1. Introduction

Diabetes is a chronic disease, which occurs when the pancreas does not produce enough insulin, or when the body cannot effectively use the insulin it produces. This leads to an increased concentration of glucose in the blood (hyperglycaemia). Diabetes mellitus (DM) may be caused by insulin resistance, insulin deficiency, or a combination of both. Pancreatectomy, pancreatitis, alcoholic chronic pancreatitis, hemochromatosis, cystic fibrosis, mitochondrial DNA mutations, or by drugs/toxins may lead to insulin deficiency. Insulin deficiency may lead to type 1 diabetes mellitus (T1DM) which may be autoimmune or idiopathic in nature and is present in 9% cases of insulin deficiency. Insulin resistance may also be caused by autoimmune diseases, lipodystrophy, or endocrinopathies including glucagonoma, pheochromocytoma, acromegaly, Cushing’s syndrome, and...
Clinically significant macular edema (CSME) is a form of thickening within 500 μm of the centre of the macula, if associated with thickening of the adjacent retina (not residual hard exudates remaining after the disappearance of retinal thickening of macular oedema). 3) A zone, or zones, of retinal thickening 1 disc area or larger, any part of which is within 1 disc diameter (1 disc diameter = 1500 μm) of the centre of the macula.

Currently, OCT is the most important test in evaluation and management of diabetic macular edema. OCT can determine whether diabetic macular edema is centre-involving or non centre-involving, which has become an important distinction in the era of anti-VEGF therapy.7,8

Metabolic syndrome (MetS), defined as a constellation of metabolic abnormalities with obesity, glucose intolerance, hypertension, elevated triglyceride (TG), and low level of high density lipoprotein cholesterol (HDL), is a risk factor for cardiovascular complications of the type 2 DM.9

The study population comprised of cases of diabetic macular oedema who fulfilled the inclusion criteria.

2.1. Inclusion criteria

1. All outdoor and indoor cases with Diabetes Macular Oedema with and without metabolic syndrome.

Following investigations were done-

1. Biochemistry investigation – Blood sugar [FBS, PP], Blood urea, HbA1c, Lipid Profile [Triglyceride, HDL, LDL, VLDL]
2. BMI and WC (waist circumference)
3. Fundus examination by direct and indirect ophthalmoscope
4. Optical Coherence Tomography- Retinal thickness and volume.
5. FFA was repeated if/whenever required.

3. Results

In our study total 80 patients were studied in which 38 patients were with metabolic syndrome and 42 were without metabolic syndrome.

Patients with metabolic syndrome had significantly higher value of BMI, Fasting Blood Sugar, Postprandial Blood Sugar, Total Cholesterol, LDL cholesterol and triglycerides compare to diabetic patients without metabolic syndrome (p<0.01). S. creatinine and HbA1C value were not found to be significantly different between both group.

Macular thickness was significantly high in both eyes in those study subjects in which metabolic syndrome was present compare to those in which metabolic syndrome was absent.

In present study macular thickness of both eyes was found to be positively correlated with HbA1C level (for right eye r = 0.50; for left eye r =0.27). In our study apart from VLDL and HDL no correlation was seen with other individual cholesterol parameters like Total Cholesterol, LDL and triglycerides. Macular thickness was positively correlated with VLDL in right eye (r=0.29) and negatively correlated with HDL in left eye (r = -0.36). Mean arterial blood pressure was also found to be significantly correlated with macular thickness of both eyes (r = 0.41 for right eye & r=0.38 for left eyes). Waist circumference was also found to be significantly correlated with macular thickness of left eye (p<0.01).

4. Discussion

Although metabolic syndrome is clearly a risk factor for macrovascular disease, its association with microvascular disease such as diabetic retinopathy is unclear.10

The present study was a Hospital based prospective observational study conducted on 80 diabetic patients with
In present study, macular thickness was significantly high in both eyes in those study subjects in which metabolic syndrome was present compared to those in which metabolic syndrome was absent.

