Title Page:

Title:

Spectrum of glaucomatous disease at Charlotte Maxeke Johannesburg Academic Hospital:

A retrospective clinical audit

An MMed dissertation in submissible article format. The journal to which the article is to be submitted to is the South African Ophthalmology Journal (SAOJ)-please see appendix for journal format guidelines.

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HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

DECLARATION:

Adherence to HREC (Medical) Ethics Application Terms and Conditions

I, the undersigned, hereby declare that I have not collected data/ done secondary data analysis or any other form of research, prior to obtaining clearance certificate from the HREC (Medical) for study no: M221019.

I have read and understood the terms and conditions on page 8-9 of the HREC (Medical) application form. I confirm that it is my responsibility to ensure that I have received final HREC (Medical) Clearance before commencing any research.

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Date: 18/04/2024

Abstract:

Background: Glaucoma is the second most common cause of blindness worldwide. A disproportionately high number of these patients live in low- and middle-income countries, placing a huge burden on the health care system. The purpose of this study was to describe how glaucoma patients presented to a dedicated glaucoma clinic at a large referral centre/tertiary hospital in central Johannesburg, South Africa. The objectives were to describe the spectrum of glaucomatous disease in these patients as well as the demographics, risk factors and severity of disease in this patient population. The secondary objective was to describe how glaucoma was being managed in the glaucoma clinic patient population.

Methods: This study was a retrospective descriptive study which was a clinical audit of the Charlotte Maxeke Johannesburg Academic Hospital's (CMJAH) glaucoma REDCap database. 787 patient records were included in the study which were patients seen and managed in a 5-year period. This study and the database had valid ethical clearance.

Results: Of the 787 patients assessed the mean age at presentation was 59 years (n=739, SD=16), 50.3% were female and 49.7% male. The majority (74.9%) were black African, and the most common diagnosis was Primary Open Angle Glaucoma (POAG) (59%). Patients with secondary glaucoma (excluding exfoliation glaucoma) were significantly younger (49 years +/-18years) whereas patients with exfoliation glaucoma were older (68 years +/-10 years), P<0.001. Black African patients with POAG were significantly younger than other racial groups, p<0.001, with 7% being younger than 35 years. 23.3% of patients had a family history of glaucoma. The median intraocular pressure (IOP) was 15 mmHg (n=690) and median vertical cup to disc ratio (VCDR) was 0.9 (n=605). Using World Health Organisation (WHO) definitions, 32.2% patients had visual acuity (VA) ≤6/120 in the better seeing eye fulfilling criteria for blindness (n=686) and 64.6% of patients had VA≤6/18 in the better eye fulfilling criteria for visual impairment. 68% (n=722) patients were on medical therapy and most patients received on average three agents. There were 426 laser procedures performed, selective laser trabeculoplasty (SLT) accounting for the bulk (65.3%) and 210 glaucoma surgeries were performed.

Conclusion: This study supports and reinforces the notion that black South African glaucoma patients are most likely to have POAG, present at a younger age and have more advanced disease with very high rates of visual impairment and blindness. The management of these patients is largely medical with more than one medication. Glaucoma surgery is an important management tool in advanced glaucoma and is being underutilised.

Keywords: Glaucoma, Primary open-angle glaucoma (POAG), epidemiology, South Africa, blindness, intra-ocular pressure (IOP)

Funding: No funding was received for this study.

Conflict of interest: The authors have no conflict of interest to declare with respect to this study.

Introduction:

Glaucoma is a group of ocular conditions that encompasses an irreversible optic neuropathy associated with a characteristic structural damage to the optic nerve and associated functional visual loss. [1-8]

Glaucoma is the second most common cause of blindness worldwide, estimated to affect approximately 80 million people in 2020. [1-4, 9, 10] Over 11.1 million people are bilaterally blind because of glaucoma, a disproportionately high number of these patients live in low-to - middle income countries, especially Sub-Saharan Africa. [1,2,4,9,10] Glaucoma places a huge burden on the healthcare system, and it is expected to increase exponentially.[1,9]

The global prevalence of all types of glaucoma for patients above 40 years old is 3.5%. [1, 3, 11] The prevalence statistics for glaucoma in Sub-Saharan Africa are a lot higher, in South Africa, Rotchford et al.[12] found an overall prevalence of 4.5% in a Zulu population in KwaZulu Natal and a prevalence of glaucoma of 5.3% in black residents of Temba. [13]

Glaucoma can be classified according to the ISGEO (International Society for Geographical and Epidemiological Ophthalmology)[2,8] criteria as open or closed angle based on the appearance on gonioscopy. Three-quarters of patients with glaucoma have open angle glaucoma (OAG).[1-5] Both open and closed angle glaucoma can be divided into primary and secondary subtypes.[8]

Primary open-angle glaucoma (POAG) is diagnosed if there is structural optic nerve damage in the form an enlarged vertical cup-disc ratio (VCDR) or on optical coherence tomography (OCT).[2, 8] A VCDR of ≥0.7 (97.5th percentile), or VCDR asymmetry ≥0.2 with functional visual field defect is a category 1 diagnosis of glaucoma. Category 2 and 3 diagnosis requires a severe structural deficit, VCDR of ≥0.8 or asymmetry of ≥0.3 (99.5th percentile) in instances where visual field testing cannot be performed or an elevated IOP ≥99.5th percentile can be diagnostic if the disc cannot be visualised. [2,8] Gonioscopy examination of the drainage angle should reveal open angles with no identifiable secondary cause of the glaucoma. [8,14,20] POAG disproportionately affects Africans and people of African descent and [15-19] the prevalence of irreversible blindness as a result of glaucoma is also four times higher in Africans. [1-11,21] Blindness is defined by the World Health Organisation (WHO) as a visual acuity of ≤6/120 in the better eye and visual impairment is defined as VA ≤6/18 in the better seeing eye.[11,22,23.]

Primary angle closure glaucoma (PACG) follows when the anterior chamber angle, seen on gonioscopy, is narrowed, or closed. [8] This form of glaucoma is more common in Asian ethnic groups due to anatomical predisposition.[3, 4, 6,8,9,14] Secondary glaucoma is caused by an underlying ocular or systemic condition. These commonly include exfoliation glaucoma (XFG), pigment dispersion glaucoma, angle recession glaucoma (ARG), uveitic glaucoma, neovascular glaucoma (NVG) and crystalline lens related glaucomas. [8]

Glaucoma can also uncommonly present in childhood. Determining glaucoma prevalence in childhood is difficult as few population studies exist due to its rarity. Primary childhood glaucoma includes congenital glaucoma (PCG) and juvenile open-angle glaucoma (JOAG). [20]

Risk factors for glaucoma development include increasing age[1-9], African ethnicity, family history, increased intra-ocular pressure, myopia for open-angle glaucomas and hyperopia for closed-angle glaucomas. [1,12,13,17,19,20-23]

The available management options for glaucoma are medical, laser therapy and surgery all targeted at reducing IOP. Initial treatment is usually medical. Selective laser trabeculoplasty (SLT) has shown promising IOP lowering effects in patients with POAG and other open angle glaucomas in African patients.[11] It is a safe, less invasive, and cost-effective option. [11] Filtration surgery may be required to obtain optimal IOP in glaucoma patients.

This study describes the spectrum of glaucomatous disease in patients who presented to a dedicated tertiary referral hospital in South Africa as well as their demographics, risk factors and severity of disease. The secondary objective was to describe how glaucoma was being managed in the adult glaucoma clinic patients.

Methodology:

The study was a retrospective clinical audit of the Charlotte Maxeke Johannesburg Academic Hospital's (CMJAH) glaucoma REDCap electronic database.[25,26] 787 patients were included in the study which included all the patients' clinical records over a 5-year period, from 01 January 2016 till 31st December 2020. Missing or incomplete records were correlated with hard copy records that are kept in the glaucoma clinic.

Patients were allocated a unique reference number to protect anonymity and data was exported to an excel spread sheet for statistical analysis. The demographic data collected included patients' ethnicity (this was self-reported using the South African Census categories[27]), age, sex, medical history (hypertension, diabetes, HIV, asthma, migraine) and family history of glaucoma or blindness.

The type of glaucoma diagnosis as well as the gonioscopic appearance of the angles were collected. Disease severity parameters including visual acuity (VA) and vertical cup-to-disc ratio (VCDR) where recorded. Where available, visual field mean deviation (MD) and optical coherence tomography (OCT) retinal nerve fibre layer (RNFL) thickness and macular ganglion cell complex (GCC) thickness was collected.

Management data were collected including which topical medications patients received (Beta blocker, prostaglandin analogue, alpha agonist, topical carbonic anhydrase inhibitor (CAI) or pilocarpine) as well as acetazolamide (Diamox). All procedures including laser and surgical procedures performed over the 5-year study period were collected.

