

**KNOWLEDGE, ATTITUDES AND PRACTICES ON  
DIABETIC RETINOPATHY AMONG PATIENTS  
ATTENDING THE DIABETES CLINIC AT  
KENYATTA NATIONAL HOSPITAL.**

**A dissertation submitted in part fulfillment for the  
Degree of Master of Medicine in Ophthalmology  
University of Nairobi.**

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## **DECLARATION**

This proposal is my original work and has not been presented for a degree at any other university.

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## **DEDICATION**

Special dedication to my beloved wife Christine and my children; Amos, Armstrong and Abias for the moral support and understanding during the entire period of writing this thesis.

## **ACKNOWLEDGEMENT**

I wish to acknowledge Dr. Millicent Kariuki and Dr. Sheila Marco for their enormous contribution in writing this work. Thanks so much for your guidance and resourcefulness in writing this thesis. I also acknowledge my sponsor, the Lions of Bavarian through Mrs. Quade for funding this study. I 'am also greatly indebted to all my teachers at the department of ophthalmology UON. The research knowledge acquired from them was fundamental in writing this work. Last but not least is to my fellow student who always 'kept me going' by their encouragement and moral support.

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## **LIST OF ABBREVIATIONS**

AAO	American Academy of Ophthalmologists
ADA	American Diabetic Association
CSME	Clinically significant macular oedema
DCCT	Diabetes Control and Complications Trial
DM	Diabetes mellitus
DR	Diabetic Retinopathy
DRS	Diabetic Retinopathy Study
DVRS	Diabetic Retinopathy Vitrectomy Study
ETDRS	Early Treatment of Diabetic Retinopathy Study
FLA	Fluorescein Angiography
GP	General practioners
IVTA	Intravitreal triamcinolone acetate
KAP	Knowledge, attitudes and practice
KNH	Kenyatta National Hospital
NPDR	Non proliferative diabetic retinopathy
PDR	Proliferative diabetic retinopathy
PRP	Panretinal photocoagulation
UKPDS	United Kingdom Prospective Diabetes Study
UON	University of Nairobi
VEGF	Vascular Endothelial Growth Factor

## ABSTRACT

**Background:** There is a paucity of data in the literature on knowledge, attitude and practices of diabetic patients with regards to diabetic retinopathy. Diabetes mellitus affects more than 170 million persons worldwide.<sup>1</sup> Diabetic retinopathy accounts for 4.8% of the 37 million cases of blindness occurring worldwide.<sup>4</sup> Currently, diabetic retinopathy is estimated to contribute about 3% of blindness in Kenya.<sup>5</sup> In a study to assess the Awareness of diabetic retinopathy amongst diabetic patients at the Murtala Mohammed Hospital, Kano, Nigeria, the retinopathy awareness rate amongst the patients was quite high (84.3%).<sup>32</sup> The study aimed at evaluating the awareness of diabetic retinopathy among the diabetic patients visiting diabetic clinic of KNH.

**Objectives:** To establish the levels of knowledge, attitude and practice on diabetic retinopathy amongst the diabetic patients visiting diabetic clinic of KNH in Kenya.

**Design:** Cross-sectional Hospital-Based study.

**Study Setting:** Kenyatta National Hospital Out-Patient Diabetic Clinic

**Participants:** Patients diagnosed with diabetes mellitus by the physicians at the diabetic clinic.

**Methodology:** Questionnaires were used to assess knowledge, attitude and practice of these patients and the data collected was coded, entered and managed in a pre-designed Microsoft Access database. Data analysis was carried out using SPSS version 17.0. Results were presented in tables and graphs.

**Results:** Two hundred and three (203) patients were interviewed. Females constituted 55.7% and the mean age was 54.8 years ( $\pm 13.7$  years). One hundred and ninety three (95%) of the 203 diabetic patients responded that diabetes affect the eye. Only 46 (22.7%) patients answered correctly what diabetic retinopathy was. Fifty seven percent of the 46 patients had been examined by an eye specialist. The ability of a patient to define correctly what DR was associated with age, level of education ( $P=0.001$ ), marital status ( $p=0.049$ ) and estimated monthly income( $p=0.005$ ).

**Conclusion:** Majority of patients (64%) did not know what DR was. Most of the diabetic patients (69%) were only aware of poor blood control as a risk factor for DR. Seventy two percent of diabetic patients interviewed strongly agreed that blood sugar control is important in preventing DR. The proportion of diabetic patients interviewed that had been seen by eye specialist is low (57.6%). The age, marital status, level of education and economic status are the

factors that were found to be significantly associated with knowledge on diabetic retinopathy.

## **1.0 BACKGROUND**

### **1.1 Definition of diabetes and diabetic retinopathy**

Diabetes is a disease in which the body fails to regulate the amount of glucose necessary for the body.<sup>1</sup> Diabetes does not allow the body to produce or properly use insulin. Insulin is a hormone that is needed to convert sugar, starches and other food into energy needed for daily life. Diabetic retinopathy (DR) can be defined as damage to the micro-vascular system of the retina accompanied by structural changes in the retina due to prolonged hyperglycaemia.<sup>1</sup> It occurs both in type 1 and type 2 Diabetes Mellitus (DM).

### **1.2 Epidemiology of diabetes and diabetic retinopathy**

Diabetes mellitus currently affects more than 170 million persons worldwide, and this scale is estimated to touch 366 million by 2030.<sup>1</sup> The eye is the most commonly affected organ by diabetes leading to Diabetic Retinopathy (DR). More than 75% of patients who have diabetes mellitus for more than 20 years will have some form of diabetic retinopathy.<sup>1</sup>

According to World Health Organization (WHO), there will be an alarming increase in the population with type II diabetes mellitus, both in the developed and developing countries over the next two decades. In the developed world, the estimated increase is approximately 46%, from 55 million in 2000 to 83 million in 2030; whereas, among developing nations, the estimated increase is approximately 150%, from 30 million in 2000, to 80 million in 2030.<sup>2</sup> In Kenya the estimated prevalence of diabetes based on regional estimates is 3.3% with up to 50% being undiagnosed<sup>2</sup>. This figure is expected to rise to 4.6% by 2025.<sup>3</sup>

Diabetic retinopathy, a well recognized complication of diabetes accounts for 4.8% (1.8million) of the 37 million cases of blindness occurring worldwide.<sup>4</sup> Currently, diabetic retinopathy is estimated to contribute about 3% of blindness in Kenya.<sup>5</sup>

The Wisconsin Epidemiological Study<sup>6</sup> has proved that microvascular complications such as diabetic retinopathy (DR) in the diabetic population are linked to the duration of the disease. Diabetic retinopathy occurs both in type 1 and type 2 diabetes mellitus. Nearly all type 1 and 75% of type 2 DM will develop DR after 15 year duration of diabetes.<sup>7</sup> During the first two

decades of disease, nearly all patients with type 1 diabetes and >60% of patients with type 2 diabetes have retinopathy.<sup>8</sup> Reportedly, in Kenya, almost 50% of diagnosed diabetics in Nairobi and almost 20% in rural Central Province had diabetic retinopathy with the majority never having undergone any eye examinations.<sup>9</sup>

Diabetic Retinopathy is symptomless in its early stage; screening is the only way to identify these patients to prevent them from going blind. The number of DR patients increase with increase in the diabetic population, especially in developing countries where there is resource scarcity.<sup>1</sup>

### **1.3 Risk factors for diabetic retinopathy**

#### **1.3.1 Duration of disease**

The duration of diabetes is probably the strongest predictor for development and progression of retinopathy. Among younger-onset patients with diabetes in the Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR), the prevalence of any retinopathy was 8% at 3 years, 25% at 5 years, 60% at 10 years, and 80% at 15 years. The prevalence of Proliferative Diabetic Retinopathy (PDR) was 0% at 3 years and increased to 25% at 15 years.<sup>6</sup> The incidence of retinopathy also increased with increasing duration. The 4-year incidence of developing proliferative retinopathy in the WESDR younger-onset group increased from 0% during the first 5 years to 27.9% during years 13–14 of diabetes. After 15 years, the incidence of developing PDR remained stable.

#### **1.3.2 Glycemic Control**

The severity of hyperglycemia is the key alterable risk factor associated with the development of diabetic retinopathy. The Diabetes Control and Complications Trial (DCCT) investigated the effect of hyperglycemia in type 1 diabetic patients. In the study, Intensive therapy reduced the mean risk of retinopathy by 76% (95% CI 62–85). The protective effect of glycemic control has also been confirmed for patients with type 2 diabetes. Epidemiological analysis of the United Kingdom Proliferative Diabetic Study (UKPDS) data showed a continuous relationship between the risk of microvascular complications and glycemia, such that for every percentage point decrease in HbA1c (e.g., from 8 to 7%), there was a 35% reduction in the risk of microvascular

complications.<sup>10</sup>

### **1.3.3 Blood pressure control**

The UKPDS also investigated the influence of tight blood pressure control.<sup>10</sup> A total of 1,148 hypertensive patients with type 2 diabetes were randomized to less tight (<180/105 mmHg) and tight blood pressure control (<150/85 mmHg) with the use of an ACE inhibitor or a  $\beta$ -blocker. With a median follow-up of 8.4 years, patients assigned to tight control had a 34% reduction in progression of retinopathy and a 47% reduced risk of deterioration in visual acuity of three lines in association with a 10/5 mmHg reduction in blood pressure.

