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ORIGINAL ARTICLE

CHALLENGES OF GLAUCOMA MANAGEMENT IN NIGERIA: A NATIONWIDE PERSPECTIVE

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ABSTRACT

Background: *Glaucoma blindness is burdensome. Knowing glaucoma management challenges can reduce glaucoma blindness burden.*

Objective: *The aim of this study was to determine challenges of glaucoma management in Nigeria*

Methods: *A descriptive cross sectional survey of Eye Care Physicians (ECP) on challenges of glaucoma management in Nigeria.*

Results: *One hundred and twenty three Physicians, mean age 44, 56.1% males. Most (68.3%) always and 31.7% often manage glaucoma. Presentation and treatment affordability; most ECP at least agree: most patients present late (110, 89.4%), cannot afford standard investigations (87, 70.7%), cannot afford treatment, 62.6%. However, most ECP at least disagree most patients readily access drugs through health insurance, 83.7%. Preferred treatment; most ECP at least agree: most patients prefer medical treatment 91.9%, being comfortable managing glaucoma with drugs, 66.7%, medical treatment being cost effective than trabeculectomy 82.9%, and being as comfortable performing trabeculectomy as with cataract surgery, 51.2%. Drugs Availability; most ECP at least agree: common anti-glaucoma drugs are readily available (112, 91.1%), and drugs are expensive for most patients (105, 85.4%). Equipment; many ECP at least disagree: there is functioning OCT to investigate glaucoma (76, 61.8%), there is fundal camera for optic disc photography (62, 50.4%).*

Conclusions: *Glaucoma management remains challenging especially late presentation, treatment non-affordability and inadequate resource for glaucoma care. Medical treatment is a preferred choice among patients. The need to improve uptake of surgical glaucoma services underscored.*

Key words: *anti-glaucoma drugs, glaucoma management challenges, health care resources, Nigeria*

INTRODUCTION

Glaucoma is the second commonest cause of visual impairment and blindness among adult Nigerians 40 year and above (1). Disturbingly, glaucoma management is fraught with many challenges particularly lack of awareness, late presentation, poor compliance with treatment regimen among the patients; poor infrastructural facilities, equipment and personnel to deal with increasing number of patients (2,3); treatment choices which is determined by availability of drugs, expertise and willingness to surgically treat the patients and availability of laser treatment on the part of the healthcare providers.

In this paper the qualified ophthalmologists and trainee ophthalmologists who participated in the study are referred to as Eye Health Care Physicians (ECP). Also, glaucoma patients are referred to as Individuals With Glaucoma (IWG). The challenge of glaucoma management has been previously investigated at some parts of Nigeria (3, 4) and across (5). However, periodic evaluation and knowledge of glaucoma challenges can lessen its burdensome effects.

This study aimed to harvest a nationwide perspective of the various aspects of management challenges of glaucoma. While this work necessarily updates the previous works it essentially differs in depth and scope.

PATIENTS AND METHODS

This is a division of a work *Challenges of Glaucoma Management in Nigeria* that has been written into two articles. Whereas the methodology is essentially the same this paper considers the Individuals With Glaucoma (IWG) presentation at health facility, available glaucoma treatment options and affordability, investigative equipment and anti-glaucoma drugs.

The Ophthalmological Society of Nigeria (OSN) is an umbrella body of all Eye Care Physicians (ECP) including trainees and qualified ophthalmologists in Nigeria. The OSN organises Annual General Meeting and Scientific Conference and members mostly attend. The congress offers opportunity to reach many Nigeria's ECP.

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The ECP attending 41st Annual General Meeting and Scientific Conference of the OSN between August 22 and 27, 2016 at Hotel Presidential Port Harcourt, Nigeria were requested to fill self-administered structured questionnaire. The inclusion criteria were consenting to participate in the study by endorsing written informed consent section of the questionnaire and being a qualified physician delivering Eye Health Care (diploma ophthalmologist, trainee ophthalmologist and fellow ophthalmologist). A diploma ophthalmologist is a physician who had additional structured two-year training in ophthalmology. A trainee ophthalmologist is a physician who is undergoing fellowship training in ophthalmology. A fellow ophthalmologist is a physician who has fellowship qualification in ophthalmology. Many ophthalmologists have additional training/ qualifications. The structured self-administered questionnaire was essentially in two sections including the ECP's socio-demography and information on challenges of glaucoma management in Nigeria. The ECP's socio-demography covers age, gender, place of practice, qualification, duration in eye care practice, and whether practice experience is in the public, private or mixed.

