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RETINOPATHY AMONGST PATIENTS WITH DIABETES MELLITUS: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Diabetes mellitus (DM) is a growing global epidemic and a leading cause of ocular complications, eye complications, and eye diseases, such as cataract, retinopathy, glaucoma, double vision, macular degeneration, and blindness. **Objectives:** This study aimed to assess retinopathy among diabetic and non-diabetic patient in Sudan eye centre at Khartoum state during the period from October to December 2018. **Method:** A cross-sectional study was performed, on 150 patients who have attended the retinopathy clinic in Sudan eye centre at Khartoum state during the period from October to December 2018. The Data were collected using questionnaire sheets then analysed using statistical package for social science (SPSS) v 24.0. **Result:** The study included 150 patients. Most of them (47%) were aged more than 60 years, 47% were female, 59.5 % had secondary education level, 32% were housewife, 15% accountant, 81% had moderate socioeconomic status, 61% were diabetic, 46.5% had more than 10 years duration of DM, 42% less than 5 years, 56% had uncontrolled DM, Insulin used by most of the patients 46.9%, metformin used by 41.7%, and most of the patients were used more than one medication, 86.5% mentioned that they had knowledge about DM complication, 96% mentioned that they developed DM complications, 47% was developed retinopathy, 20.8% HTN, 70.8% had family history of retinopathy, 38.5% of them had mild non proliferative, 85.5% in this study were treated by laser, 89.2% weren't complaining ADR, 66.4% in this study mentioned that they aware about retinopathy and 94.3% of them getting information from ophthalmologist. **Conclusion:** This study concluded that the percentage of retinopathy among diabetic patients is higher than with non-diabetic patients. The common type of DR is mild non-proliferative. Most of the patients had DR treated with laser. Additionally, factors that may put the patient at a higher risk of retinopathy: Diabetic control, Knowledge, Adherence to treatment and regular follow up (Cost, Availability and lack of information about DR are the most common reasons for non-adherence to treatment, and regular follow up). There is an imperative need to implement strategies to increase the awareness of DR and the importance of early retinal screening among affected patients in order to reduce the risk of ocular complications.

INTRODUCTION

Diabetic retinopathy (DR) is a significant complication of diabetes mellitus (DM), which remains a leading cause of visual loss in working-age populations. The diagnosis of DR is made by clinical manifestations of vascular abnormalities in the retina.[1] Clinically, DR is divided into two stages: non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR). NPDR represents the early stage of DR, wherein increased vascular permeability and capillary occlusion are two main observations in the retinal vasculature. During this stage, retinal pathologies including micro-aneurysms, haemorrhages and hard exudates can be detected by fundus photography although the patients may be asymptomatic.[1] PDR, a more advanced stage of DR, is characterised by neovascularisation. During this stage, the patients may experience severe vision impairment when the new abnormal vessels bleed into the vitreous (vitreous haemorrhage) or when tractional retinal detachment is present.[1] The most common cause of vision loss in patients with DR is diabetic macular oedema (DME). DME is characterised by swelling or thickening of the macula due to sub- and intra-retinal accumulation of fluid in the macula triggered by the breakdown of the blood-retinal barrier (BRB).[1] DME can occur at any stage of DR and cause distortion of visual images and a decrease in visual acuity. Current treatment strategies for DR aim at managing the microvascular complications, including intravitreal pharmacologic agents, laser photocoagulation and vitreous surgery.[2] Intravitreal administration of anti-VEGF agents is currently the mainstay of therapy for both early and advanced stages of DR While the conventional laser therapy only provides stabilisation of visual acuity; anti-VEGF therapy can result in visual improvement with less ocular adverse effects.[2]

Diabetes mellitus (DM) is a growing global epidemic and a leading cause of ocular complications, eye complications, and eye diseases, such as cataract, retinopathy, glaucoma, double vision, macular degeneration, and blindness. The longer duration of DM is associated with ocular complications, resulting in visual impairment and blindness. The rising trend of non-communicable diseases, especially DM, along with other comorbidities such as hypertension, occupation and sedentary lifestyle, are the likely causes of reversible vision loss in Sudan.

This study was conducted to assess retinopathy among diabetic and non-diabetic patients in Sudan eye centre at Khartoum state during the period from October to December 2018.

MATERIALS AND METHODS

Study design

Observational cross-sectional center-based study.

Study period

The study was conducted during the period from October to December 2018.