### **1.3.4 Pregnancy**

Pregnancy is occasionally associated with rapid progression of DR. Predicating factors include poor pregnancy control of diabetes, too rapid control during the early stages of pregnancy, and the development of pre-eclampsia and fluid imbalance.<sup>11-12</sup>

## **1.4 Natural history of diabetic retinopathy.**

Diabetic retinopathy progresses from mild nonproliferative abnormalities, characterized by increased vascular permeability, to moderate and severe nonproliferative diabetic retinopathy (NPDR), characterized by vascular closure, to proliferative diabetic retinopathy (PDR), characterized by the growth of new blood vessels on the retina and posterior surface of the vitreous. Macular edema, characterized by retinal thickening from leaky blood vessels, can develop at all stages of retinopathy. Pregnancy, puberty, blood glucose control, hypertension, and cataract surgery can accelerate these changes.

Vision-threatening retinopathy is rare in type 1 diabetic patients in the first 3–5 years of diabetes or before puberty. During the next two decades, nearly all type 1 diabetic patients develop retinopathy. Up to 21% of patients with type 2 diabetes have retinopathy at the time of first diagnosis of diabetes, and most develop some degree of retinopathy over time. Vision loss due to diabetic retinopathy results from several mechanisms. Central vision may be impaired by macular edema or capillary nonperfusion. New blood vessels of PDR and contraction of the

accompanying fibrous tissue can distort the retina and lead to tractional retinal detachment, producing severe and often irreversible vision loss. In addition, the new blood vessels may bleed, adding the further complication of preretinal or vitreous hemorrhage. Also neovascular glaucoma associated with PDR can be a cause of visual loss.

## **1.5 Treatment of diabetic retinopathy**

The best treatment for diabetic retinopathy is to prevent it. Strict control of your blood sugar will significantly reduce the long-term risk of vision loss. Treatment usually won't cure diabetic retinopathy nor does it usually restore normal vision, but it may slow the progression of vision loss. Without treatment, diabetic retinopathy progresses steadily from minimal to severe stages.

### **1.5.1 Laser Treatment**

In the Early Treatment Diabetic Retinopathy Study<sup>13</sup>, macular laser therapy for clinically significant macular oedema approximately halved the rate of moderate visual loss, defined as doubling of the visual angle, and equating to a change from 6/6 to 6/12 or from 6/12 to 6/24. A modest improvement (one line on the Snellen visual acuity chart) was seen in 40% of treated and 20% of untreated eyes. The number needed to treat to prevent one case of moderate visual loss over 3 years is 8. The principal effect of macular laser therapy is to reduce the rate of visual loss. In the Diabetic Retinopathy Study<sup>14</sup>, panretinal photo-coagulation for high-risk proliferative retinopathy approximately halved the risk of severe visual loss, defined as the inability to see the top letter on a Snellen chart from 1.56 m. Depending on the pattern of proliferative retinopathy, the number needed to treat to prevent one case of severe visual loss over 2 years is between 3 and 7. Thus loss of vision can be prevented with laser photocoagulation therapy for proliferative diabetic retinopathy and diabetic macular edema.

Laser photocoagulation techniques can be classified as panretinal, focal, or grid. Panretinal photocoagulation (PRP), also referred to as scatter PRP, is used for the treatment of proliferative diabetic retinopathy and indirectly treats neovascularization of the optic nerve, retinal surfaces, or in the anterior chamber angle by placing laser burns throughout the peripheral fundus. This is usually done over several sessions.

Focal and grid photocoagulation are used for the treatment of diabetic macular edema. Focal photocoagulation applies light, small-sized burns to leaking microaneurysms in the macula (outside the foveal avascular zone). Grid photocoagulation applies a grid or pattern of burns (mimicking panretinal photocoagulation but using smaller burns) to the areas of macular edema arising from diffuse capillary leakage or non-perfusion shown on fluorescein angiography (FLA).

Pan-retinal photocoagulation has been found to reduce the rate of vision loss in patients with proliferative diabetic retinopathy by 60% and focal laser can decrease the rate of vision loss in individuals with macular edema by 50%.<sup>15</sup> Common laser treatments applied to patients with sight-threatening forms of diabetic retinopathy are effective in preventing but not reversing visual loss. It is therefore imperative that patients with sight-threatening disease are referred before visual loss occurs. This requires an effective retinopathy risk reduction programme and referral chain.<sup>16</sup>

### **1.5.2 Vitrectomy**

Vitrectomy is an important mode of the treatment strategies for advanced diabetic retinopathy. Vitrectomy may not only remove vitreous hemorrhage but also prevent or relieve traction on the retina from contraction of the fibrovascular membranes that characterize severe proliferative diabetic retinopathy.

The Diabetic Retinopathy Vitrectomy Study (DRVS) showed that there was a benefit to early vitrectomy (surgical removal of vitreous) in very severe PDR in patients with type 1 diabetes. Two years after surgery, 36% of the early vitrectomy group and 12% of the late vitrectomy group had visual acuity of 20/40 or better.<sup>17-18</sup>

### **1.5.3 Role of triamcinolone and anti-VEG (Vascular endothelial Growth Factors)**

Intravitreal administration of short- and long-acting corticosteroids for the treatment of diabetic macular edema has been recently evaluated. In PDR, the growth of new vessels from the retina or optic nerve is thought to occur as a result of vascular endothelial growth factor (VEGF) release into the vitreous cavity as a response to ischemia.<sup>19-21</sup>

Intravitreal bevacizumab seems to be a useful treatment for PDR, minimizing the risk for exudative complications, progression of retinal neovascularization, vitreous hemorrhage, and decreased vision caused by macular edema.<sup>22</sup> Intravitreal bevacizumab may potentially be used as an adjuvant agent to PRP for PDR.<sup>22</sup>

The introduction of intravitreal triamcinolone acetate has been a major advance in the treatment of refractory diabetic macular edema. The Diabetic Retinopathy Clinical Research Network evaluated the role of intravitreal triamcinolone acetonide against focal laser photocoagulation. Treatment with intravitreal triamcinolone acetonide resulted in early decrease in retinal thickness at 4 months, but by 24 months those patients randomized to focal/grid laser photocoagulation had better mean visual acuity and fewer adverse effects of cataract development and elevation of intraocular pressure.

Thus, the potent and specific anti-VEGF drugs; bevacizumab (Avastin), an anti-VEGF antibody); and ranibizumab (Lucentis), an anti-VEGF antibody fragment are obvious candidates for the treatment of diabetic macular edema.

#### **1.5.4 Others**

Other drugs with antiangiogenic activity that are currently being investigated are protein kinase C inhibitors, and growth hormone antagonist

### **1.6 Screening for diabetic retinopathy**

Given the proven benefits of early detection, guidelines for screening for diabetic retinopathy have been established by national professional organizations such as the American Diabetes Association (ADA)<sup>23</sup> and the American Academy of Ophthalmology (AAO).<sup>24</sup> Unfortunately, on average, < 50% of diabetic patients in the United States meet these recommendations.<sup>25-27</sup> In fact, 60% of patients who require vision-preserving laser surgery do not receive treatment.<sup>28</sup>

The recommendations of the American Diabetes Association, the American College of Physicians, and the American Academy of Ophthalmology<sup>29</sup> are as follows: type 1 diabetic patients with onset at 0–30 years should have the first screening examination at 5 years duration, whereas type 1 diabetic patients with later onset and type 2 diabetic patients should receive a dilated retinal examination by an ophthalmologist at diagnosis.

The main limitation of screening is poor or no access to an ophthalmologist, thus it is imperative that the primary care physician be aware of the potential complications of diabetes and referral protocols.

In Kenya, the ministry of health with the realization of the increasing burden of diabetes in the country put in place a national diabetes strategy in 2010.<sup>3</sup> The strategy identifies training health care providers on the required competencies, provision of clinical guidelines and treatment protocols as an essential component. It seeks to establish standards of diabetes care at all levels.<sup>30</sup> Though this is a good step towards dealing with the complications of diabetes it does little in the way of increasing the diagnosis of DR and its screening.