Ethical considerations:

Ethical clearance to conduct this study was obtained from the University of the Witwatersrand Human Research Ethics Committee (No.M221019). Signed informed consent

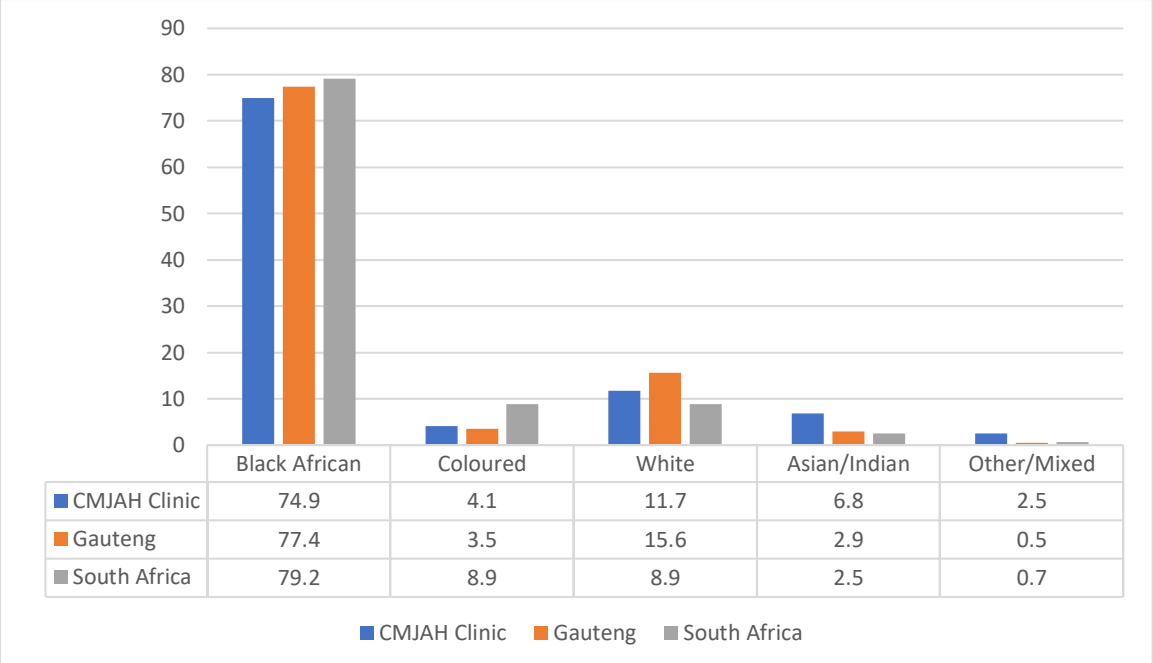
was obtained from patients prior to entering their data onto the REDCap database and Ethical clearance for the database (M190671) was obtained by Prof Williams. Data exported from the database did not include any patient identifiers protecting confidentiality.

Statistical analysis

Data were exported from REDCap with specified patient reference numbers. Statistics were performed in Microsoft Excel and STATA. Skewness and kurtosis were calculated to assess for normality of distribution of continuous data. Mean and standard deviation were calculated for age. Median and interquartile ranges were calculated for the other continuous parameters. Frequencies were calculated for categorical variables. A Chi squared test or Fisher's exact test, where appropriate, was performed to compare categorical data. An ANOVA was used to compare ages between diagnostic groups. A p-value less than 0.005 was used to determine significance.

Results:

There were 787 patients with glaucoma assessed over the study period. The mean age at presentation was 59 years ± 16 years old (n = 739). There were 50.3% females and 49.7% males (n = 760), with a male: female ratio of 1:1. Most of the patients presenting to Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) with glaucoma were black (74.9%), with the minority being white (11.7%), asian (6.8%), coloured (4.1%) and mixed race (2.5%) (n = 753). See Figure 1 comparing the race profile of CMJAH glaucoma clinic with that of Gauteng and South Africa as per the 2011 census (Stats SA). [27]



	Black African	Coloured	White	Asian/Indian	Other/Mixed
CMJAH Clinic	74.9	4.1	11.7	6.8	2.5
Gauteng	77.4	3.5	15.6	2.9	0.5
South Africa	79.2	8.9	8.9	2.5	0.7

Figure 1: Race profile of CMJAH glaucoma clinic as well as 2011 census data of Gauteng and South Africa (Stats SA). [27]

The most common glaucoma diagnosis was POAG, comprising 59% of patients (n = 761) (Figure 2). In 26 patients the diagnosis was not captured or not known. Within the POAG

group, patients with normal tension glaucoma (NTG) comprised 15%. The second most common glaucoma was secondary glaucoma compromising a total of 26.8%. Exfoliative glaucoma (XFG), the most common type of secondary glaucoma accounted for 10.6% of all glaucomas (40% of the secondary glaucomas). Other secondary glaucomas (16.2%) with causes that included, secondary open angle glaucoma (OAG) (4.3%), angle recession glaucoma (ARG) (4.1%) and others. Angle closure glaucomas, which include primary angle closure glaucoma and secondary angle closure glaucomas such as Neovascular glaucoma (NVG) accounted for 6,7% of glaucoma.

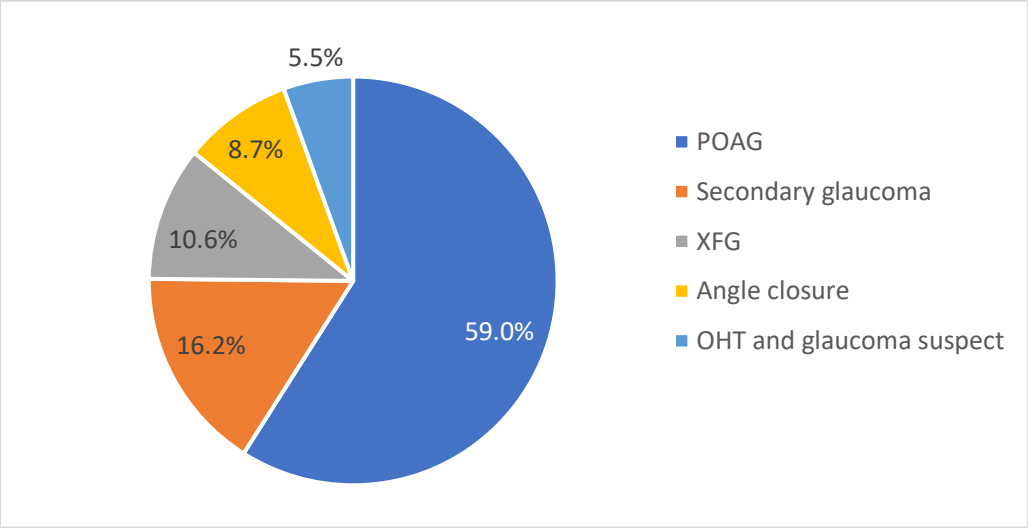


Figure 2: Glaucoma subtypes of patients at the CMJAH glaucoma clinic

The median age of the patients was significantly different between the diagnostic groups ($p < 0.001$). Patients with secondary glaucoma were much younger (49 years ± 18 years) and patients with XFG were much older (68 years ± 10 years) (Table I). Figure 3 provides a graphical representation.

Diagnosis	n 739	Age (years) Mean ± SD
POAG	438	61 ±15
Secondary glaucoma	107	49 ± 18
XFG	75	68 ± 10
Angle closure	79	58 ± 17
OHT and glaucoma suspect	40	55 ± 19

Table I: Age of patients per diagnostic group

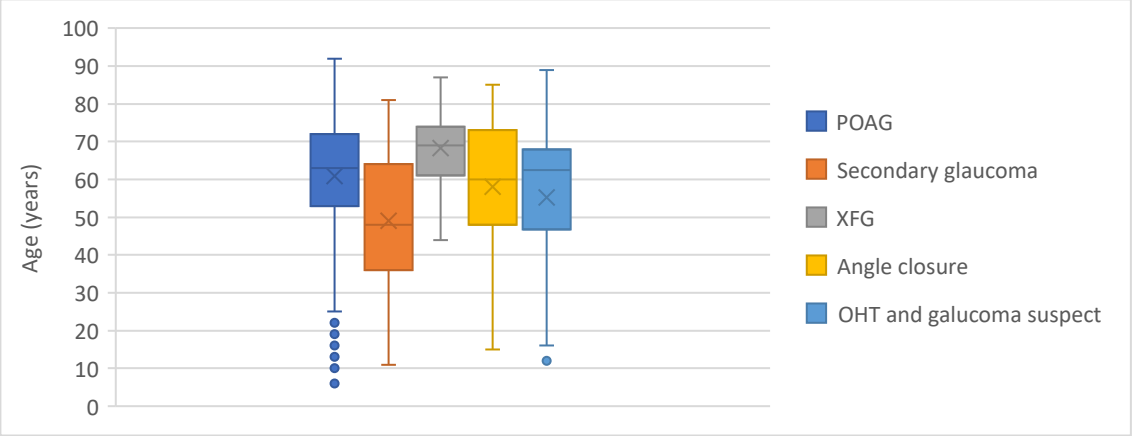


Figure 3: Box and whisker plot showing age of patients with the different glaucoma diagnoses.

