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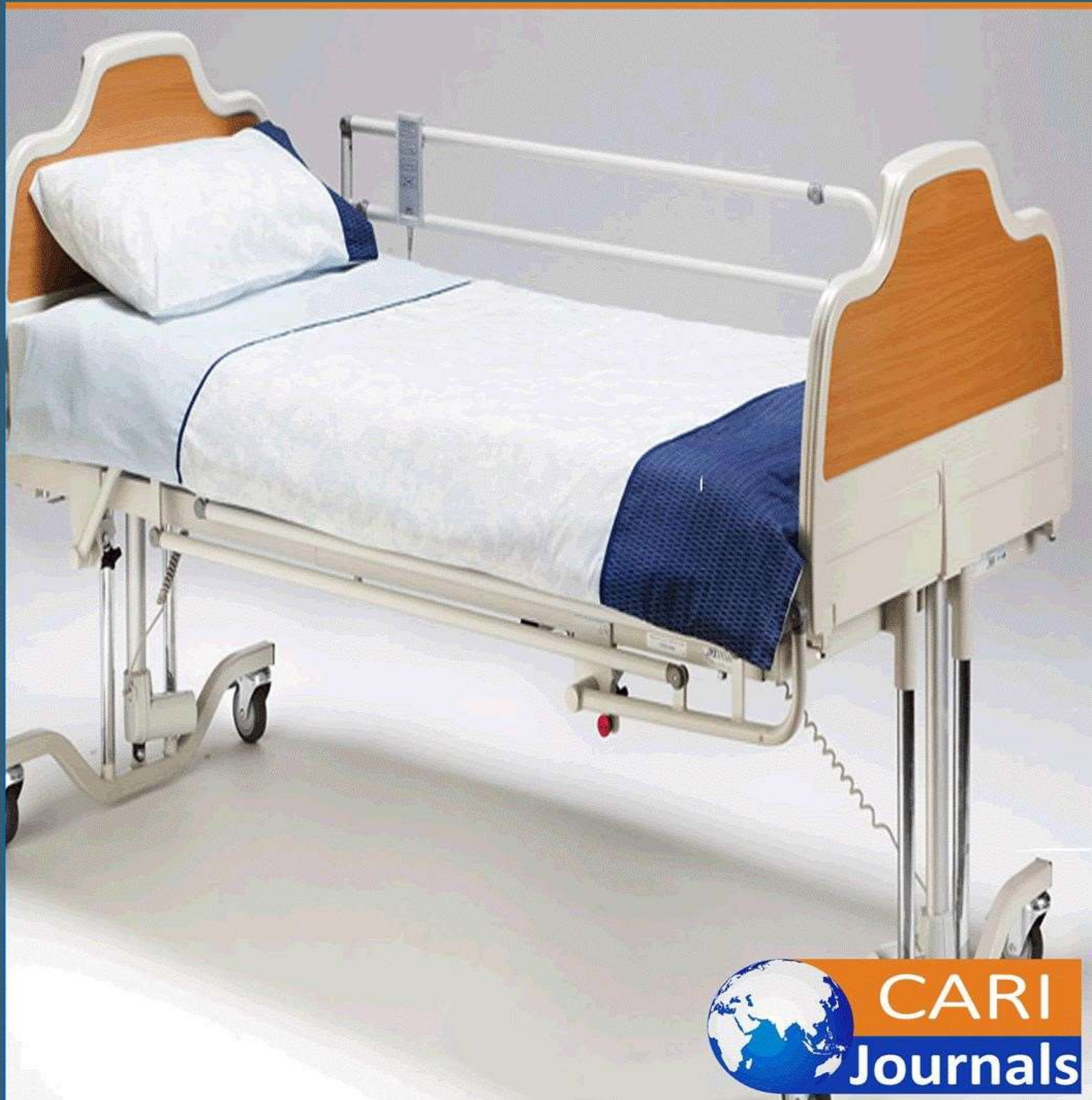

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Factors Associated with Medication Adherence among Glaucoma Patients in Ibadan, Oyo State, Nigeria

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ABSTRACT

Purpose: Managing glaucoma, the leading cause of irreversible blindness, entails the daily use of eye drops; and non-adherence to medication regimens is a problem in glaucoma management. This study assessed the predictors associated with medication adherence for glaucoma patients.

