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Research Article

Level of Awareness and Knowledge of Glaucoma among Ghanaian Undergraduates

David Ben Kumah, Philip Tetteh Djeagbo*, Mohammed Abdul-Kabir, Ahmed Abdul-Sadik, Stephen Ankamah-Lomotey and Andrews Nartey

Department of Optometry and Visual Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

***Corresponding Author:** Philip Tetteh Djeagbo, Department of Optometry and Visual Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

Received: January 24, 2018; **Published:** March 06, 2018

Abstract

Introduction: Though Ghana has been identified as the second country in the world with the highest prevalence of glaucoma, not much attention has been given to this silent thief of sight.

Objectives: The purpose of the study is to determine the level of awareness and knowledge on glaucoma amongst undergraduates of the Kwame Nkrumah University of Science and Technology (KNUST) in Kumasi, Ghana.

Methodology: A descriptive cross sectional study was employed. Using purposive and convenience sampling techniques, a total of 300 students comprising 177 (58.9%) males and 123 (41.1%) females participated in the study. The ages of participants ranged from 17 to 32 years with a mean age of 21.89±2.37 years. A self-administered standard questionnaire was used for the data collection. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 20.0 and Chi-squared tests were done at a 5% significance level to assess the statistical significance of associations obtained.

Results: More than three-quarters (83.33%) of the participants had heard of glaucoma and 247 participants (82.33%) knew it affects the eye. There was a significant association between awareness of glaucoma and participant's college of affiliation in the university ($p = 0.047$). Out of the total participants, one-third of them (33.9%) had undergone an eye screening or examination in the past one year. The mean score of knowledge on glaucoma for all the participants in the study was 41.54% with almost two-third (59%) of the participants having poor knowledge. A majority of 49.4% of the total participants indicated the media as their source of information and knowledge on glaucoma.

Conclusion: Glaucoma awareness among undergraduates of the Kwame Nkrumah University of Science and Technology in Ghana was high but their level of knowledge on glaucoma was low. It is recommended that the Ministry of Education and the Ministry of Health should collaborate to incorporate eye health education with a special focus on glaucoma into the academic curricula of high schools. This will go a no small way in preventing needless blindness from glaucoma through early diagnosis and effective management. The onus also lies on eye care professionals to embark on eye health education in schools, communities and institutions within the country.

Keywords: *Glaucoma; Knowledge; Awareness; Undergraduates*

Introduction

Glaucoma is a group of disorders characterized by gradual optic nerve damage leading to a characteristic appearance of the optic nerve head and a certain pattern of visual field defect that is irreversible. Glaucoma is most often associated but not invariably with high intraocular pressure (IOP), making IOP a major risk factor, but not the only risk factor for its development. Hence a condition with an increased IOP without any glaucomatous damage is given the term ocular hypertension whereas in a case showing signs of glaucomatous damages with low or normal IOP, the term normal or low-tension glaucoma is used [1].

Glaucoma is a dreadful eye disorder that gradually leads to total blindness in affected people and it is the second leading cause of blindness globally. A type of glaucoma called primary open angle glaucoma has an insidious onset and is usually asymptomatic until late in the disease process when there is loss of central vision [2]. Globally, there are an estimated 60 million people with glaucomatous optic neuropathy with about half of this number being unaware of their condition. set to increase to 80 million and 11.2 million respectively by 2020 [3,4]. Of these, 74% of all cases will be due to primary open angle glaucoma that will cause bilateral irreversible blindness in 4.5 million people [5].

In Africa, glaucoma accounts for 15% of blindness and it is the region with the highest prevalence of blindness relative to other regions worldwide [6]. The highest prevalence of open-angle glaucoma is seen in Africans and the highest prevalence of angle-closure glaucoma occurs in the Inuit [4]. Studies have reported most people in Africa with primary open angle glaucoma are not aware of the disease and that half of the eyes are blind at presentation [7-9]. Some authors have emphasized on the younger age of onset of glaucoma in Africans compared to Caucasians and suggested thereof, a screening earlier than the universally recommended age of 40 years [10-12].