The challenges to glaucoma contains structured statements with a Likert 5 point scale (Strongly Agree, SA; Agree, A; Not Sure, NS; Disagree, D; and Strongly Disagree, SD) response.

The positive statement is coded 5, 4, 3, 2, 1 for SA, A, NS, D and SD respectively. The coding is reversed for negative statement.

The study was approved by the University of Ilorin Ethic Review Committee. The data were collated, entered, cleaned and analyzed using Statistical Package for the Social Sciences (SPPS) version 20 (Chicago, Illinois, USA). The data was copied to excel spread sheet and analysed. The frequency and mean were calculated. The mean values of 2.4 - 4.0 was taken as significant and 0 - 2.4 as insignificant.

RESULTS

Eye Care Physician Demographics:
One hundred and twenty three ECP with a mean age 44 years including 56.1% males were surveyed. All practice in Nigeria and most are consultant ophthalmologists (64.2%) and work in public hospitals (58.5%). Eight four (68.3%) always and 39 (31.7%) often manage glaucoma eye condition. The years of ophthalmic practice range 0.5 – 44, mean 8, Standard Deviation 4.

Challenges of Glaucoma Management in Nigeria
i. Presentation of Individuals With Glaucoma for Treatment at health facilities: Most ECP at least agree; most IWG present during its late stage (110, 89.4%), and most IWG lack awareness of glaucoma (115, 93.5%). (**Table 1**).

Table 1: Individuals with Glaucoma at presentation across the health facilities.

ID	Item	Direction	SA	A	NS	D	SD	fx	n	Mean	Decision
		-VE	1	2	3	4	5				
		+VE	5	4	3	2	1				
Q11i	Most IWG present during its early stage		0	3	8	61	51	209	123	1.7	Insignificant
Q11ii	Most IWG present during its late stage		48	62	7	6	0	521	123	4.2	Significant
Q11iii	Most IWG lack awareness of glaucoma		43	72	4	4	0	523	123	4.3	Significant
-VE.Q11iv	Most IWG cannot benefit from eye care		4	8	7	40	64	521	123	4.2	Significant
			Sectional Mean							3.6	Significant

SD, Strongly Agree; A, Agree; NS, Not Sure; D, Disagree; SD, Strongly Disagree; IWG, Individual (s) With Glaucoma

ii. Glaucoma service affordability among Individuals With Glaucoma: Most ECP at least agree; most IWG cannot afford standard investigations (87, 70.7%), cannot afford treatment (77, 62.6%), and disagree; most IWG readily access drugs through National Health Insurance Scheme (NHIS) (103, 83.7%) (**Table 2**).

Table 2: Glaucoma service affordability among Individuals with Glaucoma across health facilities.

ID	Item	Direction	SA	A	NS	D	SD	fx	n	Mean	Decision
		-VE	1	2	3	4	5				
		+VE	5	4	3	2	1				
-VE.Q12i	Most IWG cannot afford standard investigations		23	64	7	27	2	290	123	2.4	Insignificant
-VE.Q12ii	Most IWG cannot afford treatment		14	63	5	40	1	320	123	2.6	Significant
Q12iii	Most IWG readily access drugs through NHIS		4	5	12	64	38	242	123	2.0	Insignificant
Q12iv	Most IWG became blind because of poverty		20	47	24	26	6	418	123	3.4	Significant
			Sectional Mean							2.6	Significant

SD, Strongly Agree; A, Agree; NS, Not Sure; D, Disagree; SD, Strongly Disagree; IWG, Individual(s) With Glaucoma; NHIS, National Health Insurance Scheme.

iii. Glaucoma treatment options across the health facilities: Most ECP at least agree; most IWG prefer medical treatment (113, 91.9%), and disagree; most IWG (98, 79.7%) prefer surgical treatment (**Table 3**).

Table 3: Glaucoma Treatment Options at Health Facility where Eye Care Physician practice.

