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Original Research Paper

Ophthalomology

TO STUDY THE INFLUENCE OF SERUM LIPIDS ON CLINICALLY SIGNIFICANT MACULAR EDEMA IN TYPE 2 DIABETIC RETINOPATHY

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ABSTRACT

Diabetic retinopathy (DR), a paramount microvascular complication of Diabetes Mellitus (DM), has a significant impact on the world's health system. Diabetic macular edema (DME) can occur at any stage of diabetic retinopathy and is the most common cause of vision loss in these patients. Up to 30 percent of patients with clinically significant macular oedema (CSME) will develop moderate visual loss.Other than diabetes several systemic factors like dyslipidemia play an important role in the pathogenesis of DME. Thus control of blood sugar along with these risk factors helps to prevent and reverse the maculopathy to some extent, thereby helps to preserve the vision of diabetic patients.

KEYWORDS : Diabetic retinopathy (DR),Diabetic macular edema (DME), dyslipidemia

INTRODUCTION

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycaemia. [1] Chronic hyperglycaemia and other metabolic disturbances of DM lead to significant long-term ocular tissue damage as well as other systemic dysfunction like renal, vascular and nervous system damage. [2] Visual impairment in DM is mainly attributed to retinopathy and macular edema. [3] WHO projects that DM will be the 7th prime cause of death by 2030. [4] Diabetic retinopathy caused 1.9% of moderate to severe visual impairment worldwide and 2.6 % of blindness in 2010. Studies suggest that prevalence of retinopathy in persons with diabetes is 35%. [5,6]

CSME, as defined by the ETDRS study is "thickening of the retina at / within 500 μm of the centre of the macula (or) hard exudates at / within 500 μm of the centre of macula, if associated with thickening of the adjacent retina or one or more zones of retinal thickening, 1 disc area or larger, any part of which is within 1 disc diameter of the centre of the macula". [7,8] CSME is a common occurrence in many cases of diabetic retinopathy. Up to 75,000 new cases of diabetic macular edema develop each year, [9]and about 30% of patients with clinically significant macular edema develop moderate visual loss. [9]CSME is the commonest cause of moderate visual loss in diabetic retinopathy cases. [10] Presence of CSME may identify individuals, who require subsequent detection and treatment of associated cardiovascular disease(s). [11]

Hence, there is a need for studies to find out the risk factor like abnormal lipid profile, associated with the development of CSME, to control the same and subsequently reduce the incidence of Diabetic maculopathy and the associated visual loss in such patients in future.

AIMS OF THE STUDY :

To study and analyse the influence of serum lipids on clinically significant macular edema in type 2 diabetic retinopathy.

MATERIALS AND METHODS:

A Hospital based observational , cross sectional study Done in 150 patients who attending the outpatient department of ophthalmology at Santhiram medical college and general hospital, Nandyal during the period from February2022 to November2022. After considering the below criteria, patients are selected into the study.

Inclusion Criteria:

1. All patients of either sex with type 2 DM with CSME.
2. Patients who have given written informed consent to participate in the study

Exclusion Criteria:

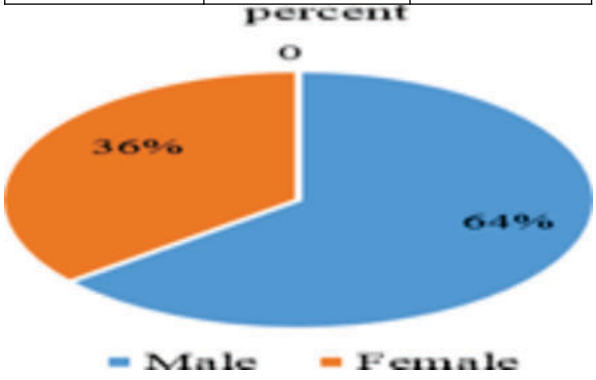
Patients with following conditions were excluded from the study:

1. Patient with hazy media which impair visualization of fundus.
2. Patient on lipid lowering drugs. Type 1 diabetes mellitus patients.
3. Patients with Macular edema due to other causes like uveitis, vascular occlusions , Post operative CME and hypertensive retinopathy are excluded
4. Those patients who did not give written informed consent to participate in study

RESULTS

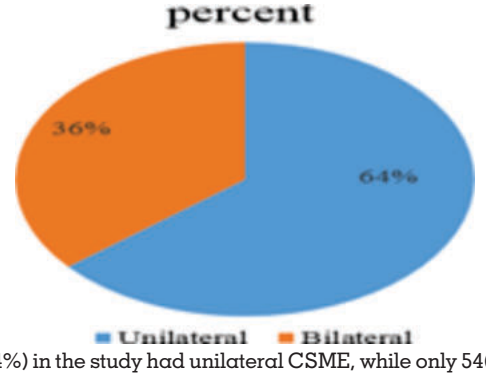
Table 1: Age Distribution

Age in years	No. of patients	%
31-40	6	4
41-50	19	12.67
51-60	38	25.33
61-70	87	58
Total	150	100



