ISSN: 2573-9573

Research Article

Journal of Ophthalmology & Clinical Research

Adherence to Topical Ocular Hypotensive Agents in Northwest Ethiopia 2021

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Submitted: 2024, Oct 15; **Accepted:** 2024, Nov 20; **Published:** 2024, Dec 05

Citation: worku, E. M., Bogale, Z. M., Yekunoamelak, B. Z., Ayele, F. A. (2024). Adherence to Topical Ocular Hypotensive Agents in Northwest Ethiopia 2021. *J Ophthalmol Clin Res, 8*(2), 01-08.

Abstract

Purpose: *This study aimed to assess adherence to glaucoma medication and associated factors among glaucoma patients attending Gondar University Comprehensive Specialized Hospital Tertiary Eye Care and Training Center, in northwest Ethiopia.*

Methods: *An institutional-based cross-sectional study was conducted. Participants were selected using a systematic random sampling technique from June 1– to August 20, 2021. A structured questionnaire was used to collect data through interviews and chart reviews. Adherence was assessed using a 10-item self-report questionnaire.*

The data were entered into Epi Info version 7 and analyzed using SPSS version 20. Descriptive statistics were presented using tables and figures. Binary logistic regression was used to identify factors associated with adherence to glaucoma medication. P-values less than 0.05 were considered statistically significant.

Results: *298 study participants took part in this study. The proportion of good adherence was 163(54.7%) [95% CI: 51.0- 62.4]. Disease duration of 2-4 years [AOR=0.35(95% CI: 0.16, 0.75)], using more than one treatment [AOR=2.05(95% CI: 1.15-3.64)], and missing appointment due to COVID-19 [AOR= 2.13(95% CI: 1.17, 3.88)] were positively associated with good adherence to topical glaucoma medication.*

Conclusion: *More than half of the study participants showed good adherence to anti-glaucoma medication. Disease duration of 2-4 years, using more than one medication, and missing appointment due to COVID-19 were significantly associated with good adherence to glaucoma medications.*

Keywords: Adherence, Topical Glaucoma Medications, Gondar

1. Introduction

Glaucoma refers to an optic neuropathy associated with certain common structural damage to the optic nerve that results in visual field loss [1]. Glaucoma is the second leading cause of blindness worldwide [2, 3]. It is predicted that globally the number of people with glaucoma in 2040 will become 111.8 million [4]. Risk factors of glaucoma include age, high intraocular pressure (IOP), family history, race, and smoking [5].

Glaucoma negatively affects patients' mental well-being, vision, and quality of life, as well as causing irreversible vision loss, financial burden, treatment side effects, and the challenges of living with this disease [6, 7].

Usually, Open-angle glaucoma typically does not show symptoms until it reaches a late stage, leading to poor treatment adherence [8]. Currently, lowering intraocular pressure is the primary method for managing the progression of the disease [9]. Patients struggle to adhere to their medication regimens due to the frequent administration of eye drops and the side effects of the drugs [6].

If patients do not properly adhere to their anti-glaucoma medication, their disease will progress, leading to visual loss and increased healthcare costs due to the need for more frequent follow-up

appointments, additional medications, and diagnostic tests [10, 11]. Adherence refers to how well patients follow their eye care providers' medication instructions, In developed countries, the average adherence to long-term therapy for chronic diseases is 50%, but it is even lower in developing countries [12].

A systematic review in Latin America found that adherence rates to glaucoma medication range from 4.6% to 59% and in the United States of America ranges from 51% to 56% [13, 14]. Many studies have been done on glaucoma adherence among industrialized nations but lacking in developing countries such as Ethiopia.

A study conducted at the University of Gondar five years ago found that there was a lack of essential data needed for proper care and treatment management in Ethiopia [15]. The study also highlighted the need for ongoing changes and improvements in healthcare practices. Additionally, the factors identified at the Gondar Hospital were deemed insufficient. This study will provide valuable insights by excluding participants with less than six months of follow-up and considering factors such as COVID-19 and social factors. The results will support and guide glaucoma treatment strategies and serve as a basis for future research in the field. Overall, the findings will contribute to improving glaucoma treatment and informing future studies

2. Materials and methods

2.1. Study design and period

An institution-based cross-sectional study was conducted from June to August 2021.