Study area:

The study was carried out in Sudan eye centre at Khartoum state, which is the political and economic capital of Sudan; during the period from October to December 2018. The centre consists of a floor that is well established and equipped to operate an average of 28 different types of eye surgery per day, and nine clinics serve in general the eye diseases, but only one is dedicated for-specialized in diagnosis and treatment of retinopathy. Each clinic serves 60 to 70 patient per week.

Study population

The study population included all patients who attended to the retinopathy clinic at Sudan eye centre at Khartoum state during the period from October to December 2018.

Inclusion criteria

Patients diagnosed with retinopathy who attended the retinopathy clinic at Sudan eye centre.

Sample size

Total coverage of all Patient attending retinopathy clinic at Sudan eye centre at Khartoum state during the period from October to December 2018 and diagnosed with retinopathy upon applying the inclusion and exclusion criteria, a sample of n= 150 patients were selected randomly for the interview.

Data collection method

Data were collected using a predesigned pretested questionnaire. The researcher filled questionnaires; they were included close-ended, simple to understand, comprehensible questions format were chosen to assess retinopathy among diabetic and non-diabetic patient in Sudan eye centre at Khartoum state. Also, Survey responses were further described according to pre-defined demographic parameters such as age, gender, socioeconomic status, education levels.

The questionnaire was translated verbally into Arabic then all participates had been interviewed. The purpose of the study was explained, and they were invited to complete the questionnaire after assuring acceptance.

Data analysis

The data was analysed using Statistical Package for Social Sciences (SPSS version 24). Data analysis was performed using Chi-square test to test significant associations between variables-value $\leq$ 0.05 was considered significant. All data was expressed as text, illustrated tables and figures.

Ethical considerations

Approval was obtained from the ethics committee of the graduated college of National university.
Also, verbal consent was taken from participants.
Research purpose and objectives was explained to participants in clear simple words.
Questionnaire was filled by the researcher after asking and explaining the questions to the participants.

RESULTS

Demographic Data

Distribution of patients according to age

At this cross-sectional study on assessing the ophthalmic diseases among diabetic patient in Khartoum state; the study included 150 patients. Most of them (47%) were aged more than 60 years.

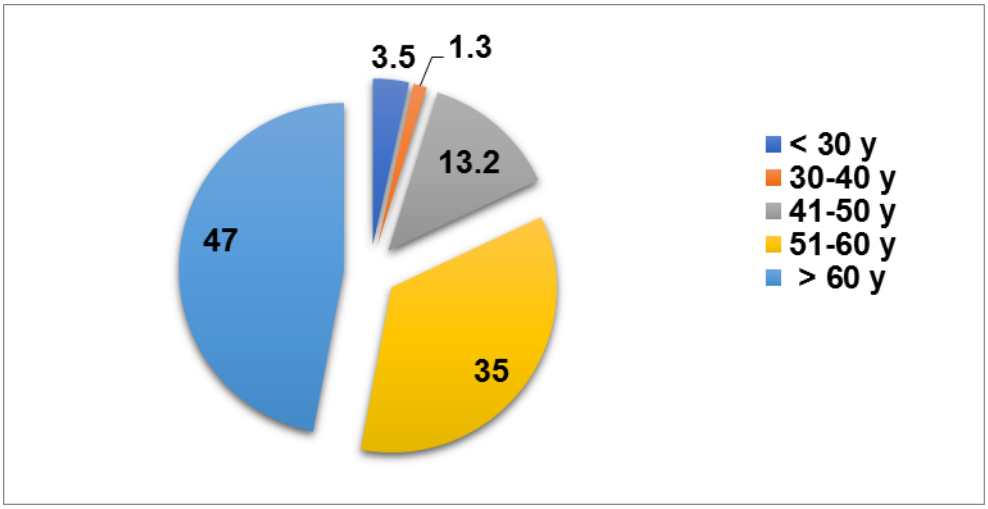

Figure 1: Distribution of patients according to age group.

Distribution of patients according to gender

Most of patients in this study were male, 47% were female.