### **1.7 Knowledge, attitudes and practices (KAP) of diabetic retinopathy among diabetic patients**

The Knowledge possessed by a community refers to their understanding of any given topic, diabetes and diabetic retinopathy in this case. Attitude refers to their feelings towards this subject, as well as any preconceived ideas that they may have towards it. Practice refers to the ways in which they demonstrate their knowledge and attitude through their actions. Understanding the levels of Knowledge, Attitude and Practice will allow for a more efficient process of awareness creation as it will allow the program to be tailored more appropriately to the needs of the community.

There is a paucity of data in the literature on awareness or knowledge of diabetic retinopathy amongst diabetic patients. In a study of an urban (supposedly better informed) population in southern India involving 2,522 subjects, asked whether diabetes could reduce vision. Only 28% were aware of such a possibility.<sup>31</sup>

In a study to assess the awareness of diabetic retinopathy amongst diabetic patients at the Murtala Mohammed Hospital, Kano, Nigeria, the retinopathy awareness rate amongst the patients was quite high (84.3%).<sup>32</sup> This is similar to findings in Myanmar where retinopathy awareness rate amongst diabetic outpatients was 86%.<sup>33</sup> Awareness rates between diabetic patients and the general population may not be similar. Awareness rates are expectedly lower in the general population.<sup>34</sup> In this study, most of the patients attributed their source of information

on diabetic retinopathy to the hospital environment (hospital staff or fellow patients). Other sources such as the mass media or the internet did not seem to play any significant roles.

In a study to assess knowledge of diabetic retinopathy among rural populations in India,<sup>35</sup> knowledge about DR was noted in 718 individuals (37.1%).

In assessment of awareness of Diabetic Retinopathy among the diabetics attending the Peripheral Diabetic Clinics in Melaka, Malaysia, it was found that 79.8% were aware of the complications of diabetes mellitus and 87.2% were aware that diabetes can affect the eyes. However, only 50% of the patients underwent an ophthalmological evaluation. Although awareness was good, the motivation to undergo the assessment was poor.<sup>36</sup>

According to a study done in United State of America (U.S.A), older age, higher socioeconomic status and higher educational level among the diabetics were associated with having an annual eye examination<sup>37</sup>. In a study done in Australia, about 71% of the diabetic individuals had undergone examination of their eye within a period of 2 years and about 18% of the diabetics (substantial portion of those not on insulin) never underwent an eye examination before.<sup>38</sup>

A study in India that involved assessing of awareness of diabetic retinopathy before and after diabetes and DR awareness campaign showed that only 55% of paramedical personnel and 7% of community members were aware of diabetic retinopathy in the beginning which increased to 79% and 68% respectfully finally.<sup>39</sup> Knowledge about detrimental effects of DR on visual acuity and recommendation by health-care providers are important, possibly modifiable factors in the attendance to DR screening.

A study in Kuala Lumpur, Malaysia to assess the awareness of eye complications and prevalence of diabetic retinopathy in the first visit to eye clinic among type 2 diabetic patients, 86% of respondents were aware of diabetic eye complications, especially in patients who had achieved tertiary educational level (96.3%). The majority of the patients (78.8%) were referred by their physicians and only 20.4% came on their own initiative. Lack of understanding on diabetic eye

diseases (68.6%) was the main barrier for most patients for not coming for eye screening earlier.<sup>40</sup>

A study conducted in Nigeria to determine previous dilated eye examination on type 2 diabetic, found that 28.9% diabetic patients had previously had dilated eye exam . Inadequate knowledge about diabetic retinopathy as well as low referral rates was found to be contributory. It was concluded that Massive health education on diabetic retinopathy as well as development of sustainable retinopathy screening protocol would be helpful.<sup>41</sup>

A study done in Oman by Rajiv et al involving 750 participants, 'Excellent', grade of knowledge about diagnosis and eye care was present in 72.9% and 18% participants respectively. The 'excellent' grade of attitude about eye involvement and eye care was found in 18% and 29.9% of the participants respectively. The practice for undergoing eye check up and accepting treatment was of 'excellent' grade in 52%) and 79.2% respectively.<sup>42</sup>

## **2.0 RATIONALE**

- a) No studies have been done on the knowledge, attitude and practice of DR among diabetic patients in Kenya.
- b) The data so acquired will provide baseline information on the level of knowledge, attitude and practice of DR among patients with diabetes at the KNH.
- c) The information so gathered will be useful to policy makers in planning for DR awareness strategies among patients with diabetes in Kenya.
- d) The information will help practitioners to better understand the knowledge gap that exists among the diabetic patients.

## **3.0 STUDY OBJECTIVES**

### **3.1 BROAD OBJECTIVES**

The study seeks to establish the levels of knowledge, attitude and practice on diabetic retinopathy amongst the diabetic patients visiting diabetic clinic at the KNH in Kenya.

### **3.2 SPECIFIC OBJECTIVES**

1. Establish the current knowledge levels on diabetic retinopathy (DR) among diabetic patients.
2. Assess the attitudes among diabetic patients towards screening examinations for DR
3. Establish and evaluate the practices among the diabetic patients regarding screening for DR.
4. Establish factors that affect the knowledge, attitudes and practices of diabetic patients with regards to screening for diabetic retinopathy.

## **4.0 METHODOLOGY**

### **4.1. STUDY DESIGN**

Cross-sectional hospital-based study.

### **4.2. STUDY AREA**

Kenyatta National Hospital (KNH) in Nairobi, Kenya.

### **4.3. STUDY POPULATION**

All diabetic patients on follow-up at the KNH out-patient diabetic clinic.

### **4.4. STUDY SETTING**

This study was conducted at diabetic patient clinic of Kenyatta National Hospital (KNH) in Nairobi, Kenya. KNH is the largest national tertiary referral hospitals in Kenya and it is located at the capital city, Nairobi. The hospital is 2.0 km from the city centre of Nairobi. The patients being seen in hospital are drawn mostly from Nairobi province and central province of Kenya while others are referrals from other hospital in all parts of Kenya. About half a million patients are seen at its outpatient clinics every year. The diabetic eye clinic at the KNH runs daily from Monday to Friday. Friday is a major diabetic clinic day and an average of 150 patients is seen per week (20 patients each day from Monday to Thursday and 70 patients on Friday).

### **4.5. STUDY PERIOD**

The study was carried out from 12<sup>th</sup> of July to 27<sup>th</sup> of July 2012.

### **4.6 SAMPLING METHOD**

Consecutive recruitment of all diabetic patients in the diabetic clinic meeting the inclusion criteria was done. A total of 203 diabetic patients recruited during the study period.

### **4.7 CASE DEFINITION**

Patients diagnosed with diabetes mellitus by the physician at the diabetic clinic.

### **4.8 INCLUSION CRITERIA**

All diabetic patients attending diabetic clinic at KNH and gave consent were included in the study.

### **4.9 EXCLUSION CRITERIA**

- a) Mental illness patient.
- b) Children under 18 years because they are not legally allowed to give consent.
- c) Patient who decline to give consent.

## **4.10 MATERIALS**

### **4.10.1 Questionnaire** (Appendix 1)

Questions in the knowledge section were designed to test the knowledge of respondents on diabetes and diabetic retinopathy.

The questions included:

- a. Complications of diabetes
- b. Risk factors for diabetic retinopathy
- c. Screening for diabetic retinopathy
- d. Treatment options for diabetic retinopathy

Questions were included in the Attitude section was designed to gauge the prevailing attitudes, beliefs and misconceptions among diabetic patients about diabetic retinopathy.

Statements were provided, and the respondent was asked to indicate the extent to which they agree with the statements, on a pre-determined scale (strongly disagree, moderately disagree, neutral, moderately agree, strongly agree).

The questions covered:

- a. Follow-up procedure and importance
- b. Importance, significance, and severity of diabetes
- c. Importance of eye check-ups.

Questions included in the Practice section were designed to assess the practices of the diabetic patients with regard to diabetes and diabetic retinopathy.

The questions included:

- a) Eye screening practices.
- b) Intervention

c) Referral practices

The questions for the study were validated once the questionnaires were prepared. The validation was aimed at assessing the ease of comprehension, relevance to their intended topics, effectiveness in providing useful information, and the degree to which the questions are interpreted and understood by the study population.

Validation was conducted by a pre-testing on a representative group of diabetic patient (10 patients).

#### **4.11 STUDY PROCEDURE.**

A proposal of this study was prepared, presented and approved by the department of ophthalmology UON and KNH/UON research and ethics committee. After patients were seen by a physician, and the diagnosis of diabetes confirmed, they were recruited in the study. The interviewers were three senior registrar ophthalmologists and interviewer administered questionnaires were used. The patients were informed that participation in the study was voluntary and the information gathered will be used solely for academic and intended purposes. In addition, the name of a participant was not indicated in the interviewer administered questionnaires. Patients who were willing to participate in the study signed the consent form. Patients below 18 years and those with mental illness were excluded from the study. Eligible diabetic patient was interviewed only once during the study period.

