Original Article

Adherence to Topical Glaucoma Medications in Ethiopian Patients

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ABSTRACT

Purpose: Successful outcomes of medical treatment for glaucoma require proper and daily use of medication to prevent disease progression. The aim of this study was to determine the adherence to anti-glaucoma medications and factors associated with non-adherence among patients with ocular hypertension (OHT) or glaucoma at Jimma University Specialized Hospital, Ethiopia.

Materials and Methods: A hospital based cross sectional study was conducted on 200 consecutive patients from July to November 2010 at Jimma University Hospital in Southwest Ethiopia. Patients with OHT or glaucoma who were taking topical anti-glaucoma medications for more than six months were included. The study subjects were interviewed and their medical records were reviewed. Non-adherence to glaucoma therapy (NAGT) was defined as self-reported on missed medications or missed appointments, or a physician noting poor adherence. A $P < 0.05$ was statistically significant.

Result: Overall, 135 (67.5%) patients were non adherent to glaucoma therapy. Non adherence was associated with older age ($P = 0.04$), advanced stage of glaucoma ($P = 0.01$), longer frequency of follow up ($P = 0.00$) and financial problem ($P = 0.000$). Sex ($P = 0.53$), level of education ($P = 0.09$), and marital status ($P = 0.77$) were not statistically significantly associated with non-adherence to anti-glaucoma drug treatment.

Conclusion: A relatively high proportion of patients were not adhering to the medications regimen for glaucoma. Older age, advanced glaucoma, lengthier frequency of follow-up and financial hardship were associated with non-adherence. Eye care providers should be aware of the problem of non-adherence to topical medications.

Key words: Glaucoma, Ocular Hypertension, Adherence, Topical Glaucoma Therapy, Ethiopia

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INTRODUCTION

Glaucoma is the second leading cause of blindness in the world, and the third leading cause in Ethiopia.[1,2] The primary objective of glaucoma therapy is to prevent progressive vision loss and blindness. Lowering of intraocular pressure (IOP) is the only proven strategy that prevents the risk of glaucoma progression.[3,4] Medical therapy, laser trabeculoplasty, and incisional surgical treatment are reasonable options for the initial treatment of glaucoma and most patients initially receive topical ocular hypotensive drops. In the majority of cases topical therapy is can is beneficial if administered correctly. Thus the outcome of therapy relies heavily on patient adherence to the treatment regimen.

According to the World Health Organization (WHO), adherence to long-term therapies among patients suffering from chronic diseases in the general population is around 50% and is much lower in developing countries.[5] Non-adherence among glaucoma patients has been reported to range as high as 80%.[6] Patients with poor adherence to medication have worse outcomes with a higher rate of visual loss[7] and increase health care costs. If their disease worsens, they require more follow up visits, additional medications, additional diagnostic

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tests, and earlier surgery further increasing costs associated with patient treatment.[8,9]

There are no standard criteria to determine adherence and the methodologies generally used include one of the three techniques: Patient self-reports, electronic monitoring, or pharmacy refill data assessed by an index called Medication Possession Ratio (MPR).[10] Each method has its own advantages and disadvantages and there is no prevalent method.

For patients living in developing countries, access to medication is generally limited due to cost and unavailability. Ensuring that patients continue to utilize and adhere to the existent treatment regimen poses an additional challenge for ophthalmologists.[9] The extent of the problem of non-adherence in glaucoma is not adequately explored in developing countries. This study was performed at a tertiary hospital in South West Ethiopia with a general objective of determining adherence to topical glaucoma treatment and identification of factors related to poor adherence. Knowledge of the problem will provide eye care professionals in the region baseline evidence for their clinical practice. Recognition of the factors for poor adherence will also serve as an entry point for future intervention to increase adherence.

MATERIAL AND METHODS

This hospital based prospective cross sectional study was performed from July to November 2010 at Jimma University Department of Ophthalmology (JUDO). JUDO is the only tertiary training and eye care center in southwest Ethiopia. The population being served by the hospital exceeds 15 million. Consecutive patients with glaucoma or ocular hypertension (OHT) aged 18 years or above, who have been on at least one topical glaucoma medication for at least six months and were attending the glaucoma clinic during the study period were included.