Black African patients with POAG were significantly younger and white patients significantly older than other racial groups with POAG ($p < 0.001$) (Table II). There were no patients with POAG younger than 36 years in races other than black Africans and 7% of Black Africans with POAG were younger than 35 years. Figure 4 provides a graphical representation.

Racial group	n= 417	Age (years) Mean ± SD
Black African	322	59 ±15
Coloured	21	65 ± 14
White	51	72 ± 9
Asian/Indian	22	66 ± 11
Mixed race/Other	1	62 ± 11

Table II: Age of POAG patients per racial group

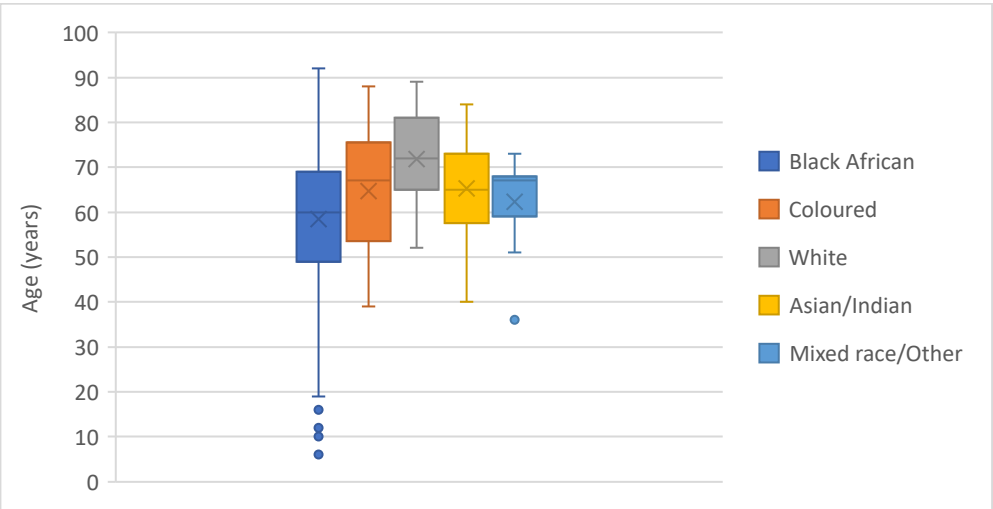


Figure 4: Box and whisker plot showing age of POAG patients in different racial groups.

The glaucoma diagnoses were significantly different between different race groups ($p<0.001$). Asian/Indian and mixed race patients were less likely to have POAG and more likely to have

secondary glaucoma. Black African patients were more likely to have XFG. Angle closure glaucoma was seen more in white patients. (Figure 5).

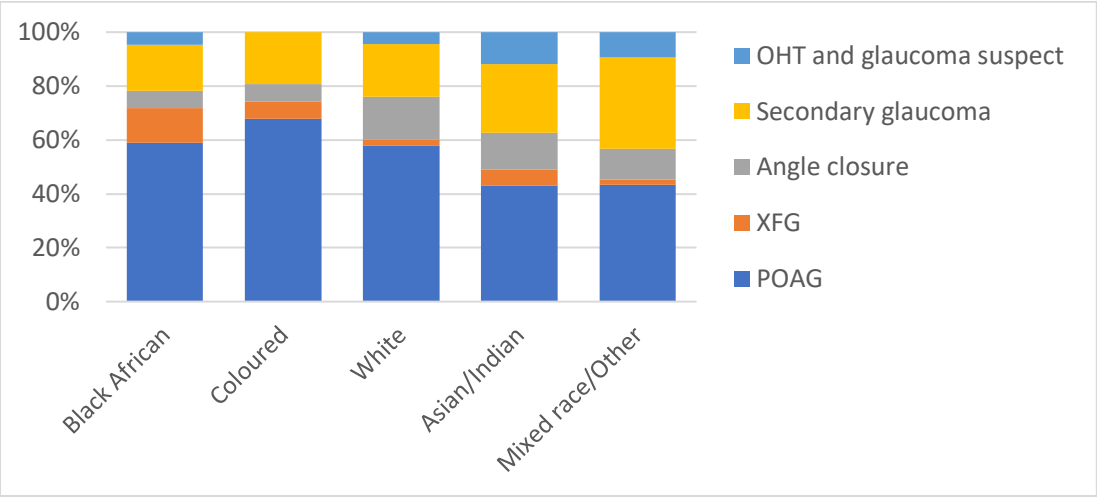


Figure 5: Proportional diagnoses of patients at the glaucoma clinic per racial group

In 23.3% of patients there was a family history of glaucoma (n = 524) and in 21.3% there was a family history of blindness (n=506). In 13.2% of the patients there was both a family history of blindness and glaucoma (n = 506).

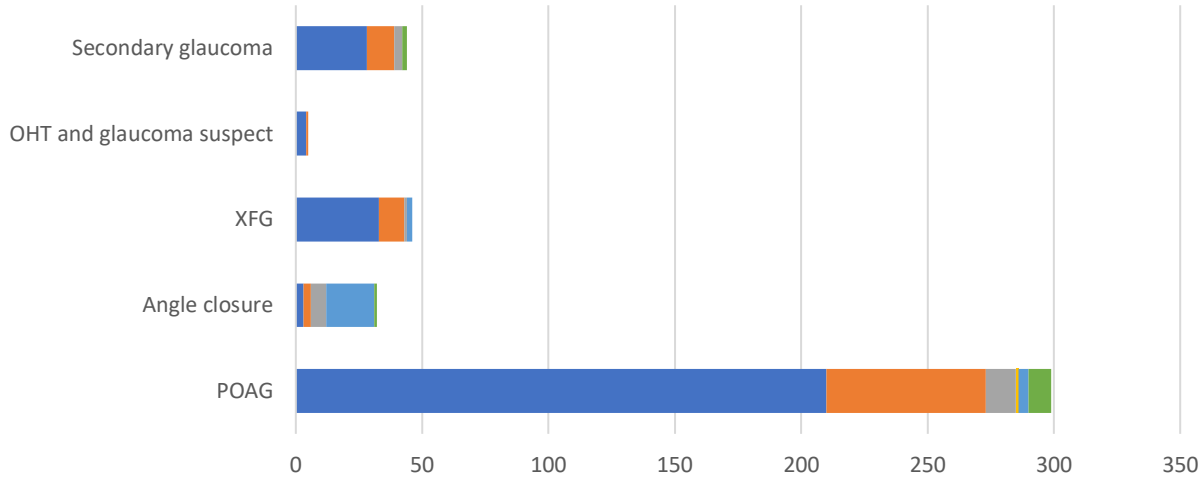
The commonest comorbidities were hypertension (28.2%) and type II diabetes (7.1%), while 28.1% had no known comorbidities (n=720). HIV, migraine and asthma were so rarely reported they were excluded from statistical analysis. Patients with POAG were more likely to have hypertension and/or diabetes, while patients with secondary glaucoma were more likely to have no co-morbidities ($p < 0.001$, n = 715).

The median intraocular pressure (IOP) for both eyes was 15 mmHg (IQR 12 – 20 mmHg) (n = 690).
The median vertical cup to disc ratio (VCDR) for the right eye was 0.9 (IQR 0.7 – 1.0) (n = 599) and for the left eye was 0.9 (IQR 0.6 – 1.0) (n = 605). The median visual field mean deviation (VF MD) performed on 24-2 Humphrey Visual Field of the right eye was -9.7dB (IQR -3.08dB to -13.20dB) (n = 165) and for the left eye was -9.8dB (IQR -4.0dB to -14.0dB) (n = 153). A normal mean deviation is between 0 and -2dB. [28]
The median optical coherence tomography (OCT) on the Cirrus HD-OCT (Carl Zeiss) macula ganglion cell (GCC) thickness for the right eye was 58.5µm (IQR 29 - 79) (n = 179) and for the left eye was 61µm (33 – 79.8) (n = 179). Average normal GCC is 97 +/-6.9µm.[29] The median OCT (retinal nerve fibre layer) RNFL thickness for the right eye was 52µm (IQR 42 – 72) (n = 181) and for the left eye was 52µm (IQR 41 - 75) (n = 180). Normal overall nerve fibre layer thickness on average is 99.2+/-9.9µm according to the Advanced Imaging for Glaucoma Study.[29]

32.2% of patients had a VA of worse than 6/120 in the better eye fulfilling WHO criteria for blindness (n = 686). 64.6% of patients had VA's worse than 6/18 in the better eye fulfilling the WHO criteria for visual impairment.

