Original Article

Factors Associated with Non-Compliance to Long Term Glaucoma Medication in a Developing Country

Huma Munir[1], Muhammad Sadiq[2], Shama Khan[3], Sarah Zafar[4], Farah Akhtar[5]
Department of Ophthalmology, [1-5]Al-Shifa Trust Eye Hospital, Rawalpindi

ABSTRACT

Purpose: To assess the level of adherence with long-term glaucoma therapy at a tertiary care center and to correlate the factors associated with non-compliance.

Study Design: Cross sectional study.

Place and Duration of Study: Al-Shifa Trust Eye Hospital (ASTEH), Rawalpindi from October 2018 to February 2019.

Methods: Two hundred patients presenting at the glaucoma clinic were recruited. An interview-based questionnaire was used to gather data. The dependent variable, adherence to long-term glaucoma treatment, was determined and independent variables were; demographic profile, socio-economic variables, ocular and medical history, personal knowledge and understanding about disease and satisfaction level of the patient. The data was analyzed using SPSS version 24. Descriptive analysis was followed by Inferential Statistics. To determine any association between independent and outcome variables, chi-square test was applied. All inferential statistics were based on a 5% significance value.

Results: A high rate (30%) of non-compliance was found. A significant correlation was present between chief complaints of patients with compliance to medication ($p < 0.05$). Knowledge about disease, education status was also found to be correlated with the compliance to glaucoma treatment ($p < 0.05$). However, age and gender had no effect on level of compliance. Eighty two percent knew that glaucoma can lead to blindness which urged them to have regular follow-up.

Conclusion: Thirty percent participants were non-compliant to glaucoma therapy. Compliance with glaucoma treatment is an important factor for preventing progression of disease. Factors leading to poor compliance can be controlled by good communication between patient and physician.

Key Words: Glaucoma, Intraocular pressure, Patient compliance, Anti glaucoma agents.

How to Cite this Article: Munir H, Sadiq M, Khan S, Zafar S, Akhtar F. Factors Associated with Non-Compliance to Long Term Glaucoma Medication in a Developing Country. Pak J Ophthalmol. 2022, **38 (3):** 193-198.

Doi: 10.36351/pjo.v38i3.1417

Correspondence: Huma Munir
Al-Shifa Trust Eye Hospital, Rawalpindi
Email: ophthalmo54@gmail.com

Received: May 4, 2022
Accepted: June 18, 2022

INTRODUCTION

Glaucoma is defined as a multitude of conditions affecting the optic nerve, causing irreversible damage to visual function which may be deferred or intercepted by surgical or medical intervention. This damage mostly results from an abnormally elevated intraocular pressure leading to permanent loss of visual function without any noticeable symptoms in the early and moderate stages of the disease. Therefore, the condition is called the 'silent killer of sight.' Glaucoma contributes 6.6% of global blindness, making it the 2nd leading cause of blindness.[1] An increase of 0.8 million (or 62%) in the number of patients blinded by the disease and 2.3 million (or 83%)in number of visually impaired patients has been reported from 1990 to 2010.[2] In South Asia, Primary Open Angle Glaucoma (POAG) predominated over Primary Angle Closure Glaucoma (PACG) while the prevalence of disease in 2013 was 3.54%.[3] Compared with other Asian sub regions, South Asia is expected

to report the most abrupt increase in prevalence of this condition, from 17.06 million in 2013 to an estimate of 32.90 million in 2040.[4]

In Pakistan, reported incidence of glaucoma related blindness is 7% while cataract, corneal opacities, and refractive errors are responsible for 66%, 12.6% and 11.4% of blindness respectively. As a result of unawareness of disease and its costly treatment, almost 0.9 million glaucoma patients have developed blindness in Pakistan due to this condition.[5] Medications for glaucoma are divided into various classes based on their chemical structure and pharmacologic action. Once put on medical therapy, patients are usually required to instill these drops for the rest of life in addition to visiting the clinic on regular basis for monitoring the progression of the disease. In clinical terms, compliance may be defined as; a measure of extent to which patient follows a prescribed treatment plan. According to various researches in different parts of the world, non-compliance to glaucoma medications was high with most usual reason entailed was asymptomatic nature of the disease until late stages when tunnel vision was left.[6] Expensive treatment greatly influenced compliance, while long-term therapy required by this chronic disease also led to non-compliance. Moreover, local side effects of treatment are sometimes more prominent than its benefit. The complexity of the therapeutic regimen and the factor like forgetfulness with increasing age also played significant role towards non-compliance. A study reported lack of compliance being related to environmental factors (49%), patient carelessness (16%), medication regimen (32%), and service provider factors (3%).[7] Other factors attributable were time required for a glaucoma clinic visit, living alone, increased number of glaucoma medications, comorbidities, low-income levels, and medical mistrust. To eradicate this and enforce compliance, communication between physicians and patients are pivotal.

