

St. Paul's Hospital Millennium Medical College



A thesis Submitted to the Department of Ophthalmology
Presented in Partial Fulfillment of the Requirements for the
Degree of General Ophthalmology

KNOWLEDGE, ATTITUDE AND PRACTICE ABOUT DIABETIC
RETINOPATHY AMONG ADULT DIABETIC PATIENTS VISITING St.
PAULS HOSPITAL MILLENIUM MEDICAL COLLEGE DIABETIC CLINIC,
ADDIS ABABA

ABABA, ETHIOPIA

ADDIS

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KNOWLEDGE, ATTITUDE AND PRACTICE ABOUT DIABETIC RETINOPATHY
AMONG ADULT DIABETIC PATIENTS VISITING St. PAUL’S HOSPITAL MILLENIUM
MEDICAL COLLEGE DIABETIC CLINIC, ADDIS ABABA

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II. ACRONYMS

DM – Diabetes Mellitus

DR – Diabetic Retinopathy

NPDR – Nonproliferative Diabetic Retinopathy

PDR – Proliferative Diabetic Retinopathy

SPHMMC- St. Paul's Hospital Millennium Medical College

SPSS- Statistical Package for the Social Science

UKPDS- Epidemiological analysis of the United Kingdom

Proliferative Diabetic Study

WHO – World Health Organization

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ABSTRACT

Introduction: Diabetic Retinopathy (DR) is one of the microvascular complications of Diabetes mellitus (DM) and it is the leading cause of blindness worldwide in the age range of 20 to 64. For this reason Patients who are diagnosed to have diabetes mellitus should have regular ocular examination. Ethiopia is included among the top five countries from Sub Saharan Africa with the highest number of DM patients

Objective: The main aim of this study was to assess the knowledge, attitude and practice towards diabetic retinopathy among adult diabetic patients visiting St. Paul's hospital millennium medical college diabetic clinic from December 2018 to June 2019

Methods: hospital based cross sectional study was conducted to assess the knowledge, attitude and practice of diabetic patients towards diabetic retinopathy. 408 diabetic patients above the age of 18 years was included in this study and they were selected by systematic random sampling technique, every 14th patient visiting DM clinic, was included. Structured, pre-tested questionnaire which was adopted from a study which was done at Jimma University tertiary hospital was used and the collected data was entered, processed and analyzed by using SPSS version 20. Quality of data was assured by giving training for the data collectors and by supervising the process

Results: Most of the study participants (95.9) knew that diabetes can cause damage to the eye. Most of the patients got information from diabetes clinic (64.8%). The other sources of information were ophthalmologist in 14.7%, relatives/friends in 6.1%, and media in 5.5%. Only 15.2% knew the type of eye disease caused by diabetes is retinopathy, only 12.4% knew eye disease in diabetes is caused by injury to retinal blood vessel. Most of the patients had positive attitude towards diabetic retinopathy. At least one ophthalmologic evaluation after the diagnosis of diabetes was done for 82.2% of the patient but only 51.2% of the total and 64.3% from those who had previous ophthalmic evaluation had funduscopy evaluation. Only 17.3% reported they do regular exercise, and 16.8% reported they consume diabetic diets the variables which had significant association with knowledge about diabetic retinopathy were educational status and source of information

Conclusion: In contrast to the general awareness about diabetes related eye injury by most of the patients, knowledge on the specific aspects of diabetic retinopathy was very limited.

Information about DM and DR should be utilized from DM clinic, media. Since this are the sources which can cover wider part of the society.

Physicians who are evaluating DM patients should create awareness about DR and other DM related complications and they also should send patients for routine ophthalmic evaluation.

1. INTRODUCTION

1.1 BACKGROUND

Diabetes Mellitus (DM) is a chronic metabolic disease with a feature of hyperglycemia which affects the health system negatively and also compromises patient's quality of life due to its different complications(1-5).It is classified based on the pathogenic mechanisms into type 1, which is due to total absence of insulin, and type 2,which is mainly due to resistance and abnormality in insulin secretion(1).Worldwide, the prevalence of DM was estimated by World Health Organization (WHO) to be 30 million in 1985(1); 171 million at 2000(2); 285 million in 2010(1), and by 2030,438 million according to International Diabetes Federation (1) and 366 million according to WHO(2,3).

From Sub Saharan Africa with the highest number of DM, Ethiopia is included among the top five countries (6).

According to WHO, the number of DM patients in Ethiopia was estimated to be 800,000 by the year 2000, and 1.8 million by 2030(7). The overall prevalence of diabetes was estimated 1.9 percent in 1970 and 9.5 percent in 1999 in Addis Ababa and 0.3 percent in the northern Ethiopia(7) and according to International Diabetes Federation (IDF) 2012 the prevalence of DM was estimated to be 3.32 % but there are also reports of 8% among HIV/AIDS in 2013(8). DM is diagnosed by the presence of fasting plasma glucose greater than or equal to 126 mg/dL (7 mmol/L), symptoms of hyperglycemia and a plasma glucose greater than or equal to 200mg/dL (11.1 mmol/L), or glucose greater than or equal to 200 mg/dL (11.1 mmol/L) 2 h after glucose load, and/or hemoglobin A1 C greater than or equal to 6.5%.

Complications of DM are classified into acute (Diabetic ketoacidosis and Hyperosmolar hyperglycemic state) and Chronic complications further classified into microvascular (retinopathy, neuropathy, nephropathy), macrovascular (coronary heart disease, peripheral arterial disease, cerebrovascular disease), nonvascular (gastroparesis, infections, and skin changes)(1).

DR is one of the chronic microvascular complications of DM.(9,10,11)and according to Early Treatment Diabetic Retinopathy study It is classified as Nonproliferative diabetic retinopathy, clinically significant diabetic macular edema and Proliferative diabetic retinopathy(1).

NPDR is characterized by retinal vascular abnormalities without development of extraretinal fibrovascular tissue and it is graded into mild, moderate, and severe based on its severity (12).

PDR is characterized by the presence of neovascularization which is a complication of ischemic retina and it is staged as early, high-risk and advanced (1).

Prevalence of DR increases with the duration of the disease and patient age, and it is rare before the age of 10. Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR) indicates about the increased risk of microvascular complication of DM with the longer duration in both type 1 and type 2(12,13) . Pathogenesis of DR is mainly due to longer duration of hyperglycemia resulting in damage to the endothelium of blood vessels which will end up in pericyte loss; basement membrane thickening and its cumulative effect may result in capillary occlusion, decreased perfusion of the retina, leakage of serum which will result in edema of the retina.

The rate of progression of DR depends on different factors which include control of blood sugar, blood pressure, lipid profiles, and others (12).

Patients who are diagnosed to have DM should have an ocular examination at the time of diagnosis for type 2 and within 5 year for type 1 and yearly thereafter for both (12,13).

1.2 Statement of the problem

The burden of DM is increasing in the past 3 decades in the developing countries (14).

Greater than 75% of patients who have diabetes mellitus for more than 20 years will have some forms of diabetic retinopathy (15).