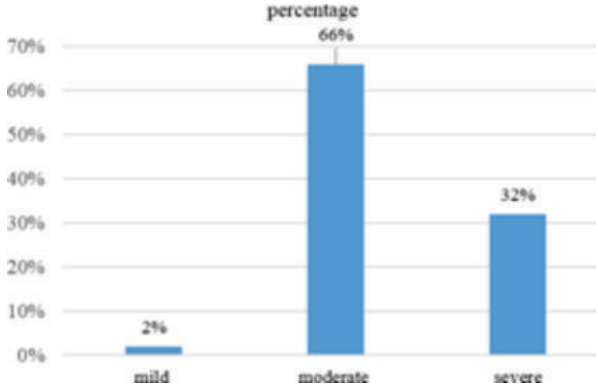
Out of 150 patients, 96(64%) were males and 54(36%) were females

IMAGE 1 : Gender Distribution



96(64%) in the study had unilateral CSME, while only 54(36%) had bilateral CSME.

IMAGE 2 : Laterality of CSME



None had BCVA of 6/6, 3 (2%) had mild visual impairment, majority 99 (66%) had moderate visual impairment and 48(32%) had severe visual impairment.

IMAGE 3: BCVA distribution of patients studied

Table 2: BCVA Distribution In Relation To Incidence Of Dyslipidemia

BCVA	Incidence of Dyslipidemia		Total (n=150)	P value
	Presence of Dyslipidemia (n=101)	Absence of Dyslipidemia (n=49)		
6/6 (Normal)	0(0%)	0(0%)		<0.0005
6/9-6/12 (Mildvisualimpairment)	0(0%)	3(2%)	3	
6/18-6/36 (Moderatevisual impairmen)	60(40%)	39(26%)	99	
>6/60(Severe visual impairment)	41((27.33%)	7(4.67%)	48	
TOTAL	101(67.33)	49	150	

Table 3 : Distribution Of Severity Of DR

Fundus	No.of patients (n=150)	%
Mild NPDR	57	38
Moderate NPDR	44	29.4
Severe NPDR	23	15.3
Early PDR	16	10.6
High Risk PDR	10	6.7

Table 4 : Distribution Of Severity Of Diabetic Retinopathy In Relation To Dyslipidemia

FUNDUS	Incidence of Dyslipidemia		P value
	Presence of Dyslipidemia(n=101)	Absence of Dyslipidemia(n=49)	
Mild NPDR	31(20.67%)	26(17.34%)	<0.001
Moderate NPDR	26(17.33%)	18(12%)	
Severe NPDR	21(14%)	2(1.33%)	
Early PDR	13(8.67%)	3(2%)	
High Risk PDR	10(6.66%)	0(0%)	
TOTAL	101(67.33%)	49(32.67%)	

Table 5 : Glucose Parameters Distribution

	No.of patiens (n=150)	%	Mean ± SD
FBS (mg/dl)			
100-140	60	40	
>140	90	60	
PPBS (mg/dl)			
<140	2	1.3	277.69±68.23
140-200	11	7.3	
>200	137	91.3	

Table 6 : Inference On Distribution Of Patients Studied

Inference	No. of patients	%	95%CI
Absent Dyslipidemia	49	32.67	25.68-40.52
Present Dyslipidemia	101	67.33	59.48-74.32
Total	150	100	-

DISCUSSION

Diabetes Mellitus is the most common metabolic disorder globally. Diabetes induced systemic complications are influential on individuals as well as on the society, since they affect diabetic patients in the most important and useful years of their productivity in the community. [13] Diabetic retinopathy is the most common microvascular complication of diabetes, which can lead to severe visual loss. [12] Independent of diabetic retinopathy, severe visual impairment among diabetes mellitus patients may also be caused by diabetic maculopathy. [12] Several previous studies have suggested that abnormal serum lipid levels, are important risk factors for the development of CSME. [12,14]Hence, this study was planned and conducted to find out the association between abnormal serum lipids and development of CSME.