Data were collected through patient interview and chart review. Data were collected by senior ophthalmology residents in the department using a structured questionnaire. The questionnaire was developed after reviewing literature on the topic and each patient was interviewed in person (face-to-face) in a private room in the eye clinic. Data were collected on socio-demographic features, and drug use through the interview and physician notes on adherence, visual status, stage of glaucoma, duration of treatment, and appointment date were retrieved from patient chart.

Participants were considered non-adherent to glaucoma treatment if they were non-adherent with medication or clinic appointments as defined below: (a) Non-adherent with taking medication - if there was a physician note about non-adherence or a self-report of missing at least one dose of medication in a week. (b) Non-adherent with appointment-keeping - if a review of clinic records or self-report revealed any clinic appointments missed in the past year. Glaucoma staging was based on Damji *et al*'s classification.[11] Characteristics of those who were adherent were compared with those who were non-adherent. Statistical analyses were performed using SPSS software for Windows Version 16 (IBM Corp., New York, NY, USA). Cross-tabulations and Fisher exact tests were computed. The 95% confidence intervals (CI) were reported. A $P < 0.05$ was considered statistically significant.

Ethical consideration

Ethical clearance was obtained from Research and Ethics review Committee of College of Public Health and Medical Sciences, Jimma University. Informed verbal consent was obtained from each respondent. Patient information was obtained with no identifier and confidentiality was maintained.

RESULTS

Two hundred consecutive glaucoma patients were included in this study. The majority [133 (66.5%) patients] were males with a male to female ratio of 1.99:1. Most of the participants were 56 years of age and older (60% of patients). Most of the participants were married [167 (83.5%) patients]. Ninety (45.0%) patients were of the Oromo ethnic origin, 38 (19%) patients were Amhara and 17 (8.5%) patients were Keficho; and [94 (47.0%) patients] were illiterate. Ninety-eight (49.0%) of the patients were Orthodox Christians whereas 79 (39.5%) were Muslims. One hundred and thirty 130 (65%) of the patients were were residing in urban areas [Table 1].

Overall, 135 (67.5%) patients were non-adherent to their glaucoma therapy (NAGT). Age statistically significant assocaited with adherence and there was a trend of lower adherence with advancing age. With 11 (50.0%) of those aged 18-40 years being non-adherent, as compared to 87 (72.5%) of those above 55 years of age who were non-adherent ($P = 0.04$, 95% CI: 0.04-0.05). Seventy five percent of the rural residents were also non-adherent compared to 63.1% of the urban residents ($P = 0.07$, 95% CI: 0.08- 0.09). Gender ($P = 0.53$), level of education ($P = 0.09$) and marital status ($P = 0.77$) were statistically significant associated with adherence to the medication regimen.

Patients who came to the clinic frequently (every two months) had good adherence to treatment [45 (69.2%) patients] compared to those who came less frequently [20 (30.8%) patients], and this was statistically significant ($P = 0.00$). Patients on treatment for the previous 1 year were more likely to be NAGT (78% patients) compared to those on treatment for more than 2 years (65.1% patients) ($P = 0.28$).

Adherence to glaucoma drops was also strongly associated to the stage of glaucoma; 80.3% of those with advanced glaucoma were non-adherent while 57.1% of those with OHT, and 61.3% of those with early glaucoma were non-adherent ($P < 0.05$, all cases) [Table 2].

More than half of the participants [112 (56%) patients] were using two or more types of topical glaucoma medication whereas 88 (44%) patients were using one type; 66 (33%) of the patients were also using other systemic medications. The number of glaucoma drops or taking other prescription medications were not associated with non adherence ($P = 0.45$, $P = 0.75$ respectively). One hundred and six (70.2%) patients who bought medications themselves were non-adherent compared to 29 (59.2%) patients who received the medications free of charge. One hundred and twenty-two (74.4%) patients who mentioned financial problems in obtaining medications were non-adherent compared to 13 (36.1%) patients who cited no financial problem. The latter was statistically significant ($P = 0.000$) [Table 3].