DR is the leading cause of blindness between 20 to 64 years of age (8,9,10). DM patients are 25 times greater chance of blindness than individuals without DM(1). worldwide around 93 million people are estimated to have DR. the prevalence of DR was around 7-63 % in Sub-Saharan,37.8 in Tikur Anbesa specialized hospital from 1994 to 1995, and 25.4 %among DM patients in Jimma university Tertiary hospital at 2011(14).

Many diabetic patients may not realize that they have diabetic retinopathy. A research which was conducted at the Joslin Center states that majority of patients (83% of patients with DR and 78% of those with vision-threatening disease) lack knowledge about their illness (16).

Because poor glycemic control is one of the known risk factor for the development of Diabetic retinopathy, Knowledge of patients about the disease is the most important part of the management.

The pace of the progression varies among patients and depends mainly on systemic factors such as blood glucose levels, blood pressure, blood lipid profiles, and others.

Since patients with early stages of DR don't have symptoms; dilated fundus examination is the only way to diagnose and preventing them from being blind (15).

Although duration of DM is the strongest predictor for development and worsening of DR, hyperglycemia is modifiable risk factor which result in DR

Epidemiological analysis of the United Kingdom Proliferative Diabetic Study (UKPDS) found an increased risk of microvascular complications in patients with uncontrolled glycaemia, and for 1% decrease in HbA1c the risk of microvascular complications was found a to be reduced by 35%(15).

In one study which was done in Addis Ababa showed self-care of DM patients was poor because patients lack knowledge regarding self-care (6).

The main objective of this study was to assess the knowledge, attitude and practice of DM patients about DR.

1.3 SIGNIFICANCE OF THE STUDY

Since DR is the leading cause of blindness worldwide measures should be taken to prevent severe blinding forms. Prevention of DM and awareness of DR are important factors in prevention of DR (9).

Early stages of DR are usually asymptomatic and can be diagnosed and managed before resulting in sight threatening complications with regular dilated fundus examination(9,13). Patients without DR should have undergone dilated fundus examination yearly. DM patients should be aware about the danger of DR and the advantage of regular ocular examination which is helpful to succeed goal of Vision 2020 which is about abolishing preventable loss of vision (9,10).

It was noted that lack of awareness about DR and regular ocular examination result in a delay for the evaluation of the patient by an ophthalmologist and resulting in severe forms of DR(5). DM patients should be aware about also strict glycemic, HTN and lipid control (3).

The current KAP about DR is helpful in to prepare effective method of health promotion about diabetes (10)

Most of DM patients don't know that DM could result in blindness (11).

The risk of DR and its sight threatening complications can be minimized by Lifestyle change, blood glucose and blood pressure control, regular ocular examination and laser treatment (21). Controlling and management of DM and DR mainly depends on the patient which is affected by the disease which in turn mainly depends on the knowledge of the patient (22).

The Knowledge and practice of DR is poor even in developed countries with highly literate and educated society. So in countries with lower level of literacy KAP is expected to be lower. For this reason studies should be conducted to know the levels of awareness of DR in developing countries (28).

There is no previous study which was conducted regarding KAP of DM patients regarding DR at this study area.

This study is going to show the extent of the problem at this specific area of study and will help to introduce appropriate health promotion policies to improve the KAP of DM patients and to decrease DR related complications.

2 LITERATURE REVIEW

2.1 Knowledge about DR

A study which was done in Turkey about KAP of DR amongst the DM Patients; Knowledge of patients about the effect of DM on the eye was (88.1%)(12) which was higher than that of the studies conducted in Aljouf and Hail Province of Saudi Arabia (75.62 %)(3), Oman (72.9%)(11), Port Harcourt, Nigeria (56.9%)(18), Ireland (61.2%)(19), China (36.6%) (20) Kenyatta national hospital, Kenya (22.7%)(15).

In a study which was done in Iran about general knowledge of DM; only 61.4% of patients are aware about DM (5).

Another study which was conducted in rural India to assess Knowledge of DM and DR among the general populations, shows that around 50% of them had knowledge about DM and only 37.1% about DR(9).

A cross sectional study which was conducted in rural Tamil Nadu in India, majority of DM patients (76.2%) know at least one complication of DM and 74.3% know that DM has an effect on the eye but around 87.2% of them couldn't mention ocular complications(10).

An observational, cross-sectional study which was conducted in a suburban town of Karachi with 60% of the patients had poor/no knowledge about DM (21).

A study regarding knowledge on DR among DM patients Sri Lanka majority of patients (69.0%) had poor knowledge (27).

An Institution-based cross sectional study which was conducted at Jimma University Specialized Hospital (JUSH) on diabetic patients showed that around 67.79% had knowledge about long-term complications of DM. (17) which was higher than A study which was conducted at Diabetes Clinic of Tikur Anbessa Teaching Hospital, Addis Ababa, the knowledge of this patients on chronic complications was noted to be very poor (44.4 in type 1 and 53.2 in type 2)(22).

In a study which was conducted Among Adult Diabetic Out patients in Addis Ababa to Assess Knowledge of Diabetes, its Treatment and Complications showed that their level of knowledge was fair with a mean (%) score of (54.4%)(23).

Another study which was conducted at JUH, Ethiopia on KAP on DR 86% of diabetic patients know that DM can affect the eye but only 22.8% of patients specifically know about DR but the knowledge about risk factors was poor(24).

A study which was conducted among Swiss diabetic patients 96.0% of patients had knowledge about the effect of DM on the eye (29).

In a study which was conducted in Malaysia majority of patients (87.2%) were aware about the effect of DM on the eye (30).

A study which was conducted among Jordan DM patients majority (88.2%) of patients know that diabetes can affect the eye (31).

Majority of the patients (74.6%) are aware that DM affects the eye in a study from Ghana (32).

2.2 Attitude towards diabetic retinopathy

Regarding attitude of diabetic patients a study which was conducted in Saudi showed that 73.80% of the participants was found to have a positive attitude about regular checkup but around 38.49% of the patients has a negative attitude towards ocular examination while having controlled blood sugar and 68.79 % of them has a positive attitude about the effect of early treatment in delaying DR (3).

In a study from Iran attitude only 50.44% has positive attitude towards DR (5).

In a research which was conducted in Oman Regarding the attitude about regular ocular checkup and laser treatment was found only in 18% and 29.9% patients respectively (11).

Around Forty-two percent of patients had positive attitude about yearly examination of the eye in a study which was conducted in Turkey (12).

Around 72% of DM patients was found to have a positive attitude on the role of controlling blood sugar in preventing DR in a study from Kenya(15).

An observational, cross-sectional study which was conducted in a suburban town of Karachi with The mean score of Attitudes towards diabetes was 5.43 ± 2.57 . It was higher in DM patients than non-diabetic respondents.

2.3 Practice

Regarding practice for regular ocular examination in a study which was conducted in Saudi (95%) was higher than in Kenya (57.6%) (15)., Oman (52%)(11)for regular ocular examination

In a study from Iran only 52.23% of diabetic patients had practice (5).

