

# Types of Glaucoma in a University Health Centre in Al-Ahsa, Saudi Arabia: A Pilot Study

Abdullatif Sami Al Rashed, Hamad Abdulaziz Al Subaie, Hisham Sameer Al Hathloul, Khalid Abdullah Al Shehab, Mansour Abdullah Al Naim, Kaberi Feroze Kaliyadan<sup>1</sup>, Ansari Mukhtar Aleem<sup>2</sup>

College of Medicine, King Faisal University, <sup>1</sup>Department of Ophthalmology, College of Medicine, King Faisal University, <sup>2</sup>Division of Biomedical Sciences, College of Medicine, King Faisal University, Al-Ahsa, Kingdom of Saudi Arabia

## ABSTRACT

**Objective:** The objective was to assess the profile of different types of glaucoma in a University Health Centre in Al-Ahsa, Saudi Arabia. **Materials and Methods:** It is a retrospective study in which the files of the patients at King Faisal University Health Centre were reviewed. The data collected included: Age, sex, race, visual acuity, the slit lamp examination findings, the intraocular pressure (IOP) as the average of 3 readings, the cup-to-disc ratio (CDR), the visual field changes, and the details of treatment received. **Results:** Eighty glaucomatous eyes from 50 patients were included in the study. The mean age was  $54.8 \pm 12.7$  years, and the mean IOP was  $19 \pm 3.9$  mmHg that ranged from 11 to 28 mmHg. The mean CDR mean was  $0.48 \pm 0.16$  that ranged between 0.3 and 0.9. Ninety-one percent of the visual field defects were arcuate scotomata. Primary open-angle glaucoma (POAG) (60%) was the most predominant type of glaucoma, followed by primary angle closure glaucoma (ACG) (21.3%), secondary OAG (7.5%), and secondary ACG (6.3%). As for the anti-glaucoma medications, 88% of the studied patients were on more than one medicine. **Conclusion:** This pilot study has demonstrated that POAG may be the predominant type of glaucoma in Al-Ahsa, Kingdom of Saudi Arabia (KSA). A population-based study with a larger sample size is warranted to confirm the outcome and to provide a baseline data on the prevalence of types of glaucoma in this region of KSA.

**Keywords:** Glaucoma, glaucoma types, prevalence, Saudi Arabia

## INTRODUCTION

Glaucoma is defined as a group of ocular disorders with multi-factorial etiology united by a clinically characteristic intraocular pressure (IOP)-associated optic neuropathy.<sup>[1]</sup> The most clinically useful classification of glaucoma into open angle glaucoma (OAG) and angle closure glaucoma (ACG) was devised by Barkan in 1938.<sup>[2]</sup> OAG and ACG are further subdivided into primary and secondary glaucomas depending on the presence of underlying contributory factors.

Worldwide, glaucoma is the leading cause of irreversible blindness, affecting more than 60 million people which is projected to increase to 76.0 million by 2020 and 111.8 million by 2040.<sup>[3]</sup> Glaucoma disproportionately affects people residing in Asia and Africa.<sup>[3]</sup> The prevalence and the type of glaucoma vary in different regions of the world. The Middle East region, to which Kingdom of Saudi Arabia (KSA) belongs, is expected to have over 2.2 million people with glaucoma by 2020 of which two million will be OAG.<sup>[4]</sup> This estimated figure for the Middle East region is based on the prevalence models for the European people due to lack of studies from this region. More studies are required in the Middle Eastern region to have more accurate statistics.<sup>[4]</sup> Though, there are few studies from different regions of KSA,<sup>[5-7]</sup> to our knowledge there is no study regarding prevalence and the types of glaucoma from the Eastern region of KSA. The present pilot study is a small endeavor to estimate the prevalence and the types of glaucomas in

