



CASE REPORT

OPEN ACCESS

DOI: 10.5281/zenodo.4748687

FREQUENCY OF TYPES OF GLAUCOMA PRESENTING TO TERTIARY CARE HOSPITAL

Arif Khan Kundi, Abdullah Ahmad Orakzai*, Osama Sherjeel Khan**

Hayatabad Medical Complex, Peshawar-Pakistan, * Pulmonology Clinic, Abaseen Hospital, Peshawar-Pakistan, **Khyber Medical College/Teaching Hospital

Background: “Glaucoma” is one of the primary causes of permanent blindness amongst the age-related ocular disorders, and its classification remains obscure. **Objectives:** To find out the frequency of types of “glaucoma” in patients presenting at the outdoor department. **Methods:** A “cross sectional study” was conducted in the Department of Ophthalmology, Hayatabad Medical Complex, Peshawar. The study duration was six months. The study was conducted on 117 patients of both genders having glaucoma in any one or both eyes for more than six months. The age group ranged from 30 to 70 years, with mean age of 53.068 ± 7.62 years and mean weight was 82.444 ± 5.59 Kg. All patients underwent eye examinations twice, which were conducted by the consultant “ophthalmologist”. Humphrey FDT visual field analyzer was used for visual field testing. Supra threshold (C20-5 or C20-1) screening mode” was used to screen all the participants involved, after the procedure was explained and demonstrated to them. Both eyes underwent individual testing with no correction. Types of “glaucoma” were noted. **Results:** Most of patients had primary open angle glaucoma (POAG) accounting for 34.2% of cases followed by primary angle closure glaucoma (PACG) being 6% whereas 7.7% of patients had secondary glaucoma. **Conclusions:** Our study demonstrated that majority of patients presented with POAG. Also, we found that secondary glaucoma and primary angle closure glaucoma mostly resulted from operational cataract procedures.

Keywords: Glaucoma; Primary Angle Closure Glaucoma; Secondary Glaucoma; Primary Open Angle Glaucoma

Citation: Kundi AK, Orakzai AA, Khan OS. FREQUENCY OF TYPE OF GLAUCOMA PRESENTING TO TERTIARY CARE HOSPITAL. THE STETHO 2020;2(4):1-6

INTRODUCTION

Most ocular diseases are common amongst specified age groups. Diseases such as diabetes related retinopathy, macular degeneration, glaucoma and cataracts are more common in older patients (1). Different ethnic backgrounds and socioeconomic statuses are one of the reasons why such diseases have variable prevalence (2–4). “Glaucoma” is the driving cause of permanent blindness globally, amongst age related ocular diseases (5) and its classification is riddled with disparities. A definitive definition for “glaucoma” has been put forward by the “International Society for Geographical and Epidemiological Ophthalmology” for epidemiological purposes by including several empirical factors, such as visual field losses and optic nerve head findings. Hence, “glaucoma” is a broad term that's utilized to portray a complex set of visual diseases with multi-factor etiology. Continued loss of “ganglion cells” in the retina linked with specific morphological changes to the optic nerve and changes in the visual acuity can be used to define “glaucoma” (6). Most patients have late diagnosis or are only examined after significant area of “visual field” is lost; this is because “glaucoma” is asymptomatic until it's in its late stages. Glaucoma can be categorized into primary and secondary types. Although the bimolecular mechanisms are poorly understood; family history, intraocular pressure and age constitute the major risk factors for primary glaucoma (7–9). “Secondary glaucoma” is thought to be a diverse group of diseases due to other eye pathologies, mechanical trauma, steroid use or other conditions including ‘pigment dispersion or pseudo exfoliation’ (10).

According to universal classification, primary glaucoma can be classified as Primary Open Angle Glaucoma (POAG) and Primary Angle Closure Glaucoma (PACG). Among these, POAG is more common while PACG is more prevalent in certain racial groups such as in Africa and South East Asia. (5, 9). In 2014, a meta-analysis found that in people between age of 40 and 80 years, prevalence of both PACG and POAG was about 4% (5). Another systematic review stated that the prevalence of “POAG” is comparatively greater in African ethnicities aged greater or equal to 40 years, with an approximated prevalence of 2%–4% (5,11). Furthermore, compared to other ethnic groups, adult Asian populations had a greater prevalence of “PACG”, approximately 1% (5, 9). Similarly, a study conducted has reported that the frequency of

POAG was 30.5%, while that of “Secondary glaucoma” was 7.8% and PACG stood at 5.1% in Nigeria (12). Another research shows that the frequency of POAG, PACG, and “Secondary glaucoma” were 1.7%, 1.5% and 0.8% respectively (13).