In Turkey around 77.3% had previously an eye examination, but only about 45.8% of patients in Nigeria (18).

In a study which was conducted in Tanzanian showed 59.1% of them had dilated fundus examination at least once. (25) But only 28.9% of patients from Southwestern Nigeria (26).

The practice for laser treatment was 79.2% in Oman (11).

An observational, cross-sectional study which was conducted in a suburban town of Karachi

Regarding the practice of DR only 56.8% DM patients had routine eye examination (21).

Only 52.6% of DM patients had previous ocular examination in a study which was conducted at Jimma university hospital (24).

A study which was conducted among Swiss diabetic patients 70.5% has previous ocular examination (29).

In a study which was conducted in Malaysia only 50% of the patients has undergone previous eye examination (30).

A study which was conducted among Jordan DM patients showed that only 29.5% of them had previous ocular examination (31).

In a study from Ghana 46% of patients have no previous ocular examination(32).

2.4 Factors affecting KAP

Regarding the factors affecting Knowledge

In a study which was conducted in rural India the Knowledge about DM was positively correlated with being women, Christian and upper socioeconomic strata, while the knowledge of DR was found to be positively affected in subjects who spoke the Malayalam language, Christians and upper socioeconomic strata.

The attitude of DM patients towards DR was found to be significantly affected by their knowledge while their Practice was found to be affected by knowledge about DR (9).

A cross sectional study which was conducted in rural Tamil Nadu in India which includes about 105 DM patients found out the positive correlation between awareness of DR and educational background (10)

Study in Oman determines factors affecting knowledge and attitude about DR to be age of the patient and duration of hyperglycemia, the practices were related with 5 to 9 years of hyperglycemia (11).

A study from Turkey educational level higher than middle school, greater than 5 yrs. duration of DM, patients from Diabetes Association or the ophthalmology department was found to have a better knowledge.

The practice of this patients was found to be positively correlated with being Male, age >50 years, educational level higher than middle school, >5 yrs duration of DM, patients who had DM education and had follow up with endocrinologist (12).

The age, marital status, level of education and economic status were found to be the factors that were associated with knowledge on diabetic retinopathy in Kenya (15).

In a study from Port Harcourt, Nigeria knowledge was affected by Age of patient and literacy, but duration of hyperglycemia and gender was not found to have an effect (18). The same study identifies factors affecting the practice (duration of DM; while Age, sex, educational background and knowledge didn't have an effect on it)(18).

Lack of knowledge about DR was found to be associated with longer duration of DM, poor glycemic control and low educational background in China (20).

An observational, cross-sectional study which was conducted in a suburban town of Karachi with Lack of awareness about DR was correlated with being illiterate and on females. The Attitudes towards diabetes was higher in DM patients than non-diabetic respondents (21).

Age and awareness about DR were associated with practice in Tanzanian (25).

Positive practice was correlated with increasing age, presence of visual impairment, longer duration diabetes mellitus, current insulin treatment, presence of non-diabetic cause of impaired vision in Southwestern Nigeria (26).

In a study which was done on diabetic patients from the Diabetes Clinic of Tikur Anbessa Teaching Hospital, Addis Ababa, Ethiopia Knowledge about chronic complications of DM was associated with educational background (22).

In a study which was conducted at JUH, knowledge about DR was found to be affected by educational level, income and duration of disease while practice for eye examination was affected by patients' knowledge about DR, attitude and risk factors for DR (24).

A study which was done in Sri Lanka Knowledge of DR was found to be affected by the duration of the disease, Level of education, income and Sources of information (27).

A study which was conducted among Swiss diabetic patients practice was affected by knowledge. in this study knowledge was not associated with age, gender, education, type of diabetes, duration of diabetes at recruitment, member of the local diabetes association, and presence of diabetic retinopathy) (29).

A study which was conducted in Jordan Patients awareness of DR was related with educational level (31).

3 Objectives

General objective

- To assess the KAP about DR in DM patients at SPHMMC from December 2018 to June 2019

Specific objectives

- Asses the knowledge of DM patients about DR from December 2018 to June 2019
- Assess the attitude of DM patients towards DR from December 2018 to June 2019
- Assess the practice of DM patients about DR from December 2018 to June 2019

4 METHODS AND MATERIALS

4.1 Study area and period

- The study was conducted at SPHMMC, Ethiopia from December 2018 to June 2019
- St Paul's hospital millennium medical college (SPHMMC) is found in Addis Ababa Ethiopia, established as a medical school starting from 2007 GC giving a service for about 200,000 patients yearly in average and for about 11, 714 Diabetic patients yearly at DM clinic. DM clinic gives service 3 days/week

4.2. Study design

- This was a hospital based cross-Sectional study which was conducted to assess the KAP of DM patients about DR

4.3 Source population

- All DM patients visiting St. Paul's hospital millennium medical college Diabetic clinic

4.4 Study population

DM patients visiting Diabetic clinic and who fulfill the inclusion criteria during the time of data collection

4.5 Inclusion criteria

- Age 18 years and above
- Both type 1 and type 2 DM patients

4.6 Exclusion criteria

- Patients with altered mental status
- Patients that are too ill to interview

4.7. Sample size

Sample size was calculated by using the following formula for each (KAP) from a study which was conducted in Tanzania. (25) The largest sample size was taken with P of 0.59 which was from the practice of the patients.

$$n = \frac{(Z_{\alpha/2})^2 P(1 - P)}{d^2}$$

Where;

n – Sample size

Z – Value of z statistic at 95% confidence interval = 1.96

P – 0.59(25)

$1-P$ – 0.41%

d – Maximum allowable error 5% = 0.05

The sample size is 371

With 10% non-respondent rate=37, total sample size will be 408

4.8 Sampling procedure

Systematic random sampling was used to select patients, who were going to be included in this study,

$K=N/n$

$N= 11,714$ –study population of 1 yr. period. Since the duration of data collection is 06 months

N within the study period will be 5857

$K=5857/408$

$K =14$

Every 14th patient starting from the 1st patient visiting DM clinic daily and who can fulfill the inclusion criteria in the study period was selected.

4.9. Variables

➤ Dependent

Knowledge

Attitude

Practice

➤ Independent

Duration of illness

Age of patient

Monthly income

Educational background

Sex

Residency of patients

Religion

Presence or absence of HTN

Marital status

4.11. Operational definition

- Good Knowledge: patients who answered correctly more than or equal to mean score
- Poor Knowledge: patients who answered below the mean score.
- Good attitude: patients who answered correctly more than mean score.
- Poor/negative attitude: patients who answered below the mean score.
- Good Practice: patients who had previous funduscopy examination

4.12 Data collection procedure instruments

Eligible diabetic patient was included only once during the study period.

A close ended Pre tested structured questionnaire which was adopted from a study which was conducted at Jimma University Tertiary hospital (24) was translated into Amharic language and was used to assess the knowledge, attitude and practice of these Patients. The nurses read the questionnaire for the participants and their response was documented by the nurses.