2.2. Study setting

The center is located in Gondar city, Northwest Ethiopia, in the central Gondar Zone of the Amhara Region. The center gives services for glaucoma patients three days per week.

2.3. Source / Study Population

The source population for the study included all adult glaucoma patients at Gondar University's eye care center, while the study population included adult glaucoma patients seen in the clinic during the study period.

2.4. Inclusion and exclusion criteria

The study included adult patients diagnosed with glaucoma who were 18 years and older, excluding those who were mentally ill or had less than six months of follow-up in a glaucoma clinic.

2.5. Sample size determination

By using the single population proportion formula the sample size was calculated as follows.

$n = \frac{z2\alpha/2\ p\ (1-p)}{w^2} = \frac{(1.96)2(0.711)\ (0.289)}{(0.05)^2} = 316$

Where: n =sample size, Z (α/2) = Z score at 95% CI=1.96 P= 0.711 (proportion of drug adherence among glaucoma patients from a previous study done in Gondar)(15),w= 5% margin of error. After adding 10% for non-response the final sample size becomes 347. While the total population number is less than 10,000, by using the correct formula, the final sample size was 298.

2.6. Sampling technique

The study selected a sample of 300 glaucoma patients using a systematic random sampling method with a sampling fraction of ten. 3000 glaucoma patients were seen. The sampling interval was calculated to be 3000/298 =10. Every tenth patient from a list of individuals scheduled for follow-up at the glaucoma clinic during the data collection period was included in the sample.

2.7. Data collection tools and procedures

Data was collected from study participants using a structured self-report questionnaire and data extraction format. The data collection process included reviewing patient medical charts for clinical characteristics and conducting face-to-face interviews using a structured questionnaire which were developed from different literature were used to assess adherence to anti-glaucoma medication [15, 16]. The interviews included questions about socio-demographic information, medication characteristics, social support, and self-report adherence. The data was collected through face-to-face interviews with verbal consent from the participants, conducted by three experienced ophthalmic nurses.

3. Operational definition

3.1. Medication adherence: The study participants who scored ≥ 8 (median) with self-report questions were categorized as adherent and those who scored < 8 were categorized as no adherent to their ocular hypotensive medication.

3.2. Early glaucoma: Optic nerve abnormalities consistent with glaucoma but no visual field abnormalities and cup-to-disc ratio (CDR) < 0.65.

3.3. Moderate glaucoma: Optic nerve abnormalities consistent with glaucoma and glaucomatous visual field abnormalities in one hemifield, and not within 5 degrees of fixation, and moderate glaucomatous disc features of vertical CDR = 0.7–0.85.

3.4. Advanced glaucoma: Patients who have CDR of 0.85 – 0.95 and glaucomatous visual field abnormalities in both hemi-fields, and/or loss within 5 degrees of fixation in at least one hemi-field, and who can perceive light. Absolute: patients who have CDR of > 0.95 and with a vision of no light perception (NLP) [17].

3.5. Visual Acuity: It is according to the ICD 12 definition of visual impairment. Mild /No visual impairment: 6/6 – 6/18, Moderate visual impairment: 6/18 – 6/60, Sever visual impairment 6/60 – 3/60, Blindness: < 3/60 [18].

Social support scale: According to the Oslo, social support scale leveling the sum score range is 3 to 14. Poor social support is in between 3–8, moderate social support 9–11, and strong social support 12–14 [19].

3.6. Data quality control

The questionnaire which was developed from different literature was translated into Amharic and then translated back into English by experts [15, 16]. Five percent of the questionnaires were tested

in Debark Town. Data collectors underwent two days of training on how to use the questionnaire, interact with respondents, and obtain consent. The collectors were supervised daily and their completed questionnaires were reviewed for accuracy and completeness by supervisors.