In Pakistan, there is a gap in comprehensive analysis of the main causes for poor compliance and adherence to glaucoma medical therapy as most research was conducted in other countries like France, Mexico and India.[8,9,10] The objective of current study was to assess the extent of non-compliance with glaucoma therapy among patients presenting at glaucoma department of a tertiary care eye hospital and to determine factors associated with it.

METHODS

A Cross-Sectional Study was conducted at Al-Shifa Trust Eye Hospital Rawalpindi between October 2018 to February 2019. Study was approved by the Institutional Ethical Review committee and the participants were included after taking an informed consent. A sample size of 200 was calculated using OPEN-EPI calculator where glaucoma prevalence was taken from World Health Organization (WHO). Data was entered with confidence interval set at 95% and eliminating the possibility of non-response-rate or missing data. A properly formatted interview-based questionnaire was used to gather data. The dependent variable, adherence to long-term glaucoma treatment, was determined using three markers consisting of timely follow up, comparison of the prescribed and used drug, and adherence to prescribed dosage of the drug.

Independent variables were categorized into 5 parts, demographic profile, socio-economic variables, ocular and medical history, personal knowledge and understanding about disease while the last part had questions about satisfaction level of the patient related to services and family support. The data was assessed and analyzed via statistical package for social sciences (SPSS) version 24. Evaluation of data was carried out in two stages. Descriptive analysis, which included all independent variables, was followed by Inferential Statistics. Frequencies and percentages were used to display categorical data while valid percentages were used to illustrate the parameters with absent numbers. To determine any association between independent and outcome variables, chi-square test was applied. All inferential statistics were based on a 5% significance value.

RESULTS

Out of the 200 participants in the study, majority belonged to the age group 20-50 (n=106, 53%) while a major proportion of respondents were males (n=114, 57%). Most of the respondents had secondary level education, followed by illiteracy and primary level education with 35.5%, 26.5% and 22.5% representation respectively. Regarding marital status, 24% of participants were unmarried followed by 12% widows or divorced while rest was married. Most of the respondents had glaucoma for 1 – 5 years (n = 104, 52%).

Almost half (n = 98, 49%) of the respondents were dependent on others for fulfilling daily life activities while 62.5% participants were residents of urban areas. Almost half of the participants reported as being the only earning member of their family (N = 98, 49%). Regarding affordability to treatment, 43% of participants clearly reported that the treatment was not affordable to them while 42% considered it as affordable. The average expanses to reach the hospital were reported to be less than 10 US dollars (converted value) by 88.5% respondents.

About 21.5% of the participants replied of not taking the prescribed dosage of the medication at the proper time. Compliance with medication calculated on the basis of various parameters is illustrated in Table 1.

Table 1: *Compliance with medication calculated on the basis of various parameters.*

Regular Follow-up to the hospital	162 (81%)
Instilling proper medication as per prescription	172 (86%)
Following proper dosage advised by the physician	157 (78.5%)

Table 2: *Determinants of compliance on the basis of patients' history*

Determinants	Compliant	Non-compliant	P-Value
Education			**0.03**
Illiterate	34 (23.6%)	19 (33.9%)	
Primary	35 (24.3%)	10 (17.9%)	
Secondary	47 (32.6%)	24 (42.9%)	
Higher	28 (19.4%)	3 (5.4%)	
Medical History Chief complaint / Reason of visit			**0.001**
Routine Follow up	111 (77.08%)	19 (33.93%)	
Pain / Discomfort	11 (7.64%)	21 (37.5%)	
Blurred Vision	13 (9.03%)	9 (16.07%)	
Lacrimation	9 (6.25%)	7 (12.5%)	
Side effects of treatment			**0.18**
No	90 (62.5%)	37 (66.07%)	
Itching	13 (9.03%)	7 (12.5%)	
Burning	14 (9.72%)	8 (14.29%)	
Stinging	27 (18.75%)	4 (7.14%)	
Overall Satisfaction with treatment			**0.001**
No	1 (0.69%)	17 (30.36%)	
Neutral	38 (26.39%)	21 (37.5%)	
Yes	105 (72.92%)	18 (32.14%)	

