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Original Research Article

Evaluating the Awareness and Knowledge of the Effect of Diabetes Mellitus on the Eye among Adult Diabetics in Accra

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ABSTRACT

Background: Increased awareness and knowledge about the sight-threatening complications of diabetes mellitus are keys to better understanding of the importance of routine eye examinations for the early detection and treatment of ocular complications in diabetics.
Aim: To assess the awareness and knowledge level of diabetes patients on the effect of diabetes on their eyes.
Setting and Design: A cross-sectional study in a tertiary Hospital.
Material and Methods: Consenting patients aged 20 years and above were sampled conveniently at the center. Data was collected with a structured questionnaire assessing patients' demographic background, awareness and knowledge of the effect of diabetes on the eye.
Statistical Methods: Multiple logistic regressions were used to examine demographic characteristics of participants associated with the level of awareness and knowledge about the ocular effects of diabetes.
Results : A total of 162 (males-69; females-93) participants were recruited for the study with most (76.60 %) participants aged 40 years and above. 80.20 % were aware that uncontrolled diabetes can affect the eye whiles 48.80 % of participants did not know examples of specific eye conditions with diabetes.
Income status and number of years ago diagnosed diabetes were possible predictors of awareness, whiles age predicted knowledge about the ocular effects of uncontrolled diabetes.
Conclusion: The low level of knowledge of specific ocular conditions associated with diabetes recorded signifies the need for further health education for patients on ocular complications with much stress on specific ocular conditions associated with diabetes for better knowledge and better management of diabetes.

Key-words: Diabetes Mellitus, diabetic retinopathy, awareness, knowledge, ocular complications and diabetes management.

INTRODUCTION

Diabetes Mellitus (DM) is a clinical syndrome which is characterized by hyperglycaemia due to an absolute or relative deficiency of insulin. [(1)] Insulin deficiency may arise from the destruction of β-cells of the pancreas which makes the body not able to regulate levels of glucose in the blood, resulting in too much glucose being present in the blood.

Diabetes mellitus is an international public health problem with estimated prevalence ranging from 2.0% to 11.7% in studied populations across the world. [2]

Diabetes mellitus is reaching epidemic proportions in many countries, including Ghana. Currently, there are 171 million diabetic patients worldwide which is even projected to increase to 366 million people by the year 2030. [1] This projected increase in diabetic population would be around 150 % for developing countries which is likely to have major economic implications. [1]

Diabetes can affect the eye causing damages to the retinal section of the eye. Diabetic related 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 and quality of life and socio-economic burdens on communities. [3-5]

Diabetic retinopathy is the cause of blindness in approximately 2.5 million of the estimated 50 million blind people in the world. [6] Diabetic retinopathy is one of the priority blinding diseases included in the disease control strategy of the 'VISION 2020' initiative. [7,8]

Diabetes-related eye disease has now become one of the alarming causes of new cases of blindness among adults in Ghana which requires much attention. [9]

Awareness creation can play an important role in encouraging people to seek timely eye care. It is also a vital step in the implementation of any successful program to battle diseases in communities.

Awareness is not the same as knowledge. Hearing about a disease is awareness, but understanding the causes or treatment of the disease, for example, is knowledge. [10]

A study in Australia showed that the level of awareness of the ocular effects of diabetes was high among people with diabetes where as Ovenseri-Ogbomo *et al* reported a very low level of awareness in Ghana. [11,12]

Several studies on awareness and knowledge of the ocular complications of diabetes mellitus have been carried out in the developed world but such information is very rare for the Ghanaian population.

This study therefore seek to assess the awareness and knowledge level of diabetes patients on the effect of diabetes mellitus on their eyes which is necessary in encouraging people to seek timely eye care.

MATERIALS AND METHODS

This was a cross-sectional study of awareness and knowledge level of diabetes patients on the effect of diabetes mellitus on their eyes.

Consenting adult diabetes patients aged 20 years and above presenting at a Diabetes Clinic were included.

