

afs2024044/25309

Assessment of Adherence to Anti-glaucoma Medication among Glaucoma Patients in Benin Metropolis

Stella E. Odjimogho¹, Emoefe S. Odjimogho¹, Becky O. Agbohi¹ and Gabriel B. Ogunma^{2*}

¹Department of Optometry, Faculty of Life Sciences, University of Benin, Benin-City Edo State, Nigeria

²Department of Science Laboratory Technology, Faculty of Life Sciences, University of Benin, Benin-City Edo State, Nigeria

*Corresponding author Email: alexthemain076@gmail.com, Tel: +234 703 269 5752

(Received September 27, 2024; Accepted in revised form September 30, 2024)

ABSTRACT: This evaluate the anti-glaucoma drugs used among glaucoma patients in Benin Metropolis. A clinic-based cross-sectional study was conducted in three local government areas of Edo state (Ikpoba-Okha, Oredo and Egor). Morisky Medication Adherence Scale (MMAS -8) was used to assess the adherence to anti-glaucoma drugs. Two hundred and ten (210) patients with glaucoma using a purposive sampling technique were selected from eye clinics in Benin City; the questionnaire was pretested on a similar study group to assess its validity and reliability. The results showed that 118(56.19%) participants had low adherence, 71(33.81%) participants had medium adherence and only 21(10.00%) participants had high adherence. Statistical analysis using ordinal regression model revealed that age ($p=0.01$), marital status ($p=0.018$), and educational status ($p=0.02$) were significant predictors of adherence to anti-glaucoma drugs among the glaucoma patients. This study contribute to the factors leading to poor and non-adherence glaucoma medications subjected to glaucoma patients thereby mitigate the factors.

Keywords: Intraocular Pressure, Patients, Glaucoma, Adherence, Benin Metropolis.

Introduction

Glaucoma, also known as "silent thief of sight," is a complex and progressive eye disease that gives rise to major public health concerns around the world. It is a group of clinical disorders marked by optic nerve damage and visual field defects with progressive loss of retinal ganglion cells, which threatens vision and quality of life (Mi *et al.*, 2014; Stein *et al.*, 2021). Glaucoma is particularly 'sneaky', it starts without noticeable symptoms in its early stages and becomes conspicuous only when irreversible damage has occurred. The common risk factors for glaucoma include raised intraocular pressure (IOP), age, family history, and ethnicity. Raised intraocular pressure is the most important and only modifiable glaucoma risk factor. Also, terms like 'low tension' or 'normal tension' glaucoma are used in cases of optic nerve damage and associated visual field loss but with low or normal intraocular pressure (Mi *et al.*, 2014).

The Intraocular pressure {IOP} is an important factor in diagnosing glaucoma and is a good predictor of the onset of primary open-angle glaucoma. Elevated intraocular pressure is believed to cause damage to the lamina cribosa. This results in the deterioration of normal structural and metabolic support of retinal ganglion cell axons and hinders axoplasmic transport. Reduction of intraocular pressure is the only proven means to stop or delay the progression of glaucoma (Da Silva and Lira, 2022; Pereira *et al.*, 2021). Intraocular pressure (IOP) results from the equilibrium between aqueous humor production and the resistance to its outflow, involving both active and passive aqueous transport mechanisms, alongside episcleral venous pressure. Aqueous production occurs in the ciliary processes which is located in the anterior chamber of the eyes. Once the aqueous has been formed, it circulates through the eyes until it is drained via the trabecular meshwork, schlemm canal, and the uveoscleral

pathway (Aina *et al.*, 2018). The trabecular meshwork and schlemm canal (conventional outflow) are the major drainage sites while the uveoscleral pathway (unconventional outflow) has a lesser contribution to aqueous drainage. Presently, the tonometers used in clinical practice only approximate the true IOP (Da Silva and Lira, 2022). Manometry is the only method available to measure IOP accurately. There are several types of tonometers including transpalpebral, applanation, indentation, rebound, and contour tonometers. Among these, Goldmann applanation tonometry (GAT) is the gold standard (Da Silva and Lira, 2022; Tham *et al.*, 2014; Kyari *et al.*, 2015).

