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Prevalence and Risk Factors of Diabetic Retinopathy in Diabetic Patients Visiting a Medical College Hospital in Telangana, India

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Abstract

Aims: To study the prevalence and risk factors of diabetic retinopathy in diabetic patients attending a medical college hospital inTelangana. *Methods:* A total of 630 diabetic patients were evaluated for presence of diabetic retinopathy. Diabetic retinopathy is classified into non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR). Various risk factors associated with diabetic retinopathy were recorded. Investigations included, blood sugar, serum lipids, complete blood count, ECG, Renal function tests. *Results:* DR was detected in 84 patients (13.3%). NPDR was seen in 78 patients (12.4%) and PDR in 6 patients (0.9%). It was found that level of glycemic control and duration of diabetes, hyperlipidemia were important risk factors for the occurrence of retinopathy. *Conclusion:* Strict glycemic control, lowering of serum lipids is effective in lowering the incidence of retinopathy in diabetic patients. Hypertension was not related to the occurrence of retinopathy. Efforts should be made to find out more risk factors in diabetic retinopathy.

Keywords: Diabetic Retinopathy; Prevalence; Risk Factors.

Introduction

Among all the countries of the world, India has the highest number of diabetic patients according to statistics from the International Diabetes Federation (IDF). As per 2015 data of IDF India had 69.1 million diabetics. By the year 2030, over 100 million people in India are likely to suffer from diabetes [1].

Indians are more susceptible to diabetes mellitus due to various factors. Genetics plays an important role and it is said that in general Indians are four times more likely to develop diabetes than Europeans, based solely on genetic basis. Also there are many social and cultural contributors like diet that is rich in carbohydrates and saturated fats. Indian diet has excess of calories and sugar leading to obesity, which is a risk factor for diabetes. Migration of people from rural areas to urban areas and also change in lifestyle are important factors. The younger generations tend to have a sedentary lifestyle and excess consumption of processed sugary foods thereby increasing the risk of diabetes.

Diabetic Retinopathy is the leading cause of blindness in India both in urban and rural population. The increasing prevalence of diabetes mellitus (DM) in India emphasizes need for epidemiologic studies on diabetes-related complications [2]. Diabetic retinopathy (DR) is one of the complications of diabetes, which affects the microvasculature of retina. It is the leading cause for visual impairment. It is shown to cause visual impairment in more than 86% type 1 diabetic patients and in 33% type 2 diabetic patients [3,4]. In epidemiological studies which have been done in the past, it has been seen that nearly all type 1patients and 75% type 2 patients develop DR within 15 to 20 years of being diagnosed as having DM [5].

Prevalence of DR in India varies from study to study. Raman et al found a prevalence of retinopathy in 18% in diabetic population whereas Agrawal et al found a prevalence of 28.9% in type 2 diabetic population [6,7]. Some population

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and hospital based studies have been conducted in northern [7] and southern [8] parts of India to estimate the prevalence of DR in type 2 diabetic population. There is paucity in the literature regarding the prevalence of diabetic retinopathy in South Indian population. With above context, a hospital-based, cross-sectional study was designed to find out prevalence of diabetic retinopathy and also the risk factors of DR in the diabetic population.

Aim of the study

To study the prevalence and risk factors for diabetic retinopathy in diabetic patients attending a medical college hospital in Telangana.

Materials and Methods

This was a prospective study conducted in the department of Ophthalmology at Kamineni Academy of Medical Sciences, Hyderabad over a period of one year from

In this study a total of 630 individuals with history of diabetes mellitus for more than 3 months were included. All the cases were from out-patient department of Ophthalmology from our institute. Institutional ethics committee clearance was obtained before starting the study. Informed consent was obtained from all the patients.

These 630 diabetic patients who reported for check-up were examined as out-patients for the presence or absence of diabetic retinopathy. A full medical history was taken including age of patient, duration of diabetes, treatment details, history of hypertension, and hyperlipidemia. Fasting blood glucose of each patient was estimated after an overnight fast of eight hours. Diabetic control was graded as Normal (<100 mg/ dl), Moderate control (100-126 mg/dl) and High (>126 mg/dl). Glycosylated hemoglobin assay was done in all the cases. Hypertension was recorded to be present when the systolic blood pressure was > 140 mm Hg or when diastolic blood pressure was >90 mm Hg or when patient gave history of hypertension controlled with medications. Hyperlipidemia was graded as present when total cholesterol was > 200 mg/ dl or when patient was on medications for hyperlipidemia. Data on demographic variables (age, gender, race) smoking status, diet, physical activity level and family history of diabetes were obtained by direct interview. Visual acuity and slit lamp examination and intraocular pressure (IOP) recording was done in all the patients. The pupil of each eye was dilated using tropicamide (0.5%) and phenylephrine 10% eye drops followed by detailed fundus examination with direct and indirect ophthalmoscopy. Binocular indirect ophthalmoscopy was done with a 20 D lens with the patient in supine position. Findings were noted and patients were categorized according to findings; as to whether diabetic retinopathy was present or absent. If present, retinopathy was classified according to non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR). Presence of diabetic macular edema was noted. If present, it was further classified into clinically significant macular edema (CSME) or non-significant. DR patients were classified according to the grading in the worse eye.

Observations and Results

Of the 630 diabetic patients, 536 (85%) were males and 94 (14%) were females.

Table 1: Percentage distribution of the sample according to age.

Age (in years)	No. of cases	Percentage (%)
31 – 40	48	7.6%
41 – 50	155	24.6%
51 – 60	287	45.5%
61 – 70	118	18.7%
71 – 80	22	3.4%
Total	630	100%

Most commonly affected age group was 51 to 60 years with 45.5% cases (Table 1).