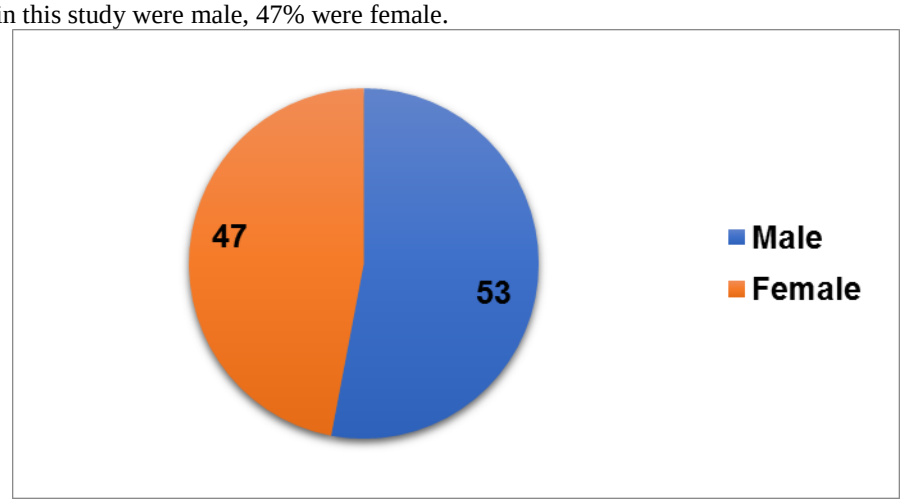

Figure 2: Distribution of patients according to gender.

Distribution of patients according to education level

Majority of patients 59.5 % had secondary education level.

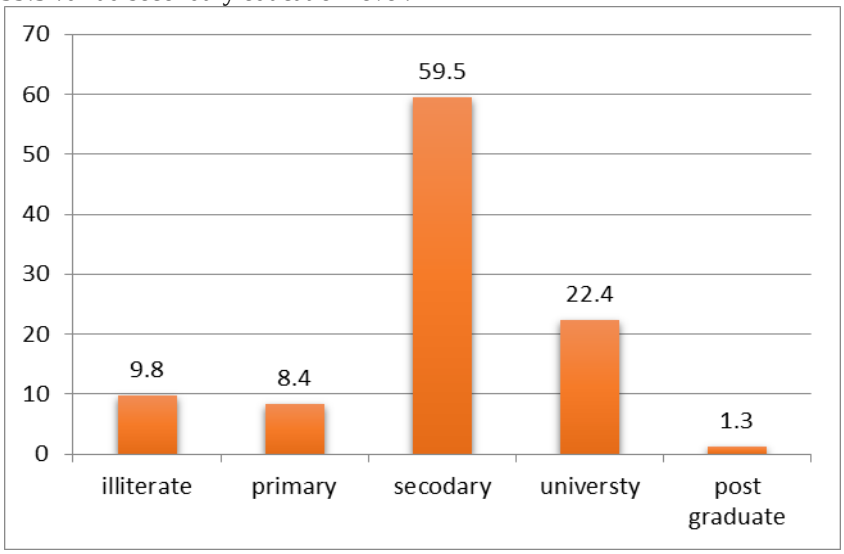

Figure 3: Distribution of patients according to education level.

Distribution of patients according to occupation

Most of patients 32% were house wife, 15% accountant.

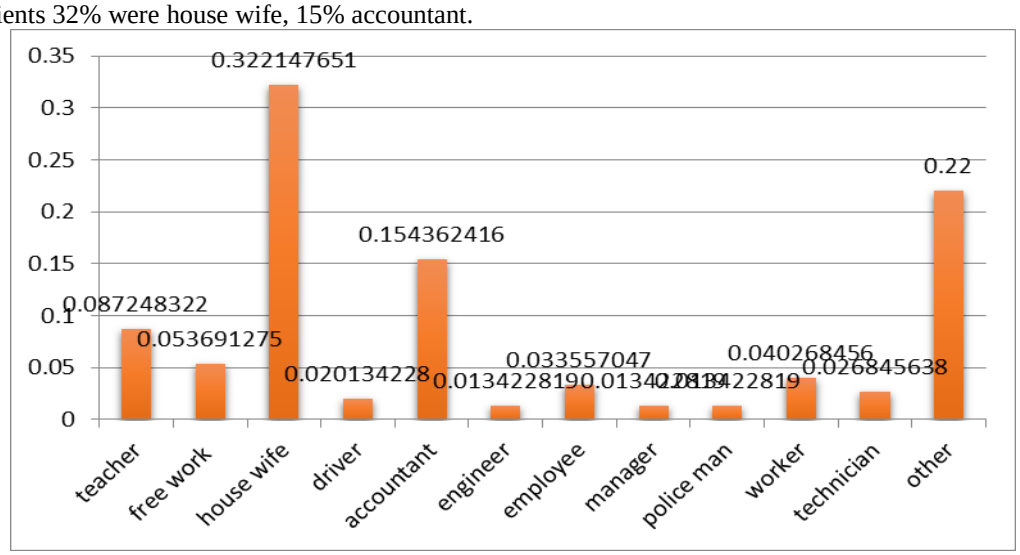

Figure 4: Distribution of patients according to occupation.

