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PREVALENCE OF DIABETIC RETINOPATHY IN NEWLY DIAGNOSED TYPE II DIABETES MELLITUS PATIENTS IN BANGLADESH.

Endocrinology

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ABSTRACT

Objective: Diabetic retinopathy is a highly specific micro vascular complication of DM and remains the leading cause of blindness and visual impairment. Accurate information about the incidence of diabetic retinopathy and associated risk factors is important for prevention of its development. This study was designed to determine the prevalence of diabetic retinopathy in patients with newly diagnosed type 2 DM in Bangladesh as well as the factors associated with DR.

Methods: This study was conducted in the department of Endocrinology at Enam Medical College and Hospital from January 2016 to June 2016. A total of 101 newly diagnosed type 2 diabetic patients were evaluated for retinopathy by three experienced ophthalmologist. Fundus examination was performed using slit lamp indirect ophthalmoscopy after pupillary dilatation with 1% tropicamide drops.

Results: The prevalence of diabetic retinopathy was 10.89%.Non proliferative diabetic retinopathy (6.9%) was more common than proliferative retinopathy (3.96%).Indirect ophthalmoscopy was performed and data regarding risk factors were collected. Chi-square and Man Whitney U tests were used to analyze data. The prevalence of diabetic retinopathy was positively associated with Systolic Blood Pressure, Triglyceride, and post prandial blood glucose. Though Diastolic blood pressure,LDL,HDL,,Total cholesterol,FBS,HbA1c,S.creatinine have some positive association with diabetic retinopathy.

Conclusion: Diabetic retinopathy is common in newly diagnosed type 2 DM.Being a preventable and treatable complication if diagnosed and treated at earlier stages, a national strategy should be implemented to achieve the goal.

KEYWORDS

Diabetic retinopathy, prevalence, Type 2 DM

INTRODUCTION:

Diabetic retinopathy is one of the preventable causes of visual loss[1] It is one of the micro vascular complications of diabetes, which may not have symptoms in the early stages. Treatment can prevent visual loss, but requires early detection of retinopathy and careful monitoring.[2] Early photocoagulation was found to be beneficial to patients with sight threatening retinopathy[3-5]. Diabetic retinopathy screening is vital for diabetic patients for early detection and management of their retinopathy and to reduce the risk of sight threatening complications.

The prevalence of diabetic retinopathy in patients with newly diagnosed type 2 DM varies between 10% and 20% in population based studies.[6] Epidemiological studies of the impact of diabetic eye disease in developing countries are scarce. Accurate information regarding the incidence of diabetic retinopathy and associated risk factors is important in the prevention of its development.[7]

This study was undertaken to establish the prevalence of diabetic retinopathy and possible risk factors associated with diabetic retinopathy in newly diagnosed type 2 diabetic patients in Bangladesh.

MATERIALS AND METHODS:

The study was conducted in the department of Endocrinology, Enam Medical College and Hospital,Savar,Dhaka during the period of January 2016 to June 2016.It was a cross sectional study. The subjects were selected purposively. One hundred and one subjects with newly diagnosed type 2 diabetes aged 20-70 years were included in this study. Exclusion criteria include history of diabetes more than one year, presence of endocrine disorders other than Diabetes ,pregnant and lactating mother, patients receiving any medication that may alter blood glucose level, patients with known history of liver or renal disease, acute infection,. They were selected from outpatient clinic of endocrinology department at Enam Medical College on the basis of availability.

Selection of the subjects:

Study subjects were selected who were newly diagnosed diabetic patients according to ADA criteria. Diabetic patients labeled as newly diagnosed referred to those with a known duration of up to one year. Those who had history or clinical features of endocrinopathies,renal disease, liver disease, acute infection ,history of taking medication that may alter blood glucose level were excluded from the study. After primary selection, patients were referred to perform following investigation: SGPT, S.creatinine, fasting lipid profile, CBC, USG of whole abdomen to exclude renal disease, liver disease and acute infection. The patients were then referred to ophthalmology department for ophthalmological examination. The examination was performed by three experienced ophthalmologists. Visual acuity measurement and slit lamp examination were performed. Indirect ophthalmoscopy was done after papillary dilatation by tropicamide1%ophthalmic drops. The results of fundoscopy were recorded by the ophthalmologists and categorized as non-proliferative and proliferative retinopathy.

