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Efficiency of Fenofibrate in Facilitating the Reduction of Central Macular Thickness in Diabetic Macular Edema

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ABSTRACT

Background: Diabetic macular edema (DME) has been reported at rates of 10% and occurs more frequently in type 2 diabetes mellitus. The present study was conducted to assess the efficiency of fenofibrate in facilitating the reduction of central macular thickness in diabetic macular edema.

Materials & Methods: 60 patients with type 2 diabetes having treatment naïve, center‑involving DME of both genders were divided into 2 groups. Group I had DME only in one eye and group II had DME in both eyes. Group I were given oral fenofibrate 160 mg/day for 6 months as a single evening dose. Central macular thickness in both groups was compared.

Results: The mean FBS was 137.6 mg/dl in group I and 158.2 mg/dl in group II, PPBS was 210.4 mg/dl and 238.6 mg/dl, blood urea (mg/dl) was 29.3 in group I and 31.5 in group II and serum creatinine (mg/dl) was 0.92 and 0.99 in group I and in group II respectively. CMT in group I and group II at baseline was 432.6 and 402.1, at 2 months was 360.2 and 358.1, at 4 months was 327.5 and 331.4 and at 6 months was 294.3 and 317.6 in group I and in group II respectively. The difference was non- significant (P>0.05).

Conclusion: Fenofibrate facilitate reduction of central macular thickness in patients with diabetic macular edema.

Keywords: central macular thickness, diabetic macular edema, Fenofibrate.

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INTRODUCTION

Diabetic retinopathy is the leading cause of blindness in adults in the working-age group in western countries.[1] Diabetic macular edema (DME) has been reported at rates of 10% and occurs more frequently in type 2 diabetes mellitus than in type 1. Diabetic patients also have multiple risk factors for retinopathy, such as hyperglycemia and hypertension.[2] Their visual acuity is often dependent on the central foveal involvement, perifoveal capillary blood flow velocity, severity of perifoveal capillary occlusion, and retinal thickness at the central fovea. The clinical findings of diabetic retinopathy are microaneurysms, soft exudates, accumulation of hard exudates, and neovascularisation.[3]

Retinal vascular and neural changes are the main characteristics of these sight threatening complications of diabetes with diabetic macular edema affecting ≥ 20% of all individuals with diabetes of at least 20 years duration.[4] Macular edema becomes clinically significant when any of the following is present: thickening of the retina at or within 500 μm of the center of the macular, hard exudates at or within 500 μm of the center of the macular with thickening of the adjacent retina or a zone of retinal thickening one disc area or larger which is

within one disc diameter of the center of the macular.[5] Fenofibrate reduced the frequency of first laser treatment for macular edema by 31% and for proliferative retinopathy by 30%.[6] The present study was conducted to assess the efficiency of fenofibrate in facilitating the reduction of central macular thickness in diabetic macular edema.

MATERIALS & METHODS

The present study comprised of 60 patients with type 2 diabetes having treatment naïve, center‐involving DME of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. All patients underwent complete ophthalmic examination such as best corrected visual acuity (Snellen), slit lamp examination, detailed fundus examination, Fundus fluorescein angiography and OCT. Serum glucose, glycated hemoglobin, serum creatinine, blood urea, liver function tests, and lipid profile were done. Patients were divided into 2 groups. Group I had DME only in one eye and group II had DME in both eyes. Group I were given oral fenofibrate 160 mg/day for 6 months as a single evening dose. Anti vascular endothelial growth factor (VEGF)/triamcinolone (IVTA) was given 3.5mm/4mm from limbus in the inferotemporal quadrant. Patients were followed up. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table 1: Assessment of parameters

Parameters	Group I	Group II	P value
FBS	137.6	158.2	0.02
PPBS	210.4	238.6	0.05
Blood urea	29.3	31.5	0.17
Serum creatinine	0.92	0.99	0.90

Table I, graph I shows that mean FBS was 137.6 mg/dl in group I and 158.2 mg/dl in group II, PPBS was 210.4 mg/dl and 238.6 mg/dl, blood urea (mg/dl) was 29.3 in group I and 31.5 in group II and serum creatinine (mg/dl) was 0.92 and 0.99 in group I and in group II respectively. The difference was significant (P< 0.05).