A minimum sample size of 115 patients was required for this study taking worldwide prevalence of diabetes to be 6.4%, [1] a degree of accuracy of 0.05, a confidence level of 1.96 and an 80% expected response rate. However, the data collected (162) exceeded the minimum sample size calculated above.

The tool for data collection was adapted from a previous study. [13] Convenient sampling technique was used in the subject selection. Subjects were recruited daily (from Monday to Friday) to complete the questionnaire from February to April, 2014.

For illiterates, the questionnaire was translated in vernacular and then back translated to English to solicit responses from participants. Participants signed an informed consent after agreeing to take part in the study and subsequently completed a structured questionnaire which assessed their socio demographic characteristics,

information about their awareness and knowledge of the effect of diabetes on the eye.

Participant's information was treated as confidential. To ensure confidentiality, names of participants did not appear on the questionnaire or in the write-up.

The study was approved by the Ethical and Protocols Review Board at the institution where the study was done with protocol identification number: MS-Et/M.2-P 4.8/20133/2014.

Statistical Analysis

Data analysis was done by the IBM SPSS Statistics software version 20. Demographic characteristics of study participants were analysed using frequency distribution. Participants' knowledge about diabetes mellitus, ocular effect of diabetes mellitus and knowledge about the control and management of diabetes mellitus were assessed using percentages. The first category was used as the reference category to assess the effect of each category in a multi-category variable; multiple logistic regressions were used to examine demographic characteristics of participants associated with the awareness and knowledge about the ocular effects of diabetes mellitus. P-values less than 0.05 were considered statistically significant.

RESULTS

A total of 162 (males- 69; females-93) patients took part in the study with a female preponderance of 57.40 %. Most (76.60 %) of the participants were aged 40 years and above. Most (74.10 %) participants were educated with 54.90 % having attained Senior High School (SHS) level and above. Skilled workers were 48.80 %, unskilled workers; 32.70 % with retirees 18.50 %. Most (56.80 %) participants were married. High income earners were 34.60 %, middle income earners were 34.00 % and 31.50 % were low income earners. 48.10 % of participants had diabetes mellitus diagnosed 1-5 years ago, 34.00 % were diagnosed 6-10 years and 17.90 % were diagnosed 11+ years ago (table 1).

Table 1: Background characteristics of participants

Characteristics		Number (%)
	Male	69(42.60)
	Female	93(57.40)
Age:	20-29	13(8.00)
	30-39	25(15.40)
	40-49	38(23.50)
	50-59	45(27.80)
	60+	41 (25.30)
Education:	None	42 (25.90)
	Basic education	31 (19.10)
	SHS	27 (16.70)
	Voc./tech.	19 (11.70)
	Professional/tertiary	43 (26.50)
Occupation:	Skilled	79 (48.80)
	Unskilled	53 (32.70)
	Retired	30 (18.50)
Marital status:	Single	32 (19.80)
	Married	92 (56.80)
	Divorced	15 (9.30)
	Widowed	23 (14.20)
*Income status:	Low income	51 (31.50)
	Middle income	55 (34.00)
	High income	56 (34.60)
Number of years ago diagnosed DM:	1-5	78 (48.10)
	6-10	55 (34.00)
	11+	29 (17.90)

*Low income (GHC1440 -GHC2160), middle income (GHC2160-GHC7554) and High income (GHC7554-GHC28800+) per annum.

Participants' knowledge about diabetes mellitus, its ocular effect, control and management were analysed. 88.30 % had knowledge of the existence of two types of diabetes mellitus. 65.20 % of the participants had type 2 diabetes mellitus; whiles 26.80 % had type 1 diabetes mellitus. However, 1.20 % of the participants were not sure of the type of diabetes mellitus they had and 6.70 % claimed they were told they have diabetes but were not told the type of their diabetes mellitus they have. 70.40 % of participants knew duration of diabetes mellitus is a risk factor in diabetes mellitus complications. 63.60 % knew diabetes mellitus could be hereditary (table 2).