Type of retinopathy: DR was detected in total 84 (13.3%) patients. Of this Non-proliferative DR (NPDR) was present in 78 (12.4%) and Proliferative DR (PDR) in 6 patients (0.9%)

Table 2: Comparison of diabetic retinopathy based on duration of diabetes

Duration of diabetes (in years)	No. of cases with diabetes	DR absent		DR present	
		No. of cases	Percentage (%)	No. of cases	Percentage (%)
0 - 5	199	190	95.5	9	4.5
6 - 10	285	251	84.6	34	15.4
11 - 15	77	61	79.3	16	20.7
16 - 20	46	31	67.4	15	32.6
>20	23	13	56.6	10	43.4
Total	630	546	86.6%	84	13.3%

The highest risk for development of diabetic retinopathy was in those patients having diabetes for > 10 years. There was significant association between duration of diabetes and development of diabetic retinopathy (Table 2).

Diabetes and hypertension: A total of 294 (46.6%) patients with diabetes had associated hypertension and of this 42 (14.2%) patients had DR. There was no significant association between DR and hypertension in this study.

Table 3: Comparison of diabetic retinopathy based on hyperlipidemia

Hyperlipidemia	No. of cases with diabetes	DR absent		DR present	
		No. of cases	Percent (%)	No. of cases	Percent (%)
Present	70	39	55.7%	31	44.3%
Absent	566	510	90.6%	53	9.4%
Total	630	549	87.1%	84	13.3%

Of the total diabetics 70 (11.1%) had hyperlipidemia. Of this 31 (44.3%) patients had diabetic retinopathy. There was significant association between hyperlipidemia and DR

Table 4: Comparison of diabetic retinopathy based on fasting blood glucose

FBS	No. of cases with diabetes	DR absent		DR present	
		No. of cases	Percent (%)	No. of cases	Percent (%)
Normal	238	230	96.6%	8	3.4%
Moderate control	190	170	89.5%	20	10.5%
High	202	146	72.3%	56	27.7%
Total	630	546	86.6%	84	13.3%

The incidence of diabetic retinopathy was more in uncontrolled diabetics

Discussion

Diabetic retinopathy is one of the few ophthalmic diseases that have a defined preventive measure to delay progression of the disease and consequent visual loss. Apart from visual morbidity, presence of diabetic retinopathy may indicate microcirculatory dysfunction in other organ systems [9,10].

Narendran et al [11] studied diabetic retinopathy in urban and rural south Indian population and found a prevalence of 26.2%. The Chennai Urban Rural Epidemiology study (CURES 1) reported a prevalence rate of 17.6% which is much lower than in other groups [8]. In a study from south India, the prevalence of diabetic retinopathy in type 2 diabetics in urban locations was 10.84% [12]. Mahesh et al have shown prevalence of diabetic retinopathy as 20.12% in urban and rural South India [13].

In the present study, we observed diabetic retinopathy in 13.3 % patients which is lower compared to most studies. It may be due to racial and demographic factors. Guidelines issued by the Vision 2020 and developed by Aravind eye care system had estimated prevalence for diabetic retinopathy as 11% in all cases of diabetes mellitus for all states in India for 2007 [14].

Specificity of direct and indirect ophthalmoscopy used in this study to detect retinopathy is high but sensitivity is low (34-50%) particularly for early retinopathy. Systematic screening for retinopathy using automated retinal image analysis is emerging as an important screening tool for early detection of diabetic retinopathy [15].

In this study a number of risk factors were investigated and it was found that many were significantly related to retinopathy. These included duration of diabetes, presence of hyperlipidemia and increased level of fasting blood sugar.

Increase in prevalence of diabetes mellitus in Indian urban population has been observed due to life style changes that are related to changes in socioeconomic status as well [16]. Several studies from the world and India have also tried to find out prevalence of different complications of diabetes mellitus.

Duration of diabetes and retinopathy are closely associated. A study by Raman et al showed that the duration of diabetes was single most common predictor which affected severity of diabetic retinopathy [6]. According to our findings, diabetic retinopathy may appear as early as 0-5 years of having diabetes and more than 43% of patients develop retinopathy after 20 years of having the disease. So our study shows duration of diabetes is definitely a risk factor for developing diabetic retinopathy. The results also suggest that annual retinal examination and early detection of diabetic retinopathy could considerably reduce the risk of visual loss in diabetic patients.

Some studies indicated that hypertension was a risk factor for retinopathy in diabetes mellitus [17,18].

The UK Prospective Diabetes Study (UKPDS) reported that intensive control of blood pressure significantly reduced the incidence of diabetic retinopathy [19]. In the present study, hypertension was not a significant risk factor for diabetic retinopathy. This difference in our study may be probably due to good control of hypertension.

The degree of glycemic control proved to be an important factor in our study consistent with other studies. Many studies have shown that higher plasma glucose level can be considered a significant risk factor for diabetic retinopathy [20,21,22].

Our study showed significant association of hyperlipidemia (Total cholesterol) and retinopathy which is consistent with some studies. In the Chennai urban rural epidemiological study, serum lipids were higher in patients with diabetic retinopathy than those without retinopathy [8]. There are conflicting reports in the literature regarding the effect of lipid profile on retinopathy.

The limitations of our study were that it was a cross-sectional investigation and the sample size was small. Fundus fluorescein angiography was not used to find out diabetic retinopathy.

Conclusion

More screening camps to detect diabetic retinopathy should be done to have a population based research. Awareness about retinopathy, good control of blood sugar and cholesterol will decrease the incidence of diabetic retinopathy. Hypertention is not the risk factor.

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