There is lack of local research data in this particular subject when considering our population. Only one research article has been found regarding this topic, which was conducted in Karachi (14), it only deals with prevalence of POAG. Furthermore, results of international researches cannot be portrayed over our local population, as the results are variable and contradictory (12, 13). Thus, this research was aimed at determining the frequency of types of “glaucoma” in patients presenting to outdoor department. Result of this study will not only generate local evidence on the topic, but also pave the way for further research in this subject.

METHODS

Our particular study was cross sectional study. A sample consisting of 117 participants was collected in the Department of Ophthalmology, Hayatabad Medical Complex, Peshawar. This study was conducted from 10th August 2019 to 10th January 2020. After taking permission from the ethical review committee and research department, patients between the ages 30-70 years of both genders with “Glaucoma” as per operational definition in any one or both eyes for more than 6 months were included in the research. “Non-probability consecutive sampling” was used as the sampling technique.

Patients with history of hypertension, macular degeneration, cataracts, significant corneal surface pathology, phthisis (by ocular examination), and participants unable to fixate by ocular examination and patients who refused informed consent were not included in the study.

Base line demographic information of patients (age, gender, affected eye side (right/left), weight on weighing machine) was taken. All patients underwent eye examinations twice, which were conducted by the consultant “ophthalmologist”. To test visual fields of participants, we used a ‘Humphrey FDT visual field analyzer’ (15). To screen participants, supra-threshold mode of screening was used after the procedure was explained and demonstrated to them. Both eyes underwent individual testing with no correction. Types

of “glaucoma” were noted. Data collected was analyzed by SPSS version 22. Participation was entirely voluntary. Patient confidentiality and safety was ensured.

RESULTS

	Frequency	Percentage
POAG	40	34.2%
PACG	7	6%
Secondary Glaucoma	9	7.7%
Total	56	47.9%

Table 1. Frequency and percentage of patients according to type of glaucoma (n=117)

Stratification of “POAG”, “PACG” and “Secondary Glaucoma” with regards to “age” and “gender” are shown in Table 2, 3,4,5,6 and 7 respectively.

Age (Years)	POAG		P value
	Yes	No	
30-50	20(40.8%)	29(59.2%)	0.199
51-70	20(29.4%)	48(70.6%)	
Total	40(34.2%)	77(65.8%)	

Table 2. Stratification of “POAG” with respect to age

Gender	POAG		P value
	Yes	No	
Male	32(34.4%)	61(65.6%)	0.921
Female	8(33.3%)	16(66.7%)	
Total	40(34.2%)	77(65.8%)	

Table 3. Stratification of “POAG” with respect to gender

Age (Years)	PACG		P value
	Yes	No	
30-50	2(4.1%)	47(95.9%)	0.462
51-70	5(7.4%)	63(92.6%)	
Total	7(6%)	110(94%)	

Table 4. Stratification of “PACG” with respect to age

Gender	PACG		P value
	Yes	No	
Male	6(6.5%)	87(93.5%)	0.674
Female	1(4.2%)	23(95.8%)	
Total	7(6%)	110(94%)	

Table 5. Stratification of “PACG” with respect to gender

Age (Years)	Secondary Glaucoma		P value
	Yes	No	
30-50	5(10.2%)	44(89.8%)	0.387
51-70	4(5.9%)	64(94.1%)	
Total	9(7.7%)	108(92.3%)	

Table 6. Stratification of “Secondary Glaucoma” with respect to age

Gender	Secondary Glaucoma		P value
	Yes	No	
Male	6(6.5%)	87(93.5%)	0.321
Female	4(5.9%)	21(87.5%)	
Total	9(7.7%)	108(92.3%)	