Distribution of patients according to socio economic status

Majority of patients in this study 81% had moderate socio economic status.

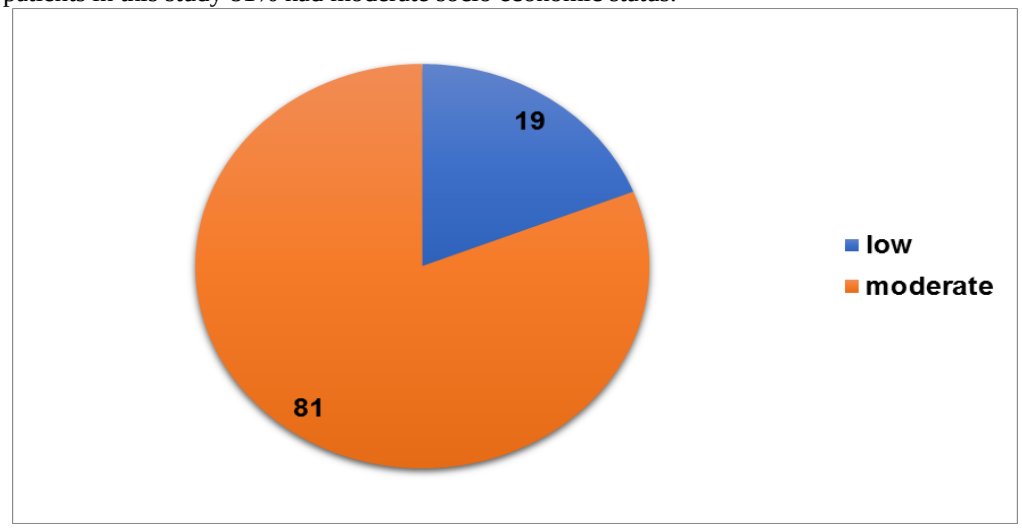

Figure 5: Distribution of patients according to socio economic status.

Medical History

Distribution of patients according to percentage of diabetic patients

Majority of patients 61% were diabetic.

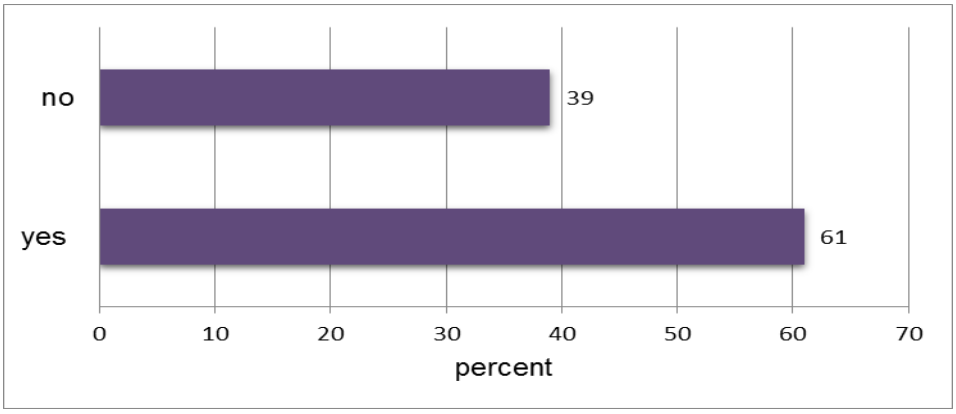

Figure 6: Distribution of patients according to percentage of diabetic patients.

Distribution of patients according to duration of DM

Most of patients (46.5%) had more than 10 years duration of DM, 42% less than 5 years.