Study protocol was approved by local Ethical committee and all patients were briefed about the study and informed written consent was obtained. At baseline, demographic data were collected and a detailed physical examination was done. Sitting blood pressure was measured in both arms after at least ten minutes of rest with an appropriate sphygmomanometer.

Anthropometric measurement:

Standing height and weight was measured using appropriate scales.BMI was calculated using standard formula, BMI=weight (kg)/height (m^2).Waist circumference was measured at the plane between anterior superior iliac spine and lower costal margin at the narrowest part of the waist line on the midaxillary line while the patient was standing and at the end of normal expiration. It was measured with a soft non elastic measuring tape.

Blood sample collection:

Subjects were requested to fast at least eight hours and fasting venous blood sample was collected between 7am to 8 am. Serum fasting glucose was measured at the day of sample collection. Serum fasting lipid profile, SGPT, creatinine, CBC, HbA1c were measured within three days of sample collection.

STATISTICALANALYSIS:

Statistical analysis was made by using SPSS for windows 16 software package. All data were expressed as mean, SD, median and or percentage as appropriate. Chi-square test was used to test difference between groups. P level‹0.05 was considered significant and 95% confidence interval was calculated.

RESULTS:

The demographic and medical characteristics of patients are shown in table I. The overall prevalence of retinopathy in patients with newly diagnosed DM was 10.89 %(11of 101 patients); 7 with non-proliferative and 4 with proliferative retinopathy (PDR).

Table-1: Demographic characteristics of the study subjects (n=101)

Characteristics	Number	Percent	Mean±SD
Age			
20-35	30	29.7	43.7±11.1
36-45	34	33.7	
46-55	23	22.8	
56-70	14	13.9	
Gender			
Male	59	58.4	
Female	42	41.6	
Duration of DM			
Newly detected	90	89.1	
1-6 month	4	4.0	
7-12 month	7	6.9	
T0tal	101	100	
Height(cm)			159±8.7
Weight(kg)			64.9±20.9
BMI(kg/M2)			25.7±4.1
SBP(mmHg)			128.8±15.2
DBP(mmHg)			82.6±9.7
Waist Circumference(cm)			84.6±5.6
HDL(mg/dl)			37.8±8.2
LDL(mg/DL)			133.9±33.4
Triglyceride(mg/dl)			219.0±125.4
SGPT			42.8±24.9
FBS(mg/dl)			12.6±8.2
2hours after 75gm glucose(mg/dl)			17.9±7.1
HbA1c			10.3±2.4
S.creatinine			51.1± 36.3
USG			
Normal	33	32.7	
Fatty liver	68	67.3	

Mean±SD age(years) of study subjects was 43.7±11.1,Mean±SD BMI(kg/m^2) was 25.7±4.1,Mean±SD waist circumference(cm) was 84.6± 5.6,Mean ±SD HbA1c was 10.3±2.4, Mean ±SD SBP(mmHg) was 128.8±15.2, Mean ±SD DBP(mmHg) was 82.6±9.7;Lipidemic status (Mean ±SD,mg/dl) in terms of total cholesterol was 212.9±43.6, LDL cholesterol 133.9±33.4 and Triglyceride 219.0±125.4.