### Access this article online

#### Quick Response Code



#### Website:

www.nigerianjournalofophthamology.com

#### DOI:

10.4103/0189-9171.164495

### Address for correspondence

Dr. Ansari Mukhtar Aleem, Division of Biomedical Sciences, College of Medicine, King Faisal University, Al-Ahsa, Kingdom of Saudi Arabia.  
E-mail: aaleem@kfu.edu.sa

Al-Ahsa, a municipality in the Eastern region of KSA. Such studies are imperative in establishing a baseline and clarifying the current needs, that would help the health policy makers to arrange their priorities for effective intervention in terms of training and other important health policy measures at the regional health level.<sup>[5]</sup> More of such regional studies could form the basis for a national prevalence indicator of different types of glaucomas and serve as a benchmark for glaucoma-related health needs.

## MATERIALS AND METHODS

The files of glaucoma patients from the King Faisal University Health Centre, Al-Ahsa were retrospectively reviewed in the month of April and May 2013. The study had been submitted and approved by the Research and Ethical Committee at the College of Medicine, King Faisal University. For the purposes of the study, Glaucoma was defined as per ISGEO criteria. From each file, the following data were collected: Patient history with emphasis on age, sex and race, the chief complaints, and family history of glaucoma. The presence of diabetes, hypertension, ischemic heart diseases or other vascular diseases were also noted. Furthermore, recorded were: Visual acuity, slit lamp examination findings, the IOP as the average of 3 readings (Goldmann applanation tonometer), the cup-to-disc ratio (CDR), and the visual field defects. The optic disc was examined with the + 90 D lens (Volk) after pupil dilation. The ratio of the maximal vertical length of the cup and the maximal vertical length of the disc was assessed, and this was calculated as the vertical CDR. The octopus automated perimeter was used for analyzing the visual field defects. The visual field indices, the mean defect and corrected loss variance were compiled. The angles of the anterior chamber; whether open, closed or narrow were recorded using the Goldmann's 4 mirror gonioscope. Angle grading was done according to the Shaffer's system of angle grading. The presence of peripheral anterior synechiae or neovascularization were noted. The iris insertion and the profile of the iris were assessed using the Spaeth's system. The type of glaucoma and the glaucoma management was also noted. Many of the files were lacking the necessary information and were excluded from the study. Furthermore, some cases diagnosed as glaucoma who were eventually found not to be really glaucomatous were also excluded. The results were tabulated, and statistical analysis was performed using Statistical Package for Social Sciences (SPSS) version 17 (SPSS inc., Chicago, IL, USA).

## RESULTS

A total of 80 glaucomatous eyes for 50 patients were included in the study, of these 39 (78%) were males

and 11 (22%) females. Saudi nationals constituted 76% of the sample while the other 24% were of different nationalities. The mean age of the studied sample was  $55 \pm 12.8$  years ranging from 18 to 76 years [Table 1].

The most common type of glaucoma in the sample reviewed was primary OAG (POAG) (60%), followed by primary ACG (PACG) (21.3%), secondary OAG (7.5%), and secondary ACG (6.3%) [Table 2]. The visual acuity ranged from 1 to "no light perception" and the refraction was emmetropia (34%), myopia (26%), and hypermetropia (40%). As for the mode of presentation, 24% of the patients were incidentally discovered during routine eye evaluation, whereas 76% presented with visual disturbances [Table 3].

The mean IOP of the studied sample was  $19 \pm 3.9$  that ranged from 11 to 28 mmHg. The mean CDR mean was  $0.5 \pm 0.2$  that ranged between 0.3 and 0.9 [Table 1]. Ninety-one percent of the visual field defects were arcuate scotomata and 6% were a tubular field. The studied patients were receiving anti-glaucoma medicines ranging from one to four with 88% receiving more than one medication. Of these, 58% were receiving two medications, 26% three medications, whereas 4% of the patients were receiving four medications [Table 3].