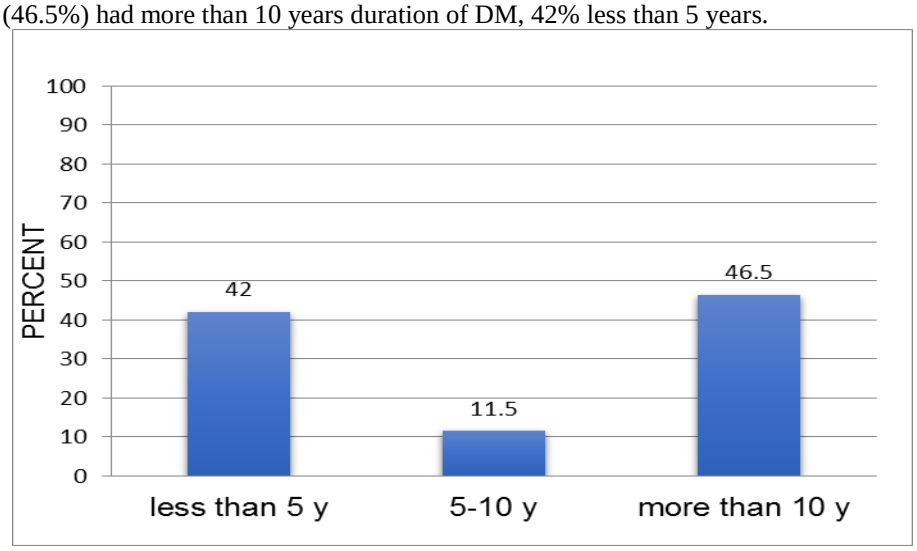

Figure 7: Distribution of patients according to duration of DM.

Distribution of patients according to diabetic control (HbA1C<6.5% and/or FBG<120mg/dl)

Most of the patients (56%) had uncontrolled DM.

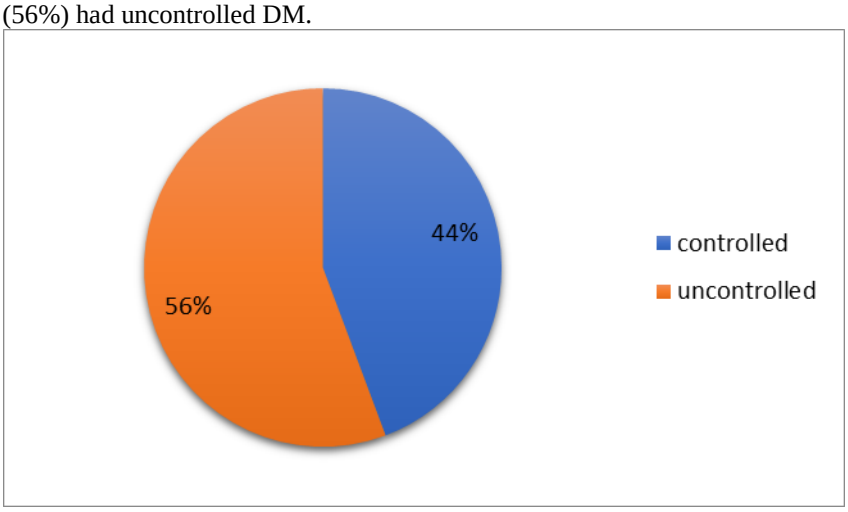

Figure 8: Distribution of patients according to diabetic control.

Distribution of patients according to medication history

Insulin used by most of the patients 46.9%, metformin used by 41.7%, and most of the patients were used more than one medication such antihypertensive drugs (most commonly used by study patients: Losartan and Candesartan {ARBs}, Atenolol and Bisoprolol{beta blockers}, Amlodipine and Nifedipine {calcium channel blockers}, Lisinopril {ACEI}).Chi-square correlation test was made between medication history and the development of complications. The result showed that depending on p-value (P-value <0.05) there were no significant associations.

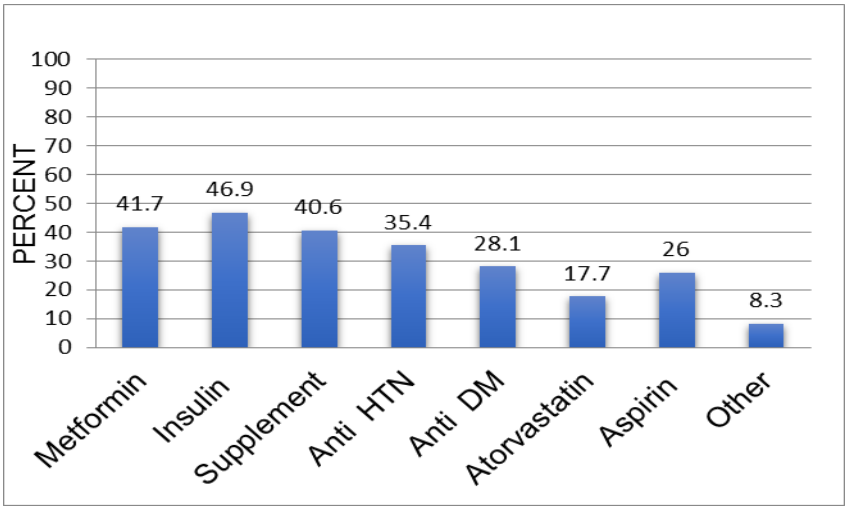

Figure 9: Distribution of patients according to medication history.

