and rural residence strongly associated with errors (28). Specifically, in Jimma, Yimer T, et al. reported high rates of bottle-tip contamination and insufficient delivery of medication to the ocular surface (42).

Collectively, these findings indicate that improper eye drop administration is a global challenge, with particularly concerning consequences in resource-limited settings like Ethiopia. Technique errors compromise intraocular pressure control, reduce adherence, and increase the risk of complications, underscoring the urgent need for structured patient education and context-specific interventions.

Adherence to glaucoma medication remains a global challenge and is influenced by a combination of behavioral, clinical, and systemic factors. A study in Italy showed that poor adherence and persistence are often related to forgetfulness, poly pharmacy, and the absence of

immediate symptomatic benefits, all of which increase the risk of disease progression and higher healthcare costs (45). In China, age and forgetfulness have also been identified as major contributors to noncompliance, with significant impacts on both patient quality of life and societal costs (46). Research from high-income countries such as the UK and Australia has further emphasized the importance of patient-friendly interventions. These include the use of automated reminders, preservative-free formulations, and improved instillation techniques, which have been shown to support short-term improvements in adherence (47, 48).

In middle-income countries, adherence barriers are compounded by socioeconomic and health system constraints. For instance, an Indian study reported that forgetfulness, financial difficulties, drug unavailability, and poor instillation practices were major reasons for poor adherence (49). Similarly, research from Ghana demonstrated that structured interventions, including patient reminders and education, can significantly improve both short- and long-term adherence (50).

In Ethiopia, adherence levels appear to be lower than desirable, and determinants are strongly linked with socio-demographic and systemic factors. A systematic review and meta-analysis showed that adherence was influenced by patients' place of residence, visual acuity, and payment mechanisms, with those paying out-of-pocket being less likely to adhere (51). More localized evidence from Sidama regional state also revealed that urban residence, higher educational level, and frequent follow-up visits were associated with better adherence (52). These findings suggest that in the Ethiopian context, adherence challenges extend beyond individual forgetfulness and are closely tied to affordability, access, and health education.

Overall, the literature demonstrates that while poor adherence is a universal problem, the underlying drivers differ by setting. In high-income countries, such as Italy, Australia, and the UK, the focus is mainly on behavioral and treatment-related barriers, whereas in Ethiopia and similar low-resource contexts, affordability, patient education, and healthcare access play a more decisive role (45–49, 51, 52).Addressing adherence in such settings therefore requires interventions tailored to local realities, including educational initiatives, improved administration techniques, and financial support mechanisms.

IOP remains the only proven and effective intervention to delay or prevent glaucomatous damage globally (50).Yet, the ability to achieve and sustain target IOP is shaped by multiple interrelated factors, including patient characteristics, systemic comorbidities, treatment modalities, and behavioral practices. Evidence from both high- and low-income settings suggests that systemic illnesses such as diabetes and hypertension, ocular parameters like corneal thickness and cup-to-disc ratio, and demographic variables such as age and gender influence pressure regulation. For example, Hashemi et al. in Iran highlighted the role of metabolic and ocular determinants (53), while Warjri et al. in India emphasized that pharmacological therapy alone often fails in advanced disease, necessitating surgical intervention for adequate control (54). Similarly, Sadiq DR et al. in Iran found that although the number of prescribed drugs significantly influenced patients' ability to reach target IOP, demographic characteristics had little effect, illustrating that treatment strategies may sometimes outweigh background traits in determining outcomes (55).

In Ethiopia, several studies reinforce the multidimensional nature of IOP control. Belay DB et al. at Felege Hiwot Hospital demonstrated that both clinical and demographic variables including age, blood pressure, family history, rural residence, diabetes, gender, glaucoma stage, and type of medication were significantly associated with IOP, reflecting the combined influence of biological and social determinants in pressure regulation (56). Similarly, Birhanu and Tegegne identified socio-demographic and clinical factors as important predictors of IOP variation, with follow-up frequency being critical for stabilization (54). Emirie and Sharma further showed that systemic conditions, ocular comorbidities, treatment type, and treatment duration influenced pressure outcomes (57), while Atey et al. highlighted that good adherence and proper instillation techniques were essential for sustained IOP control (58). Complementing these findings, Muluneh and Tegegne revealed that higher IOP was strongly linked to faster progression to blindness, with factors such as hypertension, age, and type of medication shaping long-term outcomes (59).

Taken together, the evidence illustrates that while IOP reduction is a universal goal in glaucoma management, the pathways to achieving it differ by context. In high-income countries, ocular and systemic factors often dominate, whereas in Ethiopia and other low-resource settings, socio-demographic barriers, late presentation, and poor adherence amplify the challenge. This

underscores the need for holistic interventions that combine medical, behavioral, and structural strategies to sustain IOP reduction and improve long-term outcomes. QoL has emerged as a critical outcome measure in glaucoma care, reflecting not only the functional impact of the disease but also the psychosocial and economic burden it imposes. Globally, there is consistent evidence that vision impairment and eye diseases such as glaucoma are strongly associated with reduced QoL, affecting daily functioning, independence, and mental well-being (20).

In high-income countries, studies emphasize that the decline in QoL is closely related to disease severity. For instance, an Italian multicenter study showed that while patients with early glaucoma may retain relatively good health-related QoL, progressive disease stages significantly erode functional independence and social participation (60). Similarly, studies in Asia, such as in China, underline how visual field loss affects daily tasks such as reading, mobility, and driving, with significant implications for patients' social and economic activities (22).

In Africa, where late presentation and limited treatment options are common, the impact of glaucoma on QoL is particularly pronounced. Evidence from Morocco revealed that younger age, higher educational status, and early detection were protective factors that improved QoL, suggesting that timely diagnosis and awareness are key determinants of better patient outcomes (61). Similarly, regional studies demonstrate that inadequate access to care, poverty, and low educational levels exacerbate the psychosocial consequences of the disease (62). These findings resonate with the broader challenges faced in low and middle-income settings, where socioeconomic vulnerabilities amplify the debilitating effects of vision loss.

At the Ethiopian level, research further illustrates the substantial QoL burden among glaucoma patients. Ayele et al. reported that even patients with early-stage disease and relatively preserved visual acuity experience diminished QoL, with age, rural residence, and low income emerging as significant predictors of poorer outcomes (63). Other Ethiopian studies, such as those by Mohammed H. in Boru Meda, identified additional determinants including duration of diagnosis, bilateral disease, and comorbid ocular conditions, further reinforcing the multifactorial nature of QoL impairment (64). Likewise, findings from Gondar demonstrated that severe glaucoma and poor visual acuity were strongly associated with lower QoL scores, reflecting both functional and psychological dimensions of disease burden (62) .

Taken together, the evidence from global to local contexts highlights that glaucoma significantly compromises QoL, not only through visual disability but also by influencing social roles, emotional well-being, and economic productivity. Importantly, studies from Ethiopia emphasize that even patients at early stages of the disease report meaningful QoL impairments, underscoring the urgency of early detection, timely treatment, and patient-centered support.

3. Objectives

3.1. General Objectives

To assess glaucoma treatment outcomes and associated factors among glaucoma patients in the outpatient department of the glaucoma clinic at MIIRH, Addis Ababa, Ethiopia

3.2. Specific Objectives

- To assess the correctness of eye drop administration technique among glaucoma patients
- To determine the adherence to anti glaucoma medications
- To assess the achievement of IOP target among glaucoma patients
- To identify factors associated with achievement of target IOP among glaucoma patients
- To determine the QoL among glaucoma patients
- To identify factors associated with QoL among glaucoma patients

4. Methods

4.1. Study Setting and Period

The study was conducted at the glaucoma clinic of Menelik II Referral Hospital (MIIRH) in Addis Ababa, Ethiopia, which operates under the Addis Ababa City Administration Health Bureau. Founded in 1902 E.C. MIIRH is a prominent medical facility located in the center of the capital and serves as a referral center for patients from across the country. The hospital offers a wide range of medical services, including clinical care, laboratory testing, diagnostic procedures, forensic examinations, pathology services, and optometry. Its ophthalmology referral clinic provides comprehensive care for patients with various eye diseases and disorders (65). The study was carried out at the outpatient glaucoma clinic from June to December 2024.

4.2. Study Design

A cross-sectional study design was carried out in a hospital to assess glaucoma treatment outcomes and associated factors among glaucoma treatments in the outpatient department of the glaucoma clinic at MIIRH, Addis Ababa, Ethiopia

4.3. Populations

4.4. Source Population

All glaucoma patients who attend MIIRH's glaucoma clinic made up the source population.

4.4.1. Study Population

The study population consisted of all outpatients visiting the glaucoma clinic of MIIRH during the study period.

4.5. Eligibility Criteria

Inclusion Criteria

The study included adult patients who had received at least one prescription for glaucoma medication and attended at least six months of follow-up at the MIIRH Glaucoma Clinic during the data collection period.

Exclusion Criteria

Individuals who were too sick to be interviewed, those referred from another hospital who had already started glaucoma treatment, those who had undergone incisional eye surgery within the previous three months, and those with mental health issues or hearing impairments were all excluded from this study.

4.6. Sample Size

The required sample size was determined through a series of calculations, initially employing a single proportion formula. Due to the absence of prior data concerning glaucoma treatment outcomes specific to the Ethiopian context, a conservative prevalence estimate (P) of 0.5 was utilized to maximize the initial sample size and ensure adequate statistical power. A 95% confidence interval ($Z\alpha/2 = 1.96$) and a 5% margin of error ($d = 0.05$) were pre-specified.

The initial sample size (n) was calculated as:

$n = (Z\alpha/2)^2 \times p \times (1-p) / d^2 = (1.96)^2 \times 0.5 \times 0.5 / (0.05)^2 \approx 384$

Given the finite source population (N = 1540) of glaucoma outpatients recorded at Canberra Health Services (CHS) over the preceding three months, a finite population correction factor was applied: $nf = n / [1 + (n/N)] = 384 / [1 + (384/1540)] \approx 307$

Finally, to account for potential non-response, the adjusted sample size was increased by 10%, resulting in a final required sample size of $307 + 30.7 = 337.7 \approx 338$ participants.