**Table 1: Age, IOP, CDR of the studied sample**

Variables	n	Minimum	Maximum	Mean (SD)
Age	80	18	76	54.88 (12.76)
IOP	80	11.0	28.0	19.02 (3.91)
CDR	80	0.3	0.9	0.487 (0.16)

SD: Standard deviation, IOP: Intraocular pressure, CDR: Cup-to-disc ratio

**Table 2: Variables obtained from the studied sample**

Variables	n (%)
Sex	
Male	39 (78)
Female	11 (22)
Race	
Saudi	38 (76)
Non-Saudi	12 (24)
Visual field defect	
Arcuate	73 (91.3)
Tubular	5 (6.3)
Nonspecific	2 (2.5)
Angle	
Open	61 (76.3)
Closed	5 (6.3)
Narrow	14 (17.5)
Type of glaucoma	
POAG	48 (60)
PACG	17 (21.3)
Secondary POAG	6 (7.5)
Secondary PACG	5 (6.3)
Glaucoma suspect	4 (5)

POAG: Primary open-angle glaucoma, PACG: Primary angle-closure glaucoma

**Table 3: Mode of presentation, errors of refraction, and medication used in the studied sample**

Variables	n (%)
Mode of presentation	
Accidentally discovered	12 (24)
Visual symptoms	36 (76)
Errors of refraction	
Emmetropia	17 (34)
Myopia	13 (26)
Hypermetropia	20 (40)
Medications used	
One medication	6 (12)
Two medications	29 (58)
Three medications	12 (24)
Four medications	3 (6)

## DISCUSSION

In the present study, 78% of the patients were males and 76% of the study population was composed of Saudi nationals. A similar study from Qatar had 54.8% nationals while the rest of the participants were expatriates.<sup>[8]</sup> Study by Al Obeidan *et al.*<sup>[6]</sup> had 41% males while the study from India found no significant gender difference in the prevalence of glaucomas.<sup>[9]</sup>

In the present study, the mean age of presentation of glaucoma was around 55 years which is less than the figure obtained in other studies from KSA<sup>[6]</sup> (62 years) and China<sup>[10]</sup> (64.6 years). However, our result is similar to the mean age of 56.4, 55.08, and 53.4 years obtained in studies from KSA,<sup>[5]</sup> Nepal,<sup>[11]</sup> and Cameroon,<sup>[12]</sup> respectively. A study in India reported the mean age of presentation with glaucoma as 51.44 years<sup>[9]</sup> whereas a study from Africa reported the mean age as 50 years.<sup>[13]</sup> There are studies which report the mean age of presentation to be lower than 50 years.<sup>[14,15]</sup> These results demonstrate that the major focus of glaucoma screening efforts should be directed to the middle-aged population and ideally, those above 40 years.

The main determinants of glaucomas are IOP, disc changes, and visual field changes. In the present study, the mean IOP of 19.94 mmHg and 19.23 mmHg was observed for the patients with POAG and PACG, respectively. Al Obeidan *et al.*<sup>[6]</sup> observed the IOP of 27 mmHg for POAG and 29 mmHg for PACG in Saudi patients. Mean IOP of 26.5 mmHg was also observed in a study from the Western region of Saudi Arabia.<sup>[5]</sup> A population-based survey among the Bai Nationality in rural China reported the mean IOP of 25.3 mmHg among the subjects with POAG.<sup>[10]</sup> The low IOP observed in the present study may be due to the treatment of the condition where 88% patients were already receiving more than one medications.

In this study, the mean CDR was found to be 0.49 (POAG) and 0.53 (PACG). Al Obeidan *et al.*<sup>[6]</sup> found a mean CDR of 0.73 and 0.72 in POAG and PACG, respectively with the highest mean CDR of 0.81 in Juvenile Glaucoma patients. 69% had CDR between 0.4 and 0.8, 14% had CDR of > 0.9.<sup>[16]</sup> In a study by Florcruz *et al.*,<sup>[17]</sup> vertical CDR was found to be 0.7. This lower level of CD changes in our study could be due to easy medical accessibility and early presentation to the medical setup.