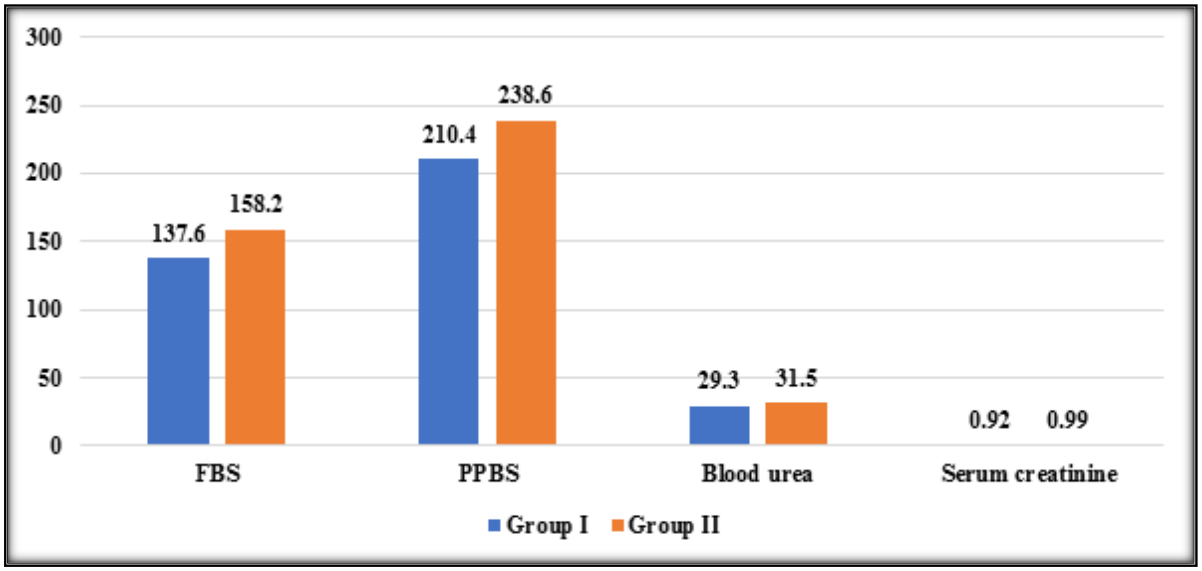
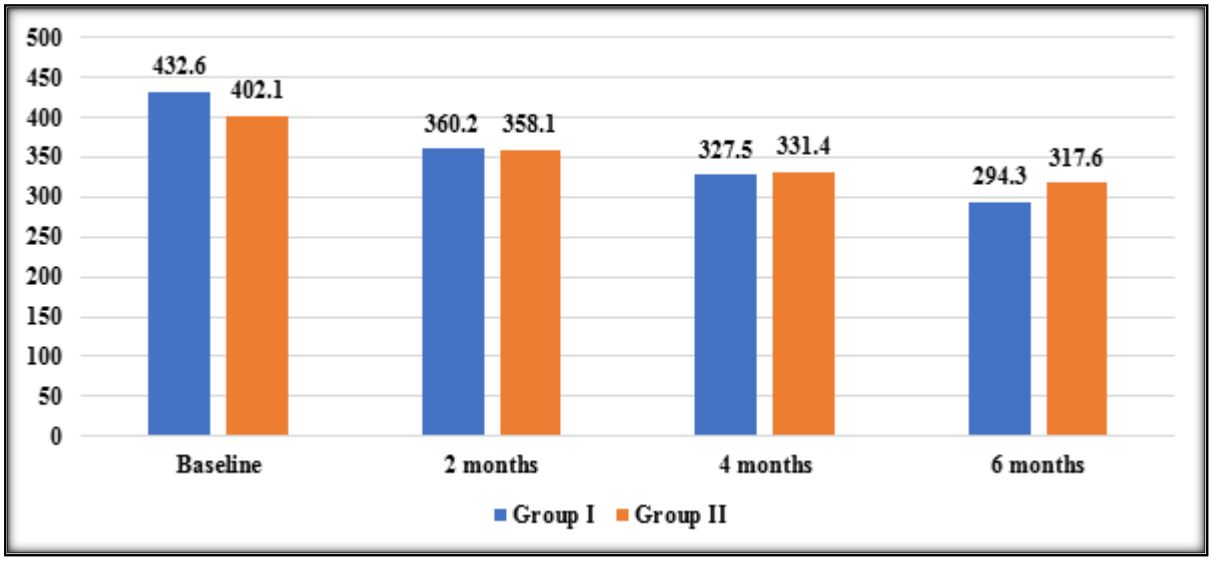


Table 2: Comparison of central macular thickness

CMT	Group I	Group II	P value
Baseline	432.6	402.1	0.12
2 months	360.2	358.1	0.26
4 months	327.5	331.4	0.86
6 months	294.3	317.6	0.05

Table II, graph II shows that CMT in group I and group II at baseline was 432.6 and 402.1, at 2 months was 360.2 and 358.1, at 4 months was 327.5 and 331.4 and at 6 months was 294.3 and 317.6 in group I and in group II respectively. The difference was non- significant (P>0.05).