Methodology: A cross-sectional survey design was used. The study was conducted in 15 selected eye hospitals in Ibadan, Oyo State, Nigeria. A total of 126 glaucoma-consenting patients were interviewed using a questionnaire. Knowledge of glaucoma severity, medication adherence, and factors associated with medication adherence were measured. Data were analysed; descriptive and inferential statistics were done with the level of significance set at ≤ 0.05.

Findings: Most (95.2%) respondents had fair or good knowledge of glaucoma severity. However, only 32.5% of them adhered to their daily medication use. Knowledge was associated with education, occupation, and age, while medication adherence was associated with age and diagnosed period. The driving factors were the availability of social support, healthcare accessibility, communication, and patient education; medication reminders and follow-ups; glaucoma support groups; fear of blindness; and knowledge of glaucoma severity. The restraining factors were the cost of medication, life stress, glaucoma eyedrop side effects, multiple drug dosing, and efficacy in eyedrop self-administration.

Unique contribution to theory, practice and policy: Notwithstanding knowledge, restraining factors are more influential than driving factors in predicting adherence to medication for glaucoma patients. Clinicians should always identify and pay attention to these factors associated with medication adherence (especially the restraining factors) when managing glaucoma patients in order to avoid blindness despite being on treatment.

Keywords: *Glaucoma, Medication adherence, Adherence factors, Blindness*

INTRODUCTION

Glaucoma is a group of progressive optic neuropathies characterised by the degeneration of retinal ganglion cells and resulting changes in the optic nerve head.[1] It is a chronic, progressive, degenerative optic nerve disorder that produces characteristic visual field damage. Loss of ganglion cells is related to the level of intraocular pressure over time, but other factors may also play a role. Although the condition has no cure, reduction of intraocular pressure is the only proven method to manage the disease.[2,3] Glaucoma is the second most common cause of blindness worldwide, after cataracts[4]. Unlike cataracts, where vision loss can be reversed through surgery, glaucoma results in permanent optic nerve damage, which makes it the leading cause of irreversible blindness globally.[5]

An estimated 60.5 million people in 2010 and 79.6 million people in 2020 were affected with glaucoma globally,[5] and about 111.8 million people will be affected by 2040.[6,7] In Nigeria, studies from the Nigeria National Blindness and Visual Impairment Survey reported that 1.1 to 1.4 million Nigerian adults have glaucoma, with the vast majority unaware of their disease status.[4,8] They also noted that 1 in every 20 Nigerian adults above 40 years has glaucoma, and 1 in 5 of those with the condition are blind. Studies have reported prevalence as high as 7.3% in Southwestern Nigeria.[9]

Management of glaucoma involves using medications every day of the affected patient's life. Therefore, adherence is an essential component of disease management. The World Health Organisation has defined adherence as 'the extent to which a person's behaviour – taking medication, following a diet, or executing lifestyle changes, corresponds with agreed recommendations from a healthcare provider.[10] Adherence to daily medication usage is necessary to avoid progressive visual loss and blindness,[3] and non-adherence is thought to be a leading cause of blindness in those with glaucoma.[11] Notwithstanding the importance of adherence in disease management, many patients still default.[11,12] Drug regimen adherence is as important as the efficacy and potency of the drug prescribed to a patient; a drug is only as effective as its compliance with prescribed usage instructions. Sadly, drug adherence continues to be a significant problem, especially for patients with chronic medical conditions.[13,14] This non-compliance rate in glaucoma has been reported to be as high as 72.8%, 50.5%, and 43.8% in some studies.[15,16] For glaucoma patients, adherence to medication consists of 4 steps: obtaining the medication, using the medication every day, appropriately timing the doses, and successfully instilling the medications into the eye.[17]

Most research on glaucoma management focused on drug efficacy, potency and side effects. Clinicians are now beginning to realise that no matter how potent, safe or efficacious a medication or combination of medications is, if there is poor patient adherence, the overall aim of treatment will still not be met.[18] Non-adherence is thought to be a leading cause of blindness in those with glaucoma.[11] Medication adherence challenges are a significant public health issue because

medication non-adherence ultimately leads to blindness. It is, therefore, important that attention be equally given to understanding how adherent patients are and then evaluating those factors that could restrain or drive full medication adherence in a chronic condition like glaucoma.