In this study 68% (n=772) of patients were receiving medical IOP lowering therapy. Most patients were receiving three topical agents. The commonest combinations of agents used were beta-blockers + prostaglandin + alpha agonist (30.4 %) and beta-blockers + prostaglandin + alpha analogue + topical carbonic anhydrase inhibitor (CAI) (15.6 %).

There were 426 laser procedures performed. Selective laser trabeculoplasty (SLT) was the commonest laser procedure (65.3%), followed by Nd:YAG goniopuncture (20.7%) and YAG PI (5.9%). (Figure 6)

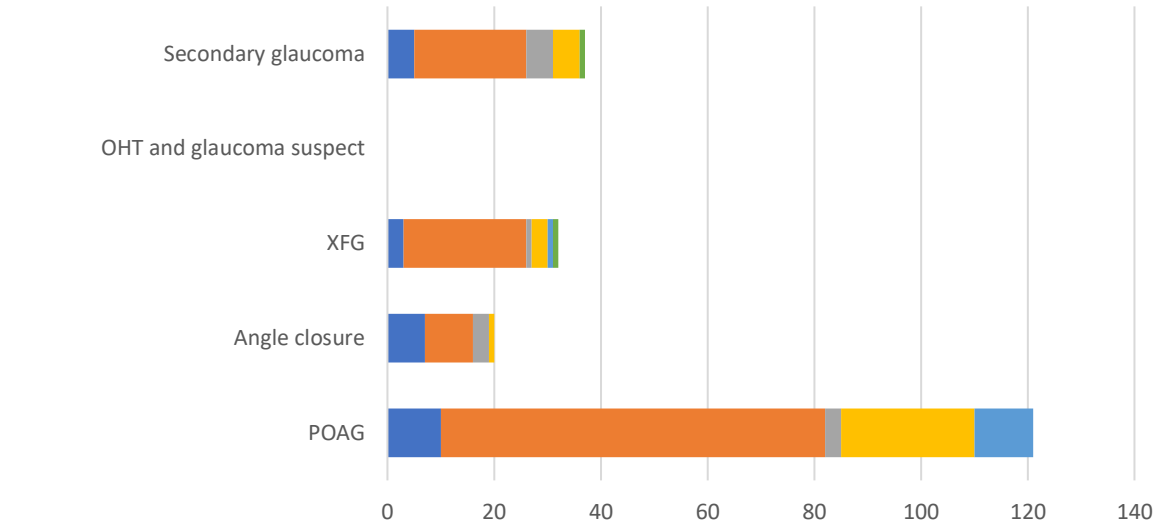


	POAG	Angle closure	XFG	OHT and glaucoma suspect	Secondary glaucoma
SLT	210	3	33	4	28
YAG goniopuncture	63	3	10	1	11
Cyclodiode	12	6	1	0	3
ALPI	1	0	0	0	0
YAG PI	4	19	2	0	0
Yag caps	9	1	0	0	2

Figure 6: Laser procedures per diagnosis. The accompanying table shows absolute counts.

During the study period there were 210 glaucoma surgeries performed. The most common surgery performed in 59.5% of patients was deep sclerectomy. Secondary procedures (these included bleb needling, bleb revision and iris sweeps) were the second most common group of procedures (16.2%) and trabeculectomies were performed in 11.9% of patients. See figure 7 for a graphical representation.

There were 200 cataract surgeries performed. Phacoemulsification and IOL was the commonest cataract surgery, accounting for 79.5%.



	POAG	Angle closure	XFG	OHT and glaucoma suspect	Secondary glaucoma
Trabeculectomy	10	7	3	0	5
Deep Sclerectomy	72	9	23	0	21
Glaucoma drainage devices (GDD)	3	3	1	0	5
Secondary procedures	25	1	3	0	5
MIGS (Minimally invasive glaucoma devices)	11	0	1	0	0
Angle based surgery	0	0	1	0	1

Figure 7: Glaucoma surgeries per diagnosis. The accompanying table shows absolute counts.

Discussion:

This study described the demographic, clinical characteristics and management received of glaucoma patients referred to a tertiary glaucoma clinic. The race profile of patients seen at the clinic is similar to the race distribution of Gauteng and South Africa, as per the 2011 census[27] and therefore is fairly representative of South Africa's patient population.

Literature suggests women appear statistically more affected by glaucoma because of their increased susceptibility to PACG as well as their longevity [10,15 16] If age is adjusted for and if only POAG was looked at, men are more likely affected. [1, 12, 13,17,19,23] Our study found males and females were equally affected.

Our study found the most prevalent glaucoma diagnosis was POAG (59%) which is consistent with multiple other previously performed population studies. POAG was present in 56% and 54% of patients in Rotchford et al.'s Themba and KwaZulu Natal studies respectively.[12,13] Studies from the Caribbean demonstrate the highest proportion of POAG amongst their black population. [19] Our study demonstrated that black patients with POAG were significantly younger than the other racial groups which has also been found in other studies across Africa. [6]

Studies have demonstrated that individuals of African descent are 4-5 times more likely to develop open angle glaucoma, compared with people of European descent. [3,5,6,15,21] This increased susceptibility is likely due to a combination of genetic and environmental factors. [7,17,21, 22] POAG in persons of African descent progresses more rapidly and affects on average, younger patients. [7,16,22] Anatomical predispositions in Africans, according to the African Descent and Glaucoma Evaluation Study (ADAGES), include higher refractive error, thinner corneal thickness, larger cup-to-disc ratios and larger disc areas.[7] The South African Eye Study (SAES) found black South Africans had thinner corneas and higher IOPs when compared to other ethnicities. [19]

Asian/Indian and mixed race patients in our study were more likely to have secondary glaucoma while angle closure glaucoma (ACG) was seen more in white patients. Salmon et al. studied a mixed-race population in the Western Cape and found a majority of primary angle closure glaucoma (PACG), likely reflecting this population's Asian heritage. [14] Although only accounting for approximately 26% of worldwide glaucoma ACG accounts for 50% of the global burden of blindness due to glaucoma. [4,9]

Secondary glaucomas occurred in 36% of patients in Rotchford's South African Temba study.[13] The vast majority (45% of secondary cases) were due to exfoliation glaucoma followed by 20% of cases being secondary to trauma. [13] Our study found 26.8% of patients [had] secondary glaucoma where 40% of these had exfoliation glaucoma. Excluding the XFG cases, the remainder of the secondary glaucomas were predominately angle recession glaucoma (ARG). These patients were considerably younger which can be explained by trauma often affecting younger individuals. The rates of secondary glaucomas elsewhere in the world are much lower, only 0.49% in Tanzania[3] and 0.7% in Barbados.[3,19]

Our study found 23.3% of patients had a family history of glaucoma which is in keeping with other studies which found a positive family history in 16.1%-35% of POAG cases, with family history, conferring a 3-fold increased risk of developing open-angle glaucoma. [16-18] Hypertension/hypotension, migraine and diabetes have been postulated as possible risk factors for glaucoma and have been studied extensively but there is no good evidence supporting any systemic co-morbidies as risk factors for glaucoma development. [1, 6-8, 16-18, 21-23] Our study demonstrated that hypertension and diabetes were more prevalent in the POAG patients as opposed to secondary glaucoma patients, but this is most likely due to the difference in ages between these groups.

Intra-ocular pressure (IOP) remains the most important and only modifiable risk factor in glaucoma.[1-16] African patients have higher presenting IOPs than other population groups. [21] A subset of POAG, with normal IOP, known as normal tension glaucoma (NTG) has varying prevalences, for example a prevalence of 33% in the Barbados Eye Studies but a prevalence of as much as 85% in Asian populations. [1-11,16,18,21] We found a prevalence of only 15% of NTG in our POAG cohort. The median IOP of 15 mmHg found in our study is not representative of the presenting IOP in these patients as the CMJAH glaucoma clinic is a tertiary referral clinic. The patients on presentation to our clinic and enrolment into the database would already have been started on topical IOP lowering agents prior to referral.

Some would even have had a prior intervention such as cataract surgery, glaucoma surgery or laser. This is a limitation of the study.

