



Impact of Age, Duration and Control of Diabetes on Risk of Diabetic Retinopathy among Sudanese Diabetic Patients in Khartoum, Sudan- 2016: Hospital based Cross-Sectional study

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Abstract

Diabetes mellitus is a group of metabolic disorders in which there is high blood sugar level over a prolonged period. It occurs either when insufficient insulin is produced by the pancreas or the body cells not responding properly to the insulin it produces. Diabetic Retinopathy is one of the major complications of Diabetes that may lead to permanent blindness. This study aimed to reveal the impact of age, duration and control of Diabetes on risk of Diabetic Retinopathy for the purpose of prevention and control of this disorder. This was a hospital based cross- sectional study conducted among 251 participants in the period between February and April 2016. Data were collected using a closed ended, adjusted and administered questionnaire and then were analyzed using Statistical Package for the Social Sciences (SPSS) version 18.0.0. The study was estimated at 95% confidence level. 36% of the study group age was between 55-64 years. The majority have had diabetes for more than 20 years (28%) with 44% of them were with poor diabetes control. Diabetic patients of age between 55 and 64 were more affected with diabetic retinopathy. The study revealed that longer duration and poor control of diabetes were strongly associated with diabetic retinopathy.

Keywords: Diabetic Retinopathy; Impact; Duration and control of Diabetes.

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1. Introduction

Diabetes mellitus (DM), commonly referred to as diabetes, is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period [1]. Symptoms of high blood sugar include frequent urination, increased thirst, and increased hunger. If left untreated, diabetes can cause many complications [2]. Acute complications include diabetic ketoacidosis and nonketotic hyperosmolar coma [3]. Serious long-term complications include cardiovascular disease, stroke, chronic kidney failure, foot ulcers, and damage to the eyes [4].

Key facts [5]:

- The number of people affected with DM has risen from 108 million in 1980 to 422 million in 2014.
- The global prevalence of DM among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014.
- Diabetes prevalence has been rising more rapidly in middle- and low-income countries.
- Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation
- In 2012, an estimated 1.5 million deaths were directly caused by DM.
- Almost half of all deaths attributable to high blood glucose occur before the age of 70 years. WHO projects that diabetes will be the 7th leading cause of death in 2030.
- Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use are ways to prevent or delay the onset of type 2 diabetes.
- Diabetes can be treated and its consequences avoided or delayed with diet, physical activity, medication and regular screening and treatment for complications.

Diabetic Retinopathy (DR) is the result of damage to the tiny blood vessels that nourish the retina. They leak blood and other fluids that cause swelling of retinal tissue and clouding of vision. The condition usually affects both eyes but usually not similar in severity.

The symptoms of DR include seeing spots or floaters, blurred vision, seeing dark or empty spot and difficulty seeing well at night [6].

The signs are leaking blood vessels, retinal swelling such as macular edema, pale and fatty deposits on the retina (exudates) – signs of leaking blood vessels, damaged nerve tissue (neuropathy) and any neovascularization at the disk or periphery of the retina.

Diabetic retinopathy is detected during an eye examination that includes Visual acuity test, Ophthalmoscopy or fundus photography, Fundus Fluorescein angiography (FFA), Optical coherence tomography (OCT), Digital Retinal Screening Programs, Computer Vision Approach and Slit Lamp Biomicroscopy Retinal Screening Programs [7,8].

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 non-perfusion [9].

There are approximately 93 million people with diabetic retinopathy, 17 million with proliferative diabetic retinopathy, 21 million with diabetic macular edema, and 28 million with vision-threatening DR (VTDR) worldwide [10].

Globally, diabetic retinopathy accounts for 5% of all blindness, affecting 2 million people [11] and it is the leading cause of blindness in people aged 15 – 64 years in industrialized countries.

A recent pooled analysis from 35 population-based studies estimated that 93 million people worldwide have diabetic retinopathy, of whom 17 million (18%) have proliferative DR, 21 million (23%) have diabetic macular edema (DME), and 28 million (20%) have sight-threatening DR.

Among people with diabetes, this translates to an overall prevalence of 34.6% for any DR, 7.0% for proliferative DR, 6.8% for DME, and 10.2% for sight-threatening DR. Pooled analyses showed no difference in prevalence between men and women. Asians had the lowest prevalence and African Americans the highest.