Individual and collective behaviour contribute to how devoutly patients will adhere to their prescribed medication regimen.[19,20] Health behaviour can be affected by society, culture, beliefs or regions. The attitude and behaviour universally attributable to all glaucoma patients might differ slightly across regions, societies or cultures. The roles of these cultures, beliefs, regions, etc., in determining patients' overall behaviour towards adherence to medication regimens cannot be overlooked.

METHODS

This study was a cross-sectional survey. Structured questionnaires were administered to 126 randomly selected glaucoma patients from fifteen eye hospitals in the Ibadan metropolis. The selected patients were those diagnosed with glaucoma disease, who were still receiving their glaucoma management in any of the eye hospitals in Ibadan for not less than six months, were using daily medications to manage the disease, and were not less than 18 years of age. Those patients who were already blind in both eyes from glaucoma or patients with any form of mental impairment limiting their ability to comply with drug regimens or provide reliable information personally were excluded from the study. The snowball technique was used to select the fifteen eye hospitals, whilst purposive sampling was adopted to select the respondents because glaucoma is a peculiar condition, and clinic visits of diagnosed glaucoma patients were not daily.

The structured questionnaire used for this study was a modified version of the Newman-Casey et al. (2014),[21] with several additions to cater for the research objectives. The questionnaire, divided into four sections, consisted of 48 questions that took about twenty minutes to complete. A 15-point scale was used to assess knowledge, and scores ≤5, 6–10 and ≥11 were categorised as poor, fair and good knowledge of glaucoma severity, respectively. The modified Morisky Adherence Scale was used to measure the medication adherence level of the glaucoma patients on an 11-point scale.[11] The American Medical Association (AMA) defined adherence as achieved when a patient has taken 80% of their medication as prescribed by their physician.[22] Therefore, this study's total score of 2.2 out of 11 will represent 20%. Since the cut-off point for adherence as defined by AMA is 80%, it was approximated that any total score of ≤2 points and a score of ≥3 were classified as adherent and non-adherent, respectively. The last section of the questionnaire identified the factors associated with glaucoma medication adherence based on commonly identified principal factors affecting medication adherence, based on the commonly identified principal factors affecting medication adherence, as highlighted by Tshivhase et al.[23]

Ethical approval for this study was obtained from the Oyo State Research Ethics Review Committee, Ministry of Health, Oyo State (Ref. No. AD 13/479/260); and all data were collected after obtaining informed consent from respondents.

Data from this study were collected and analysed using the IBM/Statistical Package of the Social Sciences (IBM/SPSS) version 25.0 using descriptive and inferential statistics at α 0.05.

RESULTS

Respondents' Socio-demographic Characteristics

The respondents' age was 47.5 ± 2.0 years; 54.0% were male, 90.5% were civilians, and 34.9% and 31.7% had OND/Diploma and university degree, respectively. The majority, 91.3%, have been on glaucoma treatment for 1-5 years. Medically, 73.8% had no medical co-morbidities, by respondents' evaluation of their overall health status, more than half (55.5%) reported good health. In terms of their personal assessment of their overall vision status, 53.2% reported good vision. Finally, 72.2% claimed to have available social support (Table 1).

Table 1: Respondents' Socio-demographic Characteristics (N=126)

Demography	Freq.	%
Sex		
Male	68	54.0
Female	58	46.0
Educational Level		
No formal education	13	10.3
Primary	7	5.6
Secondary	22	17.5
OND/Diploma	44	34.9
University	40	31.7
Status		
Civilian	114	90.5
Police/Military/Paramilitary	12	9.5
Religion		
Islam	51	40.5
Christianity	67	53.2
Traditional	8	6.3
Ethnic Group		
Yoruba	80	63.5
Igbo	24	19.0
Hausa	16	12.7
Others	6	4.8
Occupation		
Business	67	53.2
Retiree	8	6.3
Policing	13	10.3
Entrepreneur	34	27.0
Civil Servant	2	1.6
Students	2	1.6
Age (years)		
15-36	11	8.7
37-58	62	49.2
59-above	53	42.1
Diagnosed Period		
1-5 years	115	91.3
6-10 years	10	7.9
Above 10 years	1	0.8
Medical co-morbidities		
No	93	73.8
Yes	33	26.2
Perceived Overall Vision Status		
Very Bad	8	6.4
Bad	11	8.7
Average	32	25.4
Good	67	53.2
Excellent	8	6.3
Available Social Support		
No	35	27.8
Yes	91	72.2

Respondents' Knowledge of Glaucoma Severity

Most respondents (61.5%) felt that glaucoma has a cure, and 77.2% believed that glaucoma could be cured in developed countries. Regarding knowledge of normal eye pressure, 75.8% assumed that an eye pressure of 31mmHg was normal and acceptable, although almost all (94.2%) indicated that eye pressure of about 16mmHg was normal and acceptable (Table 2). Most respondents (62.7%) have good knowledge of glaucoma severity, 32.5% have fair knowledge, and only 4.8% have poor knowledge of glaucoma severity (Table 3).