In assessing participants' knowledge about the ocular effect of diabetes mellitus,

80.20 % of respondents knew uncontrolled diabetes mellitus can affect the eye whiles 48.10 % knew the condition if not controlled can cause cataract on the eye. Knowledge about diabetes mellitus causing an increase in intraocular pressure was in 48.80 % of respondents whiles 53.10 % knew uncontrolled diabetes mellitus can cause changes on the retina. 30.40 % of respondents knew diabetic retinopathy is manageable.

Only 39.63 % of respondents claim they have sufficient knowledge about the management of diabetes mellitus whiles 69.10 % of respondents believe diet lifestyle modification is essential in the control and management of diabetes mellitus. 68.50 % believe control of blood sugar level is essential in the management of diabetes mellitus. The importance of regular exercise in the management of diabetes mellitus was known by 55.60 % of respondents whiles 58.60 % of respondents knew regular medical examination is indispensable in managing diabetes mellitus. (Table 2)

Table 2: Knowledge about diabetes mellitus, its ocular effect and control/ management

Question	Number (%)
Knowledge about diabetes mellitus	
There are known two types of DM	143 (88.30)
Type of DM participants have: Type 1	44 (26.80)
Type 2	107(65.20)
Not sure	2 (1.20)
Don't know	11(6.70)
DM could be hereditary	103(63.60)
Duration of DM is a risk factor in DM complications	114 (70.40)
Ocular effect of diabetes mellitus	
Uncontrolled DM can affect the eye	130 (80.20)
Uncontrolled DM can cause cataract	78 (48.10)
Uncontrolled DM can cause increase in eye pressure	79 (48.80)
Uncontrolled DM can cause changes at the back of the eye	86 (53.10)
Uncontrolled DM can cause blindness	127(78.90)
DMR is manageable	49 (30.40)
Control/ management of diabetes mellitus	
Diet lifestyle modification is essential	112 (69.10)
Control of blood sugar level is essential	111 (68.50)
Regular medical examination is essential	95 (58.60)
Regular exercise is essential	90 (55.60)
Do you have sufficient knowledge about the management of DM:	yes 65(39.63)
	No 99 (60.37)

DM= Diabetes mellitus, DMR= Diabetic retinopathy

Table 3: Predictors of awareness about the ocular effects of uncontrolled diabetes mellitus.

Characteristics	OR (95% CI) p-value	AOR (95% CI) p-value
Gender: Female	ref	ref
Male	1.27(0.59-2.77) 0.54	1.74(0.56-5.17)0.32
Age: 20-29	ref	ref
30- 39	1.20(0.24-6.07) 0.83	2.14(0.19-23.99)0.54
40-49	2.48(0.47-12.96) 0.28	11.62(0.77-175.93)0.08
50-59	1.39(0.31-6.22) 1.39	3.47(0.28-42.61)0.33
60+	0.58 (0.14-2.45) 0.46	4.10(0.24-71.43)0.33
Education: None	ref	ref
Basic education	2.50(0.79-7.93)0.12	4.22(0.82-21.61)0.08
SHS	1.43(0.49-4.18)0.52	0.95(0.16-5.72)0.96
Voc./tech.	4.25(0.86-21.04)0.08	8.03(0.83-77.43)0.07
Prof./tertiary	3.08(1.05-9.03)0.04	4.27(0.65-28.17)0.13
Occupation: Skilled	ref	ref
Unskilled	0.40(0.16-1.02)0.06	0.93(0.17-4.91)0.93
Retired	0.20(0.07-0.54)0.00	0.18(0.02-1.81)0.15
Marital status: Single	ref	ref
Married	0.70(0.21-2.27)0.55	1.37(0.29-6.43)0.69
Divorced	1.04(0.17-6.45)0.97	2.59(0.27-25.07)0.41
Widowed	0.30(0.08-1.17)0.08	4.67(0.43-50.29)0.20
*Income status: Low income	ref	ref
Middle income	2.29(0.90-5.78)0.08	4.43(1.06-18.47)0.04
High income	2.34 (0.92-5.91) 0.07	1.27(0.28-5.76)0.76
Number of years ago diagnosed DM: 1-5	ref	ref
6-10	0.48(0.19-1.20)0.12	0.14(0.03-0.66)0.01
11+	0.24(0.09-0.67)0.01	0.07(0.01-0.40)0.00

*Low income (GHC1440 -GHC2160), middle income (GHC2160-GHC7554) and High income (GHC7554-GHC28800+) per annum.