Complications

Distribution of patients according to Knowledge about complications

Majority of patients 86.5% mentioned that they knew DM complication.

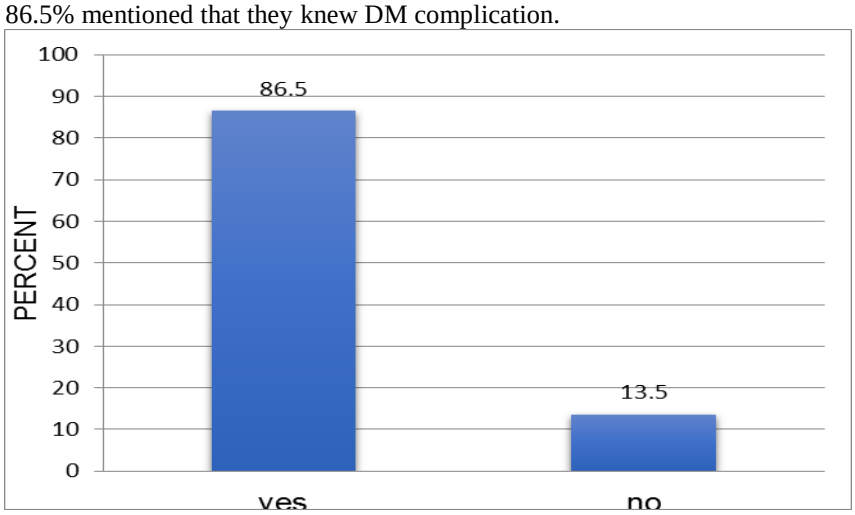

Figure 10: Distribution of patients according to Knowledge about complications.

Distribution of patients according to developed complication

Majority of patients 96% mentioned that they developed DM complications

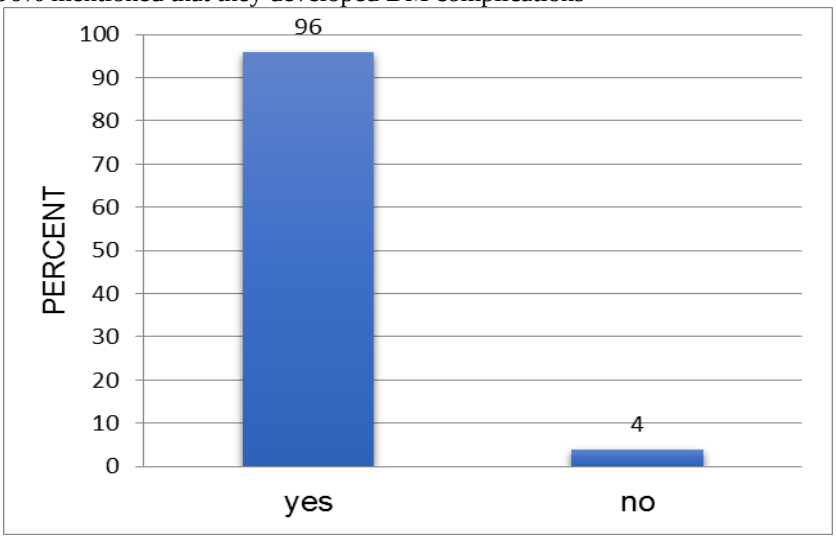

Figure 11: Distribution of patients according to developed complication.

Distribution of patients according to the type of complications developed after DM

Most of the patients 47% was developed retinopathy, 20.8% HTN.