Table 2: Respondents' Knowledge of Glaucoma Severity

	Yes	No
	Freq. (%)	Freq. (%)
Glaucoma is an eye disease that has no cure	47 (38.5)	75 (61.5)
Glaucoma is hereditary (that is, it can be inherited)	91 (73.4)	33 (26.6)
Glaucoma results to increased pressure in the eyes	124 (100)	0
Glaucoma damages the eyes slowly	124 (100)	0
Glaucoma can lead to blindness if not treated	122 (98.4)	2 (1.6)
Glaucoma management involves the use of eyedrops every day for life	89 (71.8)	35 (28.2)
Glaucoma can be managed by eating good food only	17 (13.7)	107 (86.3)
Glaucoma does not have any symptoms	99 (81.8)	22 (18.2)
Glaucoma risk increases with age	120 (96.8)	4 (3.2)
Glaucoma is a common eye disease in Nigeria	113 (94.2)	7 (5.8)
Glaucoma is detected by eye test only	106 (85.5)	18 (14.5)
Glaucoma is a spiritual problem	17 (13.7)	107 (86.3)
Glaucoma can be totally cured abroad or in developed countries	95 (77.2)	28 (22.8)
Eye pressure of about 31mmHg is normal and acceptable	91 (75.8)	29 (24.2)
Eye pressure of about 16mmHg is normal and acceptable	113 (94.2)	7 (5.8)

Table 3: Summary of the grading of the respondents' knowledge of Glaucoma severity

Knowledge score	Freq.	%
Poor (0-5 points)	6	4.8
Fair (6-10 points)	41	32.5
Good (11-15 points)	79	62.7

Respondents' Medication Adherence

The majority of the respondents, 87.7%, indicated they had used their glaucoma eyedrops a day prior to the interview. More than half, 55.6%, reported forgetting to use their glaucoma eyedrops. About a quarter of respondents (25%) pointed out that they have cut back or stopped taking their medications without telling their doctors because of adverse reactions they experienced. About thirty-seven per cent reported that they sometimes stopped using their eyedrops whenever they felt the eye pressure was under control. A few (10.8%) reported that they rarely have difficulty remembering to use all of their glaucoma medications (Table 4). Using the measuring scale, most respondents, 67.5%, were non-adherent to medication adherence (Table 5).

Table 4. Respondents' Assessment of Medication Adherence

	Yes	No
Items	**Freq. (%)**	**Freq. (%)**
I do sometimes forget to use my glaucoma eyedrops	69 (55.6)	55 (44.4)
Over the past two weeks, there were days when I did not use my glaucoma eyedrops	25 (20.2)	99 (79.8)
I have cut back or stopped taking my glaucoma medication without telling my doctor because I felt worse when I took it	31 (25.0)	93 (75.0)
When I travel or leave home, I do you sometimes forget to bring along my glaucoma medications	29 (23.4)	95 (76.6)
I did use my glaucoma eyedrops yesterday	107 (87.7)	15 (12.3)
When I feel like my eye pressure is under control, I do sometimes stop taking my eyedrops	46 (37.1)	78 (62.9)
I do feel under pressure about sticking to my glaucoma treatment plan	54 (43.5)	68 (54.8)

	Always	Usually	Sometimes	Once in a while	Never/Rarely
	Freq. (%)	**Freq. (%)**	**Freq. (%)**	**Freq. (%)**	**Freq. (%)**
How often do you have difficulty remembering to use all of your Glaucoma medications	0 (0)	8 (6.6)	47 (38.8)	53 (43.8)	13 (10.8)

Table 5. Respondents' Medication Adherence scores

Adherence Classification	Freq.	%
Non-adherent (3-11points)	85	67.5
Adherent (0-2points)	41	32.5

Factors Associated with Medication Adherence in Glaucoma Treatment

The factors associated with medication adherence were classified into five; namely, the socio-economic, health system-related, therapy-related, condition-related and patient-related.