3.7. Data processing and analysis

The data was coded and analyzed using EPI INFO 7 and SPSS version 20. Descriptive statistics such as proportion, percentage, mean, and standard deviation were used to describe results. Bivariable and multivariable logistic regression were conducted to identify factors associated with adherence. The model was checked for fitness using the Hosmer and Lemeshow test, with a p-value of <0.05 considered statistically significant. The strength of association was assessed using adjusted odds ratios with a 95% confidence interval.

3.8. Ethical approval and informed consent

Ethical clearance was obtained from school of medicine ethical review committee at University of Gondar, College of Medicine and Health Sciences. Informed Verbal consent was obtained from each participant before they were recruited in the study. Generally, the study was conducted in line with the Ethical Principle of the Declaration of Helsinki.

4. Results

A total of 298 study subjects participated in this study. The mean age of the study participants was 60.53+13.55 years. Among 298 eligible study participants, seventy-nine patients (26.5%) were in the age group of 51–62 years old. More than half of the participants were males 199(66.8 %). Two third of participants 218 (73.2%) had no formal education and 213 (71.5%) were married.

Socio-demographic characteristics of the study participants at Gondar University Comprehensive Specialized Hospital Tertiary Eye Care and Training Center, Northwest Ethiopia, 2021.

Variables	Frequency	Percentage
Age		
21-50	75	25.2
51-60	79	26.5
61-70	76	25.5
>70	68	22.8
Sex		
Male	199	66.8
Female	99	33.2
Residence		
Rural	132	44.3
Urban	166	55.7
Marital Status		
Currently married	213	71.5
Currently unmarried	85	28.5
Educational Status		
No formal education	218	73.1
Primary School	23	7.7
Secondary School	28	9.5
College/University	29	9.7
Occupation		
Government	41	13.8
Private	51	17.1
Farmer	106	35.6
Housewife	69	23.1
Retired	31	10.4
Monthly income in birr		
<700	82	27.5
701-1000	73	24.5

1001-2625	69	23.2
>2626	74	24.8
Distance from hospital		
< ½ hour	109	36.6
½ - 1 hour	68	22.8
1-2 hour	54	18.1
>2 hour	67	22.5

Table 1

5. Clinical characteristics of study participants

More than half 157(52.7%) of the study subjects had mild or no visual impairment. More than one-third 113(37.9%) and 165(55.4%) of participants had an advanced stage of glaucoma and primary open-angle glaucoma respectively. The majority of study participants had bilateral glaucoma 231(77.5%). Most of the participants 207(69.5%) were using one medication.

Clinical characteristics of the study participants at Gondar University Comprehensive Specialized Hospital Tertiary Eye Care and Training Center, Northwest Ethiopia, 2021.

Variables	Frequency	Percentage
Visual Acuity		
Mild/no visual impairment	157	52.7
Moderate visual impairment	93	31.2
Severe visual impairment	19	6.4
Blindness	29	9.7
Type of glaucoma		
POAG	165	55.4
PACG	25	8.4
Secondary glaucoma	108	36.2
Stage of glaucoma		
Early	29	9.7
Moderate	61	20.5
Advanced	113	37.9
Absolute	95	31.9
Duration of glaucoma diagnosis		
< 1year	75	25.2
1-2years	87	29.2
2-4years	66	22.1
>4years	70	23.5
Laterality		
Unilateral	67	22.5
Bilateral	231	77.5
History of surgery		
Yes	119	39.9
No	179	60.1
Family history of glaucoma		
Yes	32	10.7
No	266	89.3
Type of Medication		

Drop/beta-blocker	282	94.6
Others topical medications	16	5.4
Number of medications		
One	207	69.5
>one	91	30.5
Ocular comorbidity		
No	206	69.1
Cataract	55	18.5
Others	37	12.4
Frequency of daily dose		
Once and Twice	250	83.9
Three times and above	48	16.1
Who pays for medication?		
Self	171	57.4
Family	32	10.7
Government/non-government organizations	95	31.9

POAG: primary open-angle glaucoma, PACG: primary angle-closure glaucoma, secondary glaucoma

Table2

6. Adherence to topical glaucoma medications

The proportion of good adherence to topical anti-glaucoma was 163(54.7%) (95% CI 51.0 - 62.4). Response given by study participants at Gondar University Comprehensive Specialized Hospital Tertiary Eye Care and Training Center, Northwest Ethiopia, 2021.