Multivariate logistic regression was used to predict awareness and knowledge about the ocular effects of uncontrolled diabetes mellitus with factors such as

gender, age, education status, occupation, marital status, income status and number of years ago diagnosed diabetes mellitus. Income status and number of years ago diagnosed diabetes were possible predictors of awareness about the ocular effects of uncontrolled diabetes mellitus. Respondents within the middle income status level were four times more likely to be aware about the ocular effects of uncontrolled diabetes mellitus [AOR = 4.43, CI (1.06-18.47); P = 0.04] whiles those diagnosed with diabetes mellitus more than six years ago were less likely to be aware about the ocular effect of diabetes mellitus [AOR = 0.14, CI (0.03-0.66); P = 0.01]. (Table 3)

Age was the only covariate identified as a possible predictor of knowledge about the the ocular effects of uncontrolled diabetes mellitus. Respondents aged 40-49 were nine times more likely to have knowledge about the ocular effects of uncontrolled diabetes mellitus than those aged 20-29 [AOR = 9.21; CI (1.88-45.16); P = 0.01]. (Table 4).

Table 4: Predictors of knowledge about the ocular effects of uncontrolled diabetes mellitus.

Characteristics	OR (95% CI)	p-value	AOR (95% CI)	p-value
Gender: Female	ref		ref	
Male	1.27(0.68-2.38)	0.45	1.63(0.73-3.64)	0.24
Age: 20-29	ref		ref	
30- 39	2.86(0.69-11.82)	0.15	3.79(0.73-19.70)	0.11
40-49	4.88(1.25-19.03)	0.02	9.21(1.88-45.16)	0.01
50-59	2.81(0.75-10.49)	0.12	5.67(1.03-31.15)	0.05
60+	1.59(0.42-6.04)	0.49	5.50(0.70-43.25)	0.11
Education: None	ref		ref	
Basic education	0.88(0.35-2.23)	0.79	1.37(0.42-4.45)	0.60
SHS	0.49(0.18-1.31)	0.15	0.64(0.16-2.59)	0.54
Voc./tech.	1.42(0.47-4.31)	0.54	2.78(0.54-14.36)	0.22
Prof./tertiary	1.15(0.49-2.71)	0.75	2.05(0.49-8.65)	0.33
Occupation: Skilled	ref		ref	
Unskilled	1.07(0.53-2.15)	0.86	1.46(0.42-5.12)	0.55
Retired	0.38(0.16-0.91)	0.03	0.23(0.03-1.53)	0.13
Marital status: Single	ref		ref	
Married	1.22(0.53-2.80)	0.60	1.17(0.42-3.27)	0.76
Divorced	0.44(0.12-1.59)	0.21	0.46(0.10-2.14)	0.32
Widowed	0.96(0.32-2.83)	0.93	3.91(0.67-22.93)	0.13
*Income status: Low income	ref		ref	
Middle income	0.89(0.41-1.91)	0.76	1.02(0.38-2.78)	0.97
High income	1.10(0.52-2.36)	0.80	0.89(0.28-2.80)	0.84
Number of years ago diagnosed DM: 1-5	ref		ref	
6-10	0.78(0.39-1.56)	0.48	0.47(0.19-1.18)	0.11
11+	0.43(0.18-1.02)	0.06	0.33(0.10-1.06)	0.06

*Low income (GHC1440 -GHC2160), middle income (GHC2160-GHC7554) and High income (GHC7554-GHC28800+) per annum.