Our study found a mean vertical cup-to disc ratio (VCDR) of 0.9 which highlights the severity of glaucoma in our population sample. In patients who underwent automated perimetry a mean deviation of -9.7dB and -9.8dB for the right and left eye respectively was found. Based on the Canadian Ophthalmological Society Guidelines, the majority of our patients who had visual field testing are therefore graded as moderate glaucoma.[6,30] (See table III) Only approximately 1 in 7 patients in our database underwent visual field testing which is also a limitation of the study. As visual fields are generally only performed on patients with fair visual acuities this biases the visual field data towards the less severe glaucoma patients who can fixate and perform the tests. The median macular ganglion cell thickness and retinal nerve fibre layer thickness on OCT, although not performed on all patients was incredibly thin which was in keeping with the severity of glaucoma seen in our clinic.

Early	Mild VF defect, MD better than -6dB
Moderate	MD of between -6dB to -12dB
Severe	MD worse that -12dB (or a field defect involving central 10˚ of fixation

Table III: Staging glaucoma damage according to Mean deviation (MD) on a 24-2 Humphrey Visual Field analyser [30]

The proportion of patients blind from glaucoma varies in the literature from none in Sweden to 22% in South Africa. [2,10, 12] Half of African patients are already blind in one eye at diagnosis, and 14% are binocularly blind at diagnosis. [6, 16-18, 21-23] Postulated reasons for this include higher prevalence, inadequate control, poor awareness and screening, socioeconomic factors, lack of access to health services and late presentation. [3,11,22] Our study found 32.2% of patients fulfilling WHO criteria for blindness (VA≤6/120 in better seeing eye) and 64.6% fulfilling the criteria for visual impairment (VA≤6/18 in better seeing eye). The visual acuities in the study are pinhole VAs and some patients possibly had poor VAs due to cataracts and uncorrected refractive errors and not only glaucoma so possibly these high rates of blindness and visual impairment may be overstated.

Our study found patients in our glaucoma clinic were predominately being managed medically (68%) and most patients were on multiple agents. 54% of our patients had undergone a laser procedure for glaucoma and 27% had a glaucoma surgery. The Primary open angle African American glaucoma genetics study (POAAGG) study performed on African Americans with POAG found 67.1% were on topical medication, 36.2% had been treated with glaucoma surgery or laser and 33% of this group were also on topical glaucoma medication. [17] Challenges in medical treatment in African patients include the advanced stage of the glaucoma at presentation, local availably and affordability of certain treatment options, side-effects and their acceptability by patients all of which impact adherence and long-term success. [6,15] Major glaucoma landmark trials that guide medical treatment options were performed on largely non-African subjects. [11, 15, 21]

Glaucoma surgery was performed in 210 patients in this study which only represents 27% of the patient cohort. Given the advanced stages of glaucoma that our patients are presenting

with this rate is most likely too low. There are significant barriers to increasing glaucoma surgery numbers including training of ophthalmologists in specialised surgical skills as well as educating patients to overcome barriers to acceptance. It is especially difficult when glaucoma surgery is often offered to the remaining sighted eye for visual preservation rather than visual improvement.

The main limitation of this study is its retrospective nature. Despite correlating missing and incomplete records with hard copies there was still some missing data. Entries into the Redcap database were performed by different staff members, which increases the risk of data capturing errors.

Conclusion: This study supports and reinforces the notion that black South African patients are most likely to have POAG, present at a younger age and have more advanced disease with very high rates of visual impairment and blindness. Screening affected individuals' family members for glaucoma should be offered. The management of these patients is largely medical with more than one medication. Glaucoma surgery is an important management tool in advanced glaucoma and is probably being underutilised in this clinic. Further studies are warranted.

Acknowledgements: Dr Erica-Mari Nel who assisted with the data formatting and statistical analysis.

Tables and figures: * I have included them in the text to make sense of the data but when I submit will separate them into this section because the journal wants it separately.

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Appendix 1: Ethics clearance certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG	HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

Office of the Deputy Vice-Chancellor (Research and Innovation)

TO:	Dr I Walters School of Clinical Medicine Department of Neurosciences Division of Opthalmology Medical School University E-mail: Ingrid.Walters@yahoo.co.uk
CC:	Supervisor: Professor S Williams <Susan.Williams@wits.ac.za> and <HREC-Medical Research Office@wits.ac.za>
FROM:	Mr Iain Burns Human Research Ethics Committee (Medical) Tel: 011 717 1252 E-mail: Iain.Burns@wits.ac.za
DATE:	2022/12/21
REF:	R14/49
PROTOCOL NO:	**M221019** (This is your ethics application reference number. Please quote it in all enquiries, oral or written, relating to this study.)
PROJECT TITLE:	*Spectrum of glaucomatous disease at Charlotte Maxeke Johannesburg Academic Hospital*

Please find attached the Clearance Certificate for the above project. I hope it goes well and that an article in a recognized publication comes out of it. This will reflect well on your professional standing and contribute to Government funding of the University.

MSWorks2000/Iain0007/Clearscan.wps

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R49 Dr I Walters

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M221019

NAME: (Principal Investigator)	Dr I Walters
DEPARTMENT:	School of Clinical Medicine Department of Neurosciences Division of Opthalmology Medical School University
PROJECT TITLE:	*Spectrum of glaucomatous disease at Charlotte Maxeke Johannesburg Academic Hospital*
DATE CONSIDERED:	2022/10/28
DECISION:	Approved unconditionally
CONDITIONS:	
NOTE:	If contact information regarding student study participants is required, please contact the Registrar's office - <Nicoleen.Potgieter@wits.ac.za>
SUPERVISOR:	Professor S Williams
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2022/12/21

This Clearance Certificate is valid for 5 years from the date of approval. An extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office secretariat on the 3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to submit details to the Committee. **I agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **October** and therefore reports and re-certification will be due in the month of **October** each year. Unreported changes to the study may invalidate the clearance given by the HREC (Medical).

Signature of Principal Investigator

09/12/2022
Date

<u>Appendix 2</u>: Turn it in report.

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Assignment title:	Draft submission (all, regardless of course/programme)
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File name:	Spectrum_of_glaucomatous_disease_at_CMJAH_mmed_repor...
File size:	91.1K
Page count:	11
Word count:	3,480
Character count:	18,981
Submission date:	07-Feb-2024 09:50PM (UTC+0200)
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<u>Appendix 3:</u> South African Ophthalmology journal submission guidelines (format of research report)

South African Ophthalmology Journal guidelines for authors

The *SA Ophthalmology Journal* is a peer-reviewed scientific journal and the official mouthpiece of the Ophthalmological Society of South Africa. It appears on a quarterly basis.

1. The *South African Ophthalmology Journal* invites review articles, original studies and case reports for submission. Articles should be the original, unpublished work of the stated author. All materials submitted for publication must be submitted exclusively for publication in this journal. Written permission from the author or copyright holder must be submitted with previously published figures, tables or articles. Authors are solely responsible for the factual accuracy of their work.

2. A cover sheet is to be submitted with each manuscript. It should contain the title of the manuscript, the names of all authors in the correct sequence, their academic status and affiliations. The ORCID ID number for each author should be supplied (https://orcid.org/). The corresponding author should include his/her name, address, phone and email address.

3. Articles should be between 2 000 and 3 000 words in length. A 200-word abstract should state the main conclusions and clinical relevance of the article. Use the headings Background, Methods, Results and Conclusion. Five keywords are to be supplied at the end of the abstract.

4. Authors should declare any interests, financial or otherwise, regarding the publication of their article, under the headings of Funding and Conflict of interest. If none, this should be stated. An ethics statement regarding patient consent and/or Ethics Board approval should be included. Authors should also indicate whether the submission forms part of an 'MMed dissertation by publication' by stating so clearly on the title page.

5. All articles are to be in English and are to follow the Vancouver style of referencing. References should be numbered consecutively in the order that they are first mentioned in the text and listed at the end in numerical order of appearance. Identify references in the text by Arabic numerals in superscript after punctuation, e.g. ... trial.[13]

6. The following format should be used for references:
   Articles: Kaplan FS, August CS, Dalinka MK. Bone densitometry observation of osteoporosis in response to bone marrow transplantation. *Clin Orthop* 1993;**294**:173-78.
   Chapter in a book: Young W. Neurophysiology of spinal cord injury. In: Errico TJ, Bauer RD, Waugh T (eds). *Spinal Trauma*. Philadelphia: JB Lippincott; 1991: 377-94.