ID	Item	Direction	SA	A	NS	D	SD	fx	n	Mean	Decision
		-VE	1	2	3	4	5				
		+VE	5	4	3	2	1				
Q13i	Most IWG prefer medical treatment		39	74	7	3	0	518	123	4.2	Significant
Q13ii	Most IWG prefer surgical treatment		0	3	22	79	19	255	123	2.1	Insignificant
Q13iii	Medical personnel choose treatment option for the IWG		7	59	17	36	4	398	123	3.2	Significant
Q13iv	Laser treatment option is not offered to the IWG		14	35	18	41	15	361	123	2.9	Significant
			Sectional Mean							3.1	Significant

SD, Strongly Agree; A, Agree; NS, Not Sure; D, Disagree; SD, Strongly Disagree; IWG, Individual (s) With Glaucoma.

iv. Eye Health Care Physician Self-Appraisal on Glaucoma Management: Many ECP at least agree; being comfortable managing IWG with drugs (82, 66.7%), medical treatment being more cost effective than trabeculectomy (102, 82.9%), and disagree; trabeculectomy being demanding and unrewarding (97, 78.9%), %) (**Table 4**).

Table 4: Eye care Physician Self-Appraisal on Glaucoma Management.

ID	Item	Direction	SA	A	NS	D	SD	fx	n	Mean	Decision
		-VE	1	2	3	4	5				
		+VE	5	4	3	2	1				
Q14i	I perform gonioscopy routinely on all IWG		22	39	12	47	3	399	123	3.2	Significant
Q14ii	Trabeculectomy is demanding and unrewarding		1	11	14	71	26	259	123	2.1	Insignificant
Q14iii	I am comfortable managing IWG with drugs		8	74	12	25	4	426	123	3.5	Significant
Q14iv	Medical treatment is more cost effective than trabeculectomy		1	10	10	77	25	254	123	2.1	Insignificant
Q14v	I am as comfortable performing trabeculectomy as I am with cataract surgery		22	41	13	40	7	400	123	3.3	Significant
Q14vi	I have lost trabeculectomy skill since I rarely offer it to IWG		3	16	26	44	34	279	123	2.3	Insignificant
-VE.Q14vii	IWG do not appreciate trabeculectomy so, I abandoned it		3	11	24	49	36	473	123	3.9	Significant
			Sectional Mean							2.9	Significant

SD, Strongly Agree; A, Agree; NS, Not Sure; D, Disagree; SD, Strongly Disagree; IWG, Individual(s) With Glau-

v. Anti-glaucoma drugs Parameters: Most ECP at least agree; common anti-glaucoma drugs are readily available (112, 91.1%), and drugs are expensive for most IWGs (105, 85.4%) (**Table 5**).

Table 5: Anti-glaucoma drugs Parameters across the Health Facilities.

ID	Item	Direction	SA	A	NS	D	SD	fx	n	Mean	Decision
		-VE	1	2	3	4	5				
		+VE	5	4	3	2	1				
Q15i	The common anti-glaucoma drugs are readily available		42	69	2	8	2	510	123	4.2	Significant
-VEQ15ii	The combination anti-glaucoma drugs are not available		3	12	7	64	37	489	123	4.0	Significant
Q15iii	Adulterated anti-glaucoma drugs are common		7	37	50	20	9	382	123	3.1	Significant
Q15iv	Drugs are expensive for most IWG		27	78	5	12	1	487	123	4.0	Significant
			Seasonal Mean							3.8	Significant

SD, Strongly Agree; A, Agree; NS, Not Sure; D, Disagree; SD, Strongly Disagree; IWG, *Individuals With Glaucoma*

vi. Investigation facilities for glaucoma across the health facilities in Nigeria: Most ECP at least agree; there are tonometer (111, 90.2%), visual field analyser (95, 77.2%), and gonioscopy mirror (1-mirror or 3-mirror) (107, 87.0%); and at least disagree; presence of Optical Coherence Tomogram (OCT) (76, 61.8%), and fundal camera (62, 50.4%) (**Table 6**).

Table 6: Availability of Investigation facilities for glaucoma at the health facilities across Nigeria.

ID	Item	Direction	SA	A	NS	D	SD	fx	n	Mean	Decision
		-VE	1	2	3	4	5				
		+VE	5	4	3	2	1				
Q16i	There is functioning OCT to investigate glau-		27	14	6	36	40	321	123	2.6	Significant
Q16ii	There is functioning reliable tonometer to measure IOP		80	31	8	3	1	555	123	4.5	Significant
Q16iii	There is functioning automated visual field analyser to determine the visual field		68	27	9	10	9	504	123	4.1	Significant
Q16iv	There is fundal camera for optic disc photography		43	10	8	34	28	375	123	3.1	Significant
Q16v	There is Gonioscopy mirror (1-mirror or 3-mirror)		80	27	7	3	6	541	123	4.4	Significant
			Sectional Mean							3.7	Significant

SD, Strongly Agree; A, Agree; NS, Not Sure; D, Disagree; SD, Strongly Disagree

DISCUSSION

This work presents the views of Nigeria's Eye Care Physicians (ECP), a critical stakeholder in glaucoma care, on challenges of glaucoma management in Nigeria. The merit of the findings would be baseline for referencing, and improving glaucoma care.