Ghana has been identified as the second country in the world with the highest prevalence rate of glaucoma, with about 700,000 people affected. Out of this number 250,000 people are not aware of their condition while some 60,000 people are already blind. Information indicates that even though many Ghanaians are suffering from the disease, a lot of attention has not been given to it in the country, and the sub-Saharan Africa, in general [13].

Hitherto, a number of studies on glaucoma awareness and knowledge have been conducted among different populations and participants with varying socioeconomic backgrounds [14-17] Statistically significant predictors of glaucoma awareness were older participants, males and skilled workers [17].

The importance of early diagnosis in glaucoma cannot be overemphasized as it allows for effective management and prevention of blindness. Early detection of glaucoma is often difficult due to its asymptomatic course in the initial stage and the lack of a viable screening tool. Studies have shown that 50 - 90% of the glaucoma cases remain undiagnosed and a large number of cases are diagnosed at a later stage of the disease. Lack of awareness about glaucoma is an important reason for its late presentation, which significantly increases the risk of blindness. Lack of awareness may not only influence the timing of the diagnosis, but also the utilization of eye care services. This underscores the credo that assessment of awareness is the first step in the planning of disease management [18].

Given the inadequacy of literature on the level of awareness of glaucoma in Ghana and Africa at large, the current study sought to determine the level of awareness and knowledge on glaucoma amongst undergraduates of the Kwame Nkrumah University of Science and Technology in Ghana

Methodology

Study Area and Participants

This descriptive cross sectional study involved undergraduate students who have been enrolled into various programmes at the Kwame Nkrumah University of Science and Technology, which is located in Kumasi, Ghana. The institution with a population of 23591 students comprising 21285 undergraduates and 2306 postgraduates has been decentralized into six academic colleges namely Science, Health Science, Engineering, Humanities and Social Science, Art and Built Environment and Agricultural and Natural Resources.

Sampling

A total of 300 undergraduates were sampled to partake in this study. This included 50 students each from each of the six colleges. The study participants were homogeneously drawn from the various year groups in the colleges. Purposive sampling technique was initially used to select the undergraduates from the total student population subsequent to which the study participants were sampled using convenience-sampling technique.

Data Collection Procedure

A self-administered questionnaire was the major tool that was used to solicit information from study participants. Data on demographics and awareness of glaucoma was collected.

The questionnaire was pretested on twenty randomly selected people on the Kumasi Polytechnic campus for any modifications and clarifications to be effected where applicable. The questionnaire (which was predominantly close-ended questions with a couple of open-ended questions) was designed to be brief and easily comprehensible.

Answers on the knowledge section (both close-ended and open-ended questions) were then scored and graded using the table below.

Ethical Consideration

Permission was sought from the hostel managers and/or porters of the halls and hostels where students reside. Only students who were available and gave their consent participated this study. All participants were guaranteed of anonymity and confidentiality of the information obtained. Again, participants were assured that data collected was to be used solely for academic purposes.

Data Analysis

Data was analyzed using IBM Statistical Package for Social Sciences (SPSS) version 20.0 and Microsoft Excel 2013. Comparison of percentages and determination of significant associations in the categorical variables (gender, level of study and college of affiliation) was done using Pearson Chi Square ($\chi 2$) test with statistical significance set at a p-value of 5%. Answers to open ended questions were collated and analyzed using the thematic content analysis. The various emerging themes from the thematic content analysis together with the closed ended answers were entered into Excel and analyzed with Statistical Package for Social Sciences (SPSS) 20.0.

Results

Demographics of Respondents

A total of 300 students participated in the study. This comprises 177 (58.9%) males and 123 (41.1%) females. Fifty undergraduates each from the six colleges in the institution participated in the study. Out of the 300 students who partook in the study, 102 (33.9%) of them had undergone an eye screening or examination in the past one year. The ages of the participants ranged from 17 to 32 years, with a mean age of 21.89 ± 2.37 years. The frequency distribution of the ages of participants is presented in table 2 below.