7. Tables should carry Roman numerals, I, II etc., and illustrations Arabic numbers 1, 2 etc.

8. Abbreviations and acronyms should be defined on first use and kept to a minimum.

9. All figures, tables and photographs should also be submitted electronically. Each figure must have a separate self-explanatory legend. The illustrations, tables and graphs should not be embedded in the text file, but should be provided as separate individual graphic files, and clearly identified. Photographs should be saved as a 300 dpi JPEG file. Graphs and algorithms, which need to be editable, should be saved as MS Word documents or in PowerPoint. Tables should be saved either in MS Word or in a PowerPoint document. Photographs and X-rays need to be suitably anonymised. Permission should be obtained for the use of patient photographs.

10. Articles are to be submitted by email to the Editor-in-Chief, Prof Nagib du Toit at the following email address: journaleditor@ossa.co.za The text should be in MS Word. Pages should be numbered consecutively in the following order wherever possible: Title page, abstract, introduction, materials and methods, results, discussion, acknowledgements, tables and illustrations, references.

11. The Editor reserves the right to shorten and stylise any material accepted for publication.

12. For all accepted articles, authors will be requested to provide five (5) multiple choice CPD questions related to their paper.

Appendix 4: plagiarism declaration

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FACULTY OF HEALTH SCIENCES

PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I Ingrid Walters (Student number: 543589) am a student registered for the degree of MMED Ophthalmology in the academic year 2024.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.
- I have included as an appendix a report from "Turnitin" (or other approved plagiarism detection) software indicating the level of plagiarism in my research document.

Signature:  Date: 18 April 2024

Appendix 5: Accepted protocol

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FACULTY OF HEALTH SCIENCES

CANDIDATE'S SURNAME: [Please print] Walters	FIRST NAME/S: Ingrid	STUDENT NUMBER: 543589
CURRENT QUALIFICATIONS: BOptom (UJ), MBBCh (WITS)		
TEL: 0825731023	CELL: 0825731023.	E-MAIL: Ingrid.walters@yahoo.co.uk FAX:
DEGREE FOR WHICH PROTOCOL IS BEING SUBMITTED: OPHTHALMOLOGY MMED		
PART-TIME OR FULL-TIME: Full time		
FIRST REGISTERED FOR THIS DEGREE:	TERM : First term/January.	YEAR: 2020
DEPARTMENT: Ophthalmology/ Neurosciences		
TITLE OF PROPOSED RESEARCH: Spectrum of glaucomatous disease at Charlotte Maxeke Johannesburg Academic hospital		
CANDIDATE'S SIGNATURE: Iwalters		DATE: 03/08/2022
SUPERVISOR 1 (NAME & SURNAME): Prof Susan Williams		% Supervision 100%
SUPERVISOR'S QUALIFICATIONS		
SUPERVISOR'S DEPARTMENT		
SUPERVISOR'S ADDRESS / TEL / E-MAIL:		
SUPERVISOR 2 (NAME & SURNAME): N/A		% Supervision
SUPERVISOR'S QUALIFICATIONS		
SUPERVISOR'S ADDRESS / TEL / E-MAIL:		
SUPERVISOR 3 (NAME & SURNAME): N/A		% Supervision
SUPERVISOR'S QUALIFICATIONS		
SUPERVISOR'S ADDRESS / TEL / E-MAIL:		

SYNOPSIS OF RESEARCH:(Brief summary of proposed research project; between 200-300 words only; with sub-headings: an introduction and justification for study, aim/s, proposed methodology and expected outcome/s)
[Use reverse side of this page if more space is required]

Introduction:

Glaucoma is group of ocular conditions that encompass an irreversible optic neuropathy associated with structural damage to the optic nerve and functional vision loss. Glaucoma is the second most common cause of blindness worldwide and affects a disproportionately high number of patients in the developing world.

Glaucoma can be classified into open or closed angle glaucoma as well as divided into primary and secondary subtypes. There are well described risk factors for the development of glaucoma including ethnicity, age, sex, family history and elevated intraocular pressure.

WITS ETHICS NOT REQUIRED:	Yes No	IF ? SUPPLY ETHICS CLEARANCE CERTIFICATE AS ATTACHMENT AND INCLUDE ETHICS NUMBER HERE:
WITS ETHICS PENDING:	(Yes) No	
WITS ETHICS APPROVED:	?es No	M190671
(circle appropriate symbol)*		

***Please note the final human ethics clearance certificate or animal ethics certificate must be available prior to starting research**		
As supervisor/s, I/we confirm that I have read the protocol which has been submitted for assessment.		
SIGNATURE OF SUPERVISOR/S:	.....	.....
SIGNATURE PG OFFICE STAFF	REGISTERED YES..... NO.....	STAMP

SYNOPSIS OF RESEARCH CONTINUED

Management options for the treatment of glaucoma include medical/topical drops, laser treatment and surgery all targeted at reducing intraocular pressure.

Aims/ Justification:
The aim of my study is to describe the demographics and spectrum of glaucomatous disease in a dedicated glaucoma clinic in a large tertiary academic hospital in Johannesburg. Additionally the risk factors, severity of glaucoma and how the disease is being managed will also be looked at. The findings will be compared to existing population studies on the epidemiology of glaucoma in South Africa and will demonstrate the large burden glaucomatous disease is placing on the healthcare system.

Methodology:
A retrospective descriptive study using patient records from the Charlotte Maxeke Johannesburg Academic Hospital Glaucoma Clinic Redcap database. All 748 records from 01/01/2016-31/12/2020 will be looked at. All patients on the database have signed consent for inclusion of their data in the database and ethics for the database itself has been obtained.

Expected outcomes:
I anticipate the outcomes will be similar to population based studies performed in South Africa, namely primary open angle glaucoma is the most prevalent type of glaucoma amongst black South Africans. The commonest forms of secondary glaucoma will most likely be exfoliation glaucoma or angle recession glaucoma. The prevalence of blindness will most likely be higher than other studies amongst the population studied due to various factors such as control, access to health services, education etc.

11 March 2019/MP

MMED Protocol

Title: Spectrum of glaucomatous disease at Charlotte Maxeke Johannesburg Academic Hospital

Dr Ingrid Walters

MBBCh (Wits)

Registrar

Division of Ophthalmology

Department of Neurosciences

Faculty of Health Sciences

University of Witwatersrand

Student Number: 543589

Supervisor: Prof Susan Williams

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Plagiarism declaration for written work

I, Ingrid Walters, as a postgraduate student registered for a MMed at the University of the Witwatersrand declare the following:

- I am aware that plagiarism is the use of someone else's work without their permission and or without acknowledging the original source.
- I am aware plagiarism is wrong.
- I confirm that this written work is my own work except where I have stated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or if I have failed to acknowledge the ideas or writing of others

Signature

Date: 29/07/2022

Table of Contents

1. Introduction:

Glaucoma is a group of ocular conditions that exhibit irreversible optic neuropathy associated with characteristic structural damage to the optic nerve and associated functional visual loss. [1-7] Elevated intraocular pressure (IOP) is an important risk factor although not a defining feature of glaucoma. [2,8]

Glaucoma is the second most common cause of blindness worldwide and is estimated, in 2020, to affect approximately 80 million people. [1-4, 9, 10] Over 11.1 million people are bilaterally blind because of glaucoma and a disproportionately high number of these patients live in developing countries. [1,2,4,9,10] The blindness caused by glaucoma places a huge burden on the healthcare system which is expected to increase going forward.[1,9]

2. Literature review:

Prevalence:

The global prevalence of all types of glaucoma for patients over 40 years old is 3.5%. [1, 3, 11] The prevalence of glaucoma in Sub-Saharan Africa is a lot higher. Rotchford et al. (2002) found an overall prevalence of 4.5% in a Zulu population in KwaZulu Natal, South Africa. [12] In the town of Temba in the city of Tshwane, South Africa, Rotchford et al. (2003) found the prevalence of glaucoma to be 5.3% in black residents. [13]

The classification and spectrum of glaucoma:

Glaucoma is classified as either open or closed angle glaucoma, based on gonioscopic appearance. Three-quarters of patients with glaucoma have open angle

glaucoma (OAG).[1-5] Both open and closed angle glaucoma can be divided into primary and secondary subtypes. [8]

Primary open angle glaucoma:

Primary open angle glaucoma (POAG) can be diagnosed if there is structural optic nerve damage on optical coherence tomography (OCT), or in the form of an enlarged vertical cup-disc ratio (VCDR), which is a marker of neuroretinal rim fallout.[2, 8] A VCDR of 0.7 represents the 97.5th percentile and a VCDR of 0.8 is used to represent the 99.5th percentile. [2, 8] Functional evidence of glaucomatous optic neuropathy, in the form of a characteristic visual defect typically measured by automated perimetry, should also be present. [2,8] In certain instances where the optic nerve cannot be seen, or visual field testing cannot be performed, an elevated IOP ≥99.5th percentile may be diagnostic. [8] Gonioscopic examination of the drainage angle should reveal an open angle and no identifiable secondary cause of the glaucoma should be seen. [8]