Out of total 53 illiterate respondents, 33.9% (N = 19) were non-compliant while out of 31 respondents with higher education only 5.4% (N = 3) reported non-compliance to the treatment. There was a significant association between compliance and education status (p = 0.03). A significant association was found between reason of visit to clinic (P = 0.001) with compliance to medication however exposure to treatment related side effects had no significant effect on compliance. Almost 30% (N = 59) of respondents said that they were un-decisive about their satisfaction with the treatment options, while 9% (N = 18) reported dissatisfaction with the treatment. A significant association between medication compliance and satisfaction with treatment options was found (p = 0.001).

Factors like personal knowledge and understanding about disease, confusion regarding

Table 3: *Association of Personal knowledge, understanding of disease and family support with compliance to treatment.*

Parameters	Compliant	Non-compliant	p-value
Personal Knowledge			
Knowledge about disease			**0.003**
Yes	132 (91.7%)	33 (58.9%)	
No	12 (8.33%)	23 (41.07%)	
Understanding that control over disease provided by eye drops			**0.008**
Yes	78 (54.17%)	13 (23.21%)	
Somehow	65 (45.14%)	30 (53.57%)	
No	1 (0.69%)	13 (23.21%)	
Facing confusion regarding schedule of medication			**0.01**
Yes	22 (15.28%)	18 (32.14%)	
No	121 (84.03%)	38 (67.86%)	
Family Support			
Difficulty in putting drops in eyes			**1.03**
Yes	22 (15.28%)	8 (14.29%)	
No	122 (84.72%)	48 (85.71%)	
Attendant required for visit to hospital			**0.81**
Yes	61 (42.36%)	22 (39.29%)	
No	83 (57.64%)	34 (60.71%)	

schedule of medication and the family support was also studied. A significant association was found between knowledge about disease (P = 0.003) and the participants' understanding that medication controls the disease (p = 0.008) with compliance. Table 3 shows association of personal knowledge, understanding of disease and family support with compliance to treatment.

DISCUSSION

The most significant finding of the current study was a high rate of non-compliance (30%) with long-term glaucoma medication among the participants presenting at a tertiary care eye hospital. Our results are in accordance with those reported in a review article where non-compliance rate was reported between 4.6%-59%.[11] Another study reported higher levels of non-compliance (53.6%) compared to this study.[12] This implicates a consistent trend of noncompliance across developing countries which might be explained by various personal and healthcare system related factors.[13]

Almost 20% of respondents in the current study expressed confusion regarding the schedule of instilling eye drops. About two thirds of the patients attributed the confusion to the numerous medications and their daily consumption, which is in accordance with the results of another article where multiple doses of eye drops resulted in higher rate of non-compliance to glaucoma treatment.[14]

About 15.5% participants reported that they were unable to visit according to the prescribed schedule which could disturb the treatment plans and increase the risk of visual loss as reported in a study where adherence to the advice was found to be critical for better outcomes oftreatment.[15] Numerous side effects with long-term treatment including itching, watering, stinging or burning were frequently reported by the participants which is also in agreement with the results of another study where adverse effects of medicines negatively affected the compliance to treatment.[16] About 27.5% of patients were confused about whether the doctor explained the disease or not and this was found to be of statistical significance with the compliance level (p < 0.05). Evidence suggests that lack of communication between physician and patient is a substantial factor leading to non-compliance.[9]

Almost 30% of respondents reported to be somehow satisfied with the therapy, which is in contrast to the study by Lemij et al where 89% of patients reported satisfaction with glaucoma treatment despite adverse ocular effects; however, the author recommended further studies since adverse events lead to dissatisfaction which might negatively affect the compliance.[17]

In many developing countries preservative-free medicines are not available which may lead to ocular surface diseases resulting in ocular discomfort and dissatisfaction and ultimately leading to poor compliance.