Visual field defects are arcuate in 73% of patients and tubular in 5% of patients in our study. Arcuate visual field defects are the characteristic field changes of POAG, which is the most common type of glaucoma in our study.

In our study, most of the patients underwent medical treatment. The Collaborative Initial Glaucoma Treatment Study<sup>[18]</sup> showed that there was no difference between initial medical versus surgical therapy in visual preservation but that subjects preferred medical therapy primarily because the side effects associated with initial surgical therapy are more troublesome than those found with medical therapy. Overall, initial medical therapy remains the treatment of choice for most patients with OAG. Initial management of PACG is also medical. In about 88% of the patients in this study, more than one eye drops were used. In a study from Qatar, three-fourths of the patients were using local drops, and 6% underwent surgery.<sup>[8]</sup> There was a time when maximal medical therapy included every available glaucoma medication including beta blockers, pilocarpine, and epinephrine. Given diminishing returns with each additional medication, it is rarely beneficial for a patient to be receiving two or more glaucoma drugs at the same time.<sup>[19]</sup>

In our study, the most common type of glaucoma was POAG (60%). The prevalence of POAG was found to range between 14.4% and 69.3% in different studies around the world.<sup>[6,16,17,20]</sup> According to Quigley and Broman,<sup>[4]</sup> POAG is the most prevalent of all types of glaucomas. A study from Qatar<sup>[8]</sup> had 65.7%, whereas the Oman<sup>[21]</sup> eye study had 40.6% POAG. Our study corresponds fairly close to the study from Qatar. This could also be explained by the close geographical proximity of Al-Ahsa region to Qatar. In the present study, 24% patients accidentally discovered the disease and 76% presented to the hospital after the onset of symptoms. More awareness is needed in the community about the seriousness of glaucoma as a cause of blindness. Health education regarding POAG should be conducted at the community level to raise the level of awareness about this condition.

In the present study, 21.3% of the glaucoma patients have PACG. The prevalence of PACG has been found to vary from 5.3% to 46.6% in different studies.<sup>[6,16,17,20]</sup> This shows a huge variation in the prevalence of PACG, which could be explained by genetic predisposition, race, and other environmental factors.

In summary, POAG and PACG are the two most common types of glaucomas presenting to our hospital. In our study, more than half of the patients were having POAG. Different studies around the world show preponderance of different types of glaucoma, some showing POAG to be the most common<sup>[5,8,21]</sup> and some showing PACG to be more common.<sup>[6,9]</sup> Therefore, population-based epidemiological surveys are required to find out the true prevalence of the different types of glaucomas in this country and to implement measures for their early detection and treatment.

## ACKNOWLEDGMENTS

The authors are indebted to Prof. Mohammed Saad Morsi (Ophthalmologist) for his guidance and support toward the study from its inception to its completion. His vast knowledge and experience helped the authors in data collection and analysis.