The questionnaire had three components to assess the KAP and it contained fifteen questions about the knowledge and awareness of eye complications of diabetes and eye care (2 are awareness questions, 1 source of information and 1 about whether they had DR or not), about seven attitude related questions on primary prevention and eye care of diabetic retinopathy and twelve questions regarding practice

4.13 Data analysis

Data was coded, entered and analyzed using SPSS Version 20. The percent of KAP calculated by the percentage of score from questions contains eleven questions about the knowledge of eye complications of diabetes and eye care, six attitude related questions on primary prevention and eye care of diabetic retinopathy and four questions regarding practice. The correct responses of each question were determined by the study investigators prior to the study. If the response of participants to these questions matched with gold standard, it was considered as correct and 1 point for that response was awarded. For totally wrong answer, 0 was given.

For the knowledge questions patients who scored above the mean (>5.5) was categorized as a good knowledge.

For awareness questions the number of patients who answered correctly percent was calculated.

For the practice patients who had previous funduscopy evaluation were taken as a good practice.

4.14 DATA QUALITY ASSURANCE

Training was given for two nurses and the quality of data was supervised by the investigator. The collected data was cleared and checked for completeness and consistency before processing

4.15 ETHICAL CONSIDERATION

- Ethical clearance was processed from the ethical review board of SPHMMC
- All of the participants was fully aware of the study, including its aims and procedures, before giving their consent to join
- The right of individuals not to participate in the study was respected and participation in the study was on voluntary basis.
- Informed oral consent was obtained from the patients to conduct the study.
- Those with poor level of knowledge, attitude and practice were counseled about the benefits of Primary prevention and management of DR.
- All patients' information was kept secure and anonymous

4.16 DISSEMINATION AND UTILIZATION OF RESULTS

The final result of this study will be submitted to FMOH, Addis Ababa Health Bureau, and SPHMMC and to other organizations that have concern about DM services in Addis Ababa. Moreover, the findings will also be submitted for publication in reputable health and scientific publications

5 Results

5.1 Socio-demographic characteristics of study participants

A total of 365 (90% response rate) diabetic patients were included in this study. Male proportion was 50.7%. The mean age of the participants was 54 years (SD ±11) and majority (62%) were in the age range of 50 to 70 years. 86% of the study participants were residents of Addis Ababa. With regard to the participant’s educational status, 14.6% did not join any formal education, while 23.4% had educational status of tertiary and above. The reaming proportion had primary or secondary level educational status. The duration since diagnosis of diabetes was below 5 years in 28.7%, 5 to 10 years in 31.7%, and more than 10 years in 39.7%. Concomitant systemic hypertension was present in 47.7% of the diabetic patients.

Table1. Background characteristics of the diabetic patients Addis Ababa, Ethiopia, 2019

		N	%
Sex	F	180	49.3%
	M	185	50.7%
Age (Mean 54)	<30	15	4.1%
	30-50	103	28.4%
	50-70	225	62.0%
	>70	20	5.5%
Marriage	Single	41	11.2%
	Married	267	73.2%
	Widowed/separated	57	15.6%
Address	AA	312	86.0%
	Out of AA	51	14.0%
Religion	Orthodox	233	63.8%
	Muslim	95	26.0%
	protest	35	9.6%
	other	2	0.5%
Education	No education	53	14.6%

	Primary	132	36.3%
	Secondary	94	25.8%
	Tertiary	85	23.4%
Income	<1000	92	29.7%
	1000-2000	77	24.8%
	2000-4000	82	26.5%
	>4000	59	19.0%

5.2 Knowledge of diabetic retinopathy in diabetic patients

Most of the study participants (95.9) were aware that diabetes can cause damage to the eye. Most of the patients got information from diabetes clinic (64.8%). The other sources of information were ophthalmologist in 14.7%, relatives/friends in 6.1%, and media in 5.5%. The total score for knowledge 44.40% of participants had poor knowledge about diabetic retinopathy, scored below the mean.

In contrast to the general awareness about diabetes related eye injury by most of the patients, knowledge on the specific aspects of diabetic retinopathy was however very limited. Only 15.2% knew the type of eye disease caused by diabetes is retinopathy, 32% responded cataract, 23.1% responded glaucoma, and the rest 29.2% responded ‘‘I don’t know’’. Only 12.4% knew eye disease in diabetes is caused by injury to retinal blood vessel. 33.3% thought it is due to excess fat accumulation in the eye and the remaining patients answered either I don’t know or other incorrect answers.

With regard to knowledge of risk factors for eye injury, 21.4% could not identify any risk factor, 57.8% identified one risk factor, 14.4% two risk factors, and only 6.4% could identify three and more risk factors. Among the patients who identified one risk factor, the most commonly identified risk factors were high blood glucose in 78% and longer duration of diabetes in 17.5%. The other risk factors were identified in only 4.5% of the cases.

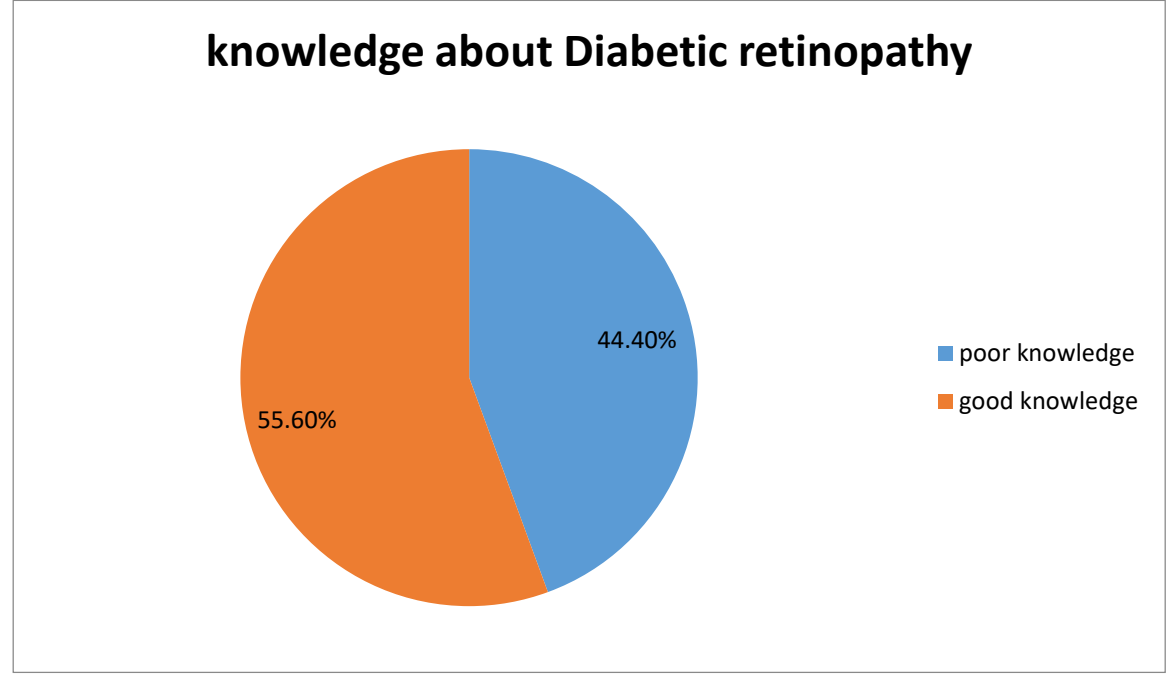


Figure 1: knowledge about Diabetic retinopathy at SPHMMC, Addis Ababa, Ethiopia, 2019