Materials and methods

Research area: The research was a quantitative cross-sectional study conducted at St Theresa's Specialist and Laser Eye Centre, Edo Specialist Hospital Eye Clinic, Africa Eye Laser Centre, Sightcare Specialist Eye Clinic, and Echos Eye Clinic. The study population comprised of two hundred and ten (210) known glaucoma patients, aged between 18 to 88 years, mean; 44.71 ± 18.51 in Benin Metropolis. Purposive sampling technique was used to select the subjects who participated in the study.

Research materials: The materials that were used for the study include a pretested questionnaire and Recording sheet and pen

Inclusion criteria: Glaucoma patients 18 years and older; glaucoma patients who had been on anti-glaucoma drugs for at least 6 months prior to the time of the study and were willing to participate in the study.

Exclusion criteria:

- Glaucoma patients who were less than 18 years old
- Glaucoma patients who were recently diagnosed of the disease (less than 6 months)
- Glaucoma patients who declined informed consent.
- Glaucoma patients with less than 6/60 visual acuity in the better eye with correction.
- Glaucoma patients who did not understand English or Pidgin.

Research procedure: Permission was sought and granted by the management of the various clinics before the commencement of the study. Informed consent was obtained from participants after an explanation of the aims and objectives of the study. The questionnaires were then distributed to patients who gave consent. The questions were read and explained to patients who were not literate enough to read, and has be predisposed to the drug treatment for six months.

The questionnaire contained 4 sections, which were;

- Section 1: Demographics and other background information
- Section 2: Illness Characteristics
- Section 3: Self-care practices (this section contained questions on perceptions and attitude of patients towards the disease and factors influencing adherence).
- Section 4: Medication Adherence using Morisky Medication Adherence Scale (MMAS 8).

Data analysis: Data obtained from the study was analyzed using Mean \pm SEM and further subjected to ANOVA via Statistical Package for Social Sciences {SPSS} version 21.0.

Ethical approval: Ethical clearance was obtained from the Departmental Research and Ethics Committee of the Department of Optometry, University of Benin, Benin City in accordance with the tenets of the Declaration of Helsinki. Permission was sought and granted by the management of the various clinics used before the commencement of the study and informed consent was also sought from each of the study participants.

Limitation of study: This study relied on the patients' self-reported medication adherence and there may have been over-estimation, recall and pleasing bias. Some patients may have over-estimated their adherence to the medications.

Results

The highest number of participants in the study population were between 21-30 years (28.57%), closely followed by people above 60 (26.67%) while the age range 18-20 (3.81%) had the least number of participants (Table 1). The gender distribution showed that the male and female participants were 90(43%) and 120(57%) females respectively (Fig. 1).

Table 1: Age distribution of participants in the study population

Age	Frequency	Percentage (%)
18-20	8	3.81
21-30	60	28.57
31-40	28	13.33
41-50	26	12.38
51-60	32	15.24
> 60	56	26.67
Total	210	100

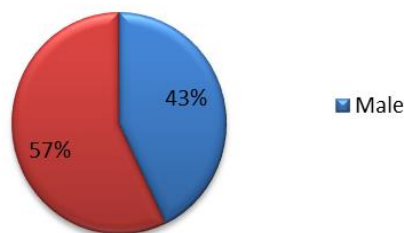


Figure 1: Gender distribution of participants in the study population.

A total of 84(40%) single respondents, 105(50%) married respondents, 2(1%) separated/divorced respondents and 19(9%) widowed respondents participated in this study (Fig. 2). Thirteen (13) participants accounting for 6.19% had no formal education, 28(13.33%) participants attained primary education, 43(20.48%) participants attained secondary education and 126(60%) attained tertiary education (Fig. 3)

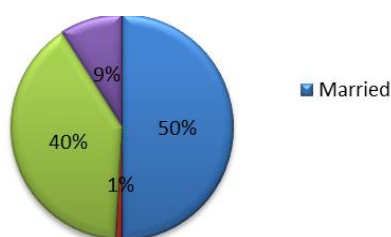


Figure 2: Distribution of marital status of respondents in the study population

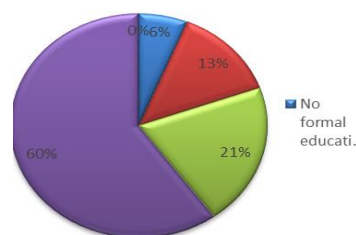


Figure 3: Distribution of Educational levels of respondents in the study population

Civil servants (20.47%) were the highest number of participants, closely followed by Business men/women (18.57%), and students (18.57%) in the occupational distribution in the study population (Table 2) while the Binis had the highest number (56.66%) of participants in the ethnic distribution of respondents. The Igarra ethnic group had the least number of participants with 0.95% (Table 3).