Table 1: Socio demographic characteristics of ocular hypertensive and glaucoma patients

Variables	Adherent *n*=65 (%)	Nonadherent *n*=135 (%)	*P*
Age in years			
18-40	11 (50.0)	11 (50.0)	0.04
41-55	21 (36.2)	37 (63.8)	
56-85	33 (27.5)	87 (72.5)	
Sex			
Male	43 (32.3)	90 (67.7)	0.53
Female	22 (32.8)	45 (67.2)	
Marital status			
Married	55 (32.9)	112 (67.1)	0.77
Single[a]	10 (30.3)	23 (69.7)	
Ethnicity			
Oromo	26 (28.9)	64 (71.1)	0.34
Amhara	10 (26.3)	28 (73.7)	
Keficho	10 (37.0)	17 (63.0)	
Others	19 (42.2)	26 (57.8)	
Education level			
Illiterate	25 (26.6)	69 (73.4)	0.09
Literate	40 (37.7)	66 (62.3)	
Religion			
Muslim	18 (22.8)	61 (77.2)	0.07
Orthodox Christian	38 (38.8)	60 (61.2)	
Protestant Christian	9 (39.1)	14 (60.9)	
Residence			
Rural	17 (24.3)	53 (75.7)	0.07
Urban	48 (36.9)	82 (63.1)	

[a]Includes those never married, divorced or widowers

Table 2: Disease related factors associated with treatment adherence among ocular hypertensive and glaucoma cases

Variables	Adherence (%)		*P*, (95% CI)
	Adherent number	Nonadherent number	
Stage of glaucoma			
OHT[a]	6 (42.9)	8 (57.1)	0.04 (0.04-0.05)
Mild glaucoma	29 (38.7)	46 (61.3)	
Moderate glaucoma	17 (37.8)	28 (62.2)	
Severe glaucoma	13 (19.7)	53 (80.3)	
Duration of diagnosis and treatment			
<1 year	9 (22.0)	32 (78.0)	0.28 (0.27-0.29)
1–2 years	18 (36.0)	32 (64.0)	
>2 years	38 (34.9)	71 (65.1)	
Average frequency of follow-up			
1-2 times	13 (22.8)	44 (77.2)	0.00 (0.00-0.01)
3-4 times	18 (25.4)	53 (74.6)	
5-6 times	34 (47.2)	135 (67.5)	

[a]OHT: Ocular hypertension, CI: Confidence interval, *P*=statistical significance. *P*<0.05 was statistically significant.

DISCUSSION

This is the first study investigating the rate of non-adherence among glaucoma patients in Ethiopia. There are multiple methods of measuring adherence in clinical practice. Furthermore, there is a signficant difference in the operational definitions, measurement techniques, and sampling strategies in the literature. This makes direct comparison between studies on adherence difficult. Additionally, there is limited data on this topic in Africa. This article assessed adherence in terms of self-reporting by patients regarding medication use, keeping appointments and a physician notes on adherence. Patient self-reporting has been found weakly but significantly correlated with actual adherence as measured by electronic monitors.[12] Physician chart notes citing poor adherence also correlate with pharmacy records.[13]

Accordingly 135 (67.5%) of the 200 participants were found to be NAGT. Clinically significant non-compliance (defined as more than two doses missed per week) was established in 44% of patients in a university hospital in Greece.[14] While a non-compliance rate of 58% has been reported by using the criteria of more than one drop missed in a month.[15] Based on patient report of whether doses ever missed, Patel and Spaeth reported 59% of cohorts to be not strictly compliant.[16] A study of predominantly African-American glaucoma patients from 2 eye clinics at Southeastern US hospitals using the same definition as ours reported 60% of the sample classified as non-adherent.[17]

There is strong correlation of non- adherence with advancing age; with 11 (50.0%) of those aged 18-40 years being non-adherent, as compared with 87 (72.5%) of those above 55 years of age ($P = 0.04$). This may be explained by difficulty in comprehending and remembering, manual dexterity and coordination which occur in old age.[16-18]