4.7. Sampling Technique

The systematic random sampling method was used. The number of glaucoma patients throughout the three-month study period was divided by the designated sample size to get the sampling interval (Kth). (Kth =N/n Kth =1540/338=4.55

From the registration list, the first patient was selected at random, followed by every fourth patient until the necessary sample size was obtained.

4.8. Recruitment of Data Collectors and Training

Two optometrists were recruited as data collectors for this study, responsible for conducting patient interviews and reviewing electronic medical records. To ensure consistency and

accuracy, the data collectors participated in a full-day training session. They learned how to conduct patient interviews using a structured questionnaire and how to extract the required data from patient charts during this session, which also acquainted them with the data collection tools. To ensure consistency of meaning, this questionnaire (Annex III) was first written in English, then translated into the local language of Amharic, and finally back-translated into English.

4.9. Data Collection Instrument and Procedures

Data collection was conducted during patients' routine visits to the glaucoma clinic. Eligible participants were identified from the registration logbook using systematic random sampling, with every fourth patient selected after a randomly chosen first patient. After confirming eligibility and obtaining informed consent, two trained optometrists conducted in-person interviews in a private room to collect patient-reported information. Relevant information including demographic data, clinical characteristics, medication adherence, eye drop administration technique, and vision-related quality of life was obtained using a structured patient interview questionnaire (Annex III).

Medication adherence was assessed using the Modified Morisky Medication Adherence Scale (MMAS-8, Annex II), an eight-item self-report instrument. Items 1–7 have "Yes" or "No" responses (No = 1, Yes = 0), except item 5 (Yes = 1, No = 0), while item 8 uses a five-point Likert scale regarding difficulty remembering to take medications, ranging from Never/Rarely = 4 to All the time = 0. Total scores range from 0 to 8 and are classified as High (score = 8), Medium (score 6–<8), and Low (score <6). Eye drop administration technique was evaluated using EDAT-9, a nine-item assessment covering the following steps: (1) washing hands thoroughly, (2) avoiding contact of the dropper with any surface, (3) pulling down the lower eyelid, (4) positioning the bottle tip correctly, (5) applying the prescribed dose, (6) closing the eyes for two minutes, (7) avoiding squeezing or blinking, (8) occluding the naso-lacrimal duct, and (9) wiping away excess drops with a clean tissue. Vision-related quality of life was measured using GQoL-15, a 15-item instrument in which each item is scored from 0 to 5 (0 = abstinence from activity due to non-visual reasons, 1 = no difficulty, 2 = a little difficulty, 3 = some difficulty, 4 = quite a lot of difficulty, 5 = severe difficulty). Total scores range from 15 to 75, with higher scores indicating poorer vision-related quality of life.

Clinical data, including both baseline and current intraocular pressure, visual acuity, diagnosis, stage of glaucoma, current medications, and duration of treatment, were retrospectively extracted from participants' electronic medical records using a structured data abstraction form (Anne III).

4.10. Pre-testing

The questionnaire was pre-tested by 5% of the sample size one week before to the planned data collection day in order to find any issues or omissions and to estimate the amount of time spent answering. The pre-test was used to find out what required to be modified.

4.11. Study Variables

4.11.1 Dependent Variables

- Intraocular Pressure (IOP
- Quality of Life (QoL)

4.11.2 Independent Variables

Socio-demographic Characteristics:

- Age
- Gender
- Educational level
- Place of residence (urban or rural)
- Marital status
- Occupation

Clinical and Treatment Characteristics:

- Type of glaucoma diagnosis
- Duration of therapy
- Stage of glaucoma
- Visual acuity
- Cup-to-disc ratio
- Type of medication prescribed
- Adherence to anti-glaucoma medication
- Technique of eye drop administration

4.12. Data Processing and Analysis

IBM SPSS Statistics ™ version 27 was used to import the gathered data onto a personal computer after it had been personally reviewed and tabulated for completeness. The socio-demographic characteristics, clinical characteristics, treatment pattern, adherence, administration technique, side effect and IOP and QoL were all described using descriptive statistics. Categorical variables were defined using descriptive statistics of frequencies and percentages. Means and standard deviations were considered continuous variables. Adherence was measured using a scoring system with total scores ranging from 0 to 8, where higher scores indicated better compliance.

The logistic regression model's goodness of fit was evaluated using the Hosmer-Lemeshow test. Univariable binary logistic regression analysis was performed to relate each variable to IOP and quality of life; variables with a p-value <0.25 were fitted into multivariate logistic regression to ascertain independent variables linked to IOP and QoL. In the univariate and multivariate analyses, the strength of the association was measured using the crude odds ratio (COR) and adjusted odds ratio (AOR), respectively. Statistical significance was indicated by a p-value < 0.05.

4.13. Ethical Considerations

The study and ethics review committee of Addis Ababa University's School of Pharmacy provided ethical permission (Ref.No. ERB/SOP/607/16/2024). The Addis Ababa Public Health and Emergency Management Directorate granted ethical clearance (Ref. No. A/A/19742/227) to conduct this research at MIIRH, following the formal letter of approval from the Department of Pharmacology and Clinical Pharmacy. Every patient was asked to provide written agreement so that information could be taken from their medical records and used in the interview. The participants' names were not disclosed during the data collection process. Each participant's data collection tool was assigned a code number, which was used for data analysis. All information obtained from the patients' medical records was kept private and confidential, and it was not permitted to be disclosed to third parties beyond those who were authorized to view it. Participants' rights to decline participation in the study or to leave the interview at any moment were protected.

4.14. Operational Definition

Adherence: Drug-taking behavior assessed using the MMAS-8 scale, categorized as: low adherence (score < 6), medium adherence (score 6 to < 8), and high adherence (score = 8) (66,67).

Appropriate Administration Technique: Completion of all essential steps for eye drop instillation, or achieving ≥ 30 points out of 45 on the eye drop administration checklist (68, 69).

Achievement of Target IOP: Determined according to glaucoma stage and baseline IOP:
Early glaucoma: 18–20 mmHg with ≥ 20% reduction from baseline .Moderate glaucoma: 15–17 mmHg with ≥ 30% reduction from baseline. Advanced glaucoma: 10–12 mmHg (70).

Mild visual acuity: Visual acuity worse than 6/12 but equal to or better than 6/18 (18) .
Moderate visual acuity: Visual acuity worse than 6/18 but equal to or better than 6/60 (18).
Severe visual acuity: Visual acuity worse than 6/60 but equal to or better than 3/60 (18).
Blindness visual acuity: Visual acuity worse than 3/60 (18) .
Early Glaucoma : Visual field damage with mean deviation (MD) ≤ 6 dB (70).
Moderate Glaucoma: Visual field damage with 6 < MD ≤ 12 dB (70).
Advanced Glaucoma: Visual field damage with MD > 12 dB (70).
Good QoL : GQoL-15 score lower than the mean score in the study population (64).
Poor QoL : GQoL-15 score equal to or higher than the mean score in the study population (64).

5. Result

5.1. Socio-Demographic Characteristics

The study Included 338 participants with a mean age of 61.17 ± 13.28 years; almost half (48.8%) were 65 years of age or older. In terms of participant sex distribution, men made up 55% of the group. In terms of marital status, the majority were married (66.9%), followed by widowed (19.8%). Educational status revealed that 29.9% of the participants had no formal education, while 25.1% had attained college education or above. Most of the participants resided in urban areas (75.4%).With respect to occupation, the largest proportion of participants were retired (27.8%), followed by housewives (22.8%) and employed individuals (16.9%) (Table 1)

Table 1. Socio demographic characteristics of ambulatory patients on follow up clinic at MIIRH, Addis Ababa from June 23, 2024, to September 23, 2024 (n=338)

Variable	**Category**	**N (%)**
Age (Mean ± SD)	18-39	26 (7.7)
	40-64	147 (43.5)
	≥65	165 (48.8)
		61.17 ± 13.28
Sex	Male	186 (55)
	Female	152 (45)
Marital Status	Single	13 (3.8)
	Married	226 (66.9)
	Divorced	32 (9.5)
	Widowed	67 (19.8)
Educational Status	No formal education	101 (29.9)
	Primary School	78 (23.1)
	Secondary /High School	74 (21.9)
	College and above	85 (25.1)
Residence	Urban	255 (75.4)
	Rural	83 (24.6)
	Farmer	36 (10.7)
	Housewife	77 (22.8)
	Merchant	38 (11.2)
	Retirement	94 (27.8)
	Unemployed	31 (9.1)
	Other*	5 (1.5)

Others Student(1), Daily labor (3) SD: Standard deviation, N:frequency, %: percentage*

5.2. Clinical Characteristics

The most common glaucoma diagnosis was POAG (37%), followed by pseudoexfoliative glaucoma (36.1%). Regarding the severity (46.4%) were advanced stage of glaucoma. Most of the study participants (74.3%) had follow-up periods less than 5 years. In terms of their cup-to-disk ratio, most participants (63.3%) exceeded 0.7. Patients exhibited varying degrees of visual acuity, with 29.9% having normal vision. The medications used included dorzolamide, timolol, and other treatments (Table 2).