POAG disproportionately affects Africans and people of African descent. [1-16] POAG was present in 56% and 54% of patients in Rotchford et al.'s Themba and KwaZulu Natal studies respectively.[12,13] Studies from the Caribbean demonstrate the highest proportion of POAG amongst their black population. [19]

Primary angle closure glaucoma:

Primary angle closure glaucoma (PACG) follows when the anterior chamber angle, seen on gonioscopy, is narrowed or closed resulting in blockage of aqueous outflow and elevated IOP. [8] With the exception of Japanese populations, PACG is more common in Asian ethnic groups due to anatomical predisposition. [3, 4, 6,8] Salmon et

al. (1993) studied a mixed-race population in the Western Cape and found a preponderance of PACG, likely reflecting this population's Asian heritage. [14] Despite only accounting for approximately 26 % of worldwide glaucoma, ACG accounts for 50 % of the global burden of blindness due to glaucoma. [4,9]

Secondary glaucoma:

Secondary glaucoma is caused by an underlying ocular or systemic condition which elevates the intraocular pressure. Some secondary causes include Exfoliation glaucoma, pigment dispersion glaucoma, angle recession glaucoma due to trauma, uveitic glaucoma from ocular inflammation, neovascular glaucoma from vaso-proliferative retinal conditions and crystalline lens related glaucoma's. [8] Secondary glaucoma's occurred in 36% (prevalence of 2.0%) of patients in Rotchford et al's South African Temba study. [13] The vast majority (45 % of secondary cases) were due to exfoliation glaucoma followed by cases being secondary to trauma (20% of secondary cases). [13] The prevalence of secondary glaucoma elsewhere in the world is much lower, for instance only 0.49% in Tanzania [3] and 0.7% in Barbados. [3,19]

Childhood glaucoma:

Glaucoma can also present in childhood although this is uncommon. Determining prevalence is difficult as few population studies exist due to its rarity. Primary childhood glaucoma includes primary congenital glaucoma (PCG) and juvenile open-angle glaucoma (JOAG). Secondary childhood glaucoma's are more common than primary and can be present at birth or acquired anytime thereafter. Some typical secondary causes include previous ocular surgery, trauma, inflammation, systemic conditions, and ocular abnormalities. [20]

Risk factors:

1. **Age:** Prevalence increases exponentially with age for most types of glaucoma so as populations live longer, they are increasingly affected. [1-19]
2. **Sex:** Woman appear to be statistically more affected by glaucoma due to increased susceptibility to PACG as well as relative longevity. [10,15 16] When age is adjusted for, men are more often affected by POAG than women.[1,12,13,17,19]
3. **Ethnicity:** Studies have demonstrated that individuals of African descent are 4-5 times more likely to develop open angle glaucoma, compared to people of European descent. [3,5,6,15-18] Whether the increased susceptibility is due to genetic or environmental factors is not yet fully understood. [7,17] POAG in persons of African descent progresses more rapidly and presents at an earlier age. [7,16] The ADAGES study (2009) demonstrated persons with African descent have anatomical predispositions to developing POAG. Examples include higher refractive errors, thinner corneal thicknesses, larger cup-to-disc ratios and larger disc and rim areas. [7] The SAES (2018) study found black South Africans had thinner corneas and higher IOP's when compared to other ethnicities. [19]
4. **Family history:** A positive family history of glaucoma or blindness in the family is a significant risk factor for POAG.[16-18] Between 16.1 - 35% of patients with POAG reported a positive family history. This implies approximately a 3 times increased risk of developing glaucoma with a positive family history present. [16-18]
5. **Elevated IOP:** IOP remains the only modifiable risk factor for glaucoma. Strong evidence exists that elevated IOP and fluctuations in IOP, are associated with glaucoma development and progression. [1-16] A subset of

POAG with normal IOP is known as normal tension glaucoma (NTG), and its prevalence varies across the literature. [1-11]

6. **Other:** Other possible risk factors for the development of glaucoma include myopia for POAG, and hyperopia for PACG. Hypertension and diabetes have been extensively studied as risk factors for glaucoma but there is no good evidence supporting this. [1, 6-8, 16-18]

Severity and prevalence of blindness:

Not only is POAG glaucoma more prevalent in Africa and the developing world, but the prevalence of irreversible blindness because of glaucoma is also much higher in these regions. [1-11] Blindness is defined by the World Health Organisation as a visual acuity worse than, or equal to, 6/120 in the better eye.[11] Postulated reasons for this include higher prevalence, inadequate control, poor awareness, poor screening, socioeconomic factors, lack of access to health services, and late presentation. [3,11] The proportion of patients blind from glaucoma vary in the literature from none in Sweden [2,10] to 22% in South Africa. [2,10, 12] Half of patients diagnosed with glaucoma in the Baltimore eye survey and 87 % of South African patients (according to Rotchford et al) were unaware they had glaucoma.[13,16] Olawoye et al. report that 47% of patients in their African study were already blind in one eye at diagnosis. [6]

Management:

The available treatment options for glaucoma are medical, laser therapy, and surgery. These are all targeted at reducing IOP. In the POAAGG (2015) study, which recruited African American patients with POAG, 67.1% were on topical medication, 36.2% had been treated with glaucoma surgery or laser, and 33% of this group had received laser or surgery and were also on topical glaucoma medication. [17]

Medical treatment:

Initial treatment is usually medical in the form of topical eyedrops. The major glaucoma landmark trials that guide medical treatment options largely included non-African subjects. [11, 15, 21] There is a paucity of literature guiding treatment in African patients. Studies such as the Baltimore Eye Survey suggest a reduced efficacy of topical IOP lowering medications in black patients, possibly due to darker iris pigmentation. [15, 16] Additional challenges in treatment of African patients include advanced stage of the glaucoma at presentation, local availability, and affordability of certain treatment options. Furthermore, side-effects and their acceptability to patients impact adherence and long-term success of medical treatment. [6,15]

Laser therapy:

Selective laser trabeculoplasty (SLT) has shown promising IOP lowering effects in patients with POAG and other types of open angle glaucoma in African patients.[11] It is a safe, minimally invasive, and very cost-effective treatment option. [11]

Surgical treatment:

Filtration surgery is occasionally required to obtain optimal IOP in glaucoma patients. The most commonly performed procedure is the trabeculectomy, which represents the gold standard for surgical management. There is strong clinical evidence to suggest that black patients are at higher risk of filtration surgery failure. [11, 15, 21]

Nguuyen et al (2018) concluded African descent was associated with a higher failure rate for trabeculectomy with mitomycin C, and a higher incidence of bleb leaks when compared to patients of European descent. [21]

3. Research aim:

A clinical audit describing the demographics and spectrum of glaucomatous disease and the management of glaucoma patients at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH).

4. Study question:

How does glaucoma present at a dedicated glaucoma clinic at a large tertiary academic hospital in Johannesburg?

5. Study Objectives:

- To describe the spectrum of glaucomatous disease at CMJAH
- To describe the demographics of the glaucoma patients at CMJAH
- To describe the risk factors, present in the patients with glaucoma at CMJAH
- To describe the management of the adult glaucoma clinic population at CMJAH.

6. Materials and Methods:

Study Design:

A clinical audit of patient records from the CMJAH glaucoma clinic database. The glaucoma clinic is situated in Parktown, Johannesburg. The study population

consists of patients diagnosed with glaucoma who have been referred for further management and follow up at the dedicated CMJAH glaucoma clinic.

Data Collection:

The CMJAH Glaucoma Clinic Database on Redcap will be used to retrieve the clinical records of patients who attended the clinic between 01/01/2016 and 31/12/2020. Missing or incomplete records will be correlated with hard copy records that are kept in the clinic. Each of the 748 existing patient records will be analysed, and data will be exported to a Microsoft excel spreadsheet. All patients will receive a unique reference number to protect their identity. See Appendix A. Data collection sheet.

Inclusion Criteria:

Each of the available 748 records of patients who attended the CMJAH glaucoma clinic between 01/01/2016-31/12/2020 will be included in the study.

Exclusion Criteria:

Children under the age of 12 will be excluded from the study.

7. Data Management:

The data collection sheet will be populated manually from the Redcap Database. Patients will be allocated a unique identifier to ensure anonymity

8. Data Analysis

Simple statistical analysis will be performed using STATA. Descriptive statistics such as means, medians and standard deviation will be used for continuous variables.

Frequency distribution and percentages will be used for categorical variables. Regression analysis will be performed to analyse the risk factors.