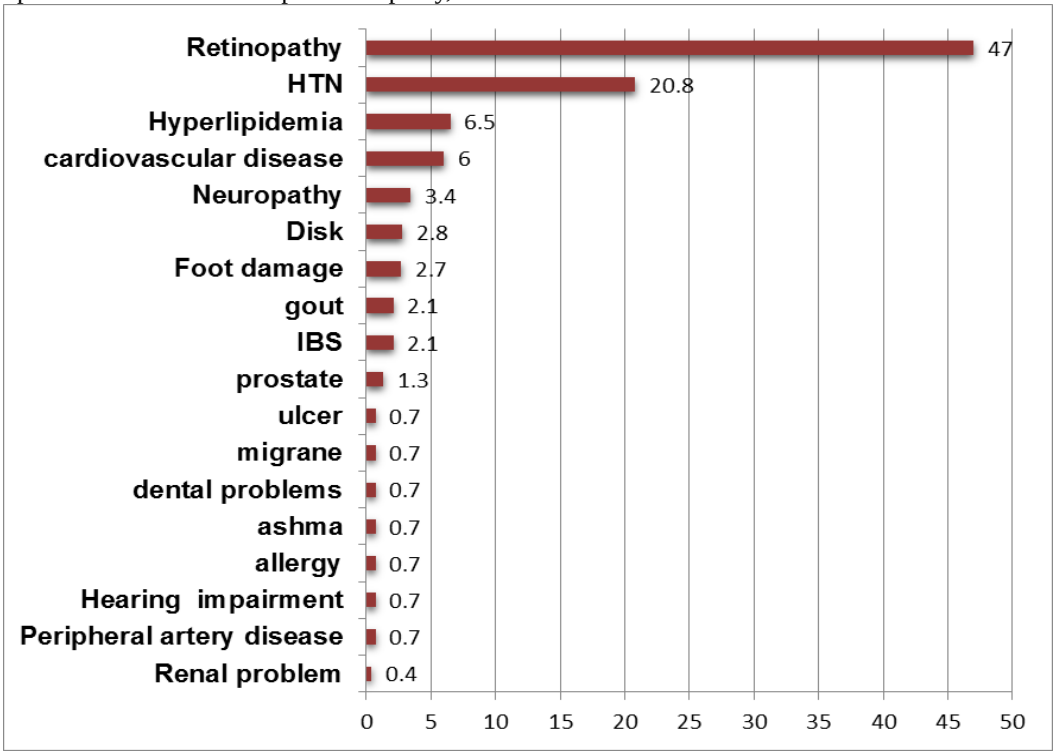

Figure 12: Distribution of patients according to the type of complications developed after DM.

Retinopathy

Medical history, sign, symptoms and type of retinopathy

Majority of patients 70.8% had a family history of retinopathy, the duration of 65.3% were less than five years; the most signs and symptoms mentioned by patients were floaters, blurred vision and fluctuating vision. According to the type of retinopathy, there were 38.5% of them had mild non-proliferative, 23.1% moderate non-proliferative and 15.4% non-centre involving DME, as shown in table 4.1.

Table 1: Medical history, sign, symptoms and type of retinopathy.

	Per cent %
Family history of eye disease	
Yes	70.8
No	29.2
Duration of eye problem	
Less than five y	65.3
5-10 y	31.4
More than ten y	3.2
Sign and symptoms	
Floaters	87.5
blurred vision	98.7
Fluctuating vision	97.7
Impaired colour vision	57.1
dark or empty areas in vision	2.4
Type of retinopathy	
Mild non-proliferative	38.5
Moderate non-proliferative	23.1
Severe non-proliferative	7.7
Proliferative	7.7
Non-centre involving DME	15.4
Center involving DME	7.7

Treatment of retinopathy

Majority of patients 85.5% in this study were treated by laser, 11.3% by surgery, 3.2 by injection. 76.8% started treatment immediately, 89.2% were not complaining ADR. Most of the patients 67.2% come for regular follow-up, and 8% are not, and 24.8% partially adheres to regular follow up. The most common cause for non-adherence to treatment or follow-up is the cost 31% followed by availability 22.7% then the knowledge 9% and occupation 4% but there is 36.4% as others, as presented in table 4.2.

Table 2: Treatment of retinopathy.

Type of treatment	Per cent %
Laser	85.5
Surgery	11.3
Injection	3.2
after how long from the identification of the problem	
Immediately	76.8
After more than one month	14.3
After more than one year	8.9
Complaining any adverse drug effect/effects?	
Yes	9.7
No	89.2
If yes what is the action taken	
Continued	25.0
Stopped	25.0
Decrease frequency of dose	50.0
Reasons for non-adherence to treatment or follow up	
Cost	31
Knowledge	9
Occupation	4.5
Availability	22.7
Other	36.4
Did he/she come for regular follow - up?	
Yes	67.2
No	8.0
Partially adhere	24.8

Awareness about retinopathy

Majority of patients 66.4% in this study mentioned that they aware about retinopathy and 94.3% of them getting information from the ophthalmologist.

Table 3: Awareness about retinopathy.

	Per cent %
Are you informed about the disease and its management?	
Yes	66.4
No	33.6
If yes, who informed you?	
Diabetes specialist	4.6
Ophthalmologist	94.3
Self-learning	1.1

DISCUSSION

Diabetes mellitus is the most widespread public-health challenge that has been confronting in the present century. Its timely management and routine eye examinations can decrease or delay their complications. At this cross-sectional study on assessing the retinopathy among diabetic and non-diabetic patients at Sudan eye centre in Khartoum state; the study included 149 patients.