Table 2: Occupational distribution of respondents in the study population

Occupation	Frequency	Percentage (%)
Artisan	4	1.90
Business man/woman	39	18.57
Civil Servant	43	20.47
Driver	2	0.95
Employed	2	0.95
Farming	4	1.90
Pensioner	31	14.76
Self employed	4	1.90
Student	39	18.57
Trading	25	11.90
Unemployed	17	8.09
Total	210	100

Table 3: Ethnic distribution of Respondents in the study population

Ethnic group	Frequency	Percentage (%)
Bini	119	56.66
Delta	4	1.90
Hausa	5	2.38
Igarra	2	0.95
Igbo	47	22.38
Owan	6	2.86
Urhobo	10	4.76
Yoruba	17	8.09
Total	210	100

The chart above shows that 195(92.86%) participants were Christians, 9(4.29%) participants were Muslims, and 6(2.86%) participants were traditional worshippers.

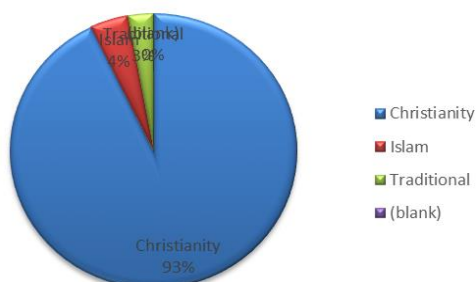


Table 4: Income distribution of respondents in the study population

Income (per annum)	Frequency	Percentage (%)
Less than ₦20,000	38	18.10%
₦ 21,000 - ₦ 50,000	54	25.71%
₦ 51,000- ₦ 100,000	34	16.19%
Above ₦100,000	84	40.00%
Total	210	100

Figure 4: Religious distribution of respondents in study population

Majority of the respondents earned above ₦100,000 per annum, followed by ₦21,000 - ₦ 50,000, and those earning between ₦51,000 to ₦100,000 made up the least number of respondents (Table 4).

The adherence to Anti-glaucoma Drugs was measured using the Morisky Medication Adherence Scale [MMAS 8]. The result showed that 65.24% sometimes forgot to use their anti-glaucoma eye drops, 55.24% reported that over the past 2 weeks there were days they didn't use their anti-glaucoma eye drops, 26.19% stopped using their eye drops without telling their doctor because they felt worse when they used it, 44.76% sometimes forgot to take along their eye drops when they travelled, 33.33% forgot to use their eye drops the previous day, 28.1% sometimes stopped using their eye drops when they felt their pressure was under control, and 47.62% of the participants found it difficult to stick to their treatment plan.

The participants responses were scored using the scoring scheme of “Yes” = 1 and “No” = 0. The aggregate respondent's score of 0 is regarded as high adherence; a score of 1 or 2 is regarded as medium adherence while a respondent's score of > 2 is regarded as low adherence. From the scoring technique, 21(10.00%) respondents has high adherence, 71(33.81%) respondents had medium adherence and 118(56.19%) respondents had low adherence to anti-glaucoma drugs (Table 5).

Table 5: Adherence to Anti-glaucoma Drugs among the Respondents

Variables	Yes	No
Do you sometimes forget to use your anti-glaucoma eye drops?	137 (65.24%)	73 (34.76%)
Over the past two weeks, were there any days when you did not use your anti-glaucoma eye drops?	116 (55.24%)	94 (44.76%)
Have you ever stopped using your eye drops without telling your doctor, because you felt worse when you used it?	55 (26.19%)	155 (73.81%)
When you travel or leave home, do you sometimes forget to bring along your eye drops?	94 (44.76%)	116 (55.24%)
Did you forget to use your anti-glaucoma eye drops yesterday?	70 (33.33%)	140 (66.67%)
When you feel like your glaucoma (eye pressure) is under control, do you sometimes stop using your medicine (eye drops)?	59 (28.1%)	151 (71.9%)
Do you find it difficult to stick to your glaucoma treatment plan?	100 (47.62%)	110 (52.38%)

The result of the responses given by the participants on their perceptions and attitude towards the disease using the Likert scale is presented in Table 6. Statistical analysis was performed for this section where it was seen that patients' perceptions and attitude towards the disease affect their adherence level.