No	Question	Yes	No
1	Do you ever forget to take your medication?	71(23.8)	227(76.2)
2	Are you careless at times about taking your medication?	32(10.7)	266(89.3)
3	When you feel better, do you sometimes stop taking your medication?	33(11.1)	265(88.9)
4	Did you take your entire drop (s) within the last few days?	16(5.4)	282(94.6)
5	Were there any days you did not apply your eye drops within the last two weeks?	18(6.0)	280(94.0)
6	Have you stopped taking eye drops (s) based on your judgment?	69(23.2)	229(76.8)
7	My thoughts are clearer on eye drop medication	94(31.5)	204(68.5)
8	Do you sometimes forget to bring your eye drops (s) when you leave home?	93(31.2)	205(68.8)
9	Do you sometimes get annoyed that you must keep taking eye drops (s) every day?	47(15.8)	251(84.2)
10	Do you have difficulty remembering to apply all your eye drops (s)?	38(12.8)	260(87.2)

Table 3

7. Factors associated with adherence to topical glaucoma medications

Multivariable logistic regression analysis revealed that the duration of disease, number of medications, and missed appointments because of COVID-19 were significantly associated with good adherence to topical glaucoma medication. As a result, those who had 2-4 years of duration of disease were 65% less likely to be good adherent to topical glaucoma medication as compared to those who had < 1-year duration of disease[AOR=0.35(95% CI: (0.16-0.75)].

Those participants who use more than one medication were 2 times more likely to have good adherence to topical glaucoma medication in comparison to one medication use [AOR=2.05(95% CI: 1.15-3.64)]. In this study, participants who missed their appointment because of COVID-19 were 2 times more likely to adhere to topical medication than those who did not [AOR= 2.13(95% CI: 1.17 - 3.88)].

Factors associated with adherence of study participants at Gondar University Comprehensive Specialized Hospital Tertiary Eye Care and Training Center, Northwest Ethiopia, 2021.

Variables	Good Adherence	Poor adherence	COR(95%CI)	AOR(95%CI)	p-value
Distance from hospital					0.047
<1/2 hour	67	42	1.00	1.00	
½ -1 hour	37	31	0.75(0.41, 1.38)	0.60(0.31,1.21)	0.148
1-2 hour	21	33	0.39(0.20, 0.78)	0.49(0.23,1.03)	0.061
>2hour	44	23	1.19(0.64, 2.26)	1.34(0.66,2.71)	0.414
Duration of disease					0.010
<1year	47	28	1.00	1.00	
1-2 years	56	31	1.08(0.57,2.04)	1.09(0.54,2.23)	0.805
2-4years	28	38	0.44(0.22,0.86)	0.35(0.16,0.75)	0.007
>4years	38	32	0.71(0.36,1.37)	0.61(0.29,1.28)	0.189
Number of medication					0.015
One	125	82	1.00	1.00	
>one	44	47	1.63(0.99,2.67)	2.05(1.15,3.64)	0.015
Visual Acuity					0.095
Mild/no visual impairment	92	65	1.00	1.00	
Moderate visual impairment	54	39	0.98(0.58, 1.65)	0.99(0.56,1.76)	0.969
Severe visual impairment	6	13	0.33(0.12,0.90)	0.27(0.90,0.78)	0.016
Blindness	17	12	1.00(0.45,2.24)	1.27(0.56,3.09)	0.606
Missed appointment due to COVID-19					
Yes	52	27	1.68(o.98,2.87)	2.13(1.17,3.88)	0.013
No	117	102	1.00		
Social factor					0.080
Poor support	11	18	0.52(0.23,1.20)	0.42(0.17,1.05)	0.064
Intermediate					
Support	97	59	1.40(0.86,2.29)	1.17(0.68,2.00)	0.579
Strong support	61	52	1.00		

Table 4

8. Discussion

An increase in medication adherence is considered an important factor for the better management of glaucoma. This study assessed the proportion of glaucoma medication adherence and factors associated with adherence based on patients self-reporting attending the University of Gondar Comprehensive Specialized Hospital Tertiary Eye Care and Training Center.