Age and gender were statistically associated with glaucoma compliance in many studies.[18,19] However, these demographic variables were not found to be statistically significant in the current study. Almost 30% of patients were illiterate, followed by only 15.5% who had higher education and the level of education was found to be significantly associated with the degree of compliance (p < 0.05) in the current study. This finding was in contrast to an Ethiopian study where the level of education was not found statistically associated with non-adherence to glaucoma treatment.[20] A possible explanation to this finding could be the lack of healthcare facilities in African countries which predominantly has more effect on compliance than the education level of the patients. Many studies have shown that glaucoma has posed an economic burden on patients in different ways.[20,21] However, other factors like cost of medications, job status, working status, duration of glaucoma, residence, and expense per visit to the hospital were not found associated with the level of compliance in the current study.

Reason for visiting the hospital was also found to be associated with adherence to glaucoma treatment in the current study. A previous study has also shown an association between presenting complaints and glaucoma compliance.[22]

This study was unique in a way as only a few studies have attempted to evaluate factors affecting compliance to glaucoma therapy in developing countries. However, since the current study was conducted in a tertiary care trust healthcare setting, some important factors could have been concealed as many patients visit regularly to get free medicines provided by the trust hospital. Patients presenting at private eye clinics might report less compliance due to more economic burden related to drugs. Hence, the results of current study cannot be generalized to every

set up. Multicentered studies are required to assess other factors resulting in poor compliance which could help in overcoming these problems, leading to efficient utilization of healthcare services.

CONCLUSION

Knowledge of the disease, poor communication with the doctor, lack of satisfaction with treatment and level of education were associated with non-compliance to long-term glaucoma therapy. Compliance towards anti-glaucoma medication can be improved by developing good communication between patient and physician as well as encouraging better understanding by the patient for the need of treatment. For better compliance, it is important to develop awareness programs to educate the patients and general public about the importance of regular eye examination.

Conflict of Interest: Authors declared no conflict of interest.

Ethical Approval

The study was approved by the Institutional review board/Ethical review board **(ERC-09/AST-18).**