Score	Level of Knowledge
Below 50%	Poor
50% - 69.99%	Fair
70% and above	Good

Table 1: *Grading System of Level of Knowledge on Glaucoma*

Age	Frequency (%)
17 - 20	88 (29.3)
21 - 24	177 (59.0)
25 - 28	31 (10.4)
29 - 32	4 (1.3)

Table 2: *Frequency Distribution of Age of Participants.*

Respondents' Awareness of Glaucoma

Out of the 300 undergraduates who took part in this study, 250 (83.33%) had heard of glaucoma. A minority of 50 (16.67%) participants indicated they had not heard of the condition. The College of Health Science recorded the highest number of undergraduates who had heard of glaucoma while the College of Humanities and Social Sciences recorded the least. The proportion of undergraduates who had heard of glaucoma vis-à-vis their colleges of affiliation is illustrated in table 3 below.

College	Number (%)
Science	38 (76)
Health Science	48 (96)
Engineering	45 (90)
Humanities and Social Science	35 (70)
Art and Built Environment	42 (84)
Agricultural and Natural Resources	42 (84)
Total	250 (83.3)

Table 3: *Respondents Awareness of Glaucoma by College of Affiliation.*

The proportion of respondents who were aware of glaucoma was also computed on the basis of their year or level of study in the institution. The results have been depicted in table 4 below.

Year/Level of Study	Number (%)
1	50 (71.4)
2	60 (85.7)
3	60 (85.7)
4	62 (88.6)
5	10 (100)
6	8 (80)
Total	250 (83.3)

Table 4: *Respondents' Awareness of Glaucoma By Level of Study.*

Respondents Knowledge of Glaucoma

In assessing participants' knowledge of glaucoma, various close-ended questions were posed to them. The questions and the responses from the participants have been detailed in table 5 below.

Question	Yes N (%)	No N (%)	Do not know N (%)
Can glaucoma lead to blindness?	232 (77.3)	0 (0)	68 (22.7)
Does the risk of glaucoma increase with age?	148 (49.3)	18 (6)	134 (44.7)
Can anyone have glaucoma?	175 (58.3)	23 (7.7)	102 (34.0)
Can blindness from glaucoma be prevented from early treatment?	203 (67.7)	3 (1)	94 (31.3)
Is the treatment of glaucoma possible?	182 (60.7)	20 (6.7)	98 (32.7)
Is vision affected in early course?	87 (29.0)	72 (24.0)	141 (47.0)
Can glaucoma be inherited	115 (38.3)	23 (7.7)	162 (54)
Does glaucoma begin without symptoms	75 (25.0)	77 (25.7)	148 (49.3)
Is glaucoma the same as cataract	13 (4.3)	104 (34.7)	183 (61.0)

Table 5: *Respondents' Knowledge of Glaucoma.*

In furtherance to the assessment of participants' knowledge, their responses on the cause and effect of glaucoma have been provided in table 6 and 7 below.

Cause	Percentage
Mature Cataract	8.9
Progressive increase in glasses numbers	3.3
Pressure damage to nerve of vision	31.1
Do not know	56.7
Total	100.0

Table 6: *Participants' Response on the Cause of Glaucoma.*

Effect	Percentage
Slow irreversible loss of vision	69.4
Swollen eye	2.8
Do not know	27.8
Total	100.0

Table 7: *Participants' Response on the Effect of Glaucoma.*

Knowledge on Risk Factors, Symptoms and Treatment of Glaucoma

Out of the 247 students who were aware of glaucoma, 55 (22.27%) of them had knowledge of at least one risk factor of glaucoma while 192 (77.73%) of them had no idea of the risk factors. Approximately two-fifth of the total participants (40.49%) were acquainted with at least one symptom of glaucoma whilst the rest of them (59.51%) either filled in a wrong symptom or left the answer column blank. Only 55 participants representing 22.27% of the total respondents were privy to some of the treatment and management therapies for glaucoma. A substantial majority of 192 (77.73%) participants either filled in a wrong treatment therapy or left the answer column blank.