Table 7. Stratification of “Secondary Glaucoma” with respect to gender

DISCUSSION

In this research study, the study sample was nationally diverse, and was represented by gender, age, area of residence (rural or urban). The response rate was significant, and thus the results can be generalized to the whole province of Khyber Pakhtunkhwa. However, the population is currently genetically diverse to a certain point. Our sample probably has the same genetic predisposition for “glaucoma” as seen in “Asian populations”. Pakistan’s prevalence of “glaucoma” is comparable to that of “Temba, South Africa” (16), and is mildly greater than “South African Zulus” (17) and “Kongwa, Tanzania” (18), however lesser than “Tema, Ghana” (19) and “Akinyele, SW Nigeria” (20). Despite the samples of these studies being local, there appears to be surfacing trend, with the prevalence being greater in “West Africa” as compared to “South Africa”, which itself is greater than in “East Africa”. Comparing the “Ghana study” (19) to our local study; there was a great number of “Level 1 diagnosis” (87.2 %) ,and there were greater number of cataracts and other pathologies which prevented visual field examination. Pakistan also has greater prevalence of “glaucoma” compared to “Brazil” (21), “Iran” (22), indigenous populations in “Australia” (23) and Qatar (24). Geographical and ethnic differences in prevalence have been linked to variations in “genetic and environmental” factors (25,26).

Glaucoma’s classification based on the pathophysiology involved and also on the angle morphological features is imperative, as “POAG” and “PACG” have different disease manifestations, treatments and prognosis. The commonest type of ‘glaucoma’ in Pakistan was ‘POAG’; with a similar trend in other populations (20,21).

In this research study, “POAG” was found to be in 34.2% of the patients, “PACG” in 6%, and “Secondary Glaucoma” was in 7.7% in a total of 117 participants. Comparing it to a different study, which showed that the frequency of POAG was 30.5%, PACG 5.1% and “Secondary glaucoma” was 7.8% in a total of 682 patients with glaucoma (12).

Similarly, another study showed that the frequency of “primary open angle glaucoma (POAG)” was 1.7%, “primary angle-closure glaucoma (PACG)” 1.5% and “Secondary glaucoma” was 0.8% in a total of 691 patients suspected of having glaucoma (13). Published studies regarding glaucoma in multiple populations have differed widely in several aspects, such as, the advancement and availability of different instruments used in the study; instruments which were used for measurements at one time might have been different

from those used for repeat testing (such as, that of a “visual field test”). The publications can also have varied in monetary aspects and other logistical resources, such as availability of support staff and examiners. Certain techniques can be used to evaluate optic disk cupping such as; using slit lamp for binocular indirect ophthalmoscopy including the use of eye piece. Other techniques include the use of scanning laser ophthalmoscope, disk photography and direct ophthalmoscopy. Hence the specific order of examination can help in organizing such studies in complete way.

One cannot state for sure whether differences in methodology might have significant effects on the estimated prevalence, keeping in mind the standard definition. However, this could be addressed by meticulous analysis of all old and newer studies to come, in which different methodological approaches are used and comparisons established. For conventional standards, there are some other instruments that can be used as a substitute such as Humphrey field analyzer (HFA).

An important aspect to bring into consideration is the reliability of these tests. Standards of trial checks offered by the “Zeiss-Humphrey” might not be up to the mark. Fixation loss scores can have insignificant accuracy or precision also they also can be sensitive in blind spot plotting in wrong way. Considering the data, the false negative and positive indices are also imprecise. The false negative rate can be between 14% and 52% given the 95% confidence interval around a 32.8% rate of false negatives. A few enhancements were done to the software in HFA machine to calculate false positive and negative rate but there is a limitation in availability of it for independent calculation. Also note, in developing countries, due to exclusion of field testing there is less reporting on prevalence of glaucoma.

Although this method is not conclusive, but the intent of this method is to identify the proportion of patients who are suffering from vision loss due to glaucoma. It also helps us in identifying the cause of disease. Further research and clinical studies are required to validate the merits of this proposed system.

CONCLUSION

Most common glaucoma in our local population is POAG. A high proportion of PACG and secondary glaucoma were caused by different cataract procedures. Males were affected more compared to females in all types of glaucoma.

