

## Awareness and Knowledge of Ocular Effects of Diabetes among Diabetics- Evidence from a Hospital Based Study

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### ABSTRACT

**Background:** Diabetes mellitus is reaching epidemic proportions in many countries, and the impact of vision loss due to diabetic eye disease on public health is a major concern. Unfortunately, there is a lack of awareness about the existing interventions for preventing diabetic eye diseases and the management of complications. This study was conducted to evaluate the level of awareness and knowledge of ocular complications of diabetic patients in a teaching hospital in Ghana.

**Methods:** The study was a descriptive cross sectional study. A detailed interview-guided questionnaire was used to obtain qualitative information on the level of awareness and knowledge about ocular complications of diabetes and attitude towards preventing diabetic ocular complications among diabetic patients. Completed data was entered in Microsoft Excel 2010 and SPSS-version 20.0 for Windows and analyzed and statistical significance was set at  $p < 0.05$ .

**Results:** 150 diabetic patients consented and took part in the study. There were more females (107) than males (43) with an overall age range between 11-90 years. The age range with the highest number of patients was 61-70 years (37.3%). The level of education with the highest number of respondents was junior high school level (J.H.S), which represented 25.3% of patients studied. Majority (59.3%) of respondents had low level of education (up to the junior high school level). Out of the 150 patients, a total of 122 (74.6%) were aware that diabetes had effects on the eyes and vision. 22 (14.7%) patients responded that the condition had no effects on the eyes and 16 (10.7%) patients responded no idea. 69 (46%) patients had never visited the eye clinic before the study, 44 (29.3%) patients responded they visited the eye clinic only once a while and 17 patients only visited the eye clinic if their vision had reduced. 54 (36%) patients responded they were referred to seek eye care by their primary physician, while 96 (64%) patients responded they were not informed to seek eye care services upon first diagnoses.

**Conclusion:** There is still a gap to be filled with respect to level of awareness and knowledge of ocular effects of diabetes between diabetic patients of lower and higher level of literacy. It is important that public health efforts in the field are intensified, particularly in developing countries. Also, physicians should ensure that diabetics are adequately educated on the ocular complications of diabetes and the need for regular eye examinations.

### INTRODUCTION

Diabetes Mellitus (DM) is a clinical syndrome which is characterized by hyperglycaemia due to an absolute or relative de-

ciency of insulin [1]. It is usually irreversible and, although patients can have a reasonably normal lifestyle, its late complications such as increased risk of coronary artery disease, peripheral vascular disease, stroke and microvascular dam-

age causing diabetic retinopathy and nephropathy result in reduced life expectancy and major health costs [2]. Diabetes mellitus is reaching epidemic proportions in many countries, including Ghana [3]. As population size of the aged, prevalence of obesity and physical inactivity increase, the number of people with diabetes is likely to increase: current projections estimate that 439 million adults will be affected by type 2 by 2030 and the rate of type 1 diabetes is increasing worldwide [4-7]. It has been reported that diabetes accounts for 15% of all blindness [8]. Therefore, the impact of vision loss due to diabetic eye disease on public health is a major concern. For example, in 2000, 7.5 million cases of diabetes were reported on the African continent alone, and it is also estimated that more than 80% of people with diabetes in Africa remain undiagnosed [8].