Graph 2: Comparison of central macular thickness

DISCUSSIONDiabetic macular edema is defined by the presence of retinal thickening as seen by a three-dimensional assessment performed by a dilated fundus examination using slit-lamp biomicroscopy with a condensing lens; and/or stereo fundus photography.[7] In cases of uncertainty about the presence of macular edema, either fundus evaluation with Goldmann macular contact lens or optical coherence tomography can be used.[8] Identifying high risk individuals for diabetic macular edema may clinically aid in monitoring disease progression and management of these patients.[9] The present study was conducted to assess the efficiency of fenofibrate in facilitating the reduction of central macular thickness in diabetic macular edema.

We found that mean FBS was 137.6 mg/dl in group I and 158.2 mg/dl in group II, PPBS was 210.4 mg/dl and 238.6 mg/dl, blood urea (mg/dl) was 29.3 in group I and 31.5 in group II and serum creatinine (mg/dl) was 0.92 and 0.99 in group I and in group II respectively. Demir et al[10] compared central macular thickness (CMT) of diabetic patients with type 2 diabetes without clinical retinopathy and healthy subjects. Optical coherence tomography (OCT) measurements were performed in 124 eyes of 62 subjects with diabetes mellitus without clinical retinopathy (study group: 39 females, 23 males; mean age: 55.06 ± 9.77 years) and in 120 eyes of 60 healthy subjects (control group: 35 females, 25 males; mean age: 55.78 ± 10.34 years). Blood biochemistry parameters were analyzed in all cases. The data for central macular thickness (at 1 mm), the levels of fasting plasma glucose, and glycosylated hemoglobin (HbA1c) were compared in both groups. The mean central macular thickness was 232.12 ± 24.41 μm in the study group and 227.19 ± 29.94 μm in the control group. The mean HbA1c level was 8.92 ± 2.58% in the study group and 5.07 ± 0.70% in the control group. No statistically

significant relationship was found between CMT, HbA1c, and fasting plasma glucose level in either group. We observed that CMT in group I and group II at baseline was 432.6 and 402.1, at 2 months was 360.2 and 358.1, at 4 months was 327.5 and 331.4 and at 6 months was 294.3 and 317.6 in group I and in group II respectively. Arthur et al[11] investigated the sex differences in retinal thickness for diabetic patients and determined which retinal layers contribute to abnormal retinal thickness. From 2047 underserved adult diabetics, 142 patients with clinically significant macular edema were identified by Eye PACS certified graders using color fundus images. First, central macular thickness from spectral domain optical coherence tomography (iVue, Optovue) was compared for 21 males vs. 21 females without clinically significant macular edema. Then, a planned comparison contrasted the greater values of central macular thickness for males vs. females with clinically significant macular edema, as compared to those without. Mean retinal thickness and variability of central macular layers were compared for males vs. females. Males without clinically significant macular edema had a 12 μm greater central macular thickness than females, 245 ± 21.3 μm and 233 ± 13.4 μm, respectively, t (40) = −2.18, P = .04. Males with clinically significant macular edema had a 67 μm greater central macular thickness than females, 383 ± 48.7 μm and 316 ± 60.4 μm, P < .001, i.e. males had 55 μm or > 5x more, t (20) = 2.35, P = .015. In males, the outer nuclear layer thickness was more variable F10,10 = 9.34.

Srinivasan et al[12] studied the benefit of addition of oral fenofibrate to the current regimen of diabetic macular edema (DME) management and quantify its effect on macular thickness and visual function in DME. Fifty three eyes of 50 patients were randomized into treatment (Group A) (oral fenofibrate 160 mg/day) and control groups (Group B). Both groups underwent treatment of DME as per the standard treatment protocol of our hospital including intravitreal injections (anti vascular endothelial growth factor/steroid) and grid laser. Patients were followed up every 2 months to note the visual acuity and central macular thickness (CMT) for 6 months. Groups were matched with respect to age (P = 0.802), mean diabetic age (P = 0.878), serum HbA1C levels (P = 0.523), and serum triglyceride levels (P = 0.793). The mean reduction in CMT was 136 μ in Group A and 83 μ in Group B at the end of 6 months. This difference was statistically significant (P = 0.031). Visual acuity improvement was 0.15 in Group A and 0.11 in Group B at the end of 6 months (P = 0.186). On subgroup analysis in Group A, we found that there was no difference in reduction of CMT between hypertensives and normotensives (P = 0.916), in patients with normal triglyceride levels and increased triglyceride levels (P = 0.975).

CONCLUSION

Authors found that Fenofibrate facilitate reduction of central macular thickness in patients with diabetic macular edema.

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