Table 6: Perception and attitude of glaucoma patients towards the disease

Question	Agree (%)	Disagree (%)	Neutral (%)	Strongly agree (%)	Strongly disagree (%)
Glaucoma leaves one at risk of going blind.	45(21.43%)	6(2.86%)	15(7.14%)	142(67.62%)	2(0.95%)
Glaucoma is hereditary.	67(31.90%)	15(7.14%)	46(21.90%)	76(36.19%)	6(2.86%)
There is enough information out there about the roles and effects of glaucoma drugs.	58(27.62%)	35(16.67%)	56(26.67%)	31(14.76%)	30(14.29%)
I have received enough information about the disease and I understand this information.	92(43.81%)	6(2.86%)	30(14.29%)	64(30.48%)	18(8.57%)
I received adequate information about the side effects of the drugs.	45(21.43%)	38(18.10%)	44(20.95%)	43(20.48%)	40(19.05%)
I received adequate information on the correct method of administering the drugs.	73(34.76%)	16(7.62%)	36(17.14%)	69(32.86%)	16(7.62%)

Question	Agree (%)	Disagree (%)	Neutral (%)	Strongly agree (%)	Strongly disagree (%)
I find it disturbing having to administer my anti glaucoma eye drops on a daily basis.	39(18.57%)	56(26.67%)	39(18.57%)	34(16.19%)	42(20.00%)
Anti-glaucoma drugs can cure glaucoma	36(17.14%)	56(26.67%)	51(24.29%)	23(10.95%)	44(20.95%)
Glaucoma causes stress on you as an individual	64(30.48%)	16(7.62%)	28(13.33%)	82(39.05%)	20(9.52%)
Glaucoma causes stress on your family members	30(14.29%)	34(16.19%)	26(12.38%)	80(38.10%)	40(19.05%)
There is a need for follow up clinic attendance	65(30.95%)	6(2.86%)	14(6.67%)	119(56.67%)	6(2.86%)

Table 7 shows the factors that influence adherence to anti-glaucoma drugs. The result which outlined some factors (barriers and facilitators) and their influence on adherence, showed the participants' responses as to, if the factors influenced or did not influence adherence levels. The responses were collected on a Likert scale.

Table 7: Factors that Influence Adherence to Anti-glaucoma drugs

Question	Agree (%)	Disagree (%)	Neutral (%)	Strongly agree (%)	Strongly disagree (%)	No response
Disease and drug education	89(42.38%)	14(6.67%)	46(21.90%)	53(25.24%)	8(3.81%)	0
Side effects of the eye drops	72(34.29%)	34(16.19%)	35(16.67%)	11(5.24%)	49(23.33%)	9(4.29%)
Reminders	51(24.29%)	21(10.00%)	49(23.33%)	87(41.43%)	2(0.95%)	0
Lack of assistance in administering the eye drops	41(19.52%)	56(26.57%)	26(12.38%)	13(6.19%)	74(35.24%)	0
Cost of the eye drops	68(32.38%)	30(14.28%)	35(16.67%)	45(21.43%)	32(15.24%)	0
Non availability of eye drops.	90(42.86%)	18(8.57%)	22(10.48%)	32(15.24%)	48(22.86%)	0
The use of multiple (other) eye drops	73(35.10%)	19(9.13%)	40(19.23%)	46(22.12%)	30(14.42%)	0

Discussion

The level of adherence was measured using the Morisky Medication Adherence Scale (MMAS-8), which is the latest version of the scale. The MMAS-8 consists of eight items which focus on the past medication use patterns of respondents. This study assessed the adherence levels of glaucoma patients to anti-glaucoma drugs in Benin Metropolis. The age range of respondents was between 18 and 88 years of age, mean; of 44.71±18.51years. However, approximately 45.71% of the respondents were 40 years of age and below. According to Pereira *et al.* (2021)., there is a complex relationship between adherence to drugs and socio-demographic characteristics of patients though a correlation between them can help predict which of them affects medication adherence the most. More females (57%) participated in this study. This is in line with the study of Ajite *et al.*, (2019) and Onakoya and Mbadugha, (2016), where a female dominance of 51.8% and 61.4% were reported respectively among patients with glaucoma. However, it is in contrast with the study of Olawoye and Tarella (2018), where there was predominance of males (63.89%) in their study. It was seen from the statistical analysis of this study that females had higher adherence to anti-glaucoma drugs than males and adherence to the drugs was higher with increasing age-range, 18-20 years had the lowest adherence level while participants above 60 had higher adherence levels. The higher number of females with glaucoma in this study may be because it had been stated that females are at an increased risk of developing glaucoma compared to males. Women account for approximately 61 percent of glaucoma patients (Rosu *et al.*, 2020).

