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Dyslipidemia as a Risk Factor in Diabetic Retinopathy: A Cross-Sectional Study

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ABSTRACT

To evaluate the association of dyslipidemia as a risk factor of retinopathy in a population based study on a specific age group of patients with DM-2 with retinal hard exudates formation, the occurrence clinically significant macular edema (CSME), occurrence and severity of diabetic retinopathy (DR) and loss of vision in type 2 diabetics. Type 2 diabetic patients seeking ocular evaluation for diabetic retinopathy were included in this cross-sectional study. They were assessed for presence and severity of diabetic retinopathy (DR), presence of hard exudates, clinically significant macular oedema (CSME) and best corrected visual acuity (BCVA). Retinal findings were correlated to serum lipids levels using univariate and multivariate analysis. Totally 100 patients were included, of which 42/100 had diabetic retinopathy of any grade. Retinal hard exudate formation, was found to have statistically significant correlation with the presence of hyperlipidemia (p=0.02), increased total cholesterol (p=0.002) and LDL levels (p=0.001). On multivariate analysis, after correcting for duration, glycemic control and albuminuria, increased cholesterol remained significantly associated with increased hard exudate formation (p=0.02). Elevated cholesterol also showed independent association with visual loss (p=0.04). The occurrence CSME showed a statistically significant correlation with hyperlipidemia (p=0.04) and increased LDL levels (0.04), which did not persist on multivariate analysis. However the there was no correlation with the occurrence and severity of diabetic retinopathy. Dyslipidemia showed a significant association in diabetic retinopathy with retinal hard exudate formation, CSME and loss of vision in type 2 diabetics. Lipid lowering agents may help in reducing the occurrence of these retinal findings and loss of vision in diabetic patients.
Keywords: dyslipidemia, diabetic, retinopathy

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INTRODUCTION

Diabetic retinopathy is a leading cause of irreversible blindness. While correlation between the various components of serum lipids and increased hard exudate formation and clinically significant macular edema (CSME) has been demonstrated by some studies, others have failed to do so. In addition the role of hyperlipidemia in the in the severity of retinopathy is still unclear. The aim of this study was to evaluate To evaluate the association of serum lipid levels and degree of retinopathy in a population based study on a specific age group of patients with DM-2with retinal hard exudate formation, CSME and the occurrence and increasing severity of diabetic retinopathy.

MATERIALS AND METHODS

STUDY POPULATION

One hundred adults with type II Diabetes patients, with an age range of 32-85 yrs and mean (SD) of 56.41(+9.91) years were recruited from the department of ophthalmology of our tertiary care hospital, over a period of 2 months, from May 2013 to June 2013 for evaluation and management of diabetic retinopathy (DR), after an informed consent was obtained from all the participants into this cross sectional study.

Inclusion criteria were as follows:

1. Type 2 diabetes
2. Fitness to undergo a dilated fundus examination and fundus photograph.
3. No gender specificity

Exclusion criteria were as follows:

1. Pregnancy,
2. Accelerated hypertension,
3. Active infection,
4. Co-existing ocular disorders like uveitis, opaque or hazy media
5. Retinal disorders like retinal vein/artery occlusions, retinitis pigmentosa,
6. Vitreo-retinal degenerations and dystrophies,
7. High myopia and
8. Recent ocular surgeries (< 6months).

Best-corrected visual acuity (BCVA) was assessed using illuminated Snellen's Chart. The BCVA of the worst eye was utilized for analysis converting it to decimal equivalent for the purposes of statistical analysis. Detailed fundoscopy was done both with indirect ophthalmoscope with 20D lens and slit lamp biomicroscopy with 78D lens.

Patients were divided into two groups; Group 0: without retinopathy, Group 1: with retinopathy of any stage, for the purpose of deriving the occurrence of retinopathy. For grading the severity of retinopathy, Group I patients were further grouped using the modified Early Treatment of Diabetic Retinopathy Study (ETDRS) protocol as follows:

Group 1 patient with mild-moderate non-proliferative diabetic retinopathy (NPDR), Group 2 patients with severe NPDR and Group 3 patients with proliferative diabetic retinopathy (PDR).