REFERENCES

- Moschos MM. Physiology and psychology of vision and its disorders: a review. *Med hypothesis, Discov Innov Ophthalmol J* [Internet]. 2014 [cited 2020 Jul 9];3(3):83–90.
- Zetterberg M. Age-related eye disease and gender [Internet]. Vol. 83, *Maturitas*. Elsevier Ireland Ltd; 2016 [cited 2020 Jul 9]. p. 19–26.
- Klein R, Klein BEK. The prevalence of age-related eye diseases and visual impairment in aging: Current estimates. *Investig Ophthalmol Vis Sci* [Internet]. 2013 Dec 13 [cited 2020 Jul 9];54(14):ORSF5. Available from: <https://pubmed.ncbi.nlm.nih.gov/24825645/>
- Cumberland PM, Rahi JS. Visual function, social position, and health and life chances the UK Biobank study. *JAMA Ophthalmol* [Internet]. 2016 Sep 1 [cited 2020 Jul 9];134(9):959–66. Available from: <https://pubmed.ncbi.nlm.nih.gov/27466983/>
- 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. *Ophthalmology* [Internet]. 2014 Nov 1 [cited 2020 Jul 9];121(11):2081–90. Available from: <https://pubmed.ncbi.nlm.nih.gov/24974815/>
- Patel AR, Patra F, Shah NP, Shukla D. Biological control of mycotoxins by probiotic lactic acid bacteria. *Dynamism dairy Ind Consum demands* [Internet]. 2017 [cited 2020 Jul 9];2015(February):2–4. Available from: <http://dx.doi.org/10.1155/2015/>
- Anholt RRH, Carbone MA. A molecular mechanism for glaucoma: Endoplasmic reticulum stress and the unfolded protein response [Internet]. Vol. 19, *Trends in Molecular Medicine*. Trends Mol Med; 2013 [cited 2020 Jul 9]. p. 586–93. Available from: <https://pubmed.ncbi.nlm.nih.gov/23876925/>
- Janssen SF, Gorgels TGMF, Ramdas WD, Klaver CCW, van Duijn CM, Jansonius NM, et al. The vast complexity of primary open angle glaucoma: Disease genes, risks, molecular mechanisms and pathobiology. *Prog Retin Eye Res* [Internet]. 2013 Nov 19 [cited 2020 Jul 9];37:31–67. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1350946213000578>
- Cheng J-W, Zong Y, Zeng Y-Y, Wei R-L. The Prevalence of Primary Angle Closure Glaucoma in Adult Asians: A Systematic Review and Meta-Analysis. *Acott TS, editor. PLoS One* [Internet]. 2014 Jul 24 [cited 2020 Jul 9];9(7):e103222. Available from: <https://dx.plos.org/10.1371/journal.pone.0103222>
- Weinreb RN, Aung T, Medeiros FA. The pathophysiology and treatment of glaucoma: A review [Internet]. Vol. 311, *JAMA - Journal of the American Medical Association*. American Medical Association; 2014 [cited 2020 Jul 9]. p. 1901–11. Available from: <https://pubmed.ncbi.nlm.nih.gov/24825645/>
- Abu-Amero K, Kondkar AA, Chalam K V. An updated review on the genetics of primary open angle glaucoma [Internet]. Vol. 16, *International Journal of Molecular Sciences*. MDPI AG; 2015 [cited 2020 Jul 9]. p. 28886–911. Available from: <https://pubmed.ncbi.nlm.nih.gov/26690118/>
- Kyari F, Entekume G, Rabiun M, Spry P, Wormald R, Nolan W, et al. 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* [Internet]. 2015 Dec 12 [cited 2020 Jul 9];15(1). Available from: <https://pubmed.ncbi.nlm.nih.gov/26653326/>
- Baskaran M, Foo RC, Cheng CY, Narayanaswamy AK, Zheng YF, Wu R, et al. The prevalence and types of glaucoma in an urban Chinese population: The Singapore Chinese eye study. *JAMA Ophthalmol* [Internet]. 2015 Aug 1 [cited 2020 Jul 9];133(8):874–80. Available from: <https://pubmed.ncbi.nlm.nih.gov/25974263/>
- Taqi U, Fasih U, Jafri SFA, Sheikh A. Frequency of primary open angle glaucoma in Abbasi Shaheed Hospital [Internet]. Vol. 61, *Journal of the Pakistan Medical Association*. 2011 [cited 2020 Jul 9]. p. 778–81. Available from: <https://pubmed.ncbi.nlm.nih.gov/22356001/>
- Wall M, Wild JM, Henson DB, Artes PH, Chaudry SJ, Chauhan BC. SUPRATHRESHOLD PERIMETRY: ESTABLISHING THE TEST INTENSITY. 1998.
- Rotchford AP, Kirwan JF, Muller MA, Johnson GJ, Roux P. Temba glaucoma study: A population-based cross-sectional survey in urban South Africa. *Ophthalmology* [Internet]. 2003 Feb 1 [cited 2020 Jul 9];110(2):376–82. Available from: <https://pubmed.ncbi.nlm.nih.gov/12578784/>
- Rotchford AP, Johnson GJ. Glaucoma in Zulul: A population-based cross-sectional survey in a rural district in South Africa. *Arch Ophthalmol* [Internet]. 2002 [cited 2020 Jul 9];120(4):471–8. Available from: <https://pubmed.ncbi.nlm.nih.gov/11934321/>
- Buhrmann RR, Quigley HA, Barron Y, West SK, Oliva MS, Mmbaga BBO. Prevalence of glaucoma in a rural east African population. *Investig Ophthalmol Vis Sci* [Internet]. 2000 [cited 2020 Jul 9];41(1):40–8. Available from: <https://pubmed.ncbi.nlm.nih.gov/10634599/>
- Budenz DL, Barton K, Whiteside-De Vos J, Schiffman J, Bandi J, Nolan W, et al. Prevalence of glaucoma in an urban west african population: The tema eye survey. *JAMA Ophthalmol* [Internet]. 2013 May [cited 2020 Jul 9];131(5):644–50. Available from: <https://pubmed.ncbi.nlm.nih.gov/23544441/>

