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Original Research

Assessment of thickness of retina in diabetic patients- A clinical study

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***ABSTRACT*:**
Background: Diabetic retinopathy (DR) is a frequent ocular complication and one of the leading causes of blindness in developed countries. The present study was conducted to assess thickness of retina in diabetic patients. **Materials & Methods:** The present study was conducted in the department of Ophthalmology. It comprised of 72 patients of diabetic retinopathy of both