Table 2. Clinical characteristics of ambulatory glaucoma patients on follow up Clinic at MIIRH, Addis Ababa from June 23, 2024, to September 23, 2024 (n=338)

Variable	Category	N (%)
Diagnosis	Primary Open Angle Glaucoma	125 (37)
	Pseudoexfoliative Glaucoma	122 (36.1)
	Primary Angle Closure Glaucoma	12 (3.6)
	Pseudophakic Glaucoma	28 (8.3)
	Glaucoma Suspect	13 (3.8)
	Angle Recession Syndrome	21 (6.2)
	Other*	17 (5)
Stage of Glaucoma	Early	126 (37.3)
	Moderate	55 (16.3)
	Advanced	157 (46.4)
Duration of Glaucoma Treatment	Less than 2 years	126 (37.3)
	2 to 5 years	125 (37)
	More than 5 years	87 (25.7)
Visual Acuity	Normal	101(29.9)
	Mild	82 (24.3)
	Moderate	82 (24.3)
	Severe	38 (11.2)
	Blindness	35 (10.4)
Cup/Disc Ratio	≤0.7	124 (36.7)
	>0.7	214 (63.3)
Type of Medication	Dorzolamide +Timolol and Latanoprost	120 (35.5)
	Dorzolamide +Timolol	87 (25.7)
	Dorzolamide +Timolol and Brimonidine	68 (20.1)
	Timolol	55 (16.3)
	Others **	8 (2.4)

N: frequency, % : percentage; Other Normal Tension Glaucoma (6), Pigmentary (4), Uveitis (3), Induced by Steroids (4); Others** (Dorzolamide(4) ,Pilocarpine(3), betoxol(1))*

5.3. Eye Drop Administration Technique

In terms of eye administration technique, it was shown that 52% of patients were following the recommended regimen correctly (Figure 1).

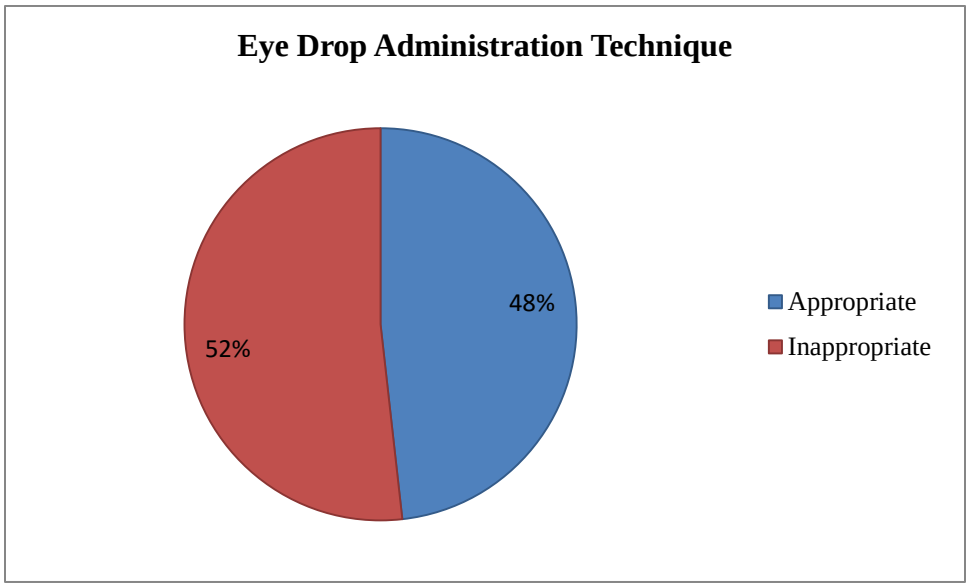


Figure 1. Eye Drop Administration Technique of Ambulatory Glaucoma Patients on follow up Clinic at MIIRH, Addis Ababa, from June 23, 2024, to September 23, 2024 (n=338)

The study showed that only 36.4% of participants consistently washed their hands before instillation, whereas about one-third never practiced hand hygiene. Technique-related practices were also suboptimal: 42% consistently formed a pocket by pulling the lower eyelid, 34% positioned the bottle at the recommended distance, and 47.3% correctly applied the prescribed dose. Post-instillation practices showed similar gaps. Only 41.4% closed their eyes for at least two minutes after instillation, 45.3% avoided tight closure or blinking, and 44.7% performed nasolacrimal occlusion. The use of clean tissue to absorb excess drops was lowest, with just 33.4% always practicing it, while nearly half (45.3%) never did. In general, these findings reveal that many patients do not consistently follow the essential steps for safe and effective use of eye drops, especially in hand hygiene and post-instillation techniques, which may reduce treatment success (Table 3).

Table 3. Summary of Glaucoma Patients' Response to the EDAT-9 at the Glaucoma Clinic, MIIRH. Addis Ababa, Ethiopia from June 23, 2024, to September 23, 2024 (n=338)

Statement		Never	Rarely	Sometimes	Usually	Always
1 Remembering to wash hands thoroughly with soap and water before the procedure	N	112	69	15	19	123
	%	33.1	20.4	4.4	5.6	36.4
2.Don't touching the dropper's opening against eye, face, hand or anything else	N	57	83	49	36	113
	%	16.9	24.6	14.5	10.7	33.3
3.Pulling lower eyelid down to form a pocket or "gutter" while slightly tilting head up	N	44	55	32	65	142
	%	13	16.3	9.5	19.2	42
4.Positioning the tip of bottle so that it does not come closer than two centimeters above lower lid	N	48	75	49	51	115
	%	14.2	22.2	14.5	15.1	34
5.Applying the prescribed amount of doses in the "gutter" correctly	N	33	45	33	67	160
	%	9.8	13.3	9.8	19.8	47.3
6.Closing eyes for at least two minutes after instilling of the medication	N	47	79	43	29	140
	%	13.9	23.4	12.7	8.6	41.4
7.Not Shutting, massaging eye too tight and/or blinking or squeezing eyelids after applying the drops	N	60	59	35	31	153
	%	17.8	17.5	10.4	9.2	45.3
8.Occulting naso-lacrimal route for at least two minutes immediately after instilling drops	N	65	58	18	46	151
	%	19.2	17.2	5.3	13.6	44.7
9. Using a clean tissue, handkerchief or others to absorb excess eye drops that run onto the cheeks.	N	153	56	5	11	113
	%	45.3	16.6	1.5	3.3	33.4

N: Frequency, %: Percentage

5.4. Glaucoma Medication Adherence

According to MMAS-8, 21% and 20% of study participants demonstrated medium and high adherence, respectively, while 59% had poor adherence (Figure 2).

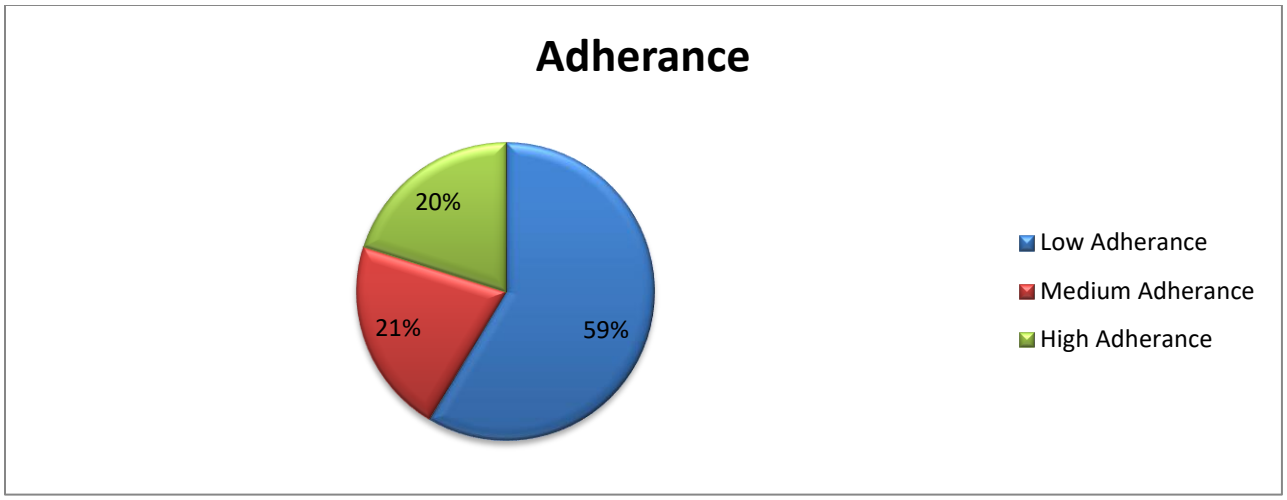


Figure 2. Adherence Status of Ambulatory Glaucoma Patients on follow up Clinic at MIIRH, Addis Ababa from June 23, 2024, to September 23, 2024 (n=338)

The study found that 52.4% of patients forget to instill eye drops, and 43.5% admitted forgetting at least once in the last two weeks. A smaller proportion (13.3%) reported stopping their medication without consulting their doctor when they felt worse. Forgetfulness during travel was reported by about one-fourth (26.6%), while a reassuring majority (88.5%) confirmed instilling their drops on the day before their follow-up date. Around 46.7% of respondents expressed being bothered by forgetting their medication. Regarding frequency of forgetfulness, nearly two in five patients (39.6%) reported forgetting all the time, usually, or sometimes, whereas only 44.1% indicated that they “never or rarely” forget to use their drops (Table 4).

Table 4. Summary of Glaucoma Patients' Response to the MMAS-8 at the Glaucoma Clinic, MIIRH, Addis Ababa, Ethiopia from June 23, 2024, to September 23, 2024 (n=338)

Variable		Yes	No
1 Do you sometimes forget instilling your eye drops?	N	177	161
	%	52.4	47.6
2 In the last two weeks, was there some day you forgot instilling your eyedrops?	N	147	191
	%	43.5	56.5
3 Have you ever stopped instilling your eyedrops because you were feeling worse without telling your doctor?	N	45	293
	%	13.3	86.7
4 When you travel or leave home, do you sometimes forget to take your eye drops?	N	90	248
	%	26.6	73.4
5 Did you instill your eye drops yesterday?	N	299	39
	%	88.5	11.5
6 When you feel better, when I feel that your eye problem is controlled, do you sometimes avoid instilling your eye drops?	N	42	296
	%	12.4	87.6
7 Have you ever felt bothered by forgetting any dose, forgetting to instill your eyedrops?	N	158	180
	%	46.7	53.3
		N	%
8 How often do you forget instilling these eye drops?	All the time	69	20.4
	Usually	65	19.2
	Sometimes	46	13.6
	Once in a while	9	2.7
	Never/rarely	149	44.1

N: Frequency, %: Percentage

5.5. Achievement of Intraocular Pressure

According to the European Glaucoma Society guidelines, target IOP was defined, and in this study. Among the study participants, 40.5% achieved target IOP in both eyes, and 66.6% in at least one eye (Figure 3).