Uncontrolled diabetes causes a host of problems in the body, one of which is eye problems or vision loss. It imposes daunting health issues on societal healthcare by its debilitating vascular complications, those of which increase the burden on healthcare authorities globally [9, 10]. Diabetic ocular complications are increasingly becoming a major cause of blindness throughout the world in the age group 20-60 years which usually results in loss of productivity, quality of life and socio-economic burdens on communities [11-13]. It is therefore very important that all efforts necessary are directed towards at least delaying the onset of these ocular complications. Two most common causes of vision loss from diabetes are cataract and diabetic retinopathy. Diabetic retinopathy is the leading cause of blindness among working-aged adults, and studies estimate its global overall prevalence to be 34.6%, and highest among African Americans [5]. It has drawn much public health concern because it is the most common complication of diabetes mellitus and is a leading cause of visual loss in industrialized nations [9]. According to the World Health Organization (WHO) estimates available, diabetic retinopathy is responsible for 3.9% (1.8 million) of the 45 million cases of blindness worldwide [14]. Although diabetic retinopathy is not totally preventable or curable, many cases of blindness can be avoided due to advances in the management of diabetes and diabetic retinopathy [15]. Many adults living with diabetes remain unaware of their ocular condition until their diabetic retinopathy has progressed to a stage at which treatment is difficult. This makes early detection paramount to preservation of useful vision: early detection of diabetic retinopathy is critical, given that prompt treatment increases the likelihood of preserving vision and early detection and timely treatment can prevent nearly all cases of severe vision loss and blindness [16, 17].

Unfortunately, not every diabetic who should undergo annual dilated eye examinations receives such services, and this situation is reported to be influenced by lack of insurance and healthcare access, knowledge of diabetes-specific ocular risk, health literacy, cultural, and language barriers [16]. Despite significant advances in treatment procedures, many diabetics still do not receive appropriate eye care in the right time frame [10]. Literature documents disparities between different racial and ethnic groups in the access and receipt of eye care services to treat illness. In the Los Angeles Latino Eye Study, researchers found that Latinos were much more likely to have received general medical care than to have received eye care [18]. Wang et al. reported that for people with diabetes, only 59 percent who were African American Medicare beneficiaries underwent an eye examination in the course of a year. For those Medicare beneficiaries aged 65 to 69 years, only 60 percent had seen an eye care professional in the two years prior [19]. African Americans have been found to have poorer access to and use of eye care services, which has ultimately led to increases in visual disorders [20]. Also, poorer access to medical care and reduced health literacy compared to Whites have been reasons cited for increased prevalence of diabetic retinopathy among ethnic minorities [21]. This shows that among the major eye diseases, race and ethnicity may play a large role in the development and progression of eye disorders.

Saikumar differentiates between awareness and knowledge thus: the former refers to hearing about a disease while the latter refers to understanding the causes or treatment of the disease [22]. However, both concepts play key roles in how diabetic patients access eye care. Although the levels of awareness and knowledge about diabetic ocular complications among diabetics have improved in recent years, there is still inadequate awareness about the real dimension of the problem among the general public and many diabetics as well. Typically, studies have reported a very low level of awareness in Ghana [23, 24]. There is also a lack of awareness about the existing interventions for preventing diabetes and the management of complications [25]. This study was conducted to evaluate the level of awareness and knowledge of ocular complications of diabetes among diabetic patients in a teaching hospital in Ghana.

## METHODS

### Study Design and Sampling

This study was a cross-sectional study carried out among diabetic patients aged 11 years and above visiting the Diabetic Clinic at the Komfo Anokye Teaching Hospital from March 1,

2014 to April 1, 2014. A convenient sampling technique was employed. Overall, 150 patients participated in the study.

**Data Collection Technique/Analysis**

Information that was relevant to the study was obtained from the participants with an interviewer-administered questionnaire. These included but were not limited to knowledge about ocular complications of diabetes and attitude of patients towards preventing ocular complications of diabetes. Trained interviewers provided translation services to participants who were illiterate. The average time for the administration of a single questionnaire was 10 minutes and this was administered in the language that the respondent understood (English or Twi).

**Data Analysis**

Data was analyzed using Microsoft Excel 2010 and SPSS-version 20.0 for Windows. Frequency distribution was used to analyze participants’ demographic characteristics. Participants’ knowledge about diabetes mellitus and ocular effect of diabetes mellitus as well as attitude towards avoiding diabetic ocular complications were assessed using percentages. Descriptive statistics and Chi-square test were employed to find significant differences between comparable categorical groups. Statistical significance was set at p values less than 0.05 (p < 0.05).