Socio-economic factors

The majority of the respondents (92.7%) noted that medication cost was a significant issue for the socio-economic factor; and 83.9% pointed out that glaucoma medications are expensive, and they sometimes try to reduce medication doses so that they could last longer. Also, the availability of social support, particularly having someone to assist in instilling the eyedrops, was reported to influence medication adherence. The majority of the respondents, 72.6%, noted that not having anyone (social support) to help them instil their eyedrops affected their adherence. And 83.9% indicated that having someone (social support) help them administer their eyedrops could help them adhere to their medication schedule. Available social support could range from having someone assisting them financially to having companions taking them to the hospital and living and helping them at home. However, critical social support is having someone assist them in administering eye drops daily. Most respondents (65.3%) perceived life stress as a restraining factor. Availability of a glaucoma support group was shown to be an influencing factor, as 78.9% of the respondents concurred that forming support groups with other patients with glaucoma could help them adhere to their medication schedule (Table 6).

Health system-related factors

Healthcare facility accessibility was the most common factor (89.5%) mentioned by the respondents. They were of the view that having an eye care clinic closer to them or having more regular appointments could help them adhere to their medication schedule. About the efficiency of their doctors, 42.7% pointed out that they were not sure their doctors explained all of the options for treating glaucoma, and 47.6% were worried that their doctors had not done everything they could do for managing the glaucoma. Most (86.3%) of the respondents reported that the health education they received was a driving factor, as it helped them adhere to their daily medication schedule. Medication reminders and follow-up were also established to be a reinforcing factor, 91.1% of respondents opined that reminders of any form (alarms, telephone apps, etc.) would help in daily medication adherence to their schedule (Table 6).

Therapy-related factors

The side effects of glaucoma medications was a restraining factor to medication adherence as 70.2% reported that some side effects such as irritation, itching or redness make it hard for them to use their glaucoma eyedrops all the time. Most (90.1%) of the respondents indicated that the feeling of frustration from multiple drug dosing was one of the restraining factors. Less than half, 40.3%, reported that difficulty in coping with the everyday medication schedule was also a factor for adherence. Only 23.4% noted that the efficacy requirement in eyedrop self-administration was also a restraining factor in offor respondents, who said they had so much trouble using their eyedrops and getting them into their eyes (Table 6).

Condition-related factors

Most respondents (95.2%) reported that they understood the risk of negative effects of not using glaucoma medications, such as the possibility of blindness. The fear or awareness of likely cases of blindness is evident and a driving factor for the respondents to use their eyedrops daily (Table 6).

Patient-related factors

Only 21.8% of the respondents reported that they do not understand why using eyedrops to treat glaucoma is important. Skepticism that glaucoma would cause vision loss was also not a restraining factor, as only 36.3% of the respondents disagreed that glaucoma could lead to blindness. Also, scepticism about the effectiveness of glaucoma medications in preventing blindness was only expressed by 34.7% of the respondents, who said they disagreed that the eyedrops could prevent them from losing vision. Similarly, forgetfulness was only described by 19.4% as a factor restraining them from adhering to their daily medication regimen. However, the respondents' forgetfulness rate increased to 33.1% when they were out of their routine, like on the weekends. Poor knowledge of glaucoma was not an important factor restraining adherence (Table 6).