DR was considered to be relatively infrequent in developing countries such as India and China; however changes in economies, diet, and longevity mean these nations now have as much, or more, DR than fully developed countries [12]. A recent study from rural China reported disturbingly high rates of DR among people with diabetes: 43% for any DR and 3.5% for DME [13]. These levels are significantly higher than those for urban Chinese: 37% for DR and 2.6% for DME.

2. Materials and Methods

2.1. Study Design

Hospital based cross-sectional study.

2.2. Study setting

The study was carried out among diabetic patients presented to Makkah Eye Complex (MEC). MEC is a tertiary specialized ophthalmic hospital located at Alreyad, Khartoum- Sudan, established on 2003.

MEC consist of more than 28 examination rooms, ophthalmic diagnostic imaging department, eight surgical operation rooms, lab, and internal medicine department that deals with preoperative and postoperative patients health assessment. Almost all subspecialties in eye care services are available at this hospital including general outpatient, retinal, diabetic eye, cataract, glaucoma, cornea, pediatric, squint, orbit and oculoplastic departments.

The monthly average of total patient attending the outpatient and special clinics is about 24000 patients and the average surgeries per month is about 2200 surgeries according to the hospital records.

2.3. Study duration

6/2/2016 to 10/4/2016.

2.4. Study population

The population of this study was diabetic patients with diabetic retinopathy attending Makkah Eye Complex clinics in Khartoum- Sudan.

2.4.1. Inclusion criteria

- Diabetic patients with diabetic retinopathy.
- Sudanese patients.
- Males and females.
- Adult patients (18 years & above)

2.4.2. Exclusion criteria

- Non Sudanese patients.
- Pediatric patients.
- Patients with unclear media which interfere with visualization of the fundus (e.g. corneal opacity, cataract...etc.).

2.5. Methods of data collection

2.5.1. List of study variables

- Age in years.
- Gender.
- Duration of onset of diabetes mellitus.
- Control practices of diabetes as regards therapy, diet and regular follow up.

2.5.2. Data collection instrument

2.5.2.1. Outlines of the data collection instrument

Data were collected using a pre-coded, pre-tested administered close ended questionnaire.

2.5.2.2. Pre-testing of the questionnaire

The questionnaire was pretested using pilot survey method among 5 participants from the targeted group with insuring not to be included in the group of the study.

2.5.3. Sample size and the sampling technique

- The sample size was estimated by using the formula $n = \frac{N}{1 + N(d)^2}$ where n = sample size, N = population and D = level of precision.

$$n = \frac{676}{1 + 676(0.05)^2} = \underline{\underline{251}}.$$

2.5.4. Sampling technique

- Simple random sampling by selecting patients with Diabetic retinopathy from those attending retina clinics and fulfilling the inclusion criteria.

2.6. Ethical considerations

- An ethical clearance was obtained from the Institutional Review Board at Elneelain University.
- A permission from the hospital research committee.
- An informed consent from each participant prior to interview.
- I was ensured that the entire participants were given my phone number or one of the data collectors to clarify queries if any.
- All data was anonymised once it had been collected. The original list of participants was held by the primary researcher only.

All field assistants were trained in matters of confidentiality and they had access to primary data only when it was necessary – for example when discussing data. All data was kept in a locked cabinet and computer used was password protected.

3. Results

- The main age group affected was between 55 and 64 years old (Table 1).
- Participants with Diabetes for more than 20 years represented the highest percentage (Figure 1).
- 44% of the study group was of poor Diabetes control (Figure 2).

Table 1: Age group of the study participants:

Age group in years	Frequency	Percentage
35-44 years	18	7
45-54 years	58	23
55-64 years	91	36
65+ years	84	33
Total	251	100