**Ethical Considerations**

This study was reviewed and approved by the Committee on Human Research, Publications and Ethics of the Kwame Nkrumah University of Science and Technology, School of Medical Sciences and Komfo Anokye Teaching Hospital, Kumasi. For each patient sampled, an informed consent was obtained before participation. For patients less than 18 years, an informed consent was obtained from their parents. The study upheld the tenets of Declaration of Helsinki at all stages.

**RESULTS**

Table 1 shows the socio-demographic characteristics of the 150 patients who took part in the study. There were more females (107) than males (43) with an overall age range between 11-90 years. The age range with the highest number of patients was 61-70 years (37.3%) and that with the least number of patients was 11-20 years and 81-90 years, both with 3 (2%) patients each. The level of education with the highest number of respondents was junior high school level (J.H.S), which represented 25.3% of patients studied. However, the educational level of majority of respondents was very minimal, in this case up to the junior high school level, which represented 59.3% of

the respondents. The level of education with the least number of patients was vocational school level with 9 patients (6%).

**Table 1:** Distribution of Gender, Age and Level of education.

Characteristics		Number	Percentage
Gender	Male	43	28.7
	Female	107	71.3
	Total	150	100
Age	11-20	3	2
	21-30	4	2.7
	31-40	5	3.3
	41-50	27	18
	51-60	39	26
	61-70	56	37.3
	71-80	13	8.7
	81-90	3	2
	Total	150	100
Level of Education	Illiterate	36	24
	Primary	15	10
	J.H.S	38	25.3
	S.H.S	37	24.7
	Vocational	9	6
	Tertiary	15	10
	Total	150	100

Patients’ awareness of the effects of diabetes on the eyes was studied. Out of the 150 patients, a total of 122 (74.6%) responded that they were aware that diabetes had effects on the eyes and vision. 22 (14.7%) patients responded that the condition had no effects on the eyes and 16 (10.7%) patients said they had no idea. Table 2 shows the distribution of the awareness of the effects of diabetics on the eye amongst diabetic patients with gender.

**Table 2:** Awareness of effects of diabetics on the eye by Gender.

	Male	Female	Total
Have Effect	30	82	112
Have NO Effect	7	15	22
No Idea	6	10	16
Total	43	107	150

Patients were asked about the frequency in which they go for an eye exam since they were diagnosed. 69 (46%) responded they had never visited the eye clinic before the study. The number of patients in this category appeared to increase with age but was not statistically significant (p=0.096), with the

majority between the ages of 61-70 years. 44 (29.3%) patients responded they visited the eye clinic only once a while. 17 patients responded they only visited the eye clinic if their vision had reduced. 20(13.4%) patients had eye examination appointments at regular intervals (monthly).

The association between frequency of eye examination and referral by primary physician was examined and was found to be positive and statistically significant ( $p=0.031$ ). Patients who were referred to the eye clinic by their primary physician upon initial diagnoses appeared to have their eye examined more often than those who were not referred.

**Table 3:** Frequency of eye exam by Gender, Age and Level of education.

Characteristics		Frequency of Eye Exam							Total
		Only if vision is poor	Every 3 months	Every 6 months	Every 12 months	Every 2 years	Not regularly	Not at all	
Gender	Male	10	2	0	3	1	7	20	43
	Female	7	8	1	5	0	37	49	107
	TOTAL	17	10	1	8	1	44	69	150
AGE	11-20	0	0	0	0	0	0	3	3
	21-30	0	0	0	0	0	2	2	4
	31-40	2	0	0	0	0	0	3	5
	41-50	2	2	0	0	1	10	12	27
	51-60	8	3	1	0	0	8	19	39
	61-70	3	5	0	8	0	16	24	56
	71-80	2	0	0	0	0	5	6	13
	81-90	0	0	0	0	0	3	0	3
	TOTAL	17	10	1	8	1	44	69	150
Level of Educ	Illiterate	4	2	0	1	1	7	21	36
	Primary	1	1	0	0	0	3	10	15
	J.H.S	4	2	0	2	0	10	20	38
	S.H.S	2	1	0	4	0	13	17	37
	Vocational	2	1	0	1	0	4	1	9
	Tertiary	4	3	1	0	0	7	0	15
	TOTAL	17	10	1	8	1	44	69	150