9. Ethics Approval

Application for ethics approval will be submitted to the Human Research Ethics Committee of Study in August 2022. Data exported will not include any patient identifiers, thus protecting confidentiality. All patients have signed informed consent for inclusion of their data in the database. Ethics approval for the database itself was obtained (Clearance certificate no. M190671).

10. Duration of Study

	July 2022	Aug 2022	Sept 2022	Oct 2022	Nov 2022
Protocol preparation					
Protocol submission/correction					
Ethics application					
Data collection and analysis					
Write up for publication					
Submit for publication/corrections					

11. Funding

This study will analyse existing patient records without incurring any cost.

12. Limitations:

Single centre retrospective study with the possibility of previous incomplete data collection resulting in missing information in the database.

12. Presentation Plans:

Study to be submitted for publication in a South African peer reviewed journal and study findings are to be presented at a national ophthalmology conference.

13. References:

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Appendix A: Data Collection sheet

Patient study no.	Age	Sex	Ethnicity	Diagnosis	Family history	BCVA		Gonio		VCDR		IOP		VF MD		No. meds		Laser		Surgery	
						R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FACULTY OF HEALTH SCIENCES

University of the Witwatersrand Student Ethics Declaration Form

(To be completed during the protocol assessor meeting)

Background

All Research conducted by a University of the Witwatersrand student, with human subjects or animals, requires approval by the Wits Human Research Ethics Committee or Animal Research Ethics Committee, respectively.

If research has been undertaken without the necessary ethics approvals, this is considered an ethics violation. This will be reported to the relevant structures, the data will have to be discarded, and in the case of students, they cannot use the data towards their degree.

To prevent any ethics violations, the ethics requirements for the proposed project will be discussed with you at the protocol assessment.

Declaration

Based on the current protocol assessment (and any proposed changes suggested by the assessor committee), we, the undersigned, understand that the proposed research requires:

1. Human Research Ethics clearance certificate	✓ Yes	No
a. Covered under existing supervisor ethics	✓ Yes	No
b. Requires a new HREC application	✓	No
2. Animal Research Ethics clearance certificate	Yes	No
3. No Human or Animal Ethics Clearance	Yes	No
4. Unclear, will seek appropriate guidance from the HREC/AREC committees (whichever relevant)	Yes	No

Signatures

Supervisor/s: _____ Student: _____

_____

Date: 3rd August 2022

11 March 2019/MP

Statement of principles for postgraduate supervision

In a context of academic freedom and within a framework of individual autonomy and the pursuit of knowledge, this statement is written in the belief that there is a reciprocal relationship and mutual accountability between supervisor and student

THE SUPERVISOR AND THE STUDENT:

1. Will establish agreed roles and clear processes to be maintained by both parties. In the case of joint supervision, the roles and responsibilities of each supervisor and the student need to be clarified.
2. Will meet regularly and as frequently as is reasonable to ensure steady progress towards the completion of the proposal, research report, dissertation or thesis. This time varies but the normal minimum requirement for face-to-face contact spread across each year of registration is: 10 contact hours for an Honours project, 15 contact hours for a Masters by coursework and research report and 24 contact hours for a Masters by dissertation and a PhD.
3. Will keep appointments, be punctual and respond timeously to messages.
4. Will keep one another informed of any planned vacations or absences as well as changes in his or her personal circumstances that might impact on the work schedule. Unplanned absences or delays should be discussed as soon as possible and arrangements should be made, to catch up lost time.
5. Will ensure that research on animal or human subjects is conducted with prior approval and according to the procedures and the requirements of the relevant Ethics committee.
6. Will both complete Progress Reports on the research project as required/requested by the relevant Faculty Graduate Studies Committee.

THE SUPERVISOR:

1. Undertakes to provide guidance for the student's research project in relation to the design and scope of the project, the relevant literature and information sources, research methods and techniques and methods of data analysis.
2. Will provide guidance at the commensurate NQF level requirements for autonomy and accountability that the student is expected to demonstrate.
3. Has a responsibility to be reasonably accessible to the students.
4. Will be prepared for meetings with the student. This includes being up-to-date on the latest work in his/her area of expertise.
5. Will expect written work as jointly agreed, and will return that work with constructive criticism within a timeframe (a suggestion of 2-4 weeks) jointly agreed at the outset of the research.
6. Will provide advice that can help the student to improve his/her writing. This may include referrals for language training and academic writing. The supervisor will provide guidance on technical aspects of writing such as referencing as well as on discipline specific requirements. Detailed correction of drafts and instruction in aspects of language and style are **not** the responsibility of the supervisor.
7. Will guide the student in the production of a research report, dissertation or thesis. Provision should be allowed for adequate, mutually respectful, discussion around recommendations made.
8. Will assist with the construction of a written time schedule, which outlines the expected completion dates of successive stages of the work.
9. Will encourage the student to present work at postgraduate/ staff seminars/national/international conferences as appropriate.
10. Will assist with the publication of research articles as appropriate.
11. Will discuss the ownership of research conducted by the student in accordance with the University rules on intellectual property, copyright, **guidelines on authorship/co-authorship**, and **policy on research integrity.**
12. Will ensure that the student is aware of the University's Plagiarism Policy, knows what plagiarism is, and what the consequences are for academic dishonesty and violation of research integrity and intellectual property.
13. Will ensure that the student is made aware in writing of the inadequacy of progress and/or of any work where the standard is below par. Acceptability will be according to criteria previously supplied to the student.
14. Has a duty to refuse to allow the submission of sub-standard work for examination, regardless of the circumstances. If the student chooses to submit without the consent of the supervisor, then this should be clearly recorded and the appropriate procedures followed.

THE STUDENT:

1. Takes full responsibility for the research and its successful completion; including managing the process under the guidance of supervisor (s).
2. Will attend such courses and lectures that are compulsory for the degree, and undertakes to catch up fully on any work, lectures and/or assignments, that are missed.
3. Undertakes to work independently under the guidance of the supervisor(s). This includes reading widely and critically to ensure that the seminal **and** current literature pertinent to his/her chosen topic has been identified, consulted and critiqued.
4. Undertakes to work in accordance with the academic standards expected by the University for the commensurate NQF level of qualification.
5. Is obliged to make appointments to consult the supervisor(s) and arrange meeting times convenient to both parties well in advance.
6. Should submit written work for discussion with the supervisor(s) well in advance of a scheduled meeting. The kind and frequency of written work should be agreed with the supervisor(s) at the outset of the research.
7. Written work that is submitted to the supervisor, including final submissions to examiners, should be relatively free from basic spelling mistakes, incorrect punctuation and grammatical errors. Responsibility for the accuracy of language, the overall structure and coherence of the final research report, dissertation or thesis rests with the student.
8. Cannot expect the supervisor to be proof-reader and editor of his/her work or to approve work with any of the weaknesses spelt out in **7** above.
9. Undertakes to heed the advice given by the supervisor(s) and to engage in discussion around suggestions made. Ultimately the student has to take responsibility for the quality, integrity and presentation of the work.
10. Should strive to maintain a focus on his/her research area and to work diligently within the agreed time schedule.
11. Agrees to honour agreements about ownership of the research and in accordance with the University's guidelines and rules in relation to co-authorship, copyright and intellectual property.
12. Will ensure that the work contains no instances of plagiarism, violation of intellectual property and research integrity standards, that all citations are properly referenced, and that the list of references is accurate, complete and consistent.
13. Agrees to work in accordance with the criteria of acceptability as supplied by the supervisor(s).
14. Undertakes not to place the supervisor(s) under undue pressure to submit work for examination until the supervisor is satisfied that it has reached an acceptable, **examinable*** level of quality.

We confirm that we have read and understood this statement and agree to be guided by its principles for as long as we continue to work together.

Name of student: Ingrid Walters

Student Number: 543589

Student's signature: Iwalters

Name of Supervisor: Prof Susan Williams

Supervisor's signature:

Name of Co-Supervisor: N/A

Co-Supervisor's signature:

The broad area of study is: Glaucoma

Provisional submission date is: 10 August 2022

Degree: MMED Ophthalmology

School: Clinical Medicine

Faculty: Neurosciences

Date: 03 August 2022

Specific agreements pertaining to: ownership, joint publication, funding, confidentiality and disclosures pertinent to the Certificate of Clearance and ETD Form which the student and/or supervisor are required to sign, must be attached to this agreement as and when appropriate and kept in the Faculty Office. In the event of disagreements between the supervisor(s) and student, the parties should act in accordance with the University Grievance Policy.

***Note: Consent by supervisor**(s) to submit work for examination does NOT guarantee that the work will pass. The appointed examiners assess and determine whether the work is of a passable standard.

(2019/09/30)