Some studies have reported living alone, or being widowed to be associated with lower adherence than being married.[19,20] Our study didn't show this difference. We found gender ($P = 0.53$) and the level of education ($P = 0.23$) were not associated to

Table 3: Medication related factors associated with treatment adherence among ocular hypertensive and glaucoma patients

Medication related factors	Adherent *n*=65 (%)	Nonadherent *n*=135 (%)	OR[a]	95% CI
Number of topical medications				
One	26 (29.5)	62 (70.5)	0.79	0.43-1.43
Two or more	39 (34.8)	73 (65.2)		
Take other prescription medications				
Yes	20 (30.3)	46 (69.7)	1.16	0.62-2.20
No	45 (33.6)	89 (66.4)		
How the patient gets medication				
Free of charge	20 (40.8)	29 (59.2)	1.63	0.83-3.17
Self - buy	45 (29.8)	106 (70.2)		
Financial problem to get the drugs				
Yes	42 (25.6)	122 (74.4)	0.2	0.09-0.42
No	23 (63.9)	13 (36.1)		

OR: Odds ratio, CI: Confidence interval, [a]: Adjusted

adherence to medication. Non-adherence tends to be lower among patients living in urban areas compared to those in rural areas (63.1% versus 75.7%). However, this was not statistically significant ($P = 0.07$).

Our study has clearly shown a strong association of NAGT with advanced stages of glaucoma ($P < 0.01$). In a county hospital population in the US, after adjustment for the impact of potential confounding variables, subjects with severe glaucomatous disease were less-adherent to their recommended follow-up than patients with mild or moderate glaucomatous disease.[21] A similar study has also shown the relationship between medication adherence and the severity of visual field defects.[22] Although poor adherence is a risk factor for progression of glaucoma, we cannot establish causality between non-adherence to glaucoma severity in such a cross-sectional analysis. Rather, we postulate that the visual severity and limitation in those with advanced glaucoma may have been a factor for application of drops. Such patients may also be more dependent on others for transportation to hospitals. However, it can also be postulated that poor follow-up may contribute to worsening of the disease worsening, perhaps by decreasing the opportunities for physician intervention when the disease is progressing.[21]

Patients who came to the clinic more frequently (every two months) had good adherence to treatment compared to those who came less frequently [45 (69.2%) patients versus 20 (30.8%) patients].

Regimen complexity as well as presence of multiple other drugs in the patient's overall regimen has been reported to be associated with non-adherence.[6,14,16,23] Patients tend to be confused by the different schedule for each drug and prescribing many drugs associated with higher regimen complexity and higher frequency of drug application. However, this is not validated in our study. Stryker *et al*.[17] also reported that both adherent and non-adherent individuals were equally likely to be taking other medications. A report from Hong Kong also reported similar findings.[24]

In general, economic condition of patient is a chief limiting factors for access to healthcare globally. This is excerbated in developing countries such as ours. In this study, 122 (74.4%) of cases who mentioned financial hardship in obtaining medications were non-adherent compared with 13 (36.1%) of those who cited no financial problem. This difference was statistically significant ($P = 0.000$). This should always be considered prior to deciding the mode of glaucoma therapy. Similar findings have been reported in the literature.[25,26]

We used a relatively strict definition of adherence, particularly on the dosage parameter. If we can label non-adherence adherence if patients used less than 80% of the prescribed doses, as suggested in other research[27], our prevalence of non-adherence would have been lower than this. For instance, a patient on only timolol eye drop twice a day and missing a single drop is still 93% adherent to the prescribed medication. On the other hand, patient self-report, although simple and inexpensive, tends to overestimate adherence and it is subject to both recall bias and the desire to please the physician.[28] Patients were recruited at a single glaucoma clinic in Ethiopia. Nevertheless, we believe this study provides balanced evidence on the experience of medical therapy for glaucoma in Africa.

CONCLUSION

There is a relatively high rate of non-adherence to glaucoma therapy in this Ethiopian study. Advanced age, advanced stage of glaucoma, longer duration of follow-up, financial problems were associated with non-adherence. Eye care providers should be aware of the problem of non- adherence and account for this variable prior to prescribing topical glaucoma medications.

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