Scoring of Participants' Knowledge on Glaucoma

The mean knowledge score of all the participants in the present study was 41.54% whilst the mean score of those participants who were aware of glaucoma was 50.52%. The mean score amongst males and females in the study was 42.55% and 40.11% respectively. How the various participants scored in the assessment of knowledge of glaucoma is outlined in table 8 below.

Scores	Number	Percentage
Below 50%	177	59%
50%-69%	93	31%
70% and above	30	10%
Total	300	100%

Table 8: *Participants' Scores on Knowledge of Glaucoma.*

Scoring of Participants' Knowledge in Colleges

The colleges of Health Science and Science were the only colleges that scored a mean knowledge score above 50%. The college of Agricultural and Natural Resources scored the least with a mean score of 16.87%. The scores of the various participants in each college are represented in table 9 below.

College	Mean Score (%)
Science	56
Health Science	54.13
Engineering	46.6
Humanities and Social Science	46.53
Art and Built Environment	29.13
Agricultural and Natural Resources	16.87

Table 9: *Mean Score of Knowledge of Respondents in Colleges.*

Participants' Source of Information on Glaucoma

The media was found to be the major source of information of respondents' knowledge on glaucoma. The various sources of information are provided in table 10 below.

Source of information	Frequency (%)
Media	49.4
Health centers/Health personnel	25.1
Family/Relative/Friend	10.1
Movie	0.8
Online	5.3
Teacher/Lecturer	9.3
Total	100.0

Table 10: *Source of Information on Glaucoma.*

Association between Knowledge of Glaucoma and Predicting Factors

There was statistically significant association between knowledge of glaucoma and college of affiliation, screening uptake and source of information. The various associations and their level of significance can be seen in table 11 below.

Factor of Comparison	P-value
Gender	0.685
College	0.012
Screening uptake	0.006
Source of information	< 0.001

Table 11: *Significance Level of Predicting Factors.*

Discussion

Demographics of Respondents

There were more males than females in this study (58.9% males and 41.1% females). This disparity could be attributed to the fact that there are more males than females in the institution and hence, the random probability of selecting a male is higher than the probability of selecting a female. This result is consistent with a study where more than two third of the study population were males [14] and contradicts other studies which revealed more than half of the study population to be females [15].

The mean age of the participants in the present study was 21.89 ± 2.37 years. This mean age mirrors the youthful tone of most undergraduates in tertiary institutions. This mean age was however dissimilar to a mean age of 54.5 years [14] and 35.07 years [15] as observed in previous studies. This difference clearly emanates from the difference in target population of the current study (undergraduates) and that of the previous studies (hospital workers and general populace).

Eye Examination or Screening Uptake among Participants in the Past One Year

Out of the 300 students who participated in the current study, 102(33.9%) of them had undergone an eye screening or examination in the past one year. There was no statistically significant association between screening uptake and other demographic factors such as gender and college ($P > 0.05$), but there was a statistically significant association between screening uptake and glaucoma awareness ($P < 0.001$). Deducing from this result, it can be posited that those who were aware of glaucoma were more likely to have undergone screening than those who lacked awareness. The low screening uptake in general could be due to the fact that students lacked ample information on eye diseases such as glaucoma that could affect their vision without presenting symptoms or signs at early stages. This assertion is reinforced by the fact that only 25% of students in the present study were aware glaucoma begins without symptoms.

Awareness of Glaucoma among Participants

More than three-quarters of the participants (82.33%) in the study were aware of glaucoma. This might be due to the fact that the study was conducted among tertiary students where there is a greater tendency of knowledge acquisition via different means.

High awareness of glaucoma is reported in other studies [15] In these previously conducted studies, majority of the participants (68.6%) were aware of glaucoma. It is however noteworthy that this study was conducted among hospital workers and so such a finding could not be a fluke nor a flash in the pan. Awareness and knowledge of glaucoma was however very low in a study conducted among Indian populations [19,20].