Table 6. Respondents' responses on Factors Associated with Medication Adherence

	Yes Freq. (%)	No Freq. (%)
Socio-economic factors		
I have no one to help me put my eyedrops in my eyes.	34 (27.4)	90 (72.6)
I have too much stress in my life, making it hard to pay so much attention to taking my Glaucoma eyedrops 100% of the time.	43 (34.7)	81 (65.3)
My Glaucoma medications are expensive.	115 (92.7)	9 (7.3)
Sometimes, I try to use a few fewer doses to make them last longer because they cost so much money.	104 (83.9)	20 (16.1)
Having someone to help me administer my eyedrops can help me adhere to my medication schedule.	104 (83.9)	20 (16.1)
Forming support groups with other patients with Glaucoma can help me adhere to my medication schedule.	97 (78.9)	26 (21.1)
Health system-related factors		
Having an eye care clinic closer to me or more regular appointments can help me adhere to my medication schedule.	111 (89.5)	13 (10.5)
I am not sure that my doctor has explained all of my options for treating my Glaucoma.	53 (42.7)	71 (57.3)
I also worry that my doctor does not do everything he/she could do for my Glaucoma.	59 (47.6)	65 (52.4)
Reminders of any form (alarms, telephone apps, etc.) can help me adhere to my daily medication schedule.	113 (91.1)	11 (8.9)
More education can help me adhere to my daily medication schedule.	107 (86.3)	17 (13.7)
Therapy-related factors		
I have so much trouble using my eyedrops and getting them into my eye.	29 (23.4)	94 (75.8)
Sometimes I feel that I just can't cope with the everyday use of eyedrops.	50 (40.3)	74 (59.7)
What makes it really hard for me to use my Glaucoma eyedrops all of the time are some side effects such as irritation, itching or redness.	87 (70.2)	37 (29.8)
I have to remember to use too many different kinds of eyedrops and I feel frustrated keeping track of many eyedrops.	109 (90.1)	12 (9.9)
I have been taking my eye drops for a while, and my vision has not improved at all.	40 (32.3)	84 (67.7)
I understand the risk of negative effects of not using Glaucoma medications, such as the possibility of blindness	118 (95.2)	6 (4.8)
Patient-related factors		
I am not confident that I can remember to use my Glaucoma eyedrops all of the time.	26 (21.0)	96 (77.4)
I do not understand why it is crucial to use eye drops to treat my Glaucoma.	27 (21.8)	97 (78.2)
I disagree that Glaucoma can lead to blindness.	45 (36.3)	79 (63.7)
My doctor tells me that I can become blind from Glaucoma, but I have had it for a while now, and I can still see well.	100 (80.6)	24 (19.4)
I have known other people who have had Glaucoma, and they could still read and drive.	106 (87.6)	15 (12.4)
I disagree that these eyedrops can prevent me from losing vision from Glaucoma.	43 (34.7)	81 (65.3)
I have a tough time remembering how to use my Glaucoma eyedrops daily.	24 (19.4)	100 (80.6)
I especially have difficulty remembering to use my daily eyedrops when I am out of my routine, like on the weekends.	41 (33.1)	83 (66.9)

Association between socio-demographic characteristics and knowledge of glaucoma severity among the respondents.

Findings show a significant relationship between selected socio-demographic variables such as education level, occupation and knowledge of glaucoma severity (Table 7).

Table 7. Socio-demographic Characteristics and Knowledge of Glaucoma Severity

Demographics	Knowledge			Fisher	p-value
	Poor	Fair	Good		
Sex					
Male	4 (5.9%)	24 (35.3%)	40 (58.8%)	0.788	0.708
Female	2 (3.5%)	18 (31.0%)	38 (65.5%)		
Level of education					
No formal education	0 (0%)	1 (7.7%)	12 (92.3%)	17.992	0.008**
Primary	0 (0%)	2 (28.6%)	5 (71.4%)		
Secondary	3 (13.6%)	3 (13.6%)	16 (72.8%)		
OND/Diploma	1 (2.3%)	15 (34.1%)	28 (63.6%)		
University	2 (5.0%)	21 (52.5)	17 (42.5%)		
Status					
Civilian	4 (3.5%)	38 (33.0%)	73 (63.5%)	4.431	0.084
Police/military/para-military	2 (18.2%)	4 (36.4%)	5 (45.4%)		
Religion					
Islam	2 (3.9%)	20 (39.3%)	29 (56.8%)	5.653	0.207
Christianity	4 (6.0%)	22 (32.8%)	41 (61.2%)		
Traditional	0 (0%)	0 (0%)	8 (100%)		
Occupation					
Business	4 (6.0%)	18 (26.9%)	45 (67.2%)	32.944	0.000**
Retiree	2 (25.0%)	6 (75.0%)	0 (0%)		
Policing, Mil, Para..	0 (0%)	0 (0%)	13 (100%)		
Entrepreneur	0 (0%)	15 (44.1%)	19 (55.9%)		
Civil Servant	0 (0%)	1 (50.0%)	1 (50.0%)		
Student	0 (0%)	2 (100%)	0 (0%)		
Age (in years)					
15-36	2 (15.4%)	7 (53.9%)	4 (30.7%)	17.255	0.011**
37-58	0 (0%)	14 (23.3%)	46 (76.7%)		
59- above	4 (7.6%)	21 (39.6%)	28 (52.8%)		
Diagnosed period					
1-5 years	6 (5.2%)	36 (31.3%)	73 (63.5%)	4.502	0.374
6-10 years	0 (0%)	5 (50.0%)	5 (50.0%)		
11 years and above	0 (0%)	1 (100%)	0 (0%)		
Medical co-morbidities					
No	5 (5.4%)	29 (31.2%)	59 (63.4%)	0.830	0.680
Yes	1 (3.0%)	13 (39.4%)	19 (57.6%)		

