



PREVALENCE OF DIABETIC RETINOPATHY AMONG CHILDREN WITH TYPE 1 DIABETES MELLITUS TREATED BY INSULIN

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ABSTRACT **BACKGROUND-** This study to find out the prevalence of diabetic retinopathy (DR) among diabetic children with type 1 DM treated with insulin.

METHODS- This is a cross-sectional study conducted on 100 children with type 1 DM from 1 to 16 years of age. All patients were subjected to full fundus examination and were then classified according to its results into patients with DR and patients without DR.

RESULTS- The mean age of the patients was 9.42±1.31 years and 56.00% were males. DR was found in 10 (10.00%) patients, seven of whom had retinopathy in one eye and three had retinopathy in both eyes. Mild nonproliferative DR was found in 11 eyes and moderate DR was found in 2 eyes.

CONCLUSION- The prevalence of DR was 10.0% among all studied patients and 6.50% among all studied eyes. The grade of retinopathy was directly related to the duration of DM, fasting blood glucose, and glycosylated hemoglobin levels.

KEYWORDS : DM, DR, FBS

INTRODUCTION

Diabetes represents a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both. Among children, diabetes is the third most frequent chronic disease and autoimmune type 1 diabetes (T1D) is the most often. Chronic hyperglycemia causes the failure and impairment of organs such as the eyes, kidneys, nerves, or heart. Diabetic eye disease covers all diabetes complications affecting the eyes, out of which diabetic retinopathy (DR) is the most severe one that carries the risk of blindness, besides cataract and secondary glaucoma that are the most important clinical entities.¹

Nowadays children are within the group of low risk of developing DR; however, the related literature refers to the cases of adolescents with diabetic macular oedema, or even proliferative DR (PDR).²⁻⁴ The prevalence of DR in the pediatric population was shown in range between 2.3% and 57.6%.⁵ In the study of 4172 patients with diagnosed T1D from 12 years of age, the background DR was 26.7%, initial DR was 10.7%, and proliferative DR was 4.1%.⁵

There are many guidelines for the screening of pediatric DR. However, they are more or less similar in giving annual screening recommendation after 3–5 years of the initial diagnosis of the disease.⁶ This work was conducted to study the prevalence of DR among diabetic children having type 1 DM treated with insulin.

MATERIAL AND METHODS

Type of study- Cross sectional descriptive analytical study.

Study population- 100 children with type 1 DM

Study palace - Department of Ophthalmology & Department of Pediatrics in SMS Medical College, Jaipur, Rajasthan (India).

INCLUSION CRITERIA:

- Age from 1 to 16 years old.
- Type 1 DM; treated by insulin, documented by increased blood glucose level, increased HbA1c, low C-peptide levels and weight within normal percentiles.

EXCLUSION CRITERIA:

- Type 2 DM.

All the cases were subjected to complete physical examination, anthropometric measures (weight, height, etc.), and biochemical examination [HbA1c, T4, thyroid-stimulating hormone (TSH), anti-tissue transglutaminase and urine for microalbuminuria].

Fundus examination was done by indirect ophthalmoscopy (under sedation if required) or slit lamp biomicroscopy using 90 D noncontact lens. It included examination of the optic disc, macula, retinal blood vessels, background, and fundus periphery to detect any signs of DR. The central macular thickness was measured by SD-OCT.

DATA ANALYSIS:

Data was recorded as per Performa. The data analysis was computer based; SPSS-22 was used for analysis. For categorical variables chi-square test was used. For continuous variables independent samples's *t*-test was used. *p*-value <0.05 was considered as significant.

RESULTS

Table 1 Patients characteristics

Age in yrs	9.42±1.31
Male : Female	56 : 44
BMI in kg/m ²	21.32±4.12
Duration of DM in yrs	4.62 ±1.26 Yrs
FBS in mg/dl	210.32±42.13
Hb1Ac	8.12 ± 0.66 (6.0–9.0)
Patients with retinopathy	10/100 (10.00%)
Eyes with retinopathy	13/200(6.5%)
Affection (unilateral : Bilateral)	7 : 3
Degree of retinopathy (Mild : Moderate)	11 : 2

A total of 10 (10.0%) patients were found to have DR. 7 patients had retinopathy in one eye and 3 patients had retinopathy in both eyes. Thus, the total number of eyes with retinopathy was 13 of 200 screened eyes (6.5% of all eyes). Most eyes with retinopathy had a mild degree of NPDR, as it was present in 11 eyes. The other 2 eyes had moderate degree of retinopathy.

Table 2. Co-relation between grade of retinopathy and characteristic

Characteristics	Grade of retinopathy	
	r-value	p-value
Age	0.12	>0.05
Duration of DM	0.34	<0.01
FBS	0.38	<0.01
Hb1Ac	0.43	<0.01
BMI	0.13	>0.05

DISCUSSION

DR is a potentially blinding complication of diabetes especially in children and young adults, hence the importance of screening and routine

fundus examination.⁷ In the past few years, routine fundus examination has been added to the health insurance system for adults in Egypt. However, routine screening in the young age is still facing difficulties, may be because of caregiverincompliance or the incompliance of the child parents themselves. Among the 100 screened children, 10 (10.0%) children were found to have DR in varying degrees. Three patients had bilateral DR and the other seven had unilateral DR, which equals 16 (6.5%) eyes with DR among the 200 screened eyes. Close results were stated by Silverstein et al.⁹ In their statement of the American Diabetes Association about the care of children and adolescents with type 1 diabetes. They stated that retinopathy usually starts after puberty in those children. However, pre-Diabetes Control and Complications Trial found that 9.0% of children younger than 13 years had background DR with very low incidence of PDR. They recommended ophthalmological screening after the age of 10 years and for children who have diabetes for 3–5 years.

A study published more recently in the year 2015 by Tapley et al.¹⁰ reported a lower prevalence rate than the current study. They studied 236 pediatric patients with either type 1 or type 2 DM and 5.5 years as a mean duration of DM. They detected DR in 3.8% of participants.

In addition, Kernell et al.¹¹, in 1997, detected retinopathy in 5% of patients between 8 and 10 years of age, which is less than our results. However, a higher prevalence of DR was found by Eppens et al.,¹² who found DR in 254 (20.0%) of 1264 patients with type 1 DM, with a mean age of 15.7 years.

CONCLUSION

The prevalence of DR was 10.0% among all studied patients and 6.50% among all studied eyes. The grade of retinopathy was directly related to the duration of DM, fasting blood glucose, and glycosylated hemoglobin levels.

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