Table2: Possible risk factors in relation to diabetic retinopathy in newly diagnosed diabetic patients(n=101)

Risk factors	Diabetic patients without retinopathy (n=90) Mean ±SD	Diabetic patients with retinopathy (n=11) Mean ±SD	P value
Age	43.8±11.1	43.4±11.0	0.907
BMI(kg/m2)	25.7±4.2	25.1±3.1	0.610
SBP(mmHg)	127.7±14.7	137.3±17.4	0.048*
DBP(mmHg)	82.2±9.3	85.9±12.8	0.236
Waist circumference (cm)	84.7±5.7	84.0±4.6	0.701
Total cholesterol(mg/dl)	207.9±41.6	233±45.6	0.064
HDL(mg/dl)	37.4±8.2	40.8±7.9	0.193
LDL(mg/dl)	132.2±33.4	148.2±31.2	0.134
Triglyceride(mg/dl)	208.2±115.7	307.5±169.0	0.012*
FBG(mg/dl)	12.4±8.3	14.4±7.4	0.446
OGTT(2 hours after 75 gm glucose intake) mg/dl	17.4±6.4	23.0±11.4	0.044*
HbA1c(%)	10.2±2.4	11.4±2.1	0.124
S.creatinine(mg/dl)	49.2±36.6	64.5±33.2	0.269
SGPT(U/L)	41.9±22.8	50.3±38.4	0.293

P value measured by Unpaired student t-test,* significant

Systolic blood pressure, Triglyceride and postprandial blood glucose were significantly higher in patients with retinopathy. No significant difference was found in fasting plasma glucose, total cholesterol, HDL and LDL cholesterol, Waist circumference, DBP, BMI and age. Though DBP, Total cholesterol, HDL, LDL, FBG and HbA_1C, serum creatinine were slightly higher in retinopathy group.

Discussion:

Diabetes Mellitus is a group of metabolic disorder characterized by high blood glucose levels with disturbances of carbohydrate, fat and protein metabolism, resulting from either impaired insulin secretion or insulin action or both. Type 2 DM account for approximately 90-95% of those with diabetes. In recent years, Diabetes Mellitus appears to be a global health problem. It is one of the leading cause of death, disability and economic loss throughout the world[8]. Uncontrolled and poorly controlled diabetes increases the risk of micro and macro vascular complications like IHD,stroke,retinopathy, nephropathy, neuropathy etc.

According to WHO report there were 171 million people worldwide with DM in 2000 and predicted that 366 million people will have DM by 2030[8-9].The IDF has estimated that another 314 million persons have IGT that will increase to 472 million by 2030[8-9]In 2003,the worldwide prevalence of DM was estimated at 5.1% among people age 20-79, which will be 6.3% by 2025. WHO listed 10 countries to have the highest numbers of people with diabetes in 2000 and 2030[9].Bangladesh appears in the list for both 2000 and 2030 with India, Pakistan, China, Japan and USA etc. According to the report, Bangladesh has 3.2 million of diabetic subjects which will be 11.1 million by 2030.

Undiagnosed type 2 DM is not a benign condition. Clinically significant morbidity is present at diagnosis and for years before diagnosis.[10] Type 2 DM remains asymptomatic before clinical diagnosis. This asymptomatic period has been estimated to last at least 4-7 years, and consequently 30-50% of type 2 diabetic patients remain undiagnosed. Untreated hyperglycemia is an explanation for the relatively high prevalence of retinopathy in newly diagnosed diabetic patients.[11]

Diabetic retinopathy is a micro vascular disorder affecting the small blood vessels in the retina, which includes microaneurysms, retinal hemorrhages and hard exudates. The progression of retinopathy is gradual, advancing from mild abnormalities, characterized by increased vascular permeability, to moderate and severe non proliferative retinopathy, characterized by vascular closure. Worse progression of retinopathy is proliferative retinopathy where growth of new blood vessels occurs on the retina and posterior surface of the vitreous. Retinal micro vascular abnormality is the leading cause of visual disability or acquired blindness. If diagnosed and treated promptly, blindness is usually preventable. The diagnosis of diabetic retinopathy is made by retinal examination by ophthalmoscope which may be coupled with a fundus fluorescein angiography.