DISCUSSION

Awareness and knowledge about diabetes is a critical component in the management of complications associated with diabetes mellitus. The World Health Organisation emphasises on diabetic education programs which are directed towards patient education about the condition and its related complications.

This study revealed a female preponderance of 57.40 % which agrees with findings from other studies. [13-15] Most (76.60 %) participants were aged 40 years and above. This high prevalence of diabetes among the aged agrees with the findings from Wild *et al* who also identified age as a risk factor for developing diabetes mellitus. [16] Other studies have also shown high prevalence of diabetes mellitus among the elderly. [14,15,17] This suggests a need for a timely health education and diet lifestyle modification to curb the condition among the present youth who will eventually become adults.

Education is known to play a very significant role in the creation of awareness concerning eye diseases. [18] Most (74.10 %) participants from this study were educated with 54.90 % having attained Senior High School (SHS) level and above. Lack of health education has a tendency to increase complications associated with diabetes mellitus. Studies conducted in the United States of America have revealed that people with diabetes who have less education are more likely to suffer much complications compared to those with high school education and more. [19,20] Educating diabetics on common eye diseases and their treatment can therefore play an important role in encouraging people to seek timely ophthalmic intervention which would help in reducing the global burden of visual impairment associated with diabetes.

A recent study in Pakistan among diabetics indicated that cataract and uncorrected refractive error were more common causes of visual impairment. [21] Studies elsewhere have demonstrated high prevalence of cataract and glaucoma among sufferers of diabetes which is why it is necessary for them to have knowledge of eye complications associated with diabetes.
Even though this study demonstrated that majority (80.20 %) of diabetics know that uncontrolled diabetes could affect the eye which is close to the findings from Saikumar *et al* [10] (84.0%) and Rajiv *et al* [22] (72.9 %), 48.80 % of participants did not know examples of specific eye conditions of diabetes such as diabetic retinopathy, cataract and glaucoma. Diabetic retinopathy is increasingly becoming a major cause of blindness throughout the world in the age group of 20-60 years. [3-5] As a result, care givers and public health educators should emphasize on the potential sight threatening conditions associated with diabetes mellitus.

Another study conducted in Oman and Australia also revealed a satisfactory level of knowledge about eye complications and care among persons with diabetes. [11,22]

Income status and number of years ago diagnosed diabetes were possible predictors of awareness about the ocular effects of uncontrolled diabetes mellitus from our study. The Fifth Round Ghana Living Standard Survey (2008) classified the income status of Ghanaians as; Low income earners (GHC1440 -GHC2160), middle income earners (GHC2160-GHC7554) and High income earners (GHC7554-GHC28800+) per annum. [23] Our findings show that middle income earners are four times more likely to be aware of the effect of diabetes on the eye compared with low income earners.

People who were diagnosed more than six years before the study had less awareness which may be attributed to an increase in health education among diabetes sufferers in recent years in Ghana.

Our findings also revealed age as a possible predictor of knowledge about the ocular effects of uncontrolled diabetes mellitus. Age and duration of diabetes were also found to be associated with knowledge about the ocular complications of diabetes in Oman. [22] Elsewhere, number of years ago a person had diabetes and having a family history of diabetes were possible predictors of knowledge about the ocular effects of uncontrolled diabetes mellitus. [24] Thus, as people diagnosed with diabetes are aging, there is that possibility of having a lot of exposure to primary health education on diabetes complications and management through routine clinic attendance unlike the young and newly diagnosed diabetics.

CONCLUSION

Findings from our studies indicate a high level of knowledge concerning the ocular complications of diabetes mellitus compared to an earlier study done at the same centre. [12] This is an indication of the

good work done in the area of health education at the diabetes center which currently has an eye unit responsible for screening diabetics for ocular complications. A rather low level of knowledge of specific ocular conditions associated with diabetes was recorded which indicates the need for further health education for patients on ocular complications with much stress on specific ocular conditions associated with diabetes to equip patients with better knowledge which will lead to better management of diabetes mellitus.

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