## REFERENCES

- Casson RJ, Chidlow G, Wood JP, Crowston JG, Goldberg I. Definition of glaucoma: Clinical and experimental concepts. *Clin Experiment Ophthalmol* 2012;40:341-9.
- Barkan O. Glaucoma: Classification, causes, and surgical control. Results of microgonioscopic research. *Am J Ophthalmol* 1938;2:1099-114.
- 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* 2014;121:2081-90.
- Quigley HA, Broman AT. The number of people with glaucoma worldwide in 2010 and 2020. *Br J Ophthalmol* 2006;90:262-7.
- Eid TM, el-Hawary I, el-Menawy W. Prevalence of glaucoma types and legal blindness from glaucoma in the western region of Saudi Arabia: A hospital-based study. *Int Ophthalmol* 2009;29:477-83.
- Al Obeidan SA, Dewedar A, Osman EA, Mousa A. The profile of glaucoma in a Tertiary Ophthalmic University Center in Riyadh, Saudi Arabia. *Saudi J Ophthalmol* 2011;25:373-9.
- Alanazi FF, Song JC, Mousa A, Morales J, Al Shahwan S, Alodhayb S, *et al.* Primary and secondary congenital glaucoma: Baseline features from a registry at King Khaled Eye Specialist Hospital, Riyadh, Saudi Arabia. *Am J Ophthalmol* 2013;155:882-9.
- Al-Mansouri FA, Kanaan A, Gamra H, Khandekar R, Hashim SP, 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* 2011;18:141-9.
- Palimkar A, Khandekar R, Venkataraman V. Prevalence and distribution of glaucoma in central India (Glaucoma Survey 2001). *Indian J Ophthalmol* 2008;56:57-62.
- Zhong H, Li J, Li C, Wei T, Cha X, Cai N, *et al.* The prevalence of glaucoma in adult rural Chinese populations of the Bai nationality in Dali: The Yunnan Minority Eye Study. *Invest Ophthalmol Vis Sci* 2012;53:3221-5.
- Thapa SS, Thapa R, Paudyal I, Khanal S, Aujla J, Paudyal G, *et al.* Prevalence and pattern of vitreo-retinal diseases in Nepal: The Bhaktapur glaucoma study. *BMC Ophthalmol* 2013;13:9.
- Ellong A, Mvogo CE, Bella-Hiag AL, Mouney EN, Ngosso A, Litumbe CN. Prevalence of glaucomas in a Black Cameroonian population. *Sante* 2006;16:83-8.
- Ntim-Amponsah CT, Amoaku WM, Ofosu-Amaah S, Ewusi RK, Idirisuriya-Khair R, Nyatepe-Coo E, *et al.* Prevalence of glaucoma in an African population. *Eye (Lond)* 2004;18:491-7.
- Nangia V, Jonas JB, Matin A, Bhojwani K, Sinha A, Kulkarni M, *et al.* Prevalence and associated factors of glaucoma in rural central India. The Central India Eye and Medical Study. *PLoS One* 2013;8:e76434.
- Neumann E, Zauberman H. Glaucoma survey in liberia. *Am J Ophthalmol* 1965;59:8-12.
- Wasim R, Shagufta R, Singh T. Profile of patients of glaucoma in Kashmir valley (A hospital based study). *JK Sci* 2010;12:137.
- FlorCruz NV, Joaquin-Quino R, Silva PA, Khu PM. Profile of glaucoma cases seen at a tertiary referral hospital. *Philipp J Ophthalmol* 2005;30:161-5.
- Lichter PR, Musch DC, Gillespie BW, Guire KE, Janz NK, Wren PA, *et al.* Interim clinical outcomes in the Collaborative Initial Glaucoma Treatment Study comparing initial treatment randomized to medications or surgery. *Ophthalmology* 2001;108:1943-53.
- Singh K, Shrivastava A. Medical management of glaucoma: Principles and practice. *Indian J Ophthalmol* 2011;59 Suppl: S88-92.
- Shen SY, Wong TY, Foster PJ, Loo JL, Rosman M, Loon SC, *et al.* The prevalence and types of glaucoma in Malay people: The Singapore Malay eye study. *Invest Ophthalmol Vis Sci* 2008;49:3846-51.
- Khandekar R, Zutshi R. Glaucoma in oman: A review. *J Glaucoma* 2006;15:271-3.

**How to cite this article:** Al Rashed AS, Al Subaie HA, Al Hatloul HS, Al Shehab KA, Al Naim MA, Kaliyadan KF, *et al.* Types of glaucoma in a University Health Centre in Al-Ahsa, Saudi Arabia: A pilot study. *Niger J Ophthalmol* 2015;23:12-5.

**Source of Support:** Nil, **Conflict of Interest:** None declared