Most of the respondents were Christians; this may either mean that Christianity is the dominant religion practiced by the people in Benin Metropolis or that other religions did not access eye care in clinics within the state during the period of the study. The predominance of Binis established by this study is not so surprising because the study was carried out in eye clinics in Benin Metropolis. It is also seen from the findings that majority are civil servants, closely followed by business men/women, students and pensioners/retires and earn

above 100,000 Naira as monthly income. This finding indicates that the majority of the respondents are involved in some type of employment that generates income this could influence levels of adherence to medications. This finding is contrary with the findings of Schuster *et al.* (2020) where the majority of their respondents (52.85%) were unemployed. Marital status significantly influences adherence to anti-glaucoma drugs; single participants were more likely to not adhere to their drugs (had lower adherence levels). This is opposed to the results of a similar study by Onakoya and Mbadugha (2016) where marital status did not significantly influence adherence. Highest educational level attained also significantly affects adherence: people with tertiary education had highest adherence levels than those with Secondary and Primary educational levels. In this study, gender, ethnicity, occupation, religion, and average monthly income did not significantly influence adherence to anti-glaucoma drugs.

This study clearly showed that a significant proportion of the patients (56.19%) had low adherence to their anti-glaucoma medications, 33.81% had medium adherence while only 10.00% had high adherence. This dominance of low adherence level (56.19%) corroborates a similar study by Oladosu *et al.* (2021) where 91.5% of the participants had low adherence to their anti-glaucoma drugs. It is also in-line with the study by Onakoya and Mbadugha (2016) where more than two-thirds of the participants (72.8%) reported less than 100% adherence. However, this study contradicts a study conducted by Ajite *et al.* (2019) in Ekiti State University Teaching Hospital, Ado Ekiti, where a high adherence level of 72.5% was reported and only 27.5% were not adherent to their anti-glaucoma medications. This may be as a result of variations in the study set-up and the financial capabilities of the participants. In a systematic review by Olthoff *et al.*, (2005) it was reported that the non-adherence rates of patients in different studies vary widely, ranging between 5% and 80%; this has further confirmed the variability in the adherence pattern among patients with glaucoma. The aggregate respondent's score of 0 is regarded as high adherence; a score of 1 or 2 is regarded as medium adherence while a respondent's score of > 2 is regarded as low adherence (Oladosu *et al.*, 2021).

This study also assessed the perception and attitude of glaucoma patients towards their disease and how they affect adherence to glaucoma medications. It was seen in this study that 89% of the respondents were aware of the risk of going blind from the disease, 68% of the respondents knew that Glaucoma was hereditary, 74.29% had enough information on the effects of the eye drops, 88% had enough information on the side effects of the drugs, and 87.62% knew that follow up clinic attendance was crucial (Stein *et al.*, 2021). However, only 42.38% had information on the roles and effects of the drugs, 47.62% had the notion that the drugs could cure glaucoma, and 46.67% admitted that they found administering their anti-glaucoma eye drops daily disturbing. Statistical information showed that those that found it disturbing to administer their eye drops daily had lower adherence levels. This was not surprising. All other percepts had no significant effect on adherence.