In our study apart from VLDL and HDL no correlation was seen with other individual cholesterol parameters like Total Cholesterol, LDL and triglycerides. Macular thickness was positively correlated with VLDL (r=0.29) and negatively correlated with HDL (r = -0.36). The lack of association of serum lipids with macular thickness in this study is compatible with previous data from the Multi-ethnic Study of Atherosclerosis (MESA), which show no association between serum lipids, including total-C, LDL-C, and HDL-C and DR, and the Australian Diabetes, Obesity, and Lifestyle Study (AusDiab).

In our study mean arterial blood pressure was found to be significantly correlated with macular thickness of both eyes (r = 0.41 for right eye & r=0.38 for left eyes). Similar to our study Goodling KM et al also reported that mean arterial pressure was independently associated with macular thickness in the inner quadrants, and with all the outer quadrants except for the nasal quadrant.

In present study macular thickness of both eyes was found to be positively correlated with HbA1C level (for right eye r = 0.50; for left eye r =0.27). Two plausible mechanisms that might explain this positive correlation between chronic HbA1c level and macular thickness and volume are, firstly, that abnormal amounts of fluid may accumulate as a result of the osmotic hydration of retinal tissue during longstanding hyperglycaemia, and secondly, that macular haemodynamics may be subject to change as a result of microvascular damage and autoregulation dysfunction.
Similar to our study Yeung L et al. also showed that chronic HbA1c levels over the previous year positively correlated with macular thickness and volume in diabetic patients. Peng Yi-Ji et al. also found that higher levels of HbA1c were associated with greater CMT and volume in eyes without macular oedema, which was consistent with our study.

In our study BMI was found to be significantly correlated with macular thickness of left eyes (r=0.48; p<0.01) but did not found any correlation with right eyes (r=0.20; p=0.06). Similar results were obtained for correlation between macular thickness and waist circumference as significant correlation was observed between macular thickness of left eye and waist circumference while waist circumference was not correlated with macular thickness of right eye. Similar to our study, Wong KCM et al. also found significant correlation between BMI and macular thickness (r=0.22; p<0.05) while in contrast to our study Gupta P et al. did not found the same. Goodling KM et al. did not report any correlation between macular thickness and waist circumference.

5. Conclusion

The mean HbA1c was 7.38% (range, 5.2%-10.1%) which was significantly higher than the normal upper limits of testing laboratory value (6%). The mean HDL, LDL and TG levels were 42.21±7.12 mg/dl, 130.15±29.29 mg/dl, and 171.78±41.02 mg/dl respectively.

Patients with metabolic syndrome had significantly higher value of BMI, Fasting Blood Sugar, Postprandial Blood Sugar, Total Cholesterol, LDL cholesterol and triglycerides compare to diabetic patients without metabolic syndrome (p<0.01). S. creatinine and HbA1C value were not found to be significantly different between both group.

Macular thickness was significantly high in both eyes in those study subjects in which metabolic syndrome was present compare to those in which metabolic syndrome was absent.

On right eye visual acuity examination, most of the diabetic patients in metabolic syndrome group had 6/9P to 6/9 visual acuity (26.3%) followed by FC1.5-6M (26.2%) while in patients without metabolic syndrome maximum subjects had 6/12P-6/12 visual acuity (30.9%) followed by 6/36P-6/36 (28.6%).

On left eye visual acuity examination, most of the diabetic patients in metabolic syndrome group had FC1.5M visual acuity (39.5%) followed by 6/36P-6/36 (21.0%) while in patients without metabolic syndrome maximum subjects had 6/60 visual acuity (28.6%) followed by 6/24P-6/24 (23.8%).

In present study macular thickness of both eye was found to be positively correlated with HbA1C level (for right eye r = 0.50; for left eye r =0.27). In our study apart from VLDL and HDL no correlation was seen with other individual cholesterol parameters like Total Cholesterol, LDL and triglycerides. Macular thickness was positively correlated with VLDL in right eye (r=0.29) and negatively correlated with HDL in left eye (r = -0.36). Mean arterial blood pressure was also found to be significantly correlated with macular thickness of both eyes (r = 0.41 for right eye & r=0.38 for left eyes).

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None.

7. Conflict of Interest
None.

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**Author biography**

Avnish Jangid Resident

Sanjeev K Nainiwal Professor and Head

Rakesh Porwal Senior Professor

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