- 9];131(5):651–8. Available from: <https://pubmed.ncbi.nlm.nih.gov/23538512/>
20. Ashaye A, Ashaolu O, Komolafe O, Ajayi BGK, Olawoye O, Olusanya B, et al. Prevalence and types of glaucoma among an indigenous African population in southwestern Nigeria. *Invest Ophthalmol Vis Sci* [Internet]. 2013 Nov 1 [cited 2020 Jul 9];54(12):7410–6. Available from: <https://pubmed.ncbi.nlm.nih.gov/24135752/>
 21. Sakata K, Sakata LM, Sakata VM, Santini C, Hopker LM, Bernardes R, et al. Prevalence of glaucoma in a South Brazilian population: Projeto glaucoma. *Investig Ophthalmol Vis Sci* [Internet]. 2007 Nov [cited 2020 Jul 9];48(11):4974–9. Available from: <https://pubmed.ncbi.nlm.nih.gov/17962447/>
 22. Pakravan M, Yazdani S, Javadi MA, Amini H, Behroozi Z, Ziaei H, et al. A population-based survey of the prevalence and types of glaucoma in central Iran: The Yazd eye study. *Ophthalmology* [Internet]. 2013 Oct [cited 2020 Jul 9];120(10):1977–84. Available from: <https://pubmed.ncbi.nlm.nih.gov/23664464/>
 23. Chua BE, Xie J, Arnold AL, Koukouras I, Keeffe JE, Taylor HR. Glaucoma prevalence in Indigenous Australians. *Br J Ophthalmol* [Internet]. 2011 Jul [cited 2020 Jul 9];95(7):926–30. Available from: <https://pubmed.ncbi.nlm.nih.gov/21113072/>
 24. Al-Mansouri F, Kanaan A, Gamra H, Khandekar R, Hashim S, Al Qahtani O, et al. Prevalence and determinants of glaucoma in citizens of Qatar aged 40 years or older: A community-based survey. *Middle East Afr J Ophthalmol* [Internet]. 2011 Apr [cited 2020 Jul 9];18(2):141. Available from: <http://www.meajo.org/text.asp?2011/18/2/141/80703>
 25. Kosoko-Lasaki O, Gong G, Haynatzki G, Wilson MR. Race, ethnicity and prevalence of primary open-angle glaucoma. *J Natl Med Assoc* [Internet]. 2006 [cited 2020 Jul 9];98(10):1626–9. Available from: <https://pubmed.ncbi.nlm.nih.gov/17052053/>
 26. Leske MC. Open-angle glaucoma - An epidemiologic overview. In: *Ophthalmic Epidemiology* [Internet]. Ophthalmic Epidemiol; 2007 [cited 2020 Jul 9]. p. 166–72. Available from: <https://pubmed.ncbi.nlm.nih.gov/17896292/>

Address for Correspondence:

Osama Sherjeel Khan, Khyber Medical College/Teaching Hospital

Cell: +92-306-5977395

Email: osamakhan.osk@gmail.com