Majority of patients in this study were between 61-70 years (Mean SD: 58.07 6.95). This supports the fact that CSME becomes more evident as the age advances. Prakash GS et al in their study found that the mean age of the patients in the study group (with CSME) was 57.02 9.75. [15] Study conducted by Seyed Ahmad et al found that the mean age of CSME patients as 53.22 with the age range of 18-77 years. [16]

The present study included 96 (64%) males and 54 (36%) females. In this study, it was found that CSME was common in male gender. However, Asensio-Sanchez Vm et al in their study reported 60% women and 40% men with CSME [1] and Ong Ming Jew et al in their study reported 42% males and 58% females with CSME. [12]

In the present study patients with unilateral CSME [96(64%)] were more, compared to patients with bilateral CSME [54(36%)]. Arulanandham A et al in their study found 22 unilateral and 15 bilateral cases of CSME among 37 subjects. [17] This shows the importance of early detection and treatment for risk factors of CSME, so that the risk of vision loss in the other eye due to CSME can be reduced by timely intervention. BCVA of patients in the study showed that majority (66%) of the patients with CSME had moderate visual loss, which supports the fact that CSME is the most common cause of moderate visual loss in diabetes, which is also revealed by Narang S et al in their study on, Atorvastatinin Clinically Significant Macular Edema in Diabetics. [10] and Prakash GS et al., [15] in their study. In our study, incidence of dyslipidaemia in CSME patients was significantly associated with moderate visual loss than with mild or severe form with significant p value of < 0.0005.

In the present study, the severity of diabetic retinopathy (according to worst eye), found to have majority of patients with mild NPDR (38%), followed by moderate NPDR (29.4%). Severe NPDR was seen in 15.3% patients, early PDR was seen in 10.6% patients and High Risk PDR was seen in 6.7% patients. Rajiv Raman et al in their study have found 6.3% mild NPDR, 25% moderate NPDR, 50% severe NPDR and 18.8% PDR among CSME patients. [7]

In this study, it was found that mean FBS and PPBS were 156.22 ± 37.21 and 277.69 ± 68.23 respectively, which is higher than the normal values of FBS and PPBS. In the study done by Rajiv Raman et al, the mean fasting plasma glucose was found to be 217.94 +80.42. [7]This supports the fact that hyperglycaemia is one of the risk factors for development of CSME. [15,18] High blood glucose levels for a long period of time can cause alterations in pericytes and basic membrane,

contributing to endothelial barrier dysfunction. [16]

In the present study, 68(45.34%) patients had high cholesterol, 50(33.4%) patients had high triglycerides, 101(67.33%) had high LDL, 51(34%) patients had highVLDL and 24(16%) patients had low HDL. Sachdev N et al, in their study have shown that 44.45% had raised LDL and 51.67% had raised cholesterol. [19]

Our findings of an association between abnormal LDL and CSME is similar to the previous reports, which have specifically proved this results. [16] In conclusion, in the present study of CSME patients, 49(32.67%) had no dyslipidaemia with 95% confidence interval of 25.68-40.52 and 101(67.33%) had dyslipidaemia with 95% confidence interval of 59.48-74.32. This shows that dyslipidaemia is significantly associated with development of CSME.

Several mechanisms discussed in earlier report regarding association of serum lipids and CSME, include the direct involvement of serum lipids in endothelial dysfunction, leading to exudation of serum lipids and lipoproteins to intercellular space in the retina. Finally the present study has shown that serum lipids, especially LDL, was largely associated with CSME(67.3%), but not with the severity of DR, suggesting a differential impact of dyslipidemia in the pathogenesis of DR and CSME, similar to the fact said by Rebab Benarous et al, [20] in their study.

CONCLUSION

Increasing number of individuals with diabetes mellitus globally, suggests that diabetic retinopathy and diabetic macular edema will continue to be the major contributors for visual impairment and associated functional impairment in the coming years. At any stage of diabetic retinopathy, macula can be affected by CSME, leading to sudden and debilitating impact on the visual acuity.

This study has shown that CSME is more common in the elderly age group of 61-70 years with male gender predilection. Most of the patients were presented with unilateral CSME. We found mild NPDR patients were more in number compared to other types of retinopathy, which was also true for incidence of dyslipidemia. This study also showed Mean FBS and PPBS levels above normal limit. In this study serum LDL, showed significant association (67.35%) with CSME. Serum mean value of cholesterol and triglycerides have shown borderline high values. Similar studies like ETDRS also have shown similar correlation of serum LDL to CSME and associated visual loss in such patients. Considering the BCVA of the worst eye, majority of the patients had moderate visual loss, which was also true for incidence of dyslipidemia. In conclusion, out of 150 patients, 101(67.33%) had dyslipidemia with 95% of confidence interval of 59.48-74.32, which shows positive correlation between the dyslipidemia and the development of the CSME. Control of the abnormalities in serum lipids is important in preserving visual function because dyslipidemia has been identified as a risk factor for both development and progression of CSME. Thus, periodic screening and timely intervening the dyslipidemia in diabetic patients definitely makes major differences in terms of visual loss and lifestyle of individual.

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