Table 2. Knowledge of diabetic retinopathy in diabetic patients at SPHMMC, Addis Ababa, Ethiopia, 2019

		N	%
DM damages eye	Yes	350	95.9
	No/ don't know	15	4.1
Source of information	DM clinic	234	64.8%
	ophthalmologist	53	14.7%
	relatives	22	6.1%
	media	20	5.5%
Disease of eye caused by DM is	Retinopathy	55	15.2
	Cataract	116	32.0
	Glaucoma	84	23.1

	Don't know	106	29.2
Eye disease in DM is caused by	Fat accumulation	121	33.3
	high glucose in eye	44	12.1
	Blood vessel damage	45	12.4
	High IOP	33	9.1
	Don't know	120	33.1
Risk factors	Don't know	78	21.4
Knows One risk factor	blood glucose level	165	45.3
	long DM duration	37	10.2
	blood pressure	3	.8
	obesity	3	.8
	pregnancy	1	.3
	smoking	2	.5
Two risk factors		52	14.4
Three or more		23	6.4

50.3% of the patients knew the need for immediate ophthalmic evaluation after the diagnosis of diabetes has been made. 67% of the patients identified at least one mode of treatment for diabetic retinopathy. The most commonly identified mode of treatment was surgery in 46.8%, followed by laser and injection, 14.6% and 4.2%, respectively.

Table 3. Knowledge of diabetic patients about diabetic retinopathy at SPHMMC, Addis Ababa, Ethiopia, 2019

		N	%
Eye examination after dx of DM	Immediate	182	50.3
	1y	143	39.5
	5y	18	5.0
	Don't know	19	5.2
What type of eye exam	Posterior segment exam	39	11.1
	VA	78	22.1
	RE	17	4.8
	Anterior segment exam	106	30.0
	Don't know	113	32.0
What forms of treatment for DR	Injection	15	4.2
	Laser	52	14.6
	Surgery	167	46.8
	Don't know	112	33.1

5.3Attitude of diabetic patients towards diabetic retinopathy

Most of the patients had positive attitude towards diabetic retinopathy. More than 95% of the patients agreed in almost all of the attitude questions. Most patients would agree on the need for ophthalmic evaluation (96.5%), on the benefit of good glycemic and blood pressure control (95.4%), and on the benefits of therapeutic interventions for diabetic retinopathy (96.4%).

Table 4. Attitude of diabetic patients about Diabetic retinopathy at SPHMMC, Addis Ababa, Ethiopia, 2019

		N	%
All DM patients need eye exam	DA	2	0.6
	N	11	3.0%
	A	351	96.5%
Eye exam needed even no visual problems	DA	1	0.3%
	N	12	3.3%
	A	351	96.4%
All new DM patients need eye exam	DA	2	0.6%
	N	13	3.6%
	A	349	95.9%
Good glycemic control prevent eye damage	DA	2	0.6%
	N	15	4.1%
	A	347	95.4%
Good BP control prevents eye damage	DA	1	0.3%
	N	20	5.5%
	A	343	94.2%
All pregnant DM patients need eye exam	DA	3	0.8%
	N	61	16.8%
	A	300	82.5%
Treatment of DR prevents blindness	DA	3	0.8%
	N	10	2.7%

	A	351	96.4%
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5.4Practice of diabetic patients on diabetic retinopathy

At least one ophthalmologic evaluation after the diagnosis of diabetes was done for 82.2% of the patients. Of the patients who had ophthalmologic evaluation, only 64.3% of them had fundus examination (51.6 of the study participants) the rest had only VA and refraction evaluations.

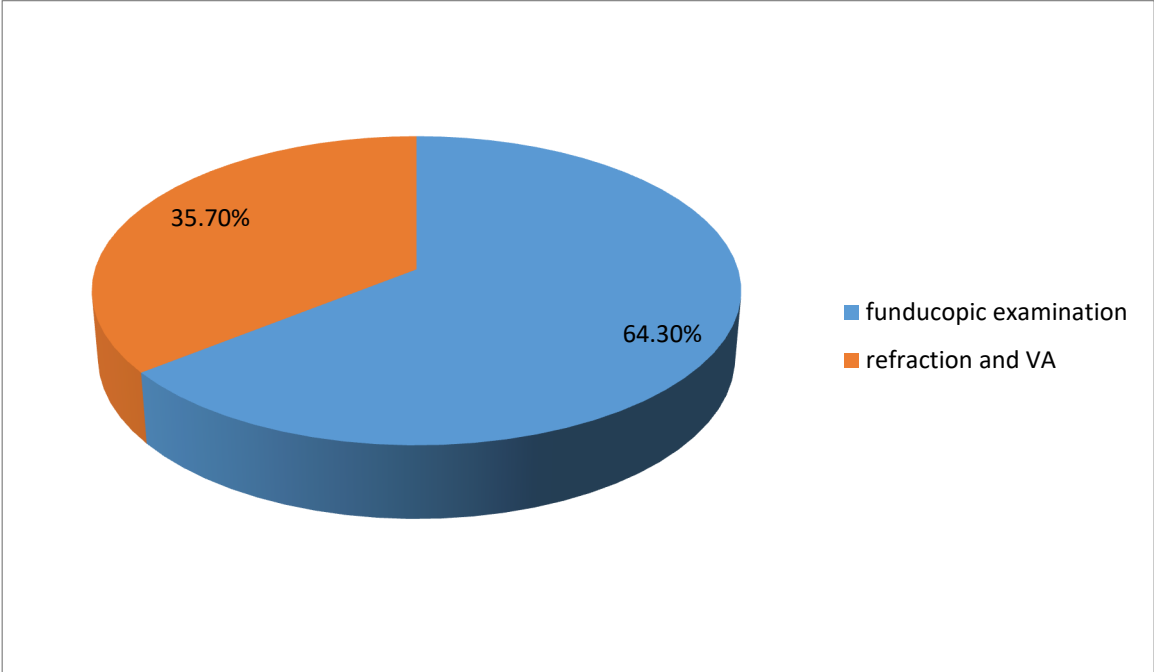


Figure 2: Practice of Diabetic retinopathy at SPHMMC, Addis Ababa, Ethiopia, 2019

From those patients who had ophthalmic evaluation 21% had been told to have diabetic retinopathy and 92.3% of the patients had at least one evaluation in the last year period. Of these, 49.6% was evaluated once, 23.7% twice, and 19% were evaluated three and more times in the last one year.