REFERENCES

1. **Bathija R, Gupta N, Zangwill L, Weinreb RN.** Changing definition of glaucoma. J Glaucoma, 1998; **7 (3):** 165-169. Doi: 10.1097/00061198-199806000-00004.
2. **Quigley HA, Broman AT.** The number of people with glaucoma worldwide in 2010 and 2020. Br J Ophthalmol. 2006; **90 (3):** 262-267. Doi: 10.1136/bjo.2005.081224.
3. **Bourne RR, Taylor HR, Flaxman SR, Keeffe J, Leasher J, Naidoo K, et al.** Vision Loss Expert Group of the Global Burden of Disease Study. Number of people blind or visually impaired by glaucoma worldwide and in world regions 1990-2010: A meta-analysis. PLOS ONE, 2016; **11 (10):** e0162229. Doi: 10.1371/journal.pone.0162229.
4. **Chan EW, Li X, Tham YC, Liao J, Wong TY, Aung T, et al.** Glaucoma in Asia: regional prevalence variations and future projections. Br J Ophthalmol. 2016; **100 (1):** 78-85. Doi: 10.1136/bjophthalmol-2014-306102.
5. **Dineen B, Bourne RRA, Jadoon Z, Shah SP, Khan MA, Foster A, et al.** Pakistan National Eye Survey Study Group. Causes of blindness and visual impairment in Pakistan. The Pakistan national blindness and visual impairment survey. Br J Ophthalmol. 2007; **91 (8):** 1005-1010. Doi: 10.1136/bjo.2006.108035.
6. **Mulugeta A.** Management of absolute glaucoma: experience of Rasdesta Damtew Hospital, Addis Abeba, Ethiopia. Ethiop Med J. 2017; **55 (2)**.
7. **Shafranov G.** Glaucoma therapy: compliance, adherence, persistence, and alliance. Understanding the terminology and addressing the issues it represents. Glaucoma Today, 2006; **8:** 40-42.
8. **Tsai JC, McClure CA, Ramos SE, Schlundt DG, Pichert JW.** Compliance barriers in glaucoma: A systematic classification. J Glaucoma, 2003; **12 (5):** 393-398. Doi: 10.1097/00061198-200310000-00001.
9. **Taylor SA, Galbraith SM, Mills RP.** Causes of non-compliance with drug regimens in glaucoma patients: A qualitative study. J Ocul Pharmacol Ther. 2002; **18 (5):** 401-409. Doi: 10.1089/10807680260362687.
10. **Nordmann JP, Auzanneau N, Ricard S, Berdeaux G.** Vision related quality of life and topical glaucoma treatment side effects. Health Qual Life Outcomes, 2003; **1:** 75. Doi: 10.1186/1477-7525-1-75.
11. **Castro ANBVd, Mesquita WA.** Noncompliance with drug therapy of glaucoma: a review about intervening factors. Braz J Pharm Sci. 2009; **45 (3):** 453-459. Doi: 10.1590/S1984-82502009000300010.
12. **Subathra GN, Rajendrababu SR, Senthilkumar VA, Mani I, Udayakumar B.** Impact of COVID-19 on follow-up and medication adherence in patients with glaucoma in a tertiary eye care centre in south India. Indian J Ophthalmol. 2021; **69 (5):** 1264-1270. Doi: 10.4103/ijo.IJO_164_21.
13. **Abu Hussein NB, Eissa IM, Abdel-Kader AA.** Analysis of factors affecting patients' compliance to topical antiglaucoma medications in Egypt as a developing country model. J Ophthalmol. 2015; **2015:** 234157. Doi: 10.1155/2015/234157.
14. **Cook PF, Schmiege SJ, Mansberger SL, Kammer J, Fitzgerald T, Kahook MY.** Predictors of adherence to glaucoma treatment in a multisite study. Ann Behav Med. 2015; **49 (1):** 29-39. Doi: 10.1007/s12160-014-9641-8.
15. **Denis P.** Adverse effects, adherence and cost-benefits in glaucoma treatment. Eur. Ophthal Rev. 2011; **5 (2):** 116-122.
16. **Bloch S, Rosenthal AR, Friedman L, Caldarolla P.** Patient compliance in glaucoma. Br J Ophthalmol. 1977; **61 (8):** 531-534. Doi: 10.1136/bjo.61.8.531.
17. **Lemij HG, Hoevenaars JG, van der Windt C, Baudouin C.** Patient satisfaction with glaucoma therapy: reality or myth? Clin Ophthalmol. 2015; **9:** 785-793. Doi: 10.2147/OPTH.S78918.

18. **Masoud M, Sharabi-Nov A, Pikkel J.** Noncompliance with ocular hypertensive treatment in patients with primary open angle glaucoma among the Arab population in Israel: A cross-sectional descriptive study. J Ophthalmol. 2013; **2013:** 405130. Doi: 10.1155/2013/405130.
19. **Tripathi S, Gupta S, Arora V.** Socio-demographic determinants of glaucoma medications compliance: A North Indian cross sectional study. Indian J Clin Exp Ophthalmol. 2017; **3 (1):** 53-56.
20. **Nayak B, Gupta S, Kumar G, Dada T, Gupta V, Sihota R.** Socioeconomics of long-term glaucoma therapy in India. Indian J Ophthalmol. 2015; **63 (1):** 20-24. Doi: 10.4103/0301-4738.151458.
21. **Hoevenaars JG, Schouten JS, van den Borne B, Beckers HJ, Webers CA.** Socioeconomic differences in glaucoma patients' knowledge, need for information and expectations of treatments. Acta Ophthalmol Scand. 2006; **84 (1):** 84-91. Doi: 10.1111/j.1600-0420.2005.00587.x
22. **Ng WS, Agarwal PK, Sidiki S, McKay L, Townend J, Azuara-Blanco A.** The effect of socio-economic deprivation on severity of glaucoma at presentation. Br J Ophthalmol. 2010; **94 (1):** 85-87. Doi: 10.1136/bjo.2008.153312.

Authors' Designation and Contribution

Huma Munir; Optometrist: *Concepts, Design, Data analysis.*

Muhammad Sadiq; Lecturer: *Manuscript preparation, Manuscript editing.*

Shama Khan; Associate Professor: *Literature search, Data analysis.*

Sarah Zafar; Professor: *Literature search, Data analysis.*

Farah Akhtar; Professor: *Manuscript editing.*