In this study, it was seen that majority of the participants agreed that the information that they received about the drugs influence how they used the drugs and their adherence level in general. It is therefore very crucial that practitioners educate and enlighten their patients on the roles, effects and how the drugs work so as to improve adherence level. Another factor worthy of note is the use of reminders, 65.71% of the participants reported getting texts and calls from the clinic for filling of their anti-glaucoma drugs as a facilitator to adherence. Practitioners should have good follow-up and appointment plans for their glaucoma patients, phone calls should be made across to them at least once every month for drug fillings, and to know how they are faring with the prescription. This will help greatly in the improvement of adherence. Non-availability of the prescribed eye drops at the clinic or pharmacy was reported by 58.10% as a reason to stop using their drugs thereby contributing to low adherence rates (Pereira *et al.*, 2021). Practitioners should prescribe good and effective eye drops that is common and is readily available to patients when it is time to re-fill. Also, the use of multiple eye drops was reported by 56.6% of the patients as a barrier to adherence. When Patients are placed on too many eye drops, they tend to select which ones they use or alternate their use. Patients should be enlightened that glaucoma eye drops must be used at the designated time every day, overall, Practitioners should try to cut down on the number of eye drops that is prescribed for a Patient, combination eye drops should be used to help avoid prescribing 'too many bottles' for one patient. The cost of drugs and lack of assistance were also identified as barriers to adherence by 53.51% and 25.71% of the respondents respectively (Pereira *et al.*, 2021).

Conclusion

Glaucoma is a disease that worsens over time and can lead to blindness if not properly managed with the appropriate medication therapy. The level of adherence to anti-glaucoma drugs in Benin Metropolis was low. Aggressive interventions to promote adherence to medication therapy among glaucoma patients in Benin Metropolis. Reminders, Cost, and Availability of the drugs were some other important factors worthy of note.

References

- Aina A, Olawoye O, Oluleye T: Factors affecting compliance with glaucoma medications in Nigeria. *S Afr Ophthalmol J*, 13(1): 17-21.2018.
- Ajite KO, Fadamiro CO, Ajayi II, Omotoye OJ: Reported medication adherence by glaucoma patients in a Nigeria hospital. *Adv Ophthalmol Vis Syst*, 9(5):129-31.2019.
- Da Silva F, Lira, M: Intraocular pressure measurement: A review. *Surv Ophthalmol*, 67(5): 1319-1331. 2022.
- Kyari F, Entekume G, Rabi M, Spry P, Wormald R, Nolan W, Murthy GV, Gilbert CE: Nigeria national blindness and visual impairment study group; A population-based survey of the prevalence and types of glaucoma in Nigeria: results from the Nigeria National Blindness and Visual Impairment Survey. *BMC Ophthalmol*, 15: 1-15. 2015.
- Mi XS, Yuan TF, So KF; The current research status of normal tension glaucoma. *Clin Intervent Aging*, 1563-1571. 2014.
- Oladosu TO, Awoseemo AB, Oladosu JO, Fawole I: Assessment of adherence anticoagulant drugs among glaucoma patients in Osun State, Nigeria. *Eur J Soc Sci Educa Res*, 1(4):41-49 2021.
- Olawoye O, Tarella S: Spectrum of glaucoma presentation in a Nigerian tertiary hospital. *Nig J Ophthalmol*, 22(1), 11-15. 2018.
- Onakoya AO, Mbadugha CA: Self-reported adherence rates in glaucoma patients in Southwest Nigeria. *J Clinical Sci*, 13(2): 51-57. 2016.
- Olthoff CM, Schouten JS, van de Borne BW, Webers CA: Non-compliance with ocular hypotensive treatment in patients with glaucoma or ocular hypertension an evidence-based review. *Ophthalmol*, 112: 953-961. 2005.
- Pereira IC, van de Wijdeven R, Wyss HM, Beckers HJ, den Toonder JM: Conventional glaucoma implants and the new MIGS devices: a comprehensive review of current options and future directions. *Eye*, 35(12): 3202-3221. 2021.
- Rosu AM, Coelho A, Camacho P: Assessment of medication therapy adherence in glaucoma: scoping review. *Expert Rev Ophthalmol*, 16(2): 113–124. 2020.
- Schuster AK, Erb C, Hoffmann EM, Dietlein T, Pfeiffer N: The diagnosis and treatment of glaucoma. *Deutsches Ärzteblatt Intern*, 117(13): 225-234. 2020.
- Sison G: *The morisky medication adherence scale: an overview*. Seattle, WA: Pillsy. 2018.
- Stein JD, Khawaja AP, Weizer JS: Glaucoma in adults-screening, diagnosis, and management: a review. *JAMA*, 325(2): 164-174. 2021.
- Tham YC, Li X, Wong TY, Quigley HA, Aung T, Cheng CY; Global prevalence of glaucoma and projections of glaucoma burden through 2040: a systematic review and meta-analysis. *Ophthalmol*, 121(11): 2081–2090. 2014.