** Statistically significant

Association between respondents' socio-demographic characteristics and medication adherence

There was a significant association between respondents' age, the period when the disease was diagnosed and medication adherence (Table 8).

Table 8: Association between Respondents' Socio-demographic Characteristics and Medication Adherence

Demographics	Medication Adherence		X^2	Fisher	p-value
	Adherent	Non-Adherent			
Sex					
Male	22 (32.4%)	46 (67.6%)	1.541		0.237
Female	13 (22.4%)	45 (77.6%)			
Educational level					
No formal education	0 (0%)	13 (100%)			
Primary	2 (28.6%)	5 (71.4%)			
Secondary	4 (18.2%)	18 (81.8%)		8.837	0.056
OND/Diploma	16 (36.4%)	28 (63.6%)			
University	13 (32.5%)	27 (67.5%)			
Status					
Civilian	30 (26.1%)	85 (73.9%)	1.877		0.171
Police/military/para-military	5 (45.5%)	6 (54.5%)			
Religion					
Islam	20 (39.2%)	31 (60.8%)			
Christianity	13 (19.4%)	54 (80.6%)		5.619	0.050
Traditional	2 (25.0%)	6 (75.0%)			
Occupational					
Business	16 (23.9%)	51 (76.1%)			
Retiree	4 (50.0%)	4 (50.0%)			
Policing	3 (23.1%)	10 (76.9%)		4.371	0.469
Entrepreneur	12 (35.3%)	22 (64.7%)			
Civil Servant	0 (0%)	2 (100%)			
Student	0 (0%)	2 (100%)			
Age (in years)					
15-36	2 (15.4%)	11 (84.6%)			
37-58	18 (30.0%)	42 (70.0%)		9.215	0.043**
59 above	15 (28.3%)	38 (71.7%)			
Diagnosed period					
1-5 years	34 (29.6%)	81 (70.4%)			
6-10 years	0 (0%)	10 (100%)		6.523	0.020**
21 years above	1 (100%)	0 (0%)			
Medical co-morbidities					
No	29 (31.2%)	64 (68.8%)	2.052		0.152
Yes	6 (18.2%)	27 (81.8%)			

** Statistically significant

DISCUSSION

Knowledge of Glaucoma Severity

This study revealed that most respondents had good knowledge of the disease condition. This current study's finding contrasts two previous studies in Nigeria.[24,25] In these studies, a few respondents had good knowledge of glaucoma. Similarly, studies by Abu Hassan [26] showed that 52.4% of respondents had a low level of knowledge about glaucoma. Also, Nkum et al.[27] found that only 27% of the respondents had accurate knowledge of glaucoma.

Medication Adherence

Findings from this study showed that most respondents were non-adherent to the daily use of medications. This is a fundamental problem, and this proportion is higher than reported in most recent studies globally,[16,28,29] where adherence to glaucoma medication was 40%, 56.2% and 72.6% of the respondents' population. In Nigeria, diverse medication adherence rates have also been reported. In a recent study,[30] 72.5% of the respondents interviewed were adherent to their glaucoma therapy. However, findings of another Nigerian study,[15] similar to the current study, showed that only 27.2% of respondents reported full or 100% adherence. They also discovered that the disease duration was a significant factor; patients who had been managed for six years less were twelve times more likely to report full compliance than those treated for glaucoma for six years or more.