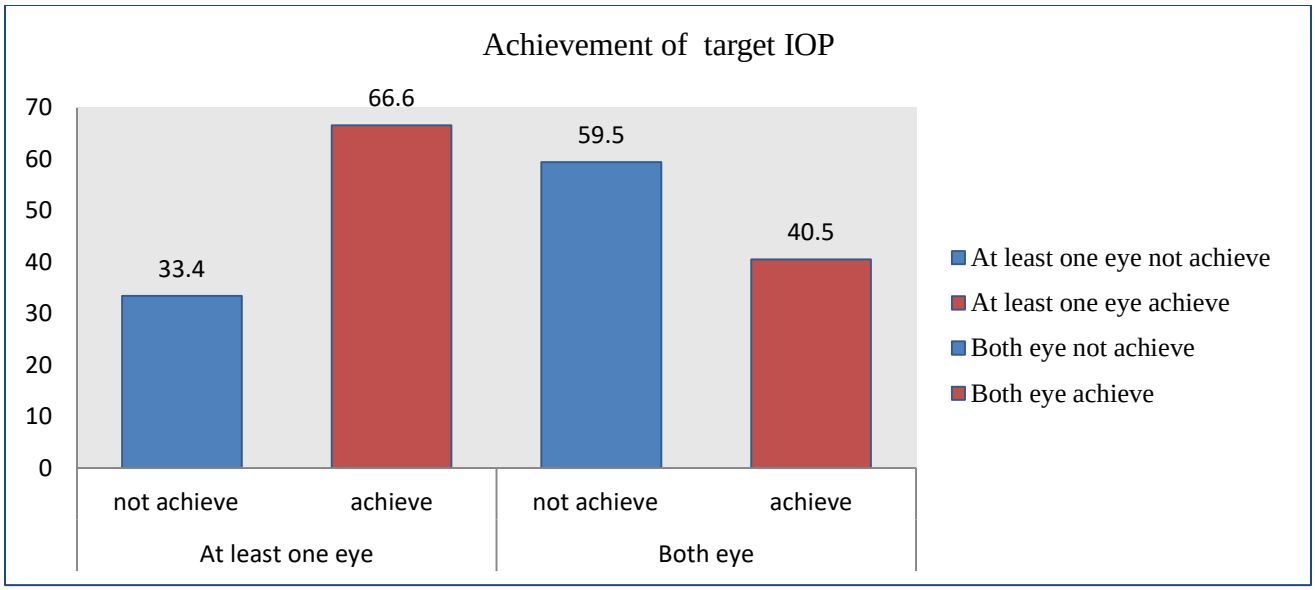


Figure 3. Achievement of IOP of ambulatory glaucoma patients on follow up clinic at MIIRH, Addis Ababa from June 23, 2024, to September 23, 2024 (n=338)

5.5.1 Association Study of Achievement of Target Intraocular Pressure

In order to determine whether variables were linked to glaucoma patients reaching their target IOP, binary logistic regression analysis was performed taking into account various socio demographic and clinical data. After completing a bivariate logistic regression model, a multivariable logistic regression model was run (Table 5). Achieving target IOP was found to be expressively linked with residence, glaucoma stage, cup/disc ratio, medication type, adherence, and eye drop administration technique in the bivariate analysis.

To ascertain potential correlations between the independent factors and the achievement of the desired IOP, these variables were transferred into the multivariable logistic regression analysis. Among those glaucoma stages, Cup ratio, medication type, adherence, and administration of eye drops were found to be determinants of IOP. Multivariate analysis identified several significant predictors. Residence was initially associated with IOP control in univariate analysis, where urban residents had higher odds of achieving IOP control compared to rural residents (COR: 1.82, 95% CI: 1.07–3.09, p = 0.027). However, the multivariate analysis showed that the association was not significant. (AOR: 1.19, 95% CI: 0.64–2.20, p = 0.592).The stage of glaucoma was a strong predictor of IOP control. Patients with advanced-stage glaucoma were significantly less likely to achieve IOP control compared to those with early-stage disease (AOR:

0.24, 95% CI: 0.14–0.43, p = 0.001). Similarly, a cup/disc ratio >0.7 was associated with poor IOP control in the univariate analysis (COR: 0.41, 95% CI: 0.26–0.65, p = 0.001), although multivariate analysis did not show a statistically significant association (AOR: 0.51, 95% CI: 0.30–0.85, p = 0.10).

The type of medication used was another important factor. Combination therapies involving Dorzolamide + Timolol + Latanoprost (AOR: 3.23, 95% CI: 1.45–7.19, p = 0.004) and Dorzolamide + Timolol + Brimonidine (AOR: 3.49, 95% CI: 1.47–8.23, p = 0.005) were significantly associated with achieving IOP control compared to other treatments. Adherence to medication also played a key role in achieving IOP control. High adherence was significantly associated with better IOP control (AOR: 2.30, 95% CI: 1.18–4.48, p = 0.015), while medium adherence showed no significant association (AOR: 1.44, 95% CI: 0.77–2.67, p = 0.252). Additionally, the technique used for eye drop administration was found to be a significant factor. Patients who used the appropriate technique were more likely to achieve IOP control (AOR:1.76, 95% CI:1.04-2.98, p=0.035) (Table 5).

Table 5. Univariate and Multivariable Logistic Regression Analysis of Factors Associated of Achievement of Target IOP

Variable	Category	Achievement of IOP		Univariant Analysis		Multivariate Analysis	
		Yes	No	COR(95%CI)	P Value	AOR(95%CI)	P Value
Residence	Rural	25	58	**1**			
	Urban	112	143	1.82(1.07,3.09)	0.27	1.19(0.64,2.20)	0.592
Stage of glaucoma	Early	74	52	**1**			
	Moderate	28	27	0.73(0.39,1.38)	0.33	0.72(0.396,1.59)	0.51
	Advanced	35	122	0.20(0.12,0.34)	0.001*	0.24(0.14,0.43)	**0.001***
Cup/disc ratio	≤0.7	67	57	**1**			
	>0.7	70	144	0.41(0.26,0.65)	0.001*	0.51(0.30,0.85)	0.10
Type of medication	Timolol	13	42	**1**			
	Dorzolamide	1	3	1.08(0.10,11.26)	0.951	2.21(0.84,26.40)	0.532
	Dorzolamide +Timolol	26	61	1.38(0.64,2.98)	0.417	2.20(0.18,3.58)	0.32
	Dorzolamide +Timolol and Latanoprost	62	58	3.45(1.69,7.08)	0.001*	3.23(1.45,7.19)	**0.004**
	Dorzolamide +Timolol and Brimonidine	33	35	3.05(1.39,6.67)	0.005	3.49(1.47,8.23)	**0.005**
	Others	2	2	3.23(0.41,25.25)	0.264	3.69(0.37,36.52)	0.265
Adherence	low	62	136	**1**			
	medium	34	38	1.96(1.13,3.41)	0.017	1.44(0.77,2.67)	0.252
	High	41	27	3.33(1.88,5.90)	0.01*	2.30(1.18,4.48)	**0.015**
Eye drop administration technique	In appropriate	53	122	**1**			
	appropriate	84	79	2.45(1.57,3.82)	0.001*	1.76(1.04,2.98)	**0.035**

AOR: Adjusted Odds Ratio, COR: Crude Odds Ratio, 1: reference group Other : (Pilocarpine, ,betoxol)

**Significance at <0.05*

5.6. Quality of Life in Glaucoma Patients

The mean GQoL score in this study was 35.12±13.8, and the dimension of glare and dark adaptation had the highest score among all GQoL-15 domains. (17.141±6.19), followed by peripheral vision (12.51±6.94) and central and near vision (4.05±2.31), and the lowest score was for outdoor mobility (1.5±1.06). Overall, among the study participants, around 48.5% of patients had a good quality of life (Table 6).

Table 6. Factors affecting the QoL Glaucoma Patients' Response to the GQoL-15 Questionnaire at the Glaucoma Clinic, MIIRH, Addis Ababa, Ethiopia from June 23, 2024, to September 23, 2024 (n=338)

Factor	Mean ± SD
F1: Central and Near Vision	4.05±2.31
F2: Peripheral Vision	12.51±6.94
F3: Glare and Dark Adaptation	17.141±6.19
F4: Outdoor Mobility	1.5±1.06
Total Quality of Life in Glaucoma Patients using the Glaucoma (Quality of Life-15)	35.12±13.8
	N (%)
Good Quality of Life-	164 (48.5)
Poor Quality of Life-	174 (51.5%)

SD: Standard deviation, N: Frequency, %: Percentage

While 43.2% of patients had no difficulty with reading or near work, 20.7% experienced significant difficulty. Recognizing faces was not an issue for 66.3% of patients. Seeing objects from the side was not difficult for 60.1%, while walking on uneven ground, judging distances, and stairs were challenging for 22.5%, 22.4%, and 23.4%, respectively. Glare and dark adaptation posed the greatest challenges, with 36.4% of patients experiencing quite a lot of difficulty walking after dark, 35.8% seeing at night, 37% adjusting to dim light, and 43.2% adjusting to bright light. Outdoor mobility was least affected, as 77.7% reported no difficulty crossing roads (Table 7).

