ORIGINAL RESEARCH PAPER

Ophthalmology

EFFECT OF STATIN USE ON STATUS OF DIABETIC ETINOPATHY/ DIABETIC MACULAR EDEMA IN PATIENTS OF TYPE 2 DIABETES MELLITUS

KEY WORDS:

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ABSTRACT

AIM:
Effect of statin use on status of diabetic retinopathy /diabetic macular edema in patients of type 2 diabetes mellitus
Check the lipid profile and detail fundus examination of all patients included in study.
Effect of lipid lowering agents (statin) on Diabetic retinopathy.
Asses the changes in fundus of DME patients after giving statin.

MATERIALS AND METHODS:-
A prospective study was conducted in the OPD of upgraded department of ophthalmology at LLRM Medical College, Meerut over the duration of from July 2019 to June 2020.
The proposed study was in association of status use and hyper triglyceridemia with diabetes macular edema in patients with type-2 diabetes and diabetic retinopathy. Clearance from institution ethics committee was obtained before the study was started.
An informed consent was obtained from all the patients before including them in to the study.
A total of 86 patients were divided in to two equal groups randomly

RESULTS:-
A prospective study was conducted in the OPD of upgraded department of ophthalmology at LLRM Medical College, Meerut over the duration of from July 2019 to June 2020 and sample size of patients taken was 86
About 70.9% of the patients in this study were males and 29.1% were females.
About 26.7% of the study subjects in this study had diabetes mellitus since 16 – 20 years, 25.6% since more than 20 years and 20.9% since 11 – 15 years.
During the baseline the CSME in left eye was present in 24.4% of the cases and during follow up, the CSME was present in 10.5% of the cases .
At the time of baseline, about 64% of the patients had no CSME in right eye and 36% had CSME. At the time of follow up 87.2% of the cases had no CSME and 12.8% had CSME.
In mild NPDR during follow up, 44.2% had mild NPDR, 24.4% had moderate NPDR and 8.1% had severe NPDR at baseline. About 17.4% of the patients who had moderate NPDR at baseline also had moderate NPDR during follow up visits in left eye.
Among all the patients with mild NPDR during follow up, 54.7% had mild NPDR, 22.1% had moderate NPDR and 10.5% had severe NPDR during baseline. About 12.8% who had moderate NPDR during baseline also had moderate NPDR during follow up in right eye
Mean cholesterol level during baseline was 154.13 mg/dl and during follow up was 138.12 mg/dl which was statistically significant (p=0.000).
The mean triglyceride level during the baseline was 178.37 mg/dl and during follow up was 156 mg/dl which was statistically significant between the two groups (p=0.000).
Mean LDL cholesterol level during the baseline was 94.99 mg/dl and during follow up was 61.24 mg/dl which was statistically significant between baseline and follow up (p=0.000).
This study had shown improvement of visual acuity, decrease in macular edema and progression of diabetic retinopathy. The study also revealed that ,the statins are effective in decreasing the total cholesterol, LDL cholesterol, and triglycerides.

CONCLUSION:-
This study had shown improvement of visual acuity, decrease in macular edema and progression of diabetic retinopathy in patients whom statins was given
The study also revealed that, the statins are effective in decreasing the total cholesterol(mean value during baseline was 154.13 mg/dl which reduces to 138.12 mg/dl during follow up), LDL cholesterol (mean value reduces from 94.99 mg/dl during baseline to 61.24 mg/dl during follow up)and triglycerides (mean value during baseline 178.37 mg/dl to 156 mg/dl during follow up).as given.

INTRODUCTION:

Diabetic retinopathy is the most frequently occurring chronic micro vascular complication in patients with diabetes resulting from hyperglycemia, glucose related hyperosmolarity, and DME is a leading cause of severe vision loss in patients with diabetic retinopathy

Progression of DR and DME is known to be associated with duration of diabetes and hypertension, dyslipidemia is also a risk factor too.

Duration of diabetes is the most important risk factor. In patients diagnosed with diabetes before age of 30 yr, the incidence of DR after 10 yr is 50%, and after 30 yr is 90%. DR rarely develops within 5 yrs of the onset of diabetes or before puberty, but about 5% of type 2 diabetes have DR at presentation.

Some reports have shown that, intensive control of lipids in patients with diabetes can also delay the progression of DR and suggested that two types of lipid lowering agents including fibrates and statins can be used to prevent the progression of DR.

AIM-
The aim of study was to see the effect of statin use on status of DR and DME in type 2 DM patients.

MATERIAL AND METHODS

A prospective study was conducted in the OPD of upgraded department of ophthalmology at LLRM Medical College, Meerut over the duration of from July 2019 to June 2020.

Keeping in mind the maximum prevalence of DR in type 2DM in north india 34.06% with 10% absolute precision 95% CI the following formula is use to calculate the sample size.