Patients were asked if their physicians advised them to see an eye care professional after they were first diagnosed of diabetes. The association between level of awareness of ocular effects of diabetes and referral by primary physician was examined: the level of awareness appeared to be higher among patients who had been referred and this was found to be statistically significant ( $p=0.042$ ). 54 (36%) patients responded they were referred to seek eye care by their primary physician, while 96 (64%) patients responded they were not informed to seek eye care services upon first diagnoses. Majority of the patients were not advised to see an eye care professional after they were first diagnosed of diabetes.

**DISCUSSION**

This study showed that the level of awareness of the ocular

effects of diabetes was high among diabetic patients: 74.6% of patients were aware of the effect of diabetes on the eyes while only 10.7% had no idea whether diabetes affected the eyes and 16(10.7%) responded diabetes did not affect the eyes. Most participants were aware that uncontrolled diabetes had negative ocular effects, consistent with findings in other studies [3, 22, 26]. In such a study population where the level of education of majority of participants was junior high school or less, the high level of awareness is most likely due to recent advancement in public health efforts on health education. However, there is still a significant number of diabetics unaware of the ocular complications of the condition, and this puts them at risk of preventable blindness. This is because other studies have revealed that people with diabetes who have less education are more likely to suffer much more

complications compared to those with higher level of education [27, 28].

This study also revealed that most patients (more than half (64%)) were not informed to seek eye care services upon initial diagnoses of diabetes. A study by Khandekar et al. revealed that a significant proportion of physicians managing diabetic patients lacked knowledge about different parts of the eye that are affected by diabetes, and this may affect patient education in the consulting room [29]. Thus, it is likely that these patients were not adequately educated on the complications of diabetes upon initial diagnoses, and this reflected in the frequency of visits to eye clinics among these patients. This is particularly unhealthy for such patients because studies have shown that increasing patients' knowledge regarding disease and its complications has significant benefits with regard to patient compliance to treatment and to decreasing complications associated with the disease [30]. Some studies have documented that diabetic education had changed health-seeking behavior and practice among diabetics [31, 32]. These health education efforts, which are best performed on a one-on-one basis between physician and patient, would go a long way to further bridge the gap between higher and lower levels of education with respect to knowledge of diabetes and vision among diabetic patients if physicians could incorporate them adequately into their practice.

The study also revealed that most of the patients did not receive regular eye examination. Only 13.4% of patients had regular monthly eye examinations. This could be due to inadequate patient education as discussed earlier, lack of health insurance, cultural and other barriers [16]. A study by McCarty et al also reported that a significant number of people with diabetes do not have access to eye care on a regular basis. Another study showed that, rate of receipt of recommended eye care by diabetics was strikingly lower among African Americans, as only 22 percent of study participants reported seeing an ophthalmologist in the previous year [33]. This puts most of these diabetics at a greater risk of suffering ocular complications because regular screening of all patients with diabetes is recommended to avoid visual impairment due to diabetic retinopathy [10]. Also, the American Diabetes Association recommends annual dilated eye examinations after diagnosis of diabetes mellitus for the prevention of blindness [16]. It has been reported that regular eye screening and improved access to eye care decreases visual impairment due to diabetic retinopathy and evidently lowers the total costs incurred by the healthcare system during the current diabetes epidemic, something developing countries like Ghana desperately need [10].

## CONCLUSION

Although recent advancement in public health education has improved health knowledge among diabetics, there is still a gap to be filled with respect to level of awareness and knowledge of ocular effects of diabetes between diabetic patients with lower level of literacy and those of higher level of literacy. Since this is crucial to their health seeking behavior and prevention of blindness due to diabetic retinopathy, it is important that public health efforts in the field are intensified, particularly in developing countries. Also, physicians should ensure that diabetics are adequately educated on the ocular complications of diabetes and the need for regular eye examinations. These measures would help in the fight against blindness due to diabetic retinopathy.

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