Table 7. Summary of Glaucoma Patients' Response to the GQoL-15 Questionnaire at the Glaucoma Clinic, MIIRH, Addis Ababa, Ethiopia. from June 23, 2024, to September 23, 2024 (n=338)

QOL-15		No difficulty	a little bit of difficulty	Some difficulty	Quite a lot of difficulty	Severe difficulty
Factor 1: central and near vision						
Reading newspapers/doing near work(N=338)	N	146	45	57	70	20
	%	43.2	13.3	16.9	20.7	5.9
Recognizing faces (N=338)	N	224	35	36	35	8
	%	66.3	10.4	10.7	10.4	2.4
Factor 2: peripheral vision						
Seeing objects coming from side (N=338)	N	203	42	47	35	11
	%	60.1	12.4	13.9	10.4	3.3
Walking on uneven ground (N=329)	N	151	28	62	74	14
	%	45.9	8.5	18.8	22.5	4.3
Judging distance of foot to step/curb (N=330)	N	151	26	67	74	12
	%	45.8	7.9	20.3	22.4	3.6
Walking on steps/stairs (N=329)	N	149	28	64	77	11
	%	45.3	8.5	19.5	23.4	3.3
Bumping into objects (N=332)	N	191	27	43	64	7
	%	57.5	8.1	13	19.3	2.1
Tripping over objects (N=334)	N	198	23	42	64	7
	%	59.3	6.9	12.6	19.2	2.1
Factor 3: glare and dark adaptation						
Walking after dark (N=338)	N	93	30	52	123	40
	%	27.5	8.9	15.4	36.4	11.8
Seeing at night (N=338)	N	93	30	54	121	40
	%	27.5	8.9	16	35.8	11.8

Adjusting to dim light (N=338)	N	90	37	50	125	36
	%	26.6	10.9	14.8	37	10.7
Adjusting to bright light or glare (N=338)	N	67	33	38	146	54
	%	19.8	9.8	11.2	43.2	16
Going from light to dark room/vice versa (N=338)	N	67	27	37	146	61
	%	19.8	8	10.9	43.2	18
Finding dropped objects (N=335)	N	221	41	29	32	12
	%	66	12.2	8.7	9.6	3.6
Factor 4: outdoor mobility						
Crossing the road (N=336)	N	261	20	24	21	10
	%	77.7	6	7.1	6.3	3

N: Frequency, %: Percentage

5.6.1 Factors associated with Glaucoma Quality of Life

To determine what factors were associated with glaucoma patients' quality of life. After completing a bivariate logistic regression model, a multivariable logistic regression model was run (Table 8). Education level, age, place of residence, glaucoma stage, visual acuity, and eye drop administration technique were all found to be expressively correlated with a good quality of life in the bivariate analysis. These factors were transferred into the multivariable logistic regression. In the multivariate analysis, age did not show a statistically significant association, but patients aged 40–64 and ≥65 had reduced odds of good outcomes compared to those aged 18–39. Patients with a college degree were more likely to have good outcomes than those without any formal education, making educational status a major predictor (AOR: 2.45, 95% CI: 1.18–5.08, p=0.017). Urban residence was associated with higher odds of good outcomes in the univariate analysis, but Statistical significance was not found in the multivariate analysis (AOR: 1.41, p=0.294).

Disease stage was strongly associated with outcomes, with patients in moderate (AOR: 0.23, 95% CI: 0.11–0.51, p=0.001) and advanced (AOR: 0.21, 95% CI: 0.12–0.37, p=0.001) stages of glaucoma having significantly lower odds of good outcomes compared to those in the early stage. Visual acuity also showed a significant association with outcomes. Patients with moderate visual impairment (AOR: 0.23, 95% CI: 0.11–0.48, p=0.001), severe visual impairment (AOR: 0.20, 95% CI: 0.08–0.48, p=0.001), and blindness (AOR: 0.44, 95% CI: 0.01–0.15, p=0.001) had significantly lower odds of achieving good outcomes compared to those with normal visual acuity. Although appropriate eye drop administration was associated with better outcomes in the univariate analysis (COR: 1.60), Statistical significance was not found in the multivariate analysis (AOR: 1.15, p=0.608). Overall, educational status, stage of glaucoma, and visual acuity were the most important predictors of patient outcomes (Table 8). .

Table 8. Univariate and Multivariable Logistic Regression Analysis of Factors Associated GQoL

Variable	Category	Good	poor	Univariant Analysis		Multivariate Analysis	
				COR(95%CI)	P Value	AOR(95%CI)	P Value
Age	18-39	18	8	**1**			
	40-64	68	79	0.38(0.16,0.94)	0.35	0.66(0.24,1.99)	0.486
	≥65	87	78	0.40(0.16,0.97)	0.42	0.88(0.30,2.59)	0.826
Educational status	No formal education	35	66	**1**			
	Primary school	35	43	1.54(0.84,2.81)	0.166	1.55(0.76,3.19)	0.232
	Secondary School /High School	43	31	2.62(1.41,4.85)	0.002	1.97(0.91,4.23)	0.087
	College and above	51	34	2.83(1.56,5.14)	0.001*	2.45(1.18,5.08)	**0.017**
Residence	Rural	31	52	**1**			
	Urban	133	122	1.83(1.10,3.04)	0.20	1.41(0.74,2.67)	0.294
Stage of glaucoma	Early	91	35	**1**			
	Moderate	18	37	0.19(0.94,0.37)	0.001*	0.23(0.11,0.51)	**0.001***
	Advanced	55	102	0.21(0.13,0.35)	0.001*	0.21(0.12,0.37)	**0.001***
Visual acuity	Normal	75	26	**1**			
	Mild	44	38	0.40(0.22,0.75)	0.001*	0.43(0.22,0.84)	0.14
	Moderate	29	48	0.21(0.11,0.40)	0.001*	0.23(0.11,0.48)	**0.001***
	Severe	12	31	0.13(0.60,0.30)	0.001*	0.20(0.08,0.48)	**0.001***
	Blindness	4	31	0.45(0.14,0.14)	0.001*	0.44(0.01,0.15)	**0.001***
Eyedrop administration technique	Inappropriate	75	100	**1**			
	appropriate	89	74	1.60(1.04,2.66)	0.31	1.15(0.66,1.96)	0.608

*AOR : Adjusted Odds Ratio, COR: Crude Odds Ratio, 1: reference group *Significance at <0.05*

5.7. Prevalence of Side Effect

In this study, 44.7% of patients reported experiencing medication side effects. For those taking Dorzolamide + Timolol, the most common side effect was burning sensation, reported by 92.1%. For those taking Timolol alone, 4% experienced headaches as a side effect (Table 9).

Table 9. Common medication side effect of ambulatory glaucoma patients on follows up clinic at MIIRH, Addis Ababa from June 23, 2024, to September 23, 2024 (n=151)

Medication	Side effect	N (%)
Dorzolamide +Timolol	Burning	139 (92.1)
	Excessive Tearing	2 (1.3)
	Hypersensitivity Reactions (Rash, swelling of eye lid	2 (1.3)
	Itching	2 (1.3)
Timolol	Headache	6 (4.0)

N : Frequency % : Percentage

6. Discussion

This study assessed the outcomes and determinants of glaucoma treatment at Menelik II Referral Hospital. The findings revealed that only 40.5% of patients achieved target IOP reduction, while more than half (59%) demonstrated poor adherence. QoL was compromised in 51.5% of patients, mainly due to advanced disease stage and poor visual acuity. Socio-demographic characteristics such as age ≥65 years (48.8%), low educational attainment (29.9% had no formal education), and rural residence (24.6%) influenced treatment outcomes. Improper administration techniques (48%) and high prevalence of medication side effects (44.7%) further contributed to poor outcomes.

Nearly half of the patients (48.8%) were ≥65 years old, confirming that aging is a strong risk factor for glaucoma. This aligns with studies from Nigeria (46% above 60 years) and Ghana (44% above 60 years) (9, 10). Similarly, studies from the USA and Germany also report similar trends, with glaucoma prevalence rising significantly in individuals over 60 years of age (71 ,72). However, 7.7% of patients in our study were aged 18–39 years, higher than reports from Kenya and South Africa (<5%) (19, 73). where early-onset glaucoma is less common. Early-onset cases are relatively rare in high-income countries such as the USA and UK (<3%) (74, 75), This discrepancy may reflect genetic predispositions, limited access to early screening, and a higher burden of secondary glaucoma due to trauma and uveitis in sub-Saharan Africa (10).

Male predominance (55%) was similar to findings from Felege Hiwot, Ethiopia (69.9%) (56), Nigeria (57%) (76), and India (54%) (77). In contrast, studies in Germany and the UK reported slightly higher female representation (around 55%) (71, 78), often explained by women's longer life expectancy and increased health-seeking behavior. The urban dominance (75.4%) in our study reflects easier access to tertiary hospitals in Addis Ababa. Similar patterns are reported in Jimma, Bahir Dar, and Boru Meda (36, 62, 64), while rural patients continue to face economic, geographic, and workforce barriers also highlighted in Ghana and Uganda (9, 19).

Primary open-angle glaucoma (37%) and pseudoexfoliative glaucoma (36.1%) were the leading subtypes, consistent with Ethiopian studies (63 ,79) and reports from South Africa (73) and India (80). In contrast, POAG accounts for more than 70% of glaucoma cases in the USA and UK (74 ,81).The higher prevalence of pseudoexfoliative glaucoma in our study may be attributed

to environmental and genetic factors, as studies suggest its increased prevalence in regions with high ultraviolet (UV) exposure (82).