Globally, the incidence of diabetic retinopathy in newly diagnosed type 2 DM patients has varied widely - (2.6%),[12] (7.3%),[13] (l4.4%),[14] (21%),[15] (25.5%),[16] (39% in men, 35% in women),[17] and (55%)[18] - depending on the methodology and population sample. Retinopathy is responsible for 5% cases of blindness throughout the world(According to WHO).Retinal disease is more frequent cause of blindness in developing countries[8].Worldwide the prevalence of retinopathy is increasing at an alarming rate possibly due to low priority in the prevention of blindness programs in developing countries.

The excellent and very detailed Andhra Pradesh Eye Disease Study (APEDS) found that retinal diseases were a much more common cause of adult blindness in India [19].As a result of the increasing trend of DM, as well as growing problem of undetected cases of DM in developing countries, the number of people with diabetic complications like diabetic retinopathy will continue to rise. There have been many epidemiological studies assessing the prevalence of diabetic retinopathy. About half of the people with diabetes in the USA have at least some form of retinopathy[20].In western Europe DR has been

reported to the most common cause of blindness among people in working age group. In India DR was the 17th cause of blindness20 years ago; today it has ascended to the 6th position. However, in the Chennai Urban Rural Epidemiology Eye Study (CURES) found the overall prevalence of DR was 17.6%.

In Bangladesh, the prevalence of diabetic retinopathy among diabetic patients was reported at 21.6%.The prevalence of DR in our study group was within the limits of the international rates, but still it was lower than anticipated. This might be due to the fact that findings obtained by indirect ophthalmoscopy and indirect slit lamp biomicroscopy, which are less sensitive than fundus fluorescein angiography and fundus photography at detecting DR at earlier stages.[21,22]

In our study, the presence of sight threatening diabetic retinopathy (severe non-proliferative diabetic retinopathy, proliferative diabetic retinopathy or macular oedema) was detected in 11patients out of 101(10.89 %), which is within the limits of the international rates.

Table-3: Prevalence of diabetic retinopathy

Study subjects	101	100%
NPDR	7	6.93%
PDR	4	3.96%
Total	11	10.89%

The lack of screening programs to detect type 2 DM patients, resulting in late diagnosis and treatment initiation with progression of complications, might be the cause behind this phenomenon. This is supported by studies stating that approximately one third of asymptomatic patients with type 2 DM are undiagnosed,[23,24]and some are miss-classified as type 1 DM as in many young patients with severe hyperglycemia.[25]

The incidence and progression of DR can be reduced by optimal metabolic control. Laser photocoagulation therapy is effective in reducing DR progression and early vitrectomy can prevent severe vision loss in patients with advanced stages of DR. This goal could be achieved with cooperation of all those who are in contact with the diabetic patients, namely, general physicians, endocrinologists, ophthalmologist and trained Para-medical personnel. To accomplish this, an appropriate, cost-effective, national strategy should be implemented with the following goals:

1. Screening and early detection of type 2 DM.
2. Intensive glycemic control of type 2 DM.
3. Screening and early detection of DR in newly diagnosed type 2 DM patients, and initiation of treatment with photocoagulation for sight threatening DR.
4. Lifestyle modification of DM patients, to achieve good glycemic control and appropriate weight through healthier food consumption habits and physical activity programs.

Failure of early detection of diabetic retinopathy will increase the burden for the health care system due to the high cost of treatment and disability payments.

Limitations of the study

Use of fundus photography and fluorescein angiography, which have a higher sensitivity rate for detection of diabetic retinopathy, was restricted due to the high cost of these procedures.

Conclusion:

Diabetic Retinopathy, the potential sight threatening condition, is a significant public health problem all over the world. It is a common finding in patients with newly diagnosed type 2 DM.However this morbidity is largely preventable and treatable if diagnosed and treated earlier stages.DR is significantly associated with impairment of vision and blindness. The socioeconomic burden resulting from diabetic retinopathy is a serious concern. So a national strategy should be implemented to achieve this goal.

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