This study indicated that 54.7% [95% CI: 51.0- 62.4] of participants were adherent to their anti-glaucoma medication. This result is in line with studies done in Iran (57%) and Ethiopia (56.2%) [20, 21]. On the other hand, this finding was lower than other studies done in South Korea (72.6%), Saudi Arabia (72.6), Ethiopia (61.4%) and South India (58%) [15, 22, 23, 24]. Contrary to this, the current result was higher than the studies that were done in Turkey (40%), Nigeria (21.1%)(26) and Ethiopia, Menelik II Referral Hospital (42.6%) and in Jimma Hospital (32.5%) [25, 27, 28]. This variation might be from the inconsistency of the definition of adherence levels, the occurrence of the COVID-19 pandemic, and the utilization of scales. For example, Turkey's study uses the Reported Adherence to Medication (RAM) questionnaire, which consists of six questions measuring participants' attitudes within the last 2months. This study uses the Medication Adherence Rating Scale (MARS) that incorporates features of both the drug attitude inventory (DAI) and Morisky medication adherence assessment tool. While using MARS the patient should be asked to respond to the statements in the questionnaire which best describe their behavior or attitude towards their medication during the past week.

In this study, the odds of having good adherence to topical anti-glaucoma medications is 0.35 times lower among participants who had 2-4 years of duration of disease as compared to those who had< 1-year duration of disease [AOR= 0.35 (95% CI: 0.16- 0.78)]. This result agrees with other studies done in Germany, Iran and Nigeria

[26, 29, 30]. The patient's inability to recognize the importance of treatment for such asymptomatic diseases as glaucoma, tiredness of using the treatment for a long time, and drug side effects might be incriminated as reasons for non-adherence.

The odds of having good adherence to topical anti-glaucoma medications is 2 times higher among those participants who used more than one medication in comparison to one medication use [AOR=2.05(95% CI: 1.15, 3.64)]. This might be due to patients who have more than one drug prescription by their physicians may perceive the disease as serious and as a result of this, they may become more adherent to their medications. In contrast to this result, other studies said that patients who were on monotherapy were more likely to comply better than those on dual therapy in addition to these, patients' exhaustion from multiple therapies, the fear of the side effect of the drug and the charge might be the responsible factors for non-adherence [7, 27, 31].

In this study, The odds of having good adherence to topical anti-glaucoma medications are 2 times higher among those participants who missed their appointment because of COVID-19 as compared to those who have not missed their appointments [AOR= 2.13(95% CI: 1.17, 3.88)]. This scenario might be because those who missed due to the pandemic seem more responsible and therefore adhere. The COVID-19 pandemic has caused a high rate of poor adherence to glaucoma medication for those patients who were compliant before the lockdown [32].

9. Conclusion

More than half of the study participants were adherent to their anti-glaucoma medication. Duration of disease 2-4 years, more than one of the medications, and missed an appointment due to COVID-19 were significantly associated with good adherence to glaucoma medications

10. Ethics approval and consent to participate

The study was conducted following the Declaration of Helsinki and approved by the institutional review board of the University of Gondar, college of medicine, and health science school of medicine's ethical review committee. Informed verbal consent was obtained from each study participants.

11. Patient and public involvement

This study was conducted on adult glaucoma patients and public involvement. The participants were not requested to comment on the study design and were not consulted to develop patients' relevant findings or to conclude the results. The participants were not invited to contribute to the writing or editing of this document for readability or correctness. There are no plans to distribute the outcomes of the study to each study participant.

12. Availability of data and materials

The data sets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

13. Competing interests

The authors report no conflict of interest in this work.

14. Funding

Light for the World supported financially for this study.

15. Acknowledgement

We would like to thank the University of Gondar for financial support to conduct the study. We are also very grateful to the study participants.

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