Late presentation was striking, with 46.4% having advanced disease. This was higher than Nigeria (30%) and Kenya (35%) (19, 76). In Jimma and Boru Meda, late presentation has also been documented as a major barrier to effective management (62 ,63). This is significantly higher than the 28–35% advanced cases reported in studies from the U.S. and Europe (83, 84). The delayed presentation may stem from poor awareness, lack of routine screening, and economic barriers to early diagnosis in Ethiopia

Correct administration of drops was demonstrated in 52%. Similar technique-related errors have been reported in Jimma and Bahir Dar, where poor administration remained a major barrier to effective treatment (36, 62). Slightly higher rates were observed in Kenya (60%) and South Africa (65%) (19, 73), while contamination risk in our cohort (33.1% never washed hands) was consistent with reports from Eritrea (34) and Uganda (19). Comparable findings were also documented in India (55%) (85). In contrast, studies from the USA and UK reported much higher correct technique rates (70–80%) (74, 86), largely due to structured patient education and pharmacist-led training programs.

Adherence to medication was poor (59%), comparable to findings from Bahir Dar (63%) (36), Sidama (61%) (52), and Asmara, Eritrea (55%) (44). Forgetfulness was the leading cause (52.4%), similar to Nigeria (54%) (76), but higher than reports from China and India (30–35%) (46, 77). In Germany and the USA, adherence also remains a challenge, with 40–50% of patients missing doses (71, 87). However, the use of electronic reminders, fixed-dose combinations, and patient support programs has significantly improved compliance in these settings. This suggests that, although forgetfulness is a universal barrier, systemic interventions can mitigate its impact an approach that is still lacking in Ethiopia.

The success rate in achieving target IOP was 40.5% in our study. In contrast, studies from the UK, and Germany have reported higher IOP control rates (~55–65%) (88, 89), primarily due to earlier diagnosis and greater access to multiple drug regimens. In Ethiopia, however, financial constraints and supply chain limitations limit these treatment options, leaving many patients undertreated. Multivariate analysis confirmed that advanced disease stage (AOR: 0.24, p=0.001)

and poor adherence (AOR: 2.30, p=0.015) were major determinants of unsuccessful IOP control. Similar findings have been reported in China and India, where advanced disease and poor adherence strongly correlate with inadequate pressure control (90, 91).

The superior effectiveness of combination therapy (Dorzolamide + Timolol + Latanoprost, AOR: 3.23, p=0.004) aligns with data from the U.S., where multi-drug regimens are preferred for better IOP control (92). However, in Ethiopia, financial constraints often limit access to such combinations, leading to reliance on monotherapy, which may be less effective.

The mean GQL-15 score in our study was 35.12 ± 13.8, indicating a greater impact of glaucoma on quality of life in Ethiopia compared to developed countries, where reported scores are approximately 40–45 (93, 94). Within Ethiopia, studies from Bahir Dar, Jimma, and Boru Meda have similarly shown that glaucoma significantly impairs vision-related quality of life, particularly in domains such as daily activities and mobility (63, 79). Within Africa, comparable reductions in QoL have been reported in Nigeria and Ghana, highlighting that vision impairment due to glaucoma is a major concern across the region (9, 19 ,22). The highest domain-specific impact in our cohort was observed in glare and dark adaptation (17.14 ± 6.19), consistent with findings from India and Brazil, where difficulties in adjusting to changing light conditions are a major concern (94). Lower educational attainment and advanced disease stage were key predictors of poor quality of life in our study. Specifically, patients with lower educational levels (AOR: 2.45, p=0.017), emphasizing the role of health literacy in glaucoma management. Similar associations have been reported in Ethiopia, including at Felege Hiwot and Bahir Dar hospitals, as well as in Nigeria and South Africa, highlighting the consistent influence of educational status and disease severity on vision-related quality of life across diverse settings (79, 90) has similarly been identified as a determinant in international studies (95), emphasizing the role of health literacy in managing glaucoma.

Side effects were reported by 44.7% of patients, comparable to Brazil (42%) and Turkey (46%) (96, 97).The burning sensation from Dorzolamide + Timolol (92.1%) were similar to India (88%) (33). In contrast, studies from Germany and the USA reported lower rates of ocular irritation (~25–30%) (98, 99), attributed to the widespread availability of preservative-free formulations. In Ethiopia, as in other low-income settings, the lack of preservative-free eye drops

likely contributes to higher intolerance rates. The differences between our findings and international data can be attributed to several factors. In Ethiopia, the lower ophthalmologist-to-population ratio compared to high-income countries leads to delays in diagnosis and treatment. Limited access to preservative-free and combination a therapy contributes to higher side effect rates and lower adherence. Lower health literacy levels affect disease awareness and self-management, impacting adherence and technique. Additionally, cultural factors such as the use of traditional medicine and perceptions about chronic disease treatment influence adherence patterns differently compared to Western settings.

7. Strength and Limitation of the Study

7.1. Strength

A prospective design was used in this study enabling the collection of both objective and subjective patient data, enhances the validity of our findings, and this study was conducted in a specialized eye care center, adding to the credibility of our results.

7.2. Limitation

The limitations of this study include its cross-sectional design, which precludes the ability to track patient outcomes over time and limits the assessment of causal relationships. The reliance on self-reported measures for medication adherence and eye drop administration techniques may have resulted in overestimation of adherence and proper administration. Additionally, as the study was conducted in a single tertiary referral hospital in Addis Ababa, the findings may not be generalizable to other regions, particularly rural areas with more limited access to eye care services. Clinical data, including intraocular pressure and visual acuity, were extracted from routine medical records, which may be subject to measurement or documentation errors. Furthermore, the study did not assess patients' Living situation or availability of caregiver support, which may influence adherence and treatment outcomes

8. Conclusion

This study highlights the multifactorial challenges affecting glaucoma management at Menelik II Referral Hospital, where both patient-related and systemic factors limit effective treatment and compromise quality of life. Optimal intraocular pressure control remains suboptimal due to inadequate adherence, improper eye drop administration, and restricted access to combination therapies. Forgetfulness and treatment-related side effects further undermine consistent medication use, reducing the likelihood of achieving therapeutic targets. Late-stage presentation continues to be prevalent, particularly among older and less-educated patients, increasing the risk of irreversible visual impairment. Vision-related quality of life is moderately affected, with glare adaptation and peripheral vision most compromised, especially among those with advanced disease and lower educational attainment. These findings underscore the need for integrated strategies that prioritize early detection, enhance patient adherence, optimize administration techniques, and expand access to effective therapies to preserve visual function and improve overall well-being.

9. Recommendations

Improving glaucoma management requires a multifaceted approach. Clinically, emphasis should be placed on early detection through routine screening and patient education on proper eye drop administration and adherence, supported by structured follow-up systems. At the hospital level, access to combination therapies and preservative-free formulations should be expanded, while healthcare staff receive ongoing training in patient counseling and glaucoma management. Strengthening infrastructure for patient education and adherence support is also essential. For policymakers, comprehensive national strategies for glaucoma screening and management should be developed, ensuring affordable medications and services are accessible, particularly in rural areas. Additionally, research on long-term adherence interventions and patient support

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Annexes

Annex I: Participants' Information Sheet

Dear Participant,

My name is _____, and I am a member in research conducted under the title of Assessing Glaucoma Treatment Outcomes and Associated Factors in the Outpatient Department of the Glaucoma Clinic at Menelik II Referral Hospital, Addis Ababa, Ethiopia.

The study conducted by Tigist Yared, under supervision of Zelalem Tilahun and Dr Minyahil Alebachew for the purposes of obtaining a Master's Degree in Pharmacy practice at AAU CHS SOP.

Research Budget Covered By: Addis Ababa University

Risks: There are no risks associated with participating in this study. Confidentiality regarding this interview will be strictly maintained. Your name will not be recorded on the data collection form and will never be used in connection with any information you provide. The only potential inconvenience during the interview may be the time spent (approximately a maximum of 20 minutes).

Participant Rights: Interviewees have the right to withdraw at any time from the interview, choose not to participate, and skip questions that are uncomfortable for them.

Benefits: The study could enhance the quality-of-service delivery for patients and promote future interventions.

Confidentiality: The study results will not include participants' names or addresses. Confidentiality is ensured as data will be accessed only by ethically trained and experienced health professionals involved in the study and analyzed by the principal investigator.

Agreement: Participation in the study is entirely voluntary.

Tigist Yared Cell Phone: +251-925138132

Email: t12yared@gmail.com

Annex II: Informed consent

You are welcome to ask the researchers any questions that occur to you during the interview. If you have further questions once the interview is completed, you are encouraged to contact the principal researcher using the contact information given below.

Name :Tigist Yared

Phone no: +251925138132

Email: t12yared@gmail.com

Addis Ababa University, IHS, School of Pharmacy, Department of Clinical Pharmacy

I, _____, have read the above information stated in the Information sheet and freely decide and agree to participate in this study. I also understand that I am free to refuse to answer any question and to withdraw from the study at any time. I Understand that my responses will be kept anonymous. Participant Signature_____ Date _____

Thank you for your participation.