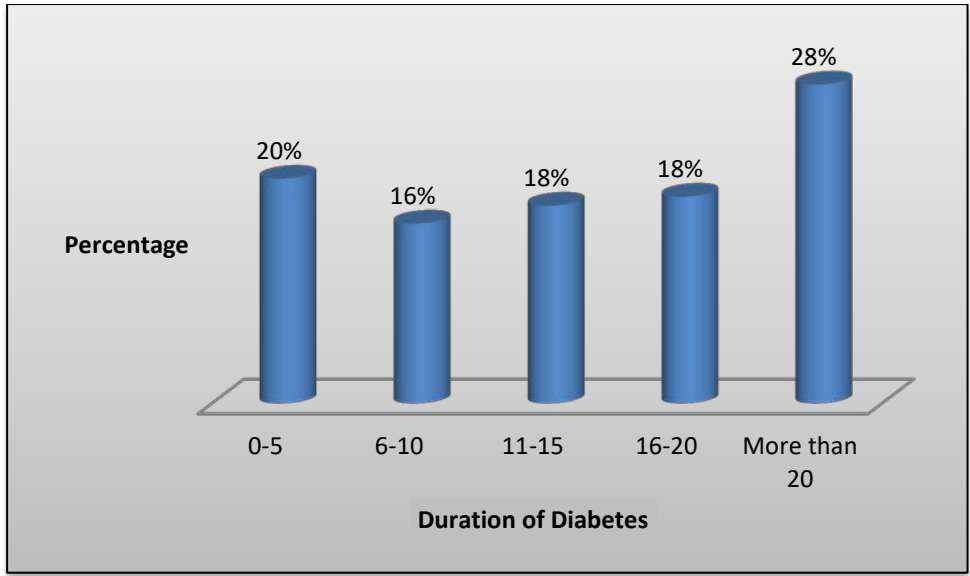


Figure 1: Duration of Diabetes among study participants (in years) Participants with diabetes for more than 20 years represented the highest percentage.

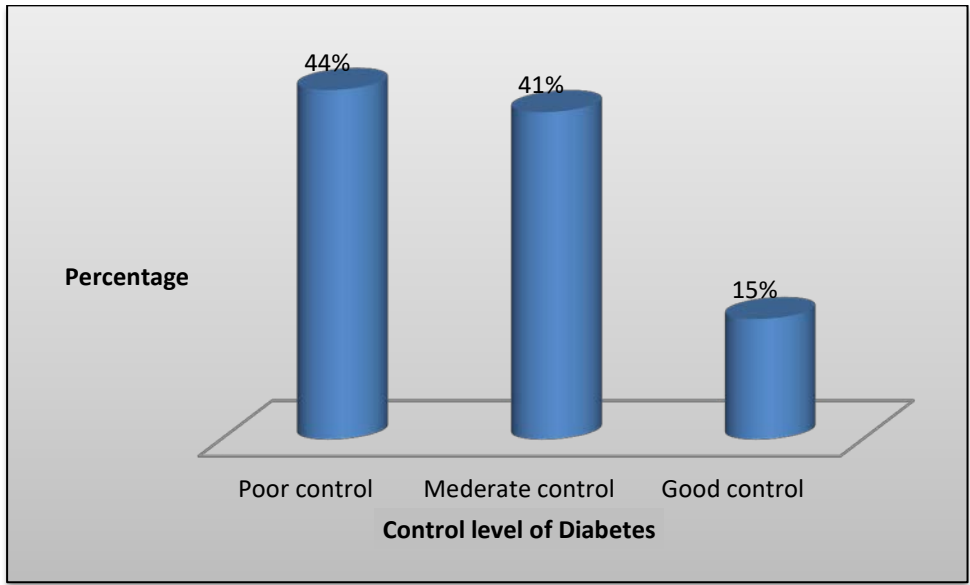


Figure 2: Diabetic retinopathy according to control of Diabetes 44% of the study participants had poor control of diabetes.

4. Discussion

This study was conducted to identify the major risk factors of DR aiming to reveal information for prevention and control. Candidates of this study were patients with DR confirmed by Fundus Photography.

This study revealed that the main age group affected is of 55-64 years old (36%) which is almost the same age group affected in other studies [14]. DR is a progressive disease that directly associated with longer duration of diabetes and prolonged periods of uncontrolled levels of glucose which could be the logical reason for higher

percentage in elder age group since it develops over long duration [15], although it may develop over short period of diabetes but prevalence increases with the longer duration starting from 8% at 3 years with DM to 80% at 15 years of DM [16].

The study yielded that 28% of the participants have DM for more than 20 years indicating that long duration of DM is a considerable risk factor for DR. Long duration of DM will affect the micro-vascular structures of the body and retina is of that important part with micro-vascular blood vessels thus long standing DM especially if it's uncontrolled will significantly affect the blood vessels of the retina. Zoungas S and his colleagues stated in their study that duration of DM is an independent risk factor for micro-vascular complication [17].

The control of DM was studied at three levels; poor, moderate and good control, DR was found to be strongly associated with the level of DM control illustrating 44% with poor control, 41% with moderate control while only 15% with good control indicating that good control of DM is of great value in prevention from DR and it is considered as the major modifiable risk factor of DR this study.

5. Conclusion

Among Sudanese participants of this study, it was observed that old age group (55-64 years), longer duration of DM and poor control of DM were significant associated risk factors of DR.

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