Factors Associated with Medication Adherence

Several factors have been attributed to medication adherence, and these factors were classified into five groups.[31]

Socio-economic factors

This study revealed that the most significant restraining socio-economic factor to medication adherence for glaucoma patients in Ibadan was the cost of glaucoma medications. This is similar to findings from other studies.[4,17,21,32] Another restraining factor found in this study is perceived life stress. This is similar to the findings of Newman-Casey et al.[21] The availability of social support was discovered to be a significant driving factor for adherence. These findings are similar to those of Hwang et al.,[33] who reported that patients with chronic diseases who have social support are more likely to adhere to their treatment plans and have better health outcomes. In Aina, Olawoye and Oluleye's study,[34] they discovered that some reasons, such as advancing age, rising medication costs, longer glaucoma treatment durations, and "not appreciating the effect of the drugs," account for poor adherence to glaucoma medications.

Health-system related factors

Reminders and follow-ups were the most significant driving factors. This strongly supports the result of the studies of Osahon et al.[18] and Tshivhase et al.[23] Other significant driving factors from

this study are healthcare accessibility, communication and patient education, and availability of glaucoma support groups. All these have similarly been highlighted by previous studies.[23,35,36]

Therapy-related factors

Restraining factors: Three factors were discovered in this study to restrain adherence to daily medication. The most significant was multiple drug dosing. The others were side effects of the glaucoma eye drops and the efficacy requirement for eyedrop self-administration (most glaucoma patients have to instil their eyedrops themselves every day, which requires a level of efficacy to ensure the eyedrop gets into the eye effectively). These two restraining factors were similarly echoed in the study by Newman-Case et al.[21]

Condition-related factors

Driving factors: The significant condition-related factor highlighted by this study is the fear or awareness of blindness from glaucoma. Almost all the respondents acknowledged that they understood the risk of not using glaucoma medications, such as the possibility of blindness. This finding is similar to Ramesh et al,[32] and Dreer et al.,[20] where respondents reported taking such risks.

Patient-related factors

Driving factors: The major patient-related driving factor from this study is the patient's knowledge of glaucoma and its severity. Most respondents demonstrated a good understanding of why they were using eyedrops and their importance. This knowledge of glaucoma and its severity was similarly shown in the results from the second section of the questionnaire, where the majority of the respondents had fair or good knowledge of glaucoma severity, and only a few had poor knowledge of it.

A significant relationship was found between education, occupation, age and knowledge of glaucoma severity. Similarly, Nkum et al.[27] also found statistically significant differences between those with higher education and knowledge of glaucoma

There was a significant association between respondents' age, the period when the disease was diagnosed and medication adherence. This finding is corroborated by that of Aina and others, who found that the proportion of patients with poor compliance levels was higher in patients >60 years compared with patients between 40 and 60 years of age, which was statistically significant.

CONCLUSION

For chronic disease conditions such as glaucoma, management entails everyday use of medications. Effective management of chronic eye conditions such as glaucoma depends not only on the potency and efficacy of medications but also on the patient's ability to adhere to the use of the medications daily. This study revealed that most glaucoma patients receiving treatment in the selected facilities

had good knowledge of glaucoma severity. However, notwithstanding the high knowledge of glaucoma severity, only about one-third of the patients were adherent to the daily use of their medication. The significant driving factors for adherence were the availability of social support, healthcare accessibility, communication and patient education, medication reminders and follow-ups, glaucoma support groups, fear of blindness, and knowledge of glaucoma and its severity. The major restraining factors associated with daily medication adherence were the cost of medication, life stress, glaucoma eyedrops side-effects, multiple drug dosing, and efficacy requirement in eyedrop self-administration. Considering the high level of knowledge and low level of adherence, it can be concluded that the effect of the identified restraining factors has a way more negative influence on daily medication adherence, whilst the impact of the driving factors was not enough to guarantee adherence to daily medication use in glaucoma patients in Ibadan. Finally, it can be deduced that high knowledge of glaucoma severity does not automatically translate to adherence to daily medication use in glaucoma patients. A patient's level of education, occupation and age are significantly associated with knowledge, whilst age and diagnosed period of the disease have a significant association with medication adherence.

RECOMMENDATIONS

The government and health policymakers should subsidize the cost of glaucoma medication or expand the health insurance coverage to include varieties of glaucoma eyedrops so as to address the cost of medication restraining factor in glaucoma management. Also, the formation of glaucoma social support groups can provide the emotional and social support needed by the patients to increase their medication adherence. Finally, eye care providers should always provide intensive education sessions about glaucoma to their patients to address misconceptions and myths about the condition, and to continuously emphasize the lifelong management process of the disease.

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