The age, sex, marital status, occupation, residence, education level and monthly income was enquired and noted on the questionnaire. Each questionnaire was coded.

Data on knowledge, attitude and practices was filled on the questionnaire ( appendix I) as the patient gave his/her responses.

#### **4.12 DATA MANAGEMENT AND ANALYSIS**

The data collected was coded, entered and managed into Microsoft Access database. At the end of data entry, data was cleaned then analyzed using SPSS version 17.0 statistical software.

Data was summarized into proportions for categorical data such gender, ophthalmic history and clinical examinations and means/medians for continuous data such as age. Level of knowledge on diabetic retinopathy was obtained by summarizing the various questions on knowledge and a

score given to identify the patients with adequate knowledge and those without knowledge or low level of knowledge. Attitudes were measured using a variety of questions that was scored and a cut-off given to indicate attitude levels of patients towards screening of DR. Practices were analyzed and presented as proportions based the various questions related to eye examinations. Factors associated with level of knowledge, attitudes and practices were analyzed using Chi-square/Fisher's exact tests for categorical variables and Student's t/ Mann Whitney U tests for comparing of means or medians respectively. All statistical tests were performed at 5% level of significance (95% confidence interval). Presentation of findings was done using tables and graphs.

#### **4.13 ETHICAL CONSIDERATIONS**

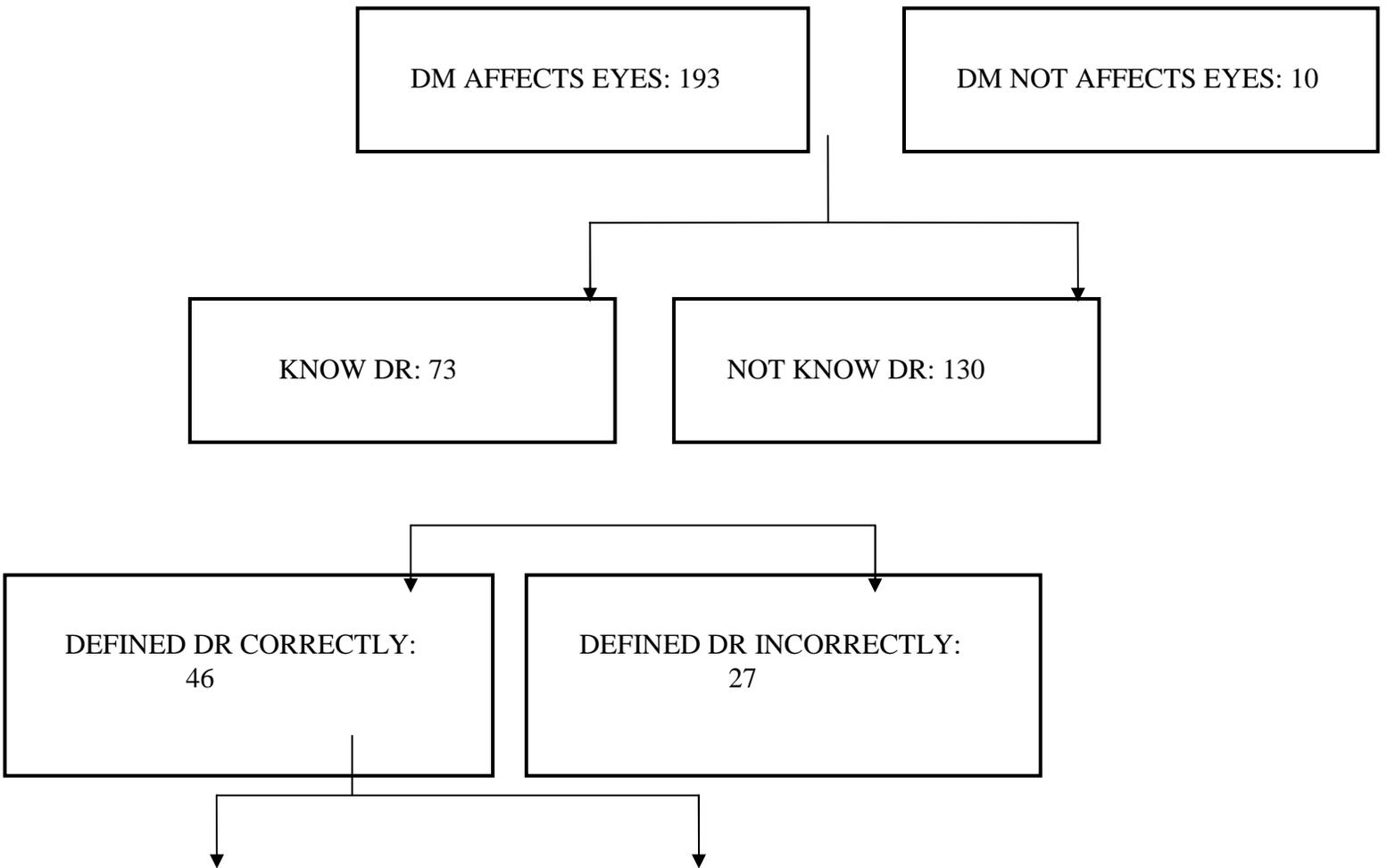
1. Informed consent from the patient was taken.
2. Confidentiality was maintained during data collection and analysis.
3. Approval from KNH/UON ethics and research committee was sought.

5.0

TOTAL: 203

RESULTS

Figure 1: Patients' flow chart



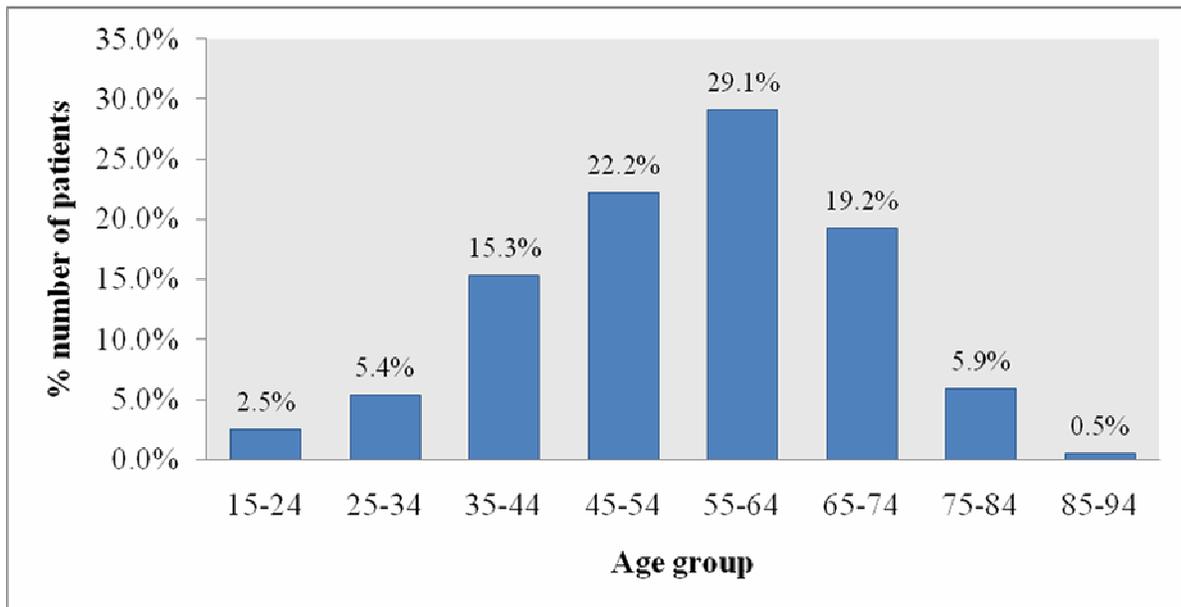
A total of 203 patients interviewed, of which 193 responded that diabetes affect the eyes. Forty six of those who knew DR could defined correctly.

**Table 1: Socio-demographic characteristics (n=203)**

<b>Variable</b>	<b>Frequency (%)</b>
<b>Sex</b>	
Male	90 (44.3)
Female	113 (55.7)
<b>Age</b>	
Mean (SD)	54.8 (13.7)
<b>Marital status</b>	
Single	29 (14.3)
Married	157 (77.3)
Widowed	14 (6.9)
Separated.	3 (1.5)
<b>Occupation</b>	
Formal employment	34 (16.7)
Casual labourers	27 (13.3)
Business	59 (29.1)
Farming	55 (27.1)
Unemployed	28 (13.8)
<b>Level of education</b>	
No schooling	17 (8.4)
Primary	64 (31.5)
Secondary	71 (35.0)
Tertiary(College/university)	51 (25.1)

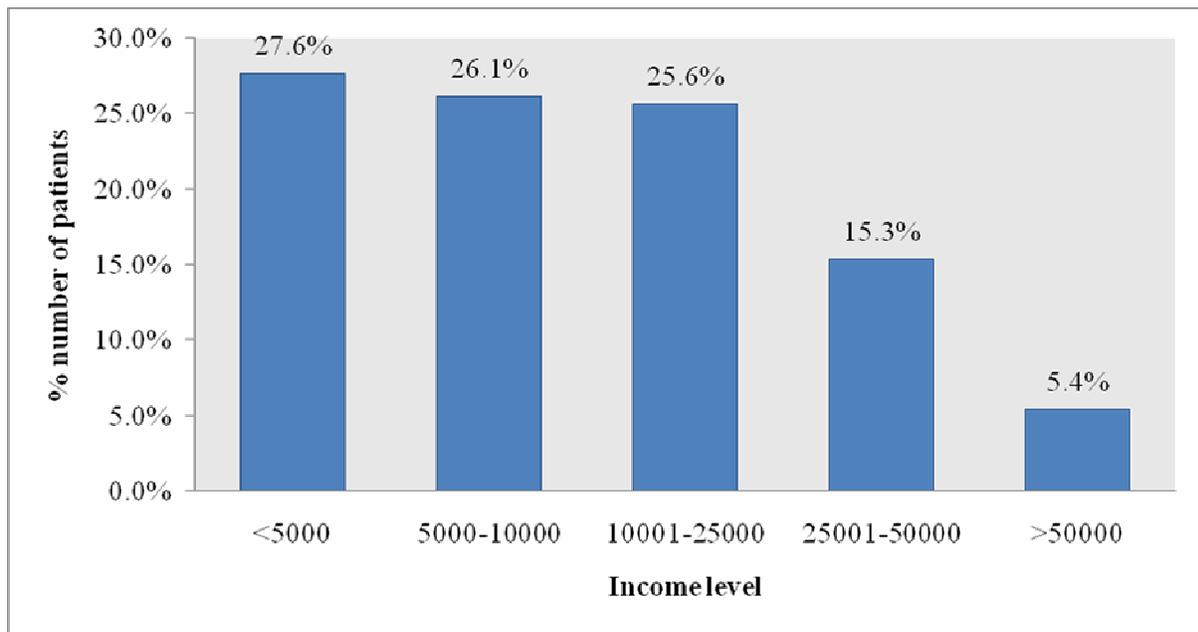
Females constituted 55.7% of the patients interviewed. Majority of the participants (77.3%) were married.

**Figure 2: Age distribution (n=203)**



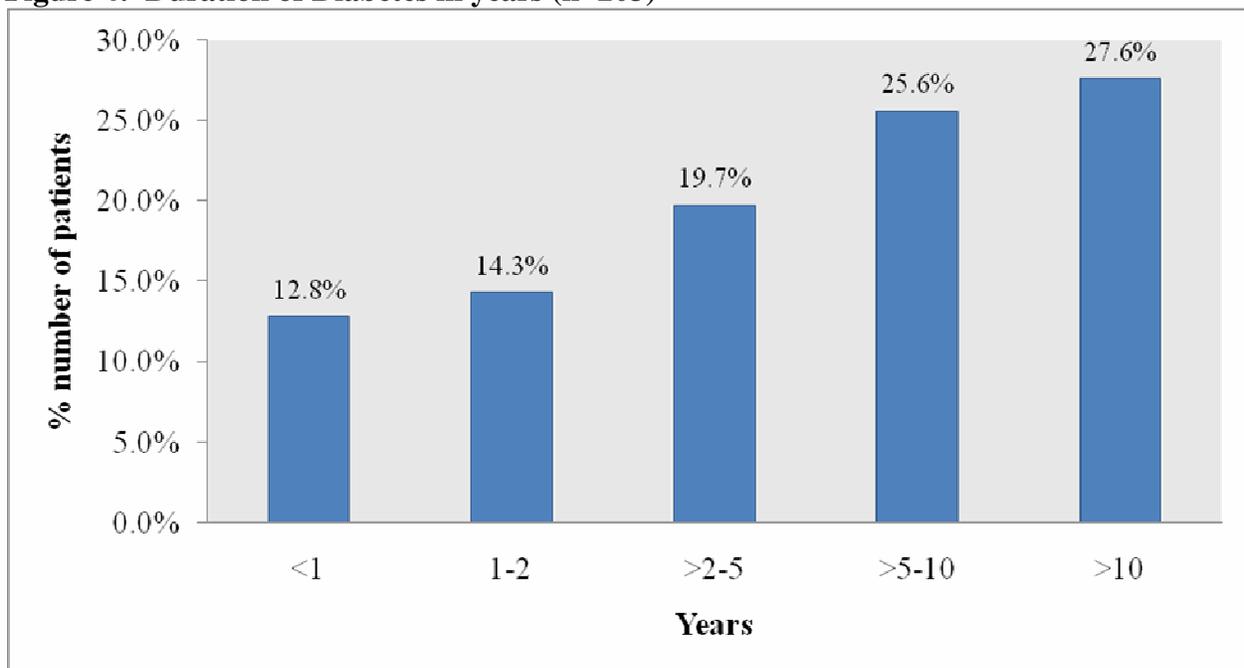
The majority of patients (29%) interviewed were between 55-64 years of age.

**Figure 3: Estimated monthly income (n=203)**



The majority (27.6%) of the participants had an income level of less than Ksh. 5000 p.m while only 5.4% had income level of more than Ksh. 50000 p.m.

**Figure 4: Duration of Diabetes in years (n=203)**



Majority of the participants (27.6%) had diabetes for more than 10 years.

## Knowledge

**Table 2: Knowledge on the effects of diabetes on eyes**

<b>Variable</b>	<b>Frequency (%)</b>
<b>Does diabetes affect the eye? (n=203)</b>	
Yes	193 (95.1)
No	7 (3.4)
Don't know	3 (1.5)
<b>What Eye condition does diabetes cause? (n=193)</b>	
Diabetic retinopathy	21 (10.9)
Cataract	71 (36.8)
Glaucoma	17 (8.8)
Diabetic retinopathy & cataract	10 (5.2)
Diabetic retinopathy, cataract & glaucoma	2 (1.0)
Don't know	72 (37.3)
<b>Should DM person visit eye specialist? (n=193)</b>	
Yes	188 (97.4)
Don't know	5 (2.6)
<b>How soon after diagnosis should DM person visit eye specialist? (n=193)</b>	
Immediately	126 (67.0)
One year	50 (26.6)
Two years	2 (1.1)
Five years	1 (0.5)
Don't know	10 (5.3)
Depends on doctor's decision	5 (2.7)

In this study, One hundred and ninety three (95%) of the 203 diabetic patients responded that diabetes affect the eye.

**Table 3: Knowledge on diabetic retinopathy**

<b>Variable</b>	<b>Frequency (%)</b>
<b>What is diabetic retinopathy? (n=193)</b>	
It is the same as cataract	3 (1.5)
It is high sugars in the eye	20 (10.8)
Changes in the blood vessels of the retina due to diabetes	46 (22.7)
It is an age-related process leading to a decrease in peripheral vision	2 (1.0)
Don't know	122 (64.0)
<b>Have you been diagnose with diabetic retinopathy? (n=46)</b>	
Yes	21 (45.7)
No	23 (50.0)
Don't know	2 (4.3)
<b>How did you come to know about diabetic retinopathy? (n=46)</b>	
General medical practitioner	12 (26.1)
Ophthalmologist	25 (54.3)
TV, magazines and other media	9 (19.6)
<b>What are the risk factors for diabetic retinopathy? (n=46)</b>	
Poorly control blood sugar	31 (67.4)
Duration of diabetes	4 (8.7)
Hypertension	5(10.9)
Pregnancy	2 (4.3)
Don't know	4 (8.7)
<b>Can diabetic retinopathy cause blindness? (n=46)</b>	
Yes	45 (97.8)
No	1 (2.2)
<b>Is diabetic retinopathy preventable? (n=46)</b>	
Yes	45 (97.8)
No	1 (2.2)
<b>Is Blood sugar control important in preventing diabetic retinopathy? (n=46)</b>	
Yes	46(100)
<b>Is Diabetic retinopathy treatable? (n=46)</b>	
Yes	33 (71.7)
No	13 (28.3)

<b>What treatment options are available for diabetic retinopathy? (n=46)</b>	
Intravitreal injections: avastin/lucentis or triamcinolone	1 (2.2)
Laser	15 (32.6)
Surgery	3 (6.5)
Don't know	27 (58.7)

Sixty four percent admitted that they did not know what DR was.

### Attitudes

**Table 4: Perceptions on the effect of diabetes on eyes (n=193)**

Variable	Strong disagree	Moderately disagree	Neutral	Moderately agree	Strong agree
Eye examination required only when vision is affected	79 (40.9)	56 (29.0)	3 (1.6)	36 (18.7)	19 (9.8)
Newly diabetic patients do not require eye check ups	93 (48.2)	47 (24.4)	14 (7.2)	30 (15.5)	9 (4.7)
Good blood sugar control is important in preventing DR	9 (4.7)	2 (1.0)	5 (2.6)	35 (18.1)	142 (73.6)
Laser treatment prevent blinding complications	7 (3.6)	2 (1.0)	128 (66.3)	24 (12.4)	32 (16.6)
Pregnant diabetic mother should see an eye doctor	2 (1.0)	3 (1.6)	27 (14.0)	39 (20.2)	122 (63.2)

The majority of patients interviewed (73.6%) strongly agreed that good blood sugar control is important in preventing DR.

## Practices

**Table 5: Practices on eye examination among diabetic patients**

Variable	Frequency (%)
<b>Have you ever been referred to see an eye specialist? (n=193)</b>	
Yes	118(61.1)
No	75 (38.9)
<b>Have your eyes been examine by an eye specialist? (n=193)</b>	
Yes	111 (57.6)
No	82 (42.4)
<b>How many times have your eyes been examined in the last one year? (n=111)</b>	
Once	77 (69.4)
Twice	25 (22.5)
3 times	6 (5.4)
Cannot remember	3 (2.7)
<b>How often were you advise to see an eye doctor for eye examination when you were last pregnant (pregnant diabetic patients)? (n=40)</b>	
<b>Advice</b>	3(7.1)
First trimester	1 (2.4)
Second trimester	2 (4.7)
Third trimester	0
<b>Not advice</b>	37 (92.9)
<b>Were you seen by eye doctor when last you were pregnant? (n=40)</b>	
Yes	3 (7.1)
No	37 (92.9)

Sixty one percent of the participants had been referred to an eye doctor but only 57.6% had been examined by an eye specialist. Ninety three percent of the diabetic pregnant mothers were not seen by an eye doctor when they last during their last pregnancy.

**Table 6: Factors associated with knowledge on effects of diabetes on eyes**

Variable	Does diabetes affect the eye?		P value
	Yes n=193	No n=10	
<b>Sex</b>			
Male	87 (45.1)	3 (30.0)	0.357
Female	106 (54.9)	7 (70.0)	
<b>Age, mean (SD)</b>	54.9 (13.6)	52.3 (17.6)	0.554
<b>Marital status</b>			
Single	27 (14.0)	2 (20.0)	0.260
Married	151 (78.2)	6 (60.0)	
Widowed	12 (6.2)	2 (20.0)	
Separated	3 (1.6)	0	
<b>Level of education</b>			
No schooling	15 (7.8)	2 (20.0)	0.379
Primary	61 (31.6)	3 (30.0)	
Secondary	67 (34.7)	4 (40.0)	
Tertiary(College/university)	50 (25.9)	1 (10.0)	
<b>Estimated monthly income</b>			
<5000	52 (26.9)	4 (40.0)	0.887
5000-10000	51 (26.4)	2 (20.0)	
10001-25000	50 (25.9)	2 (20.0)	
>25000	40 (20.7)	2 (20.0)	

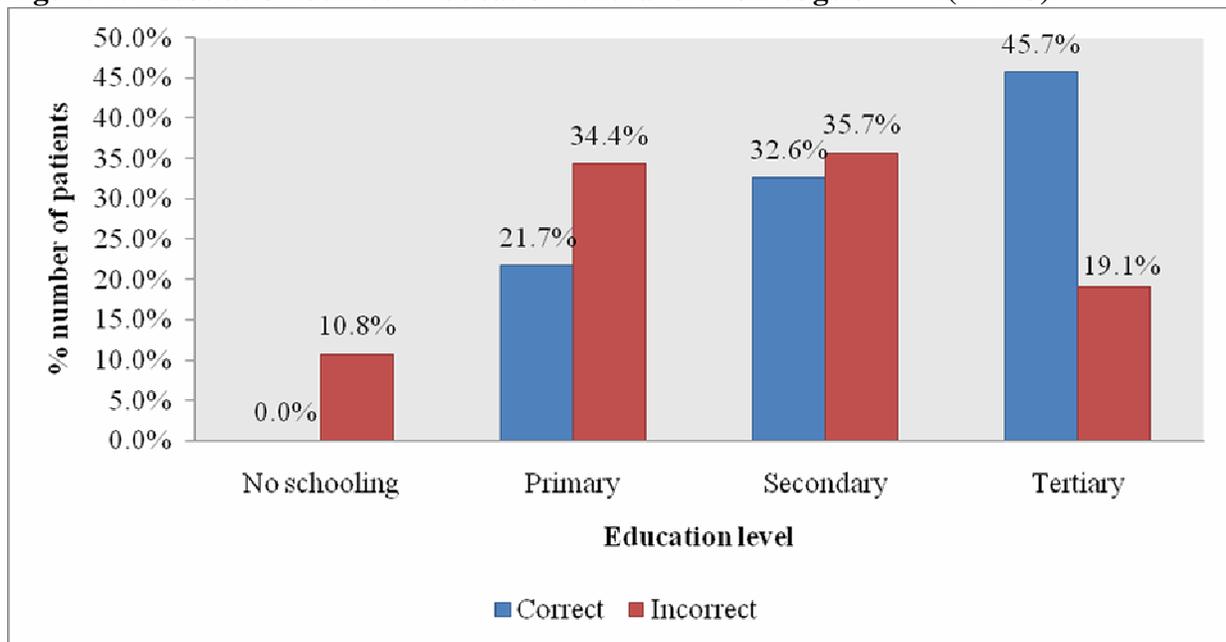
In the study, there was no statistically significant association between sex, age, marital status, level of education and level of income and knowledge on effects of diabetes on the eye.

**Table 7: Factors associated with knowledge on DR (n=193)**

Variable	What is DR?		P value
	Correct n=46	Incorrect n=147	
<b>Sex</b>			
Male	21 (45.7)	64 (43.6)	0.838
Female	25 (54.3)	83 (56.4)	
<b>Age, mean (SD)</b>	48.9 (14.0)	56.5 (13.2)	0.001
<b>Marital status</b>			
Single	10 (21.7)	18 (12.3)	0.049
Married	33 (71.7)	116 (78.9)	
Widowed	1 (2.2)	12 (8.1)	
Separated/Divorced	2 (4.3)	1 (0.7)	
<b>Level of education</b>			
No schooling	0	16 (10.9)	0.001
Primary	10 (21.7)	51 (34.7)	
Secondary	15 (32.6)	52 (35.4)	
Tertiary(College/university)	21 (45.7)	28 (19.0)	
<b>Estimated monthly income</b>			
<5000	5 (10.9)	47 (32.0)	0.005
5000-10000	12 (26.1)	38 (25.9)	
10001-25000	13 (28.3)	37 (25.1)	
25001-50000	10 (21.7)	20 (13.6)	
>50000	6 (13.0)	5 (3.4)	

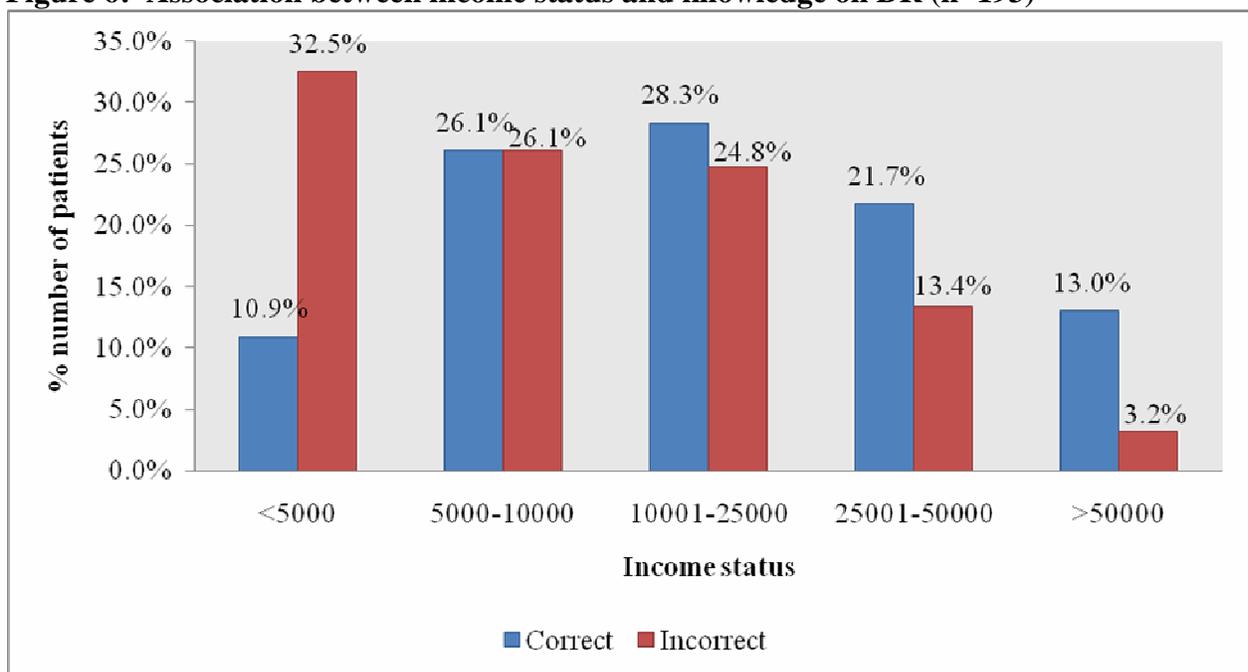
The ability of a patient to define correctly what DR was associated with age, level of education, marital status and estimated monthly income.

**Figure 5: Association between Education level and knowledge on DR (n=193)**



From the graph above it can be seen that the knowledge on DR increases as the level of education increases.

**Figure 6: Association between income status and knowledge on DR (n=193)**



The knowledge on DR increases as the level of income increases.

**Table 8: Factors associated with knowledge on risk factors of DR**

Variable	Risk factors of DR		P value
	Know (n=44)	Don't know (n=2)	
<b>Sex</b>			
Male	21 (47.7)	0 (0.0)	0.493
Female	23 (52.3)	2 (100.0)	
<b>Age, mean (SD)</b>	49.8 (13.6)	40.0 (14.1)	0.328
<b>Marital status</b>			
Single	9 (20.5)	0 (0.0)	1.000
Married	32 (72.7)	2 (100.0)	
Widowed	1 (2.3)	0 (0.0)	
Separated/widowed	2 (4.5)	0 (0.0)	
<b>Level of education</b>			
Primary	10 (22.7)	1 (50.0)	0.290
Secondary	13 (29.5)	1 (50.0)	
Tertiary(College/university)	21 (47.7)	0 (0.0)	
<b>Estimated monthly income</b>			
<5000	5 (11.4)	0 (0.0)	1.000
5000-10000	12 (27.3)	1 (50.0)	
10001-25000	12 (27.3)	1 (50.0)	
25001-50000	9 (20.5)	0 (0.0)	
>50000	6 (13.6)	0 (0.0)	

There was no significant statistical association between sex, age, marital status, level of education and monthly income with knowledge on the risk factors for diabetic retinopathy.

**Table 9: Factors associated with practices on eye checkups**

Variable	Eyes checked by an eye doctor?		P value
	Yes n=111	Not n=82	
<b>Sex</b>			
Male	50 (45.3)	35 (43.0)	0.747
Female	61 (54.7)	47 (57.0)	
<b>Age, mean (SD)</b>	56.5 (12.9)	52.6 (14.6)	0.046
<b>Marital status</b>			
Single	10 (9.4)	17 (20.9)	0.027
Married	94 (84.6)	55 (67.4)	
Widowed	6 (5.1)	8 (9.3)	
Separated	1 (0.9)	2 (2.3)	
<b>Level of education</b>			
No schooling	10(9.0)	6 (7.3)	0.768
Primary	37 (33.3)	24 (29.3)	
Secondary	36 (32.5)	31 (37.8)	
Tertiary(College/university)	28 (25.2)	21 (25.6)	
<b>Estimated monthly income</b>			
<5000	30(27.1)	23 (28.0)	0.623
5000-10000	31 (27.9)	19 (23.2)	
10001-25000	30 (27.0)	20 (24.4)	
25001-50000	16 (14.4)	13 (15.9)	
>50000	4 (3.6)	7 (8.5)	

Age and marital status were significantly associated with practices on eye check-up

## 6.0 DISCUSSION

This study recruited 203 diabetic patients at diabetes clinic of KNH in Kenya and sought to assess their knowledge, attitude and practice of DR. Females constituted 55.7% of the patients interviewed.

In this study, 193 (95%) of the 203 diabetic patients knew that diabetes affects the eye. The awareness of eye complications among diabetic patients in a study done in Kuala Lumpur, Malaysia was 86%.<sup>42</sup> Of 193 patients who knew that diabetes affects the eye, 10.9% and 36.8% of the patients mentioned DR and cataract respectively, as the specific eye conditions caused by DM. However, 37.3% did not know any eye condition associated with DM. This implies that a considerable percentage of diabetic patients being followed in diabetic clinic are not aware about conditions associated or complication of DM and this could negatively affect their motivation to follow up by an eye care specialist for early detection and treatment of DR.

In this study 95.1% of diabetic patients had the knowledge that diabetic retinopathy can cause blindness. This is higher than what was found in a study at the Murtala Mohammed Hospital, Kano, Nigeria, where retinopathy awareness rate amongst the patients was 84.3%<sup>32</sup> and also in Myanmar where retinopathy awareness rate amongst diabetic outpatients was 86%.<sup>33</sup>

The source of information for 26.1% of the patients was the general medical practitioners/physicians while eye care specialist was the source in 54.3% of the patients. This shows that the general medical practitioners/physicians and eye care specialists need to improve in discussing the potential blindness caused by DR with the diabetic patients. The information given to diabetic patients should be clear and not only about the complication but should include

the risk factors for developing these complications. It is also prudent for the general practitioners and physicians to emphasize to the diabetic patients the need for screening for DR.

A better understanding of risk factors by persons with diabetes is essential to improve compliance to preventive measures among those at risk. Most of the patients (67%) in the study understand poor blood control as a risk factor. Only 11% and 4.3% of the patients were aware of hypertension and pregnancy respectively as risk factors for DR. The significant low proportion of patients who are aware of hypertension and pregnancy as risk factors for DR could be detrimental to the effort of reducing the rate of occurrence of DR in diabetic patients in Kenya.

Concerning attitude, the majority of patients interviewed (73.6%) strongly agree that good blood sugar control is important in preventing DR, while 4.7% strongly disagree. Sixty three percent of the interviewed patients strongly agree that pregnant diabetic mother should see an eye specialist. For a patient to see an eye care specialist, he should be aware that the illness (DR) carries some morbidity if not diagnosed and managed early. The awareness booster positive attitude on preventive options targeting risk factors of diabetic retinopathy such as blood sugar as well as blood pressure control.

Diabetic Retinopathy often has no early warning signs. Given the proven benefits of early detection, guidelines for screening for diabetic retinopathy have been established. It is also important for diabetic patients to be aware of need to see eye specialist for screening early. In this study, 61.1% of the interviewed patients had been referred to see an eye doctor but only 57.6% of the interviewed patients had actually been examined by an eye specialist. The same finding was noted in a study done in Oman on diabetic patients where 57% of patients had visited ophthalmologist.<sup>42</sup> This shows that 39% of the diabetes patients being seen in diabetic clinic of the facility might not have been referred to an eye specialist for fundoscopy. Moreover, not all the patient referred to the eye care specialist for DR screening presented themselves for the screening, probably because of not being aware of DR as the potential complication of DM. The other possibility could be wrong information given to them as suggested by a study done by Oenga et al that 33% of general practitioners in provincial hospitals in Kenya were not aware that diabetic retinopathy is treatable with a significant proportion not being aware of the modes of treatment options available.<sup>43</sup> The incorrect information about DR being passed to the

diabetic patient could impact negatively on their will to go for screening because they think even if diagnosis is made no treatment will be offered. A study in Kuala Lumpur found that 78.8% of diabetic patients were found to have been referred by their physicians to see an eye doctor.<sup>40</sup>

The barriers to practice the recommended eye examinations may include insufficient referrals, low level of education and low economic status. In this study, 7.1% of pregnant diabetic mothers were seen by eye specialist for screening for DR. The majority of patients (93%) face high risk of developing blindness due to DR during that critical period without being noticed. A study by Oenga et al<sup>43</sup> in all provincial hospital in Kenya revealed that 43% of general medical practitioners referred pregnant diabetic mothers to ophthalmologist. For this huge gap to be filled the medical personnel working in antenatal and maternity unit should have better understanding of Diabetic retinopathy as a complication of DM so as to educate the expectant mothers.

In our study, age was significantly associated with knowledge on DR (Table 7). This is different from what was found in Oman study<sup>42</sup> where age was not associated with knowledge on DR.

There was a statistically significant association between monthly income and knowledge on DR. Diabetic patients who had higher monthly income had better knowledge on diabetic retinopathy. Rani PK et al<sup>35</sup> in a study done in India found that knowledge on diabetes and DR being significantly higher in those with upper socioeconomic status compared with extreme lower socio-economic. The higher knowledge on DR on those with higher monthly income could be explained by the fact that they are able to access information on DR from multiple sources such as electronic media and internet.

It was found in this study that sex was not significantly associated with knowledge on DR and similar findings were noted in Oman<sup>42</sup> and Myanmar study<sup>33</sup> where gender was not associated with knowledge on DR.

The higher level of education was not significantly associated with improvement in eye checkups by an eye specialist though it was significantly associated with higher knowledge on DR. It is possible that most of the diabetic patients who have acquired formal education had access the information on diabetic retinopathy but putting into practice remained a challenged.

There was a statistically significant association between marriage and going for screening with married people likely to go for screening than single. This is possibly because married couples are likely to remind each other about their important of going to eye specialist.

## **7.0 CONCLUSION**

- 1.** Majority of patients (64%) did not know what DR was while only 22.7% could identify correctly the definition of DR.
- 2.** Most of the diabetic patients (67%) were only aware of poor blood control as a risk factor for DR. A few of diabetic patients were aware of hypertension (11%) and pregnancy (4%) as risk factors.
- 3.** Seventy three per cent of diabetic patients interviewed strongly agreed that blood sugar control is important in preventing DR.
- 4.** The proportion of diabetic patients interviewed that had been seen by eye specialist was low (57.6%).
- 5.** Ninety three per cent of diabetic mothers were not seen by an eye specialist when last pregnant.
- 6.** The age, marital status, level of education and economic status (monthly income) were the factors that we found to be significantly associated with knowledge on diabetic retinopathy.
- 7.** There was no significant statistical association between sex, age, marital status, level of education and monthly income with knowledge on the risk factors for diabetic retinopathy.

## **8.0 RECOMMENDATIONS**

- 1.** There is need to improve awareness /educations of patients on DR as a complication of DM and its potential to cause blindness. This would increase demand for early referral to an ophthalmologist and prevent blindness.
- 2.** There is need to create awareness among diabetic pregnant mothers on the importance of screening for DR during pregnancy because pregnancy is a risk factor for the development of DR.
- 3.** Further studies need to be done to determine the impediment to seeing ophthalmologist by diabetic patients at KNH apart from the poor referral.

## **9.0 STUDY LIMITATIONS**

- 1.** Consecutive recruitment of patients from the diabetic clinic might have led to biasness because probably patients who had low level of knowledge or vice versa came during the entire study period.
- 2.** Some diabetic patients might not have given right information about their monthly income this being a sensitive issue in our culture.
- 3.** Some patients especially those over 70 years could not understand English or Swahili and hence there was need to find a translator to translate what was in the questionnaire to a language the patient understands. This might have led to distortion of information.
- 4.** Relation of DR and other body organs, BP and lipids was missed and should be explored in follow up studies.

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## **APPENDIX I: QUESTIONNAIRE.**

### **Biodata**

1. Code number.....
2. Sex
  - a) Male
  - b) Female
3. Age.....
4. Marital status
  - a) Single
  - b) Married
  - c) Widowed
  - d) Separated/Divorced
5. Occupation.....
6. Residence.....

7. Education level

- a) No schooling
- b) Primary
- c) Secondary
- d) Tertiary (College/University)

**Socio-economic status.**

1. What is your estimated monthly income?

- a) <5000
- b) 5000- 10000
- c) 10001- 25000
- d) 25001- 50000
- e) >50000

**Knowledge on Diabetic retinopathy**

1. Does diabetes affect the eye?

- a. Yes
- b. NO
- c. Don't know

2. What eye condition does diabetes cause?

- a. diabetic retinopathy
- b. cataract
- c. glaucoma
- e Don't know
- d. others

3. Do you think that a person with diabetes mellitus should visit a specialist eye doctor following diagnosis?

- a. Yes
- b. No
- c. Don't know

4. If 'yes' then how soon after the diagnosis has been made should that person visit the specialist eye doctor?

- a. Immediately after diagnosis
- b. One year after diagnosis

- c. Two years after diagnosis
- d. Five years after diagnosis
- e. Other \_\_\_\_\_

5. How long have you had diabetes (years)?

- a) <1
- b) 1 - 2
- c) >2 - 5
- d) >5 - 10
- e) >10 years

6. What is diabetic retinopathy?

- a) It is the same as cataract.
- b) It is high sugars in the eye.
- c) Changes in the blood vessels of the retina due to diabetes
- d) It is an age-related process leading to a decrease in peripheral vision.
- e) Don't know
- f) Other (specify).

7. Have you been diagnose of diabetic retinopathy.

- a. Yes
- b. No
- c. Don't know

8. How did you come to know about diabetic retinopathy?

- a) General medical practitioner/physicians.
- b) Ophthalmologist.
- c) Optometrist/optician.
- d) Eye camp.
- e) Family member/relative/friend suffering from.
- f) TV, magazines, other media.
- g) Other(specify):

9. What are the risk factors for diabetic retinopathy?

- a) Poorly control blood sugar
- b) Duration of diabetes
- c) Pregnancy.

- d) Hypertension
- e) Other (specify)
- f) Don't know.

10. Can diabetic retinopathy cause blindness?

- a) Yes.
- b) No.
- c) Don't know.

11. Is diabetic retinopathy preventable?

- a) Yes.
- b) No.
- c) Don't know

12. Is blood sugar control important in preventing diabetic Retinopathy?

- a) Yes.
- b) No.
- c) Don't know

13. Is diabetic retinopathy treatable?

- a) Yes.
- b) No.
- c) Don't know.

14. What are the treatment options available for diabetic retinopathy ?

- a) Intravitreal injections: avastin/ Lucentis or triamcinolone
- b) Laser.
- c) Surgery.
- d) Don't know.

## **Practices**

1. Have you ever been referred to see an eye doctor?

- a. Yes
- b. No

2. Have your eyes been examine by an eye doctor?

- a. Yes
- b. No

3. If yes how many times in the last one year?

- a. Once
- b. Twice
- c. Three times
- d. More than 3 times

4. How often were you advise to see an eye doctor for eye examination went you were pregnant (pregnant diabetic patients)?

- a. Preconception
- b. First trimester
- c. Second trimester
- d. Third trimester
- e. All trimesters
- f. Not advice

5. Did you see en eye doctor for eye examination when you were last pregnant?

- a. Yes
- b. No

### **Attitudes**

For each of the questions below indicate whether you strongly disagree, moderately disagree, neutral, moderately agree, strongly agree

1. Eye examination is only required in diabetic patients when vision is affected

- a. Strongly disagree
- b. Moderately disagree
- c. Neutral
- d. Moderately agree
- e. Strongly agree

2. Newly detected diabetic patients do not require eye check ups

- a. Strongly disagree
- b. Moderately disagree
- c. Neutral
- d. Moderately agree
- e. Strongly agree

3. Good Blood sugar control is important in preventing diabetic retinopathy

- a. Strongly disagree
- b. Moderately disagree
- c. Neutral
- d. Moderately agree
- e. Strongly agree

4. Laser treatment can prevent blinding complications of diabetic retinopathy

- a. Strongly disagree
- b. Moderately disagree
- c. Neutral
- d. Moderately agree

e. Strongly agree

5. A pregnant diabetic mother should see an eye doctor for examination

- a. Strongly disagree
- b. Moderately disagree
- c. Neutral
- d. Moderately agree
- e. Strongly agree

## **APPENDIX II: CONSENT FORM**

### **English.**

I am a student at the University of Nairobi and undertaking a study on the knowledge, attitudes and practices among diabetic patients. Participation in this study is voluntary and the information gathered will be used solely for academic and intended purposes. You do not have to write your name or identify yourself in any way in the questionnaires. Thank you for your co-operation.

### **Declaration.**

I ..... accept that I have read and understood the above explanation and I am willing to participate in the study on a voluntary basis.

**Signature**.....

### **Swahili.**

Mimi ni mwanafunzi wa Chuo Kikuu Cha Nairobi na ninafanya utafiti kuhusu ujuzi, mwelekeo na mazoea ya wagonjwa wa diabetic retinopathy. Kuhudhuria kwako kwa utafiti huu ni kwa hiari

yako na mazulio ya uchunguzi huu yatumika kwa nia ya masomo peke yake. Hutahitajiwa kuandika jina lako au kujitambua kwa njia yoyote ile kwenye fomu ya maswali.

Ahsante sana kwa ushirika wako.

**Matamshi.**

Mimi ..... nakubali kwamba nimeyasoma na nimeyaelewa maelezo haya na kuhudhuria kwangu kwa utafiti huu ni kwa hiari yangu.

**Sahihi**.....