Grading of hard exudates was done based on Wisconsin Grading, by comparing patients retinal findings with the standard photographic plates 3, 4 and 5. Then they were grouped as Group 0 no retinopathy, Group 1 patients with retinopathy but no hard exudate, Group 2 patients with retinopathy but hard exudates less than or equal to standard plate3, Group 3 less than or equivalent to standard plate 5 and Group 4 less than or equivalent to plate 4.

Patients were assessed for the presence of clinically significant macular edema using slit-lamp biomicroscopy assessment with a 78D lens. The definition utilized in diagnosing CSME was the presence of one or more of the following

1. Retinal thickening at or within 500 micron of center of macula
2. Hard exudates at or within 500 micron of center of the macula if associated with adjacent retinal thickening.
3. Zone or zones of retinal thickening 1 disc area in size, at least part of which is within one disc diameter of center of macula.

Patients were then grouped as either Group 0 no retinopathy, Group 1 retinopathy present but no features of CSME and Group 2 CSME present.

Serum lipid measurements were done using fasting samples, to analyze total cholesterol, cholesterol components and triglycerides utilizing the Dade Dimension Series using photometric enzymatic method. For the purpose of analysis hyperlipidemia was defined as serum total cholesterol >160mg/dl, Triglyceride levels >150mg/dl, LDL levels >100mg/dl and HDL<40 for men and <50 for women mg/dl according to NCEP Expert Panel. Statistical analysis was done using SPSS version 10 statistical package.

RESULTS

Totally 100 patients fulfilling the inclusion criteria were included in the analysis. There were 64 males and 36 females, with an age range of 32-85 yrs and mean (SD) of 56.41(+9.91) years. hyperlipidemia was present in 46/100 (45.5%) patients. Diabetic retinopathy of any severity was found in 43/100(42.7%) patients, with mild to moderate NPDR in 26/100 (26.1%), severe NPDR in 8/100 (8.4%) and PDR in 8/100(8.2%). Of the 43 with diabetic retinopathy, 17/43 had mild hard exudate formation and 42/43 had grade 2 or harder exudate formation. CSME was present in 17/43 (39.5%)

Retinal hard exudate formation was found to have statistically significant correlation with the presence of hyperlipidemia (p=0.02), increased total cholesterol (p=0.002) and LDL levels (p=0.001) and the correlation with triglyceride levels showed a trend towards significance (p=0.07) On multivariate analysis, increased total cholesterol showed a statistically significant association with increased retinal hard exudate formation (p=0.02), whilst the other variables did not. The occurrence CSME showed a statistically significant

correlation with hyperlipidemia (*p*=0.04) and increased LDL levels (0.04), which did not persist on multivariate analysis.

The occurrences of hyperlipidemia didnot show a statistically significant correlation with the occurrence and increasing severity of diabetic retinopathy. Elevated total cholesterol also showed a statistically significant correlation with decreased BCVA (*p*=0.01) and this association remained, even on multivariate analysis (*p*=0.02). The correlation of elevated LDL with decreased BCVA showed a trend towards significance (*p*=0.06).

DISCUSSION

In our study we have found that elevated cholesterol were significantly associated with retinal hard exudate and reduced visual acuity. Elevated LDL cholesterol and presence of dyslipidemia showed association with CSME and retinal hard exudates. These find concurrence with studies like the ETDRS [1] and WESDR,[2] while they contrast with findings of Aus Diab study [3].

Like the results of our study, the WESDR study did not find a correlation between serum lipids and the incidence and increasing severity of diabetic retinopathy. The Diabetes Control and Complications Trial (DCCT) however showed a relationship with the occurrence of retinopathy and elevated very low and low density lipoproteins [4]. In some of our patients even with grossly abnormal lipids there was retinopathy indicating that abnormal lipids may not be the only risk factor.

Some recent studies have shown lipid lowering drugs to significantly cause regression of hard exudates deposits and improvement in vision [5]. Although the existing data including ours is observational, they suggest serum lipid lowering may help in preventing visual loss. In conclusion our study findings has added to the growing evidence that hyperlipidemia and specifically increased total cholesterol and LDL are significant risk factors for the development of retinal hard exudates, CSME and decreased vision. Preserving vision may be an additional motivating factor for lowering serum lipids.

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