Eye Care Physician Demographics: The surveyed ECP include fellow ophthalmologists, diploma ophthalmologists and trainee ophthalmologists. They form critical stakeholders in eye health care and their opinion is representative of the state of glaucoma care in Nigeria.

Challenges of Glaucoma Management in Nigeria

i. Presentation of Glaucoma IWGs for Treatment at health facilities: Late presentation of IWG for treatment is an important and well documented challenge in glaucoma care (2, 3, 6-8) also observed in this survey.

This is of concern because late presentation implies larger percentage of 1.2 million retinal nerve fibre have been irreversibly damaged (physical loss) manifesting as irreversible functional vision loss especially visual field and acuity impairment (7,8) Unfortunately, the common POAG in Nigeria rarely present with any ocular symptoms except at a late phase when there is symptomatic visual function impairment. (6) Notwithstanding, many IWG are often detected during eye examination for other eye conditions including free eye screening. Late presentation may be consequent to ignorance, illiteracy, lack of eye care resource, prohibitive cost and lack of glaucoma awareness. (2,3,6).

Also noted in this survey as elsewhere, was IWG poor awareness of glaucoma. In a study Adekoya et al., report as many as 94 (45.2 %) of 208 IWG had never heard of glaucoma and worrisome 69 of 95 (72.6 %) IWG wrongly believed visual loss from glaucoma is reversible. (9).

Meanwhile, most ECP at least disagree most IWG cannot benefit from eye care (84.6%). Whereas there may be no marked improvement in visual function following glaucoma treatment there are reasons to belief treatment delay progression of visual function decay. In a review of ten-year outcomes in newly diagnosed IWG on anti-glaucoma treatment, Sharma et al. demonstrate it is possible to maintain visual function in IWG. (10).

ii. Glaucoma management affordability among Individuals With Glaucoma:
As elsewhere (6), this work notes many IWG cannot afford the cost of glaucoma management particularly standard investigations and treatment. They become blind because of poverty, and would not readily access drugs through NHIS. NHIS supposed to insure Nigerians from the health care cost. (11) Regrettably, NHIS is not available, accessible and affordable to most Nigerians. It is a fact NHIS is yet to cover some glaucoma investigations and treatment. (12)

iii. Glaucoma treatment options across the health facility: This work finds most IWG would prefer medical treatment compare with surgical treatment. Generally, many IWG fear surgery preferring drug treatment instead. Moreover, report indicates that effective medical treatment of glaucoma can prevent up to 50% of blindness. (13) IWG and physicians prefer topical hypotensive medications as first-line treatment for their effectiveness, safety, availability and ease of administration. Notwithstanding, medication has limitations especially adverse effects, challenge with self-administration and daily eye drops instillation fatigue (14).

Further, not all IWG do well on medication especially those having narrow or close angle glaucoma, young IWG, those with initial intraocular pressure greater than 30mmHg and those with IOP that cannot be controlled despite maximal drug therapy. (7) Besides, having to be on life-long drug therapy is flawed with challenges particularly compliance, adulteration, affordability, tachyphylaxis (7). Meanwhile, surgical therapy has been recommended as primary treatment in Africa due to advances in the treatment of glaucoma. (15 - 17) Trabeculectomy is a choice surgical therapy in Africans majorly because of late clinical presentation, challenges with medication and its efficacy. It of concern many Nigerian IWG are not keen having glaucoma surgery because of fear of surgery and lack of visual improvement following surgery. (18, 19)

Interestingly, as many as (53.7%) ECP at least agree to medical personnel choosing treatment option for the IWG. This is paternalism, a situation where health care professional choose a treatment option considered in the best interest of such IWG. (20) Whereas paternalism may find application in selected health conditions it is generally no longer in vogue and better discouraged in glaucoma management. Rather than choosing treatment option for the IWG, ECP should provide comprehensive information on available glaucoma treatment options, their merits and demerits to allow informed decision on choice of treatment option by the IWG.