:

Annex III: Data collection tools

Annex IV: Data abstraction format from patient interview (English version)

Part I Socio-demographic information (Use "√ " in the Boxes)

Code Number_____

Card Number _____

Phone No ____

A1. Age (yr) _____

A2. Sex: Male ☐ Female ☐

A3. Marital status 1)Single ☐ 2) Married ☐ 3) Divorced ☐ 4) Widowed ☐

A4.Educational status 1)Illiterate ☐ 2) Primary School ☐ 3)Secondary School ☐ 3) College and above ☐

A5. Residence(current) 1) Rural ☐ 2) Urban ☐

A6 .Job/Occupation 1) Office ☐ 2) work ☐ 3) Farmer ☐ 4) Merchant ☐

5)Housewife ☐ 6) Student ☐ 7) Daily laborer ☐ 8) Retirement

9) Others, specify ___

B. Clinical characteristics (supplementary to the information obtained from medical chart)

B1. Duration of treatment _____

B2. Immediate experience of side effects from the medication? 1) Yes ☐ 2) No ☐

B3.1 If yes, Specify the drug and side effect? _____

C: 8-Items Morisky Medication Adherence Scale- (MMAS-8)

<table>
<tr><td>No</td><td colspan="4">Item</td><td>Yes</td><td>No</td></tr>
<tr><td>1</td><td colspan="4">Do you sometimes forget instilling your eye drops?</td><td>1</td><td>0</td></tr>
<tr><td>2</td><td colspan="4">In the last two weeks, was there some day you forgot instilling your eyedrops?</td><td>1</td><td>0</td></tr>
<tr><td>3</td><td colspan="4">Have you ever stopped instilling your eyedrops because you were feeling worse without telling your doctor?</td><td>1</td><td>0</td></tr>
<tr><td>4</td><td colspan="4">When you travel or leave home, do you sometimes forget to take your eye drops?</td><td>1</td><td>0</td></tr>
<tr><td>5</td><td colspan="4">Did you instill your eye drops yesterday?</td><td>0</td><td>1</td></tr>
<tr><td>6</td><td colspan="4">When you feel better, when I feel that your eye problem is controlled, do you sometimes avoid instilling your eye drops?</td><td>1</td><td>0</td></tr>
<tr><td>7</td><td colspan="4">Have you ever felt bothered by forgetting any dose, forgetting to instill your eyedrops?</td><td>1</td><td>0</td></tr>
<tr><td>8</td><td colspan="4">How often do you forget instilling these eye drops?</td><td>+</td><td>0</td></tr>
<tr><td></td><td></td><td>Never/rarely</td><td>A=4</td><td rowspan="5">The item result ÷ 4=
1.00
0.75
0.50
0.25
0.00, respectively</td><td></td><td></td></tr>
<tr><td></td><td></td><td>Once in a while</td><td>B=3</td><td></td><td></td></tr>
<tr><td></td><td></td><td>Sometimes</td><td>C=2</td><td></td><td></td></tr>
<tr><td></td><td></td><td>Usually</td><td>D=1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>All the time</td><td>E=0</td><td></td><td></td></tr>
</table>

D: Assessment of patients' response to the nine-item WHO recommended (Eye Drop Administration Technique (EDAT-9)

Please indicate how often you perform the following techniques when administering your eye drops by marking "X" in the appropriate box.

Administration Technique	Always	Usually	Sometimes	Rarely	Never
Remembering to wash hands thoroughly with soap and water before the procedure					
Don't touching the dropper's opening against eye, face, hand or anything else					
Pulling lower eyelid down to form a pocket or "gutter" while slightly tilting head up					
Positioning the tip of bottle so that it does not come closer than two centimeters above lower lid					
Applying the prescribed amount of doses in the "gutter" correctly					
Closing eyes for at least two minutes after instilling of the medication					
Not Shutting, massaging eye too tight and/or blinking or squeezing eyelids after applying the drops					
Occulting naso-lacrimal route for at least two minutes immediately after instilling drops					

F. Quality of life in glaucoma patients using the Glaucoma Quality of Life-15 questionnaire GLQ-15

The GLQ-15 is a glaucoma-specific questionnaire consisting of 15 items.

Each question has scores ranging from 0 to 5, where 0 is difficulty to perform the task due to non-visual problems, 1 is no difficulty, and 5 is severe difficulty. These 15 items are grouped into four subscales:

1. Factor 1: central and near vision (two items);
2. Factor 2: peripheral vision (six items);
3. Factor 3: dark adaptation and glare (six items); and
4. Factor 4: outdoor mobility (one item).

Higher scores represent more difficulty with vision-related activities and are associated with poorer quality of life.

Please indicate how much difficulty you have with each activity due to your vision, even with glasses, by marking "X" in the appropriate box.

Does your vision give you any difficulty, even with glasses, with the following Activities? None (0 = abstinence from activity owing to non-visual reasons, 1 = no difficulty, 2 = a little bit of difficulty, 3 = some difficulty, 4 = quite a lot of difficulty, 5 = severe difficulty**)**	0 = abstinence from activity owing to non-visual reasons,	1 = no difficulty	2 = a little bit of difficulty	3 = some difficulty	4 = quite a lot of difficulty	5 = severe difficulty)
Factor 1: central and near vision						
Reading newspapers/doing near work						
Recognizing faces						
Factor 2: peripheral vision						
Seeing objects coming from side						
Walking on uneven ground						

Judging distance of foot to step/curb						
Walking on steps/stairs						
Bumping into objects						
Tripping over objects						
Factor 3: glare and dark adaptation						
Walking after dark						
Seeing at night						
Adjusting to dim light						
Adjusting to bright light or glare						
Going from light to dark room/vice versa						
Finding dropped objects						
Factor 4: outdoor mobility						
Crossing the road						

F：Data abstraction format from Patients' medical chart

Code Number_____

Card No _____

Date of visit _____

F1 Diagnosis _____

1) Pseudoexfoliative glaucoma ☐ 2) Primary open angle glaucoma

3) Primary angle closure glaucoma ☐ 4) Normal tension glaucoma ☐

5) Secondary glaucoma ☐ 6) other (s) _____--

F2. Stage of glaucoma

1) Early ☐ 2) Moderate ☐ 3) Advanced ☐

F3. Current Ophthalmic condition and medication

S. No	Date of visit	Indication	Product name Brand name	(Generic Name)	Full Dosage regimen			
					Dose,	route,	frequency	duration)

F13. IOP (Intraocular Pressure):

(Findings at the beginning and current results)

_____

_____

F14. Visual acuity

_____

_____

F16. Any Pertinent investigations and imaging and/or Review of systems findings:

_____

Amharic Translation

ቅጽ 1: ጥናቱን በተመለከተ ለታካሚ የሚሰጥ መረጃ

ስሜ _____ ይባላል፤ ለ ትዕግስት ያሬድ የዚህ ጥናት ዋና ኣጥኚ እየስራሁ እገኛለው።እሷም በኣዲስ ኣበባ ዩኒቨርስቲ ፋርማሲ ትምህርት ቤት በፋርማሲ ፕራክቲስ (MPharm) ድህረ-ምረቃ ፕሮግራም የሁለተኛ ዲግሪ (ማስተርሰ) ተማሪ ናት ። ስለሆነም ለመመረቅያ ፁሁፍ ማሟያ ጥናትእየሰራች ትገኛለች የጥናቱ ርዕስ በ ሚኒሊክ ሆስፒታል በግላኮማ ተመላላሽ ታካሚዎች የማከም ውጤት እና ተያይዞ ሁኔታዎች ይሰኛል

ጥናቱ የሚካሄድበት ቦታ፡ ዳግማዊ ምኒልክ ሪፈራል ሆስፒታል፣ አዲስ አበባ፣ ኢትዮጵያ

የጥናቱ ዋና ሀሳብ፡ በ ፤በግላኮማ ሕመምተኞች የማከም ውጤት እና ተያያዥ ሁኔታዎችን” መፈተሽ

የተመራማሪው ስም፡ ጥናቱ የሚካሄውም በ ትዕግስት ያሬድ እና በጥናቱ አማካሪዎች

ጉዳት: ጥናቱ የተወሰነ ጊዜን ከመሻማቱ በስተቀር የሚስከትለዉ ጉዳት የለም

የተሳታፊው መብት: ተሳታፊው ቃለ መጠይቁን በፈለገው ሰዓት ማቋረጥ ፣ ላለመሳተፍ የመምረጥ እና ያልፈለገውን ጥያቄ ያለመመለስ መብት አለዉ።.

ጥቅም: የጥናቱ ዉጤት ለወደፊቱ የተሻለና ጥራት ያለው አገልግሎት ለመስጠት ይረዳ ዘንድ ግብዐት ሆኖ ያገለግላል. ጥናቱ የሚካሄደው የህክምና ካርዶዎን በመከለስና በገጽ ለገጽ ቃለ መጠይቅ ነው። ስለዚህ የእርስዎ ቅንና ሓቀኛ መረጃ ለጥናቱ እጅግ በጣም ወሳኝ ነው።

ምስጢራዊነት፡ የጥናት ውጤቶቹ የተሳታፊዎችን ስም ወይም አድራሻ አያካትትም፣ ከእርስዎ የምንሰበስበው ማንኛውም የህክምና መረጃ ሚስጥር የተጠበቀ ነው። ከዋና ኣጥኚ በስተቀር ማንም ሰው መረጃውን ማየት በፍፁም ኣይቻለውም።

ስምምነት: በጥናቱ ውስጥ መሳተፍ ሙሉ በሙሉ በፈቃደኝነት ነው.