SAMPLE SIZE CALCULATION

$n = (1.96)^2 pq/d^2$

where, n = sample size, d = absolute precision, p = prevalence
q = (1–p)

$$\frac{3.84 \times 0.3406 \times 0.6594}{(0.1)^2}$$

$$\frac{0.8624}{.01} = 86$$

We enrolled the patients attending the OPD of department of medicine and ophthalmology during my study.

INCLUSION CRITERIA
- Type-2 DM patient with DR with or without DME.
- Sex – Either sex.

EXCLUSION CRITERIA
- No DR.
- Use of any other lipid lowering agent other than statins.
- DR patients requiring any other treatment like anti -VEGF ,laser ,or any surgical treatment.
- Follow of less than 1 year.
- Hypertension retinopathy patient.
- Sickle cell disease patient.
- Mature cataract & hazy media.
- Vitrectomy.
- Other retinal diseases.

RESULT AND OBSERVATION-

Table 6. Distribution of the study group according to CSME (RE)

CSME (RE)	Baseline n (%)	Follow up n (%)
Absent	55 (64.0)	75 (87.2)
Present	31 (36.0)	11 (12.8)
Total	86 (100)	86 (100)

χ^2 Value=0.484   df=1   p value, sig= 0. 001, Sig

Table 5. Distribution of the study group according to CSME (LE)

CSME (LE)	Baseline n (%)	Follow up n (%)
Absent	65 (75.6)	77 (89.5)
Present	21 (24.4)	9 (10.5)
Total	86 (100)	86 (100)

χ^2 Value=9.721   df=1   p value, sig=0.002, Sig

Table 7. Distribution of the study group according to Diabetic retinopathy (LE)

DR (LE)	Mild NPDR n (%)	Moderate NPDR n (%)	Severe NPDR n (%)
Mild NPDR	38 (44.2)	0	0
Moderate NPDR	21 (24.4)	15 (17.4)	0
Severe NPDR	7 (8.1)	4 (4.7)	1 (1.2)
Total	66 (76.7)	19 (22.1)	1 (1.2)

χ^2 Value=32.0   df=3   p value, sig=0.000, Sig

Table 8. Distribution of the study group according to Diabetic retinopathy (RE)

DR (RE)	Mild NPDR n (%)	Moderate NPDR n (%)	Severe NPDR n (%)
Mild NPDR	47 (54.7)	0	0
Moderate NPDR	19 (22.1)	11 (12.8)	0
Severe NPDR	9 (10.5)	0	0
Total	75 (87.2)	11 (22.1)	0

χ^2 Value=28.0   df=3   p value, sig=0.000, Sig

DISCUSSION

Diabetes mellitus is a complex metabolic disease and carries high mortality and morbidity with variety of complications which are known to worsen if left untreated.[1,2]

Diabetic retinopathy is the most frequently occurring chronic micro vascular complication in patients with diabetes resulting from hyperglycemia, glucose related hyperosmolarity, and DME is a leading cause of severe vision loss in patients with diabetic retinopathy.[3] Diabetic retinopathy also results due to elevated blood lipid levels particularly cholesterol and low density lipoprotein (LDL).[7,8,9,10]

Some reports have shown that, intensive control of lipids in patients with diabetes can also delay the progression of DR and suggested that two types of lipid lowering agents including fibrates and statins can be used to prevent the progression of DR.[11,12]

But the results of many studies have not demonstrated beneficial effects of lipid lowering agents such as statins. Hence it was decided to take up this study to ascertain effect of statin use on status of diabetic retinopathy and diabetic macular edema.

A prospective study was conducted in the OPD of upgraded department of ophthalmology at LLRM Medical College, Meerut over the duration of from July 2019 to June 2020. The proposed study was in association of statin use and hyper triglyceridemia with diabetes macular edema in patients with type-2 diabetes and diabetic retinopathy. A total of 86 patients constituted the sample size. Age group

This study had shown that, majority of the patients were aged more than 40 years. In a study by Kung et al (2019), the mean age of patients in statin group was 61.5 years and no statin group was 61.0 years.[13] In a study by Chung et al (2017), the mean age in statin group was 58.1 years and 52.3 years in the no statin group.[14]

Sex
About 70.9% of the patients in this study were males and 29.1% were females in this study. In a study by Chung et al (2017), males were more in statin group and females in no stating group.[14]

Duration of Diabetes mellitus
About 26.7% of the study subjects in this study had diabetes mellitus since 16 – 20 years, 25.6% since more than 20 years and 20.9% since 11 – 15 years. The mean duration of the diabetes in Chung et al (2017) was 12.4 years in statin group and 8.6 years in no statin group.[14]

Visual acuity
The Logmar visual acuity at the baseline was 3 and 2.05 during the follow up in the right eye. At the time of baseline, the Logmar vision for the left eye was 2.95 and 2.17 during the time of follow up which was statistically significant (p=0.000 in both eyes) between the two groups. In a study by Shi et al (2018), there no significant difference in worsening of visual acuity between the lipid lowering drugs and the placebo groups.[15] In a study by Sen et al (2002), VA improved in four patients using simvastatin, and worsening of VA occurred in seven patients in the placebo group.[16]