Moreover, nearly equal number of ECP at least either agree or disagree on laser treatment option is not offered to the IWG. Generally, laser treatment option is not available in most health facilities across Nigeria. Therefore, ECP plausibly agree or disagree to 'laser treatment option is not offered to the IWG' based on availability of laser treatment in their places of practice. Nonetheless, the ECP is supposed to mention available treatment options to IWG including alternative glaucoma treatment. The IWG can thereafter, be adjudged to take informed decision having chosen a course of treatment from presented options.

iv. Eye Care Physician Self-Appraisal on Glaucoma Management:
Gonioscopy enables ECP to visualize anterior chamber angle towards determining if the angle is opened, narrowed or closed. It is mainly used to classify glaucoma as open or close angle and may assist in choosing a course of treatment. For instance, close angle glaucoma would benefit from filtration surgery than medical therapy. The ECP is almost equally divided on whether to perform or not routine gonioscopy. Though ideal to do routine gonioscopy on every IWG it may be unpractical in a busy eye clinic where available patient load overwhelm the eye care resources. It is unlikely medical treatment is more cost effective than functioning trabeculectomy at least in the long term as most ECP observed in the study. In a study among Nigerian IWG, Adio and Onua (21) report a monthly anti-glaucoma direct cost of (N6 000, USD 40) and when indirect costs are added, the cost increased to (N15 810, USD 105.4) per IWG. Two third (80, 66.7%) visited the eye clinic monthly. The estimated (N41 310, USD 275.4) for glaucoma filtration surgery is believed to be a cheaper option.

v. Anti-glaucoma drugs Parameters: Advances in anti-glaucoma drugs continue leading to new more effective anti-glaucoma medication.

The medication has to be available, accessible and affordable to IWG to optimize their use. This work indicates common anti-glaucoma drugs are readily available including combination drugs even if many IWG would not afford them. The ECP are almost equally divided across agree, uncommitted and disagree in their responses on adulteration of anti-glaucoma drugs.

vi. Investigation facilities for glaucoma across the health facilities in Nigeria: There is need for investigations; for the diagnosis, to determine the severity and of course to monitor progress of the treatment. (6) Even when glaucoma is diagnosable clinically in its late stage, its management necessarily requires high index of suspicion and supporting investigations (especially visual field) in its early stage (22), and to rule out glaucoma in myopias and familiar high cup disc ratio.

Most ECP indicates availability of tonometer for IOP, automated visual field analyzer for the visual field, and gonioscopy mirror (1-mirror or 3-mirror) for anterior chamber angle. Contrariwise, many ECP admit absence Optical Coherence Tomograhy (OCT) to investigate glaucoma, and fundus camera for optic disc photography. However, few ECP indicates their availability at their places of practice.

Notably, OCT is advantageous over most other imaging techniques for early detection of glaucoma and follow up of both early and late presenting cases. Studies (23, 24) indicate that Optic Nerve Head (ONH) and lamina cribrosa deformation can be observed through OCT prior to detectable Retina Nerve Fibre Layer (RNFL) thinning or functional loss in glaucoma which may allow therapeutic intervention at the earliest stage of the disease besides monitoring disease progression and its treatment outcome. Regrettably, OCT is only affordable, available and accessible to a privileged few IWG. However, resources should be mobilized towards high-tech imaging equipment for management of all IWG the social status notwithstanding. A pathway after Allocco et al. (25), for essential glaucoma diagnostic examination and treatment procedures appropriate for our level of development should be developed towards saving resources, reducing costs and managing most IWG.

Limitations: Some of ECP failed to complete or submit copy of questionnaire distributed to them thus reducing the sample size. Further, the ECP is not evenly distributed across the country for instance about 16% (2) of ECP practice in Lagos State alone leaving other 36 States to share the balance even unevenly.

The lopsided ECP distribution implies more congress attendees from a particular zone. Besides, the number of ECP congress attendees from nearby the venue of the congress might be disproportionately higher than ECP distant from the venue. To ensure Nigeria-wide representation at least one ECP from each of the states that make up the six-geo-political zone were requested to fill the questionnaire. This was made possible by a co-author from a particular zone reaching out, after the congress, to the ECP in the zones noted to not have adequate ECP congress attendees (representatives) during the survey. The questionnaires were sent to the ECP in their places of practice and their inputs are part of this work.

Conclusions: Glaucoma management remains challenging especially late presentation, inability to afford treatment and inadequate resource for glaucoma care. Resolving these challenges would reduce the burden of glaucoma visual impairment and blindness. Medical treatment is a preferred choice among Individuals With Glaucoma. The need to improve uptake of surgical glaucoma services underscored.

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