Most of them (47%) were aged more than 60 years. Most of them had secondary education level, regarding the occupations most of them were housewife, 15% accountant.

Most of the patients had more than ten year's duration of DM, 42% less than five years. Also, most of them their DM were uncontrolled.

Insulin used by most of the patients 46.9%, metformin used by 41.7%, and most of the patients were used more than one medication (such as antihypertensive, lipid-lowering drugs, Aspirin, supplement and multivitamins). None of the medications mentioned in the patient's sample covered by this study is compatible with drugs found the French pharmacovigilance database[4], and the review article studies.[5]

The main factor that was related to increased awareness of DR in the study was the level of education. It has been previously shown in Jordan that higher levels of education are associated with higher awareness of DM.[6] This is consistent with several reports from other countries that show patients with higher education levels are more aware and well informed about DR occurring as a complication of DM, compared to patients with low levels of education.[7-9]

The percentage of DR among patients with diabetes in this study was 47% which was lower than Jordan, which reported 64.1%, but similar to that reported in most regional and international studies.[10] It has also been shown that visual impairment and blindness due to diabetes were prevalent among Jordanian adults.[11] The result also revealed that the retinopathy was distributed among non-diabetic patients mainly in housewife and accountant; these findings are of interest to our study. As the results of this study showed high awareness of DR occurring as a complication of DM among patients with diabetes, which is contrary to the high percentage of DR, this may be due to stressful lifestyle and low incomes.

Majority of patients 70.8% had a family history of retinopathy, the duration of 65.3% were less than five years, the most signs and symptoms mentioned by patients were floaters, blurred vision and fluctuating vision also there were 38.5% of them had mild-proliferative, 23.1% moderate non-proliferative and 15.4% non-centre involving DME.

Majority of patients 85.5% in this study were treated by laser, 11.3% by surgery, and 3.2 by injection. 76.8% started treatment immediately, 89.2% were not complaining, 9.7% were complaining of adverse drug effect. Most of the patients 67.2% come for regular follow-up, and 8% are not, and 24.8% partially adheres to regular follow up. The most common cause for non-adherence to treatment or follow-up is the cost 31% followed by availability 22.7% then the knowledge 9% and occupation 4% but there is 36.4% as others.

In this study the reason given by patients for not getting an early DR screening was mainly a Cost, Availability and lack of information about DR. which was consistent with other study that found reasons included a lack of time to take the examination, cost of the test and a fear of discovering bad things about their eyes.[3] This finding warrants further investigation into how to encourage patients with diabetes to routinely comply with vision examinations and retinal assessments every 12 months, as recommended by the international guidelines.[12]

In this study, there were 67.2% of patients had compliance in attending eye examinations follow up. Such a discrepancy between the levels of awareness and compliance in terms of routine eye examination seems to be shared among patients with diabetes in the world, with reports stating that only half of the patients in Myanmar[13] and two-thirds of Japanese patients attended a routine eye examination,and a recent study in Turkey showed that while 41.9% of patients with diabetes were aware of annual eye examination, 77.3% of these patients previously had an eye examination.[9]

Furthermore, the level of awareness of DR reported in our study is much higher than the levels reported in other places such as Turkey[9] and Baltimore, USA. In Jordan, there is an established national eye health care program and referral guidelines regarding DM and DR management for primary care. Patients are referred for an eye examination at the same time as their diagnosis of DM. This may explain the high level of awareness of DR found in this study.

The primary source of information about DR in our sample was ophthalmologist, followed by self-learning. This is consistent with the reported sources of information about DM among Jordanians.[6] This result is consistent with other reports; for example, a study from Pakistan showed that doctors were the primary source of information about DR.[7]

CONCLUSION

This study concluded that the percentage of retinopathy among diabetic patients is higher than with non-diabetic patients. The common type of DR is mild non-proliferative. Most of the patients had DR treated with laser. Additionally, factors that may put the patient at a higher risk of retinopathy: Diabetic control, Knowledge, Adherence to treatment and regular follow up (Cost, Availability and lack of information about DR are the most common reasons for non-adherence to treatment, and regular follow up). The primary source of information about DR in our patient population is ophthalmologist, followed by self-learning. There is an imperative need to implement strategies to increase the awareness of DR and the importance of early retinal screening among affected patients in order to reduce the risk of ocular complications. Additionally, screening programs for DR should not be exclusive to eye care centres, and in order to access undiagnosed patients, it is

recommended to implement screening campaigns close to their place of residence. Other causes of poor compliance with follow-up and available treatment should be studied further.

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