CSME
During the baseline the CSME in Left eye was present in 24.4% of the cases and during follow up, the CSME was

present in 10.5% of the cases. This difference was statistically significant between the baseline and follow up (p=0.016). At the time of baseline, about 64% of the patients had no CSME in Right eye and 36% had CSME. At the time of follow up 87.2% of the cases had no CSME and 12.8% had CSME in Right eye . In a study by Kang et al (2019), in the statin group macular edema was significantly lower than the no statin group.[51] In a study by Chung et al (2017), macular edema was present in 23% of the statin group and 48% of the no statin group had diabetic macular edema.[14]

Severity of Diabetic retinopathy

In mild NPDR during follow up, 44.2% had mild NPDR, 24.4% had moderate NPDR and 8.1% had severe NPDR at baseline. About 17.4% of the patients who had moderate NPDR at baseline also had moderate NPDR during follow up visits in left eye. Among all the patients with mild NPDR during follow up, 54.7% had mild NPDR, 22.1% had moderate NPDR and 10.5% had severe NPDR during baseline in right eye. About 12.8% who had moderate NPDR during baseline also had moderate NPDR during follow up in right eye. Kang et al (2019) had shown that, about 10.6% in the statin group and 12.0% in the no statin group developed diabetic retinopathy. The patients in the statin group had a significantly lower rate of diabetic retinopathy, non proliferative & proliferative diabetic retinopathy, vitreous hemorrhage and tractional retinal detatchment.[13] A study by Shi et al (2018) had shown that, the lipid lowering drugs were associated with reduced risk in DR progression. In a study by Chung et al (2017), use of statins by patients with type 2 diabetes and pre-existing DR did not increase the risk of DR Progression. Al – Janabi et al (2018) reported that, simvastatin 20 mg delayed the progression of DR compared with placebo treated controls.[17]

Total Cholesterol

Mean cholesterol level during baseline was 154.13 mg/dl and during follow up was 138.12 mg/dl which was statistically significant (p=0.000). In a study by Chung et al (2018), the mean total cholesterol was 4.4 mmol/L in statin group and 4.4 mmol/L in no statin group.[14] In a study by Sen et al (2002), total cholesterol decreased in simvastatin group.[16]

Triglyceride levels

The mean triglyceride level during the baseline was 178.37 mg/dl and during follow up was 156 mg/dl which was statistically significant (p=0.000) between the two groups. Mean triglyceride level in statin group was 1.9 mmol/L and 2.1 mmol/L in no statin group in a study by Chung et al (2018).[16]

LDL cholesterol levels

Mean LDL cholesterol level during the baseline was 94.99 mg/dl and during follow up was 61.24 mg/dl which was statistically significant (p=0.000) between baseline and follow up. In a study by Chung et al (2017), the level of LDL cholesterol was 2.1 mmol/L in statin group and 3.0 mmol/L in no statin group.[53] In a study by Sen et al, low density lipoprotein decreased in simvastatin group (2002).[16]

CONCLUSION-

This study had shown improvement of visual acuity, decrease in macular edema and progression of diabetic retinopathy.

The study also revealed that ,the statins are effective in decreasing the total cholesterol, LDL cholesterol, and triglycerides.-This study had shown improvement of visual acuity, decrease in macular edema and progression of diabetic retinopathy.

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SUMMARY-

- A prospective study was conducted in the OPD of upgraded department +of ophthalmology at LLRM Medical College, Meerut over the duration of from July 2019 to June 2020 and sample size of patients taken was 86.
- This study had shown that, majority of the patients were aged more than 40 years.
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- The Logmar visual acuity at the baseline was 3 and 2.05 during the follow up in the right eye.
- At the time of baseline, the Logmar vision for the left eye was 2.95 and 2.17 during the time of follow up which was statistically significant (p=0.000 in both eyes) between the two groups.
- During the baseline the CSME in left eye was present in 24.4% of the cases and during follow up, the CSME was present in 10.5% of the cases .
- At the time of baseline, about 64% of the patients had no CSME in right eye and 36% had CSME. At the time of follow up 87.2% of the cases had no CSME and 12.8% had CSME.
- In mild NPDR during follow up, 44.2% had mild NPDR, 24.4% had moderate NPDR and 8.1% had severe NPDR at baseline. About 17.4% of the patients who had moderate NPDR at baseline also had moderate NPDR during follow up visits in left eye.
- Among all the patients with mild NPDR during follow up, 54.7% had mild NPDR, 22.1% had moderate NPDR and 10.5% had severe NPDR during baseline. About 12.8% who had moderate NPDR during baseline also had moderate NPDR during follow up in right eye.
- Mean cholesterol level during baseline was 154.13 mg/dl and during follow up was 138.12 mg/dl which was statistically significant (p=0.000).
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