ጥናቱን በተመለከተ ምንም አይነት ምንም አይነት ጥያቄ ካሎት -

ትዕግስት ያሬድ :+251925138132

ኢ-ሜል ፡ t12yared@gmail.com

ቅጽ 2፡ በቃለ መጠይቅ ለመሳተፍ የፊቃድኝነት ቃል መቀበያ ቅጽ

በዚህ ጥናት የእርስዎ መረጃ ሙሉ በሙሉ በምስጥር የተጠበቀና ለምርምሩ አላማ ብቻ የሚዉል ነው። በተጨማሪም የእርስዎ ተሳታፊነት በፊቃደኝነት ላይ የተመሠረተ ነው። የጥናቱ አላማውን ተረድተውና ጊዜዎን ሰውተው፤ ከ 20-30 ደቂቃዎች ለሚፈጅ ቃለ-መጠይቅ እውተኛው መረጃ በመስጠት ፍቃደኛ በመሆንዎ በቅድሚያ አመሰግናለሁ። በየትኛውም ጊዜ ጥያቄ ካለዎት ይጠይቁን።

_____

የቃለ መጠይቅ አቅራቢ ፊርማ

_____

የቃለ መጠይቅ የቀረበለት ሰው ፊርማ

የተከበረ ጊዜዎን ስለሰጡን እጅግ በጣም እናመሰግንዎታለን። ዋና አጥኚ።

በየትኛውም ጊዜ ጥያቄ ካለዎት ይጠይቁን።

ትዕግስት ያሬድ በስ.ቁ +251925138132

በኢ-ሜል፡ ፡ t12yared@gmail.com

ሀ. የታካሚዉ አጠቃላይ መገለጫዎች (መመሪያ፡ ለመረጡት ምላሽ በየ √ ምልክትን ያድርጉ)

1.ኮድ ___

2.ካርድ ቁጥር _____

3. A. ስለ ታካሚው አጠቃሊይ መግለጫዎች

A1. ዕድሜ (ዓመት) ___

A2 : .ፆታ 1) ወንድ ☐ 2) ሴት ☐

A3.የጋብቻ ሁኔታ 1) ያለገባ/ች ☐ 2) ያገባ/ች ☐ 3) አግብቶ/ታ የፈታ/ች ☐ 4) ሚስት/ባል የሞተችበት/ባት ☐

A4. የትምህርት ደረጃ 1) ማንበብ እና መፃፍ አልችልም ☐ 2) አንደኛ ደረጃ ☐ 3) ሁለተኛ ደረጃ መስናዶ ☐ 4) ከፍተኛ ትምህርት (ሰርተፍኬት, ዲፕልማ, የመጀመሪያ ዲግሪ ከዚያ በሊይ) ☐

A5 .መኖሪያ ቦታ 1) ገጠር ☐ 2) ከተማ ☐

A6 የስራ ቅጥር ሁኔታ

1) ተቀጣሪ (የመንግስት/የግል) ☐ 2) አርሶ አደር ☐ 3) የቤት እመቤት ☐

4) የግል ስራ/ነጋዴ ☐ 5) ጡረታ ☐ 6) ስራ አጥ ☐ 7) ሌላ ይግለጹ_____

B. ክሊኒካዊ ባህሪያት (ከህክምና ሰንጠረዥ ለተገኘው መረጃ ተጨማሪ)

B1. መድሀኒት መውሰድ ከጀመሩ ስንት ግዜ ሆኖት ?_____

B2. መድኃኒቱን አንደወሰዱ የሚሰማወት ስሜት (የጎንዮሽ ጉዳት) አለ ? 1) አዎ ☐ 2) አይ ☐

B3.1 አዎ ከሆነ፣ መድሃኒቱን እና የጎንዮሽ ጉዳቱን ይግለጹ? _____

C: የግላኮማ በሽታ ታካሚዎች በመድኃኒት አወሳሰድ /አጠቃቀም ዙርያ ግምገማ (ሞሪስኪ ስምንት) ለመረጡት ምላሽ በየ √ ምልክትን ያድርጉ)

ጥያቄዎች	0.አዎ	1.አይ
1.አንዳንድ ጊዜ የዓይን ጠብታዎትን ረስተው ሳይወሰዱ ቀርተው ያውቃሉ?		
2. ሰዎች አንዳንድ ጊዜ ከመርሳት በተጨማሪ ባሉት የተለያዩ ምክንያቶች መድኃኒታቸውን ሳይወስዱ ይቀራሉ። ባለፈት ሁለት ሳምንታት፣ መድኃኒትዎን ሳይወስዱ የቀሩበት ቀናቶች ነበሩ?		
3. መድኃኒትዎን እየወሰዱ ሀመምዎ ባለመቆሙ ሐኪምዎን ሳያማክሩ መድኃኒትዎን አቋርጠው ያውቃሉ?		
4. 4. በጉዞ ወይም በሌላ ምክንያት ከቤትዎ አርቀው ሲጓዙ አንዳንድ ጊዜ መድኃኒትዎን ረስተውት ሳይወስዱት ያውቃሉ?		
4. በጉዞ ወይም በሌላ ምክንያት ከቤትዎ አርቀው ሲጓዙ አንዳንድ ጊዜ መድኃኒትዎን ረስተውት ሳይወስዱት ያውቃሉ?		
5. በትላንትናው ዕለት ሁሉንም የዓይን ጠብታዎችን ወስደዋል ?		
6 ሀመምዎ ጋብ ሲልሎት (የሀመምዎ ስሜቶች ሲጠፈ) አንዳንድ ጊዜ መዴኃኒትዎን አቋርጠው ያውቃሉ?		
7 በየቀኑ የዓይን ጠብታዎችንማድረግ ፣ ለአንድ አንድ ሰዎች አይመችም። እርስዎ በየቀኑ እንድሁም አንድም ሰዓት ሳያዛንፉ ጠብታዎችን ማድረግ የመሰላቸት ስሜት ተሰምቶት ያውቃል?		
8 የዓይን ጠብታዎትን አስታውሰው ለማድረግ ምንያክል ይቸገራሉ?		

D፡የአለም ጤና ድርጅት ዘጠኙ የአይን ጠብታ አተገባበር ቴክኒክ የታካሚዎች ምላሽ ግምገማ (የዓይን ጠብታ አወሳሰድ ቴክኒክ (EDAT-9) : እባክዎን የዓይንዎን ጠብታዎች በሚያደርጉበት ጊዜ የሚከተሉትን ቴክኒኮችን ምን ያህል ጊዜ እንደሚያከናውኑ በተገቢው ሳጥን ውስጥ "√" ምልክት በማድረግ ያመልክቱ።

ጥያቄዎች	5. ጭራሽ አይቸግረኝም	4.በጣም አልፎ አልፎ ከስንት አንድ ጊዜ ይቸግረኛል	3. አንዳንድ ጊዜ ይቸግረኛል	2. አብዛኛው ጊዜ ይቸግረኛል	1. ሁሌ ጊዜ ይቸግረኛል
1.ጠብታውን ከመውሰድዎ በፊት እጆችዎን በሚገባ በሳሙና እና በውሀ መታጠብ።					
2. . የጠብታውን ጫፍ አይኖችዎን፣ ፊትዎን፣ እጅዎን ወይም ሌላ አካልዎን እንዳይነካ መጠንቀቅ።					

3. ጭንቅላትዎን ወደ ኋላ በመጠኑ ዘንበል አድርገው የታችኛውን የአይን ሽፋሽፍት ወደ ታች በመሳብ ኪስ ወይም “ጓተር” በመፍጠር መክፈት።					
4. ከታችኛው የአይን ሽፋሽፍት ከ2ሳ.ሜ በማይበልጥ እርቀት የጠብታውን ብልቃጥ ወደ አይን አቅጣጫ መያዝ።					
5. በሽፋሽፍቱ የውስጥ ጠርዝ ላይ በሀኪም በተመከረው የአወሳሰድ መጠን ጠብታውን መጨመር።					
6. ጠብታውን ከጨመሩ በኋላ ለሁለት ደቂቃ ያህል አይኖችዎን መጨፈን፤ ከማሸት መቆጠብ።					
7. .ጠብታውን ከጨመሩ በኋላ አይኖችዎን አጥብቀው አለመጨፈን፣ አለማርገብገብ ወይም የአይን ሽፋሽፍቱን አለመጭመቅ።					
8. 8. . ጠብታውን ከጨመሩ በኋላ ቢያንስ ለ2 ደቂቃ ያህል ጠብታው ወደ እንባ እጢ እና ወደ አፍንጫ አቅጣጫ እስኪሄድ መጠበቅ።					
9.ወደ ጉንጭ የፈሰሰውን ጠብታ በንጹህ ጨርቅ ወይም ሶፍት መጥረግ።					

E. በግላኮማ ሕመምተኞች ላይ የኑሮ ደረጃ መጠይቅ (GLQ-15) የሚከተሉትን በተመለከተ የአይን መነጽርም አድርገው የማየት ችግር አለብዎ?

0= ከእይታ ጋር ባልተገናኙ ምክንያቶች ከእንቅስቃሴ መገደብ፣

1= ችግር የለብኝም፣

2= በመጠኑ ያስቸግረኛል፣

3= አንዳንዴ ያስቸግረኛል፣

4= እጅግ ያስቸግራል፣

5= በከባድ ሁኔታ ያስቸግረኛል።

ለመረጡት ምላሽ በየ √ ምልክትን ያድርጉ)

ጥያቄዎች	0= ከእይታ ጋርባልተገናኙ ምክንያቶች ከእንቅስቃሴ መገደብ፣	1= ችግር የለብኝ ም	2= በመጠኑ ያስቸግረኛ ል	3= አንዳን ዴ ያስቸግ ረኛል	4= እጅግ ያስቸግ ራል	5= በከባድ ሁኔታ ያስቸግረኛል
የእክል አይነት 1፡ ማዕከላዊ እና የቅርብ እይታ						
1. ጋዜጣ ማንበብ በቅርብ ያሉ ስራዎችን መስራት፣						
2. ፊት መለየት						
የእክል አይነት 2፡ የጎን እና ጎን እይታ						
1.ከጎን የሚመጡ ነገሮችን ማየት						
2. ወጣ ገባ ባለ መንገድ መራመድ						
3. ደረጃ ለመውጣት እግርን ርቀት መወሰን						
4. በደረጃዎች ላይ መራመድ						
5. በዓይን ብርሃን ምክንያት ነገሮች ላይ መጋጨት						
6. በዓይን ብርሃን ምክንያት ነገሮች ላይ መሰናከል .						
የእክል አይነት 3: የብርሃንን መንጸባረቅ እና የጨለማን መለማመድ						
1. ከጨለመ በኋላ የእግር ጉዞ ማድረግ						
2. በምሽት ማየት						
3. ጨለም ያለ ሁኔታን መለማመድ						
4.ብሩህ የሆነ ብርሀንን ወይም ነጸብራቅን መለማመድ						

5.ከብሩህ ክፍል ወደ ጨለማ ክፍል ወይም በተቃራኒው መመላለስ						
6.የወደቁ ነገሮችን ማግኘት						
የእክል አይነት 4: ከቤት ውጪ የሚደረግ እንቅስቃሴ						
1. መንገድ ማቋረጥ						