77% of the patients reported they had regular follow up for the diabetes. Only 17.3% reported they do regular exercise, and 16.8% reported they consume diabetic diets

Table 5.Practice of diabetic patients on diabetic retinopathy at SPHMMC, Addis Ababa, Ethiopia, 2019

		N	%
Referred to ophthalmologist	Yes	311	85.2
	No	54	14.8
Seen by ophthalmologist ever	Yes	300	82.2
	No	65	17.8
Have DR	Yes	63	21%
	No	237	79%
Had eye exam in the last one year	Yes	277	92.3%
	No	23	7.7%
How many times in the last one year	once	149	49.6%
	twice	71	23.7%
	three times and more	57	19%
Lifestyle and behavioral factors	Smoking	6	1.7%
	Exercise	62	17.3%
	Appropriate DM diet	60	16.8%
	Regular follow up for DM	276	77%

Category of knowledge with variables

Knowledge with sex

	sex		Total
	F	M	

Knowledge category	Poor knowledge % within sex	48.3%	40.5%	44.4%
	Good knowledge % within sex	51.7%	59.5%	55.6%

Knowledge with age

		Age category				Total
		<30	30-50	50-70	>70	
Knowledge category	Poor knowledge % within age group	86.7 %	46.6%	40.9%	45.0 %	44.6 %
	Good knowledge % within age group	13.3 %	53.4%	59.1%	55.0 %	55.4 %

Knowledge with marital status

		Marital status category				Total
		single	married	widowed	separated	
Knowledge category	Poor knowledge % within marital status	56.1 %	45.3%	30.8%	40.0%	44.4 %
	Good knowledge % within marital status	43.9 %	54.7%	69.2%	60.0%	55.6 %

		adress		Total
		AA	Out of AA	
Knowled ge category	Poor knowledge % within address	41.0 %	62.7 %	44.1 %
	Good knowledge % within address	59.0 %	37.3 %	55.9 %

score category * education Crosstabulation

		Educational status category				Total
		no education	prima ry	second ary	tertiar y	
Knowled ge category	Poor knowledge % within educational status	71.7%	50.0 %	37.2%	27.1 %	44.5 %
	Good knowledge % educational status	28.3%	50.0 %	62.8%	72.9 %	55.5 %

score category * income2 Crosstabulation

		Monthly Income category				Total
		<100 0	1000- 2000	2000- 4000	>4000	
Knowledg e category	Poor knowledge % within income category	56.5 %	44.2%	35.4%	27.1%	42.3 %
	Good knowledge % income category	43.5 %	55.8%	64.6%	72.9%	57.7 %

score category * DM_dur2 Crosstabulation

		DM_dur2			Total
		<5	5-10	>10	
score category	Poor knowledge % within income category				
		50.0 %	41.7 %	43.1 %	44.6 %
	Good knowledge	50.0	58.3	56.9	55.4

	% income category	%	%	%	%
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score category * htn Crosstabulation

		htn		Total
		yes	no	
knowledge category	Poor knowledge % within income category	39.1 %	49.2 %	44.4 %
	Good knowledge % within income category	60.9 %	50.8 %	55.6 %

6 Discussion

DR is one of the chronic microvascular complications of DM. DR is the leading cause of blindness between 20 to 64 years of age. (8,9,10) worldwide around 93 million people are estimated to have DR.

The duration of DM is the strongest risk factor for the development of DR. However; many other factors can affect the risk and progression of DR. Most of these are the general risk factors of cardiovascular diseases, such as uncontrolled hyperglycemia, dyslipidemia, obesity, hypertension and others. Most of these risk factors can be modified by using varieties of life style modifications such as regular exercise, avoiding smoking, changing dietary habits and pharmacologic management such as control of glycemic levels, treating hypertension and dyslipidemia and others. Once DR has developed, early identification and treatment may prevent an otherwise permanent ocular damage. But patients usually are not aware of the development of DR until the late stages. Therefore patients should be screened and identified for this purpose.

Successful and comprehensive management of diabetes requires active participation of the patient. The management recommendations of diabetes may require a paradigm shift in the life style of the patient. Such behavioral changes are often very difficult and challenging for the patient. Unless the patient has adequate awareness on the risks of DM complications and preventive strategies, commitment for life style change will be more difficult. Therefore, awareness creation is a core part of prevention and management of chronic complications of diabetes.

In our study, most patients had general awareness on diabetes can cause eye injury. The most common source of information was from DM clinic for 64.8% of the patients in our study which is comparable with studies in Jimma(24). Even though, most common source of information was from DM clinic, the rest of 35% in our study were not told about the risks of DM related ocular damage during the times of follow up for the management of DM and counseling services should be improved further. Since such encounter to health services are important opportunities to create awareness it should be utilized as much as possible. Only 10.7% in jimma(24) and 5.5% in our study got information from media sources. This shows the contribution of media for dissemination of health related information is very low and needs to be worked on by the responsible bodies.

Despite general awareness about possibility of eye damage in most of the patients, knowledge on many of the specific aspects of DM related ocular damage was very low. Knowledge about DR was present only in 15.2% of the patients which was lower than a study in Jimma(22.8%)(24). Knowledge on risk factors of DR, apart from diabetes itself was low. Only 20% had knowledge on risk factors other than diabetes, which was comparable with a study in Jimma(24). General awareness without specific knowledge is less likely to bring the desired behavioral changes and commitment in the patient. A similar pattern of good general awareness with low knowledge on the specific aspects of DR has also been noted in other studies. A study which was conducted at JUH, Ethiopia showed, 86% of diabetic patients know that DM can affect the eye but only 22.8% of patients specifically know about DR and the knowledge about risk factors was also poor (24). A good general knowledge on the effect of DM on eye was also reported in Ghana 74.6%(32) , 69.9%, Nigeria 69.9% (18), Swiss 96%(29), Malaysia 87.2%(30), Jordan 88.2%(31), which are comparable to the finding of 95.6% in our study.

In our study 87.7% of patients were aware that DR can be treated, which was larger than a study in Jimma which was 75.84(24). Regarding the modes of management of DR in a study which was conducted at Jimma only 29.02% (24) of patients mentioned at least one mode of management which was smaller than in our study (67.7%). In both studies surgery was the most frequently mentioned management option by the patients.

Similar with this study the patients were aware that DR is preventable and can cause blindness in a study which was conducted in jimma 73.2% and 81.5% of cases respectively(24).

At least one ocular examination was done for 51.6% of the patients in our study. A comparable finding was also reported from Jimma (59%)(24), Tanzania (59.1%)(25), Kenya (57.6%)(15) and 77.3% Turkey (12)

49% in India (28), Malaysia (57%)(30) . The practice of dietary management of DM and exercise were low, and present in 16%, and 17% respectively.

Attitude of the patients towards diabetic retinopathy was better in our study than a study from Jimma (80%)(24), Saudi 73.80%(3), Iran attitude 50.44% (5) and 18% and 29.9% in a study from Oman the attitude about regular ocular checkup and laser treatment(11).

7 Limitations

Most patients in this study are from Addis Ababa who probably are with a better access for information which may bias the result.

This study was conducted only at public hospital and it may not reflect KAP of private centers.

8 CONCLUSIONS

Most of the study participants (95.9) knew that diabetes can cause damage to the eye. Most of the patients got information from diabetes clinic (64.8%). The other sources of information were ophthalmologist in 14.7%, relatives /friends in 6.1%, and media in 5.5%.

In contrast to the general awareness about diabetes related eye injury by most of the patients, knowledge on the specific aspects of diabetic retinopathy was however very limited. Only 15.2% knew the type of eye disease caused by diabetes is retinopathy, only 12.4% knew eye disease in diabetes is caused by injury to retinal blood vessel.

With regard to knowledge of risk factors for eye injury, 21.4% could not identify any risk factor, 14.4% two risk factors, and only 6.4% could identify three and more risk factors. Among the patients who identified one risk factor, the most commonly identified risk factors were high blood glucose in 78% and longer duration of diabetes in 17.5%. The other risk factors were identified in only 4.5% of the cases

Most of the patients had positive attitude towards diabetic retinopathy. More than 95% of the patients agreed in almost all of the attitude questions. At least one ophthalmologic evaluation after the diagnosis of diabetes was done for 82.2% of the patients. Of the patients who had ophthalmologic evaluation, 21% had been told to have diabetic retinopathy. Only 17.3% reported they do regular exercise, and 16.8% reported they consume diabetic diets.

9. Recommendation

Information about DM and DR should be utilized from DM clinic, media and diabetic associations, since this are the sources which can cover wider parts of the society.

FMOH and policy makers should work on creating awareness of DR on DM patients and on the society in general.

Health professional treating DM patients should create awareness about DR and other DM related complications and they also should send patients for routine ophthalmic evaluation.

In the future studies should be conducted to assess the KAP of general population and DM patients at private hospital

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9 ANNEXES

8.1 Annex 1: Consent form

8.1.1 English version

Verbal informed consent of the participants will be obtained.

I am an Ophthalmology resident at St. Paul’s hospital millennium medical College and undertaking a study on the knowledge, attitudes and practices among diabetic patients about diabetic retinopathy. Participation in this study is voluntary and the information gathered will be used solely for academic and intended purposes.

Your name will not be written in this questionnaire.

Thank you for your co-operation.

8.1.1 Amharic translation

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9.2 ANNEX II: English Questionnaire

Part one: Personal Data

No	Questions	Classification
101	Code no	
102	Sex	1.Male 2 Female
103	Age	-----
104	Marital status	1. Single 2. Married 3. Widowed 4. Divorced
105	Occupation	
106	Address	. 1. Urban 2. Rural
107	Education level	1. No schooling 2. Primary 3. Secondary 4. Tertiary(College/University)
108	What is your estimated monthly income?	-----
109	Duration of DM	
110	Religion	
111	Are you hypertensive?	1. yes 2. No

1. Part two: Knowledge on Diabetic retinopathy

No	Question	Classification
201	Diabetes can damage eyesight	1. Yes 2. No 3. . I don't know
202	Can Diabetes cause blindness	1. Yes 2. No 3. I don't know
203	What eye condition does diabetes specifically cause in the eyes	1. Diabetic retinopathy 2. Cataract 3. glaucoma 4. I don't know 5. others
204	What is diabetic retinopathy	1. it is the same as cataract 2. it is high sugars in the eye 3. it is changes in the blood vessels of the retina due to diabetes 4. it is high pressure in the eye 5. I don't know 6. others
205	What are risk the risk factors for developing diabetic retinopathy(you can choose more than one answer)	1. poorly controlled blood sugar 2. duration of diabetes 3. hypertension 4. high BMI 5. pregnancy 6. smoking 7. I don't know
206	Is blindness from diabetic retinopathy preventable	1. Yes 2. No 3. I don't know
207	Is blood sugar control important in	1. Yes

	preventing blindness from diabetic retinopathy	2. No 3. I don't know
208	Is diabetic retinopathy treatable	1. Yes 2. No 3. I don't know
209	What are the treatment options available for diabetic retinopathy	1. Intravitreal injections (injections inside the eyes) 2. Laser burns inside the eyes 3. Surgery 4. Other 5. I don't know
210	Should a person with DM visit a specialist eye doctor following diagnosis	1. Yes 2. No 3. I don't know
211	How soon after the diagnosis has been made should that person visit the specialist eye doctor	1. Immediately after diagnosis of DM 2. 1 year after diagnosis 3. 5 years after diagnosis 4. Other -----
212	Does a diabetic patient need a regular eye checkup	1. Yes 2. No 3. I don't know
213	What kind of an eye examination does a diabetic patient need to diagnose diabetic retinopathy	1. Vision 2. Checking for eye glasses 3. Dilated examination of the back of the eye 4. Slit-lamp/torch examination of anterior part of the eye 5. Other-----
214	Have you been diagnosed with diabetic retinopathy	1. Yes 2. No 3. I don't know

215	How did you come to know about DM affecting the eye	1. Health professional at the diabetes follow up clinic 2. Ophthalmologist/optometrist/optician 3. Eye camp 4. Family member/relative/friend with DM 5. TV, magazines, other media 6. Other
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Part three: practice

No	Question	Classification
301	Have you ever been referred to see eye doctor	1. Yes 2. No 3. I don't know
302	Have your eyes been examined by an eye doctor after the diagnosis of DM	1. Yes 2. No 3. I don't know
303	If yes how many times in the last one year	1. None 2. Once 3. Twice 4. Three times or more
304	What kind of eye exam did you get	1. Vision 2. Checking for eye glasses 3. Dilated examination of the back of the eye 4. Slit-lamp/torch examination of anterior part of the eye 5. Other-----
305	If no to question 302, why (explain each answer)	1. I did not think it was necessary

		2. I was not advised by my doctor 3. Financial restrictions 4. Lack of convenient facility 5. Others (specify)
306	Did you see an eye doctor for eye examination when you were last pregnant	1. Yes 2. No 3. I don't know 4. Does not apply
307	If no to question 306, why	1. I did not think it is necessary 2. I was not advised to by my doctor 3. Financial restrictions 4. Lack of convenient facility 5. Others (specify)
308	Do you regularly check your blood sugar	1. Yes 2. No 3. I don't know If yes, how often-----
309	If no to question 308, why	1. I did not think it is necessary 2. I was not advised to by my doctor 3. Financial restrictions(how much do you spend in each visit) 4. Lack of convenient facility (how far is the facility to you)

		5. Others (specify)
310	Do you regularly check your blood pressure	1. Yes 2. No 3. I don't know If yes how often do you check
311	If no to question 310, why (please explain each answer)	1. I did not think it is necessary 2. I was not advised to 3. Financial restrictions(how much do you spend in each visit) 4. Lack of convenient facility (how far is the facility to you) 5. Others (specify)
312	Which of the following do you regularly do	1. I smoke cigarette 2. I exercise 3. I follow a diabetes friendly diet 4. I follow my diabetic clinic

Part four: attitude

No	Question	Classification
401	Diabetic patients should have an eye examination	1. Strongly disagree 2. Moderately disagree 3. Neutral 4. Moderately agree 5. Strongly agree
402	Eye examination is required in diabetic patients even when vision is not affected	1. Strongly disagree 2. Moderately disagree 3. Neutral 4. Moderately agree 5. Strongly agree
403	Newly diagnosed diabetic patients require eye checkups	1. Strongly disagree 2. Moderately disagree 3. Neutral 4. Moderately agree 5. Strongly agree
404	Good blood sugar control is important in preventing blinding diabetic retinopathy	1. Strongly disagree 2. Moderately disagree 3. Neutral 4. Moderately agree 5. Strongly agree
405	Good blood pressure control is important in preventing blinding diabetic retinopathy	1. Strongly disagree 2. Moderately disagree 3. Neutral 4. Moderately agree 5. Strongly agree
406	A pregnant diabetic mother should see an eye doctor for examinations	1. Strongly disagree 2. Moderately disagree 3. Neutral 4. Moderately agree

		5. Strongly agree
407	Treatment can prevent blinding complications of diabetic retinopathy	1. Strongly disagree 2. Moderately disagree 3. Neutral 4. Moderately agree 5. Strongly agree

ANNEX III – The Amharic Translation of the Questionnaire

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101	□□□□□	
102	□□	1. □□ 2. □□□
103	□□□	-----
104	□□□□□□□□□	1. □□□ 2. □□□
105	□□□□□□□□□	1. □□□□□ /□ 2. □□□□□□□ 3. □□□□□□□ 4. □□□□□□□ /□□□□ □□□□□□□□□/
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Socio-demographic characteristics

Variable	Frequency (%)
Sex Male Female	
Age Mean	
Occupation Formal employment Casual laborer Business Farming Unemployed	
Level of education No schooling Primary Secondary Tertiary(College/university)	
Duration of diabetes <1 years 1 to 4.9 5 to 9.9 10 to 14.9 15 +	
Address Urban	

Rural	
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Knowledge of diabetes and DR

No	variable	frequency
1	Diabetes can damage eyesight Yes No I don't know	
2	Can Diabetes cause blindness Yes No I don't know	
3	What eye condition does diabetes specifically cause in the eyes Diabetic retinopathy Cataract glaucoma I don't know others	
4	What is diabetic retinopathy it is the same as cataract it is high sugars in the eye it is changes in the blood vessels of the retina due to diabetes it is high pressure in the eye I don't know others	
5	What are risk the risk factors for developing diabetic retinopathy(you can choose more than one answer) poorly controlled blood sugar duration of diabetes hypertension	

	high BMI pregnancy smoking I don't know	
6	Is blindness from diabetic retinopathy preventable Yes No I don't know	
7	Is blood sugar control important in preventing blindness from diabetic retinopathy Yes No I don't know	
8	Is diabetic retinopathy treatable Yes No I don't know	
9	What are the treatment options available for diabetic retinopathy Intravitreal injections (injections inside the eyes) Laser burns inside the eyes Surgery Other I don't know	
10	Should a person with DM visit a specialist eye doctor following diagnosis Yes No I don't know	
11	How soon after the diagnosis has been made	

	should that person visit the specialist eye doctor Immediately after diagnosis of DM 1 year after diagnosis 5 years after diagnosis Other -----	
12	Does a diabetic patient need a regular eye checkup Yes No I don't know	
13	What kind of an eye examination does a diabetic patient need to diagnose diabetic retinopathy Vision Checking for eye glasses Dilated examination of the back of the eye Slit-lamp/torch examination of anterior part of the eye Other-----	
14	Have you been diagnosed with diabetic retinopathy Yes No I don't know	
15	How did you come to know about DM affecting the eye Health professional at the diabetes follow up clinic Ophthalmologist/optometrist/optician Eye camp	

	Family member/relative/friend with DM	
	TV, magazines, other media	
	Other	

Part three: practice

No	Variables	Frequency
301	Have you ever been referred to see eye doctor 1. Yes 2. No 3. I don’t know	
302	Have your eyes been examined by an eye doctor after the diagnosis of DM 1. Yes 2. No 3. I don’t know	
303	If yes how many times in the last one year 1. None 2. Once 3. Twice 4. Three times or more	
304	What kind of eye exam did you get 1. Vision 2. Checking for eye glasses 3. Dilated examination of the back of the eye 4. Slit-lamp/torch examination of anterior part of the eye 5. Other-----	
305	If no to question 302, why (explain each answer) 1. I did not think it was necessary	

	2. I was not advised by my doctor 3. Financial restrictions 4. Lack of convenient facility 5. Others (specify)	
306	Did you see an eye doctor for eye examination when you were last pregnant 1. Yes 2. No 3. I don't know 4. Does not apply	
307	If no to question 306, why 1. I did not think it is necessary 2. I was not advised to by my doctor 3. Financial restrictions 4. Lack of convenient facility 5. Others (specify)	
308	Do you regularly check your blood sugar 1. Yes 2. No 3. I don't know If yes, how often-----	
309	If no to question 308, why 1. I did not think it is necessary 2. I was not advised to by my doctor 3. Financial restrictions(how much do you spend in each visit) 4. Lack of convenient facility (how far is the facility to you) 5. Others (specify)	
310	Do you regularly check your blood pressure 1. Yes	

	2. No 3. I don't know 4. If yes how often do you check	
311	If no to question 310, why (please explain each answer) 1. I did not think it is necessary 2. I was not advised to 3. Financial restrictions(how much do you spend in each visit) 4. Lack of convenient facility (how far is the facility to you) 5. Others (specify)	
312	Which of the following do you regularly do 1. I smoke cigarette 2. I exercise 3. I follow a diabetes friendly diet 4. I follow my diabetic clinic	

Part four: attitude

No	Variables	Frequency
401	Diabetic patients should have an eye examination 1. Strongly disagree 2. Moderately disagree 3. Neutral 4. Moderately agree 5. Strongly agree	
402	Eye examination is required in diabetic patients even when vision is not affected 1. Strongly disagree	

	2. Moderately disagree 3. Neutral 4. Moderately agree 5. Strongly agree	
403	Newly diagnosed diabetic patients require eye checkups 1. Strongly disagree 2. Moderately disagree 3. Neutral 4. Moderately agree 5. Strongly agree	
404	Good blood sugar control is important in preventing blinding diabetic retinopathy 1. Strongly disagree 2. Moderately disagree 3. Neutral 4. Moderately agree 5. Strongly agree	
405	Good blood pressure control is important in preventing blinding diabetic retinopathy 1. Strongly disagree 2. Moderately disagree 3. Neutral 4. Moderately agree 5. Strongly agree	
406	A pregnant diabetic mother should see an eye doctor for examinations 1. Strongly disagree 2. Moderately disagree 3. Neutral 4. Moderately agree	

	5. Strongly agree	
407	Treatment can prevent blinding complications of diabetic retinopathy 1. Strongly disagree 2. Moderately disagree 3. Neutral 4. Moderately agree 5. Strongly agree	