The current study also found the mean age of those aware of glaucoma to be 22.1 years, while that of those not aware of glaucoma to be 21.3 years. Though only a marginal difference, it can be inferred that age could potentially influence awareness of glaucoma. Older people (60 - 79 years) are 2.7 times more likely to be aware of glaucoma than younger people (40 - 49 years) [19].

There was no statistically significant association between glaucoma awareness and other demographic factors such as gender ($P = 0.951$) and level of study ($P = 0.303$). However, there was a significant association between glaucoma awareness and college of affiliation ($P = 0.047$). Thus, ones' academic background and exposure could inform one's awareness of glaucoma.

Knowledge of Glaucoma among Participants

Per the study, knowledge on the various aspect of glaucoma showed that a majority of 77.73% lacked knowledge of a risk factor and a treatment or management therapy for glaucoma. Some 58.51% participants did not know of any symptom of glaucoma. Fifty nine percent of the participants scored less than 50% on the glaucoma knowledge assessment. In summarizing the scoring and grading of participants' knowledge, more than half (59%) had poor knowledge, 31% had fair knowledge, whilst only 10% of the participants had good knowledge. These findings corroborate other papers in literature. For instance, it was reported that more than half (56.25%) of the participants had no clue as to whether glaucoma can be cured or managed [15,19]. Osaguona., *et al*. reported in their study that only 23.04% of the participants had good knowledge about glaucoma, 23.42% had fair knowledge and 53.54% had either poor knowledge or were unaware of glaucoma [16]. The poor knowledge of glaucoma as seen in these studies and the present study could be attributed to the little attention given to this all-important subject matter. This brings to the fore, whether the relevant stakeholders such as the Ministry of Health under the Ghana Health Service and the Ministry of Education under the Ghana Education Service are efficiently playing their roles.

There was no statistically significant association between glaucoma knowledge and other demographic factors such as age, gender and level of study ($P > 0.05$). This contrasts a previous study where age and gender were strong predictors of knowledge of glaucoma [19]. A statistically significant association however existed between knowledge of glaucoma and college of affiliation, screening uptake and source of information.

The mean knowledge score of all the participants in the present study was 41.54% whilst the mean score of those participants who were aware of glaucoma was 50.52%. These scores clearly indicate that the average participant had poor knowledge of glaucoma. The question that was correctly answered by most participants (77.2%) was "can glaucoma lead to blindness?" This finding was observed probably because cataract and glaucoma are the two common eye diseases that are ubiquitously known by people anytime severe visual impairment and/or blindness is made mention of.

Participants' Sources of Information on Glaucoma

This study found that about half of all participants obtained various information on glaucoma from the media. In the wake of pervasive technological advancement, various media sources with a special mention of social media have made access to information much easier than before. A study in Ethiopia documented relatives of glaucoma patients as the major source of information on glaucoma knowledge [14]. This could be attributed to the fact that given the genetic component of the disease, glaucoma patients were most likely to talk their relatives into getting their eyes examined to determine their glaucoma status.

Conclusion

In spite of a remarkably high awareness of glaucoma among undergraduates of the Kwame Nkrumah University of Science and Technology, the students' knowledge on the disease was poor. Eye examination or screening uptake among participants was quite low. The students' uptake of screening was independent of their ages, gender and college but it influenced or informed their awareness and knowledge on glaucoma. It is paramount for those with good educational background to have awareness and substantial knowledge of glaucoma. This will enable them develop positive health-seeking behaviors towards the disease and also have the capacity to appropriately advise others who seek their opinions. It is recommended that the Ministry of Education under the Ghana Education Service and the Ministry of Health under the Ghana Health Service should collaborate to incorporate eye health education with a special focus on glaucoma into the academic curricula of high schools.

Conflict of Interest Disclosure

The authors declare that they have no financial relation regarding the conduct of this study and there is no conflict of interest with regards to the publication of this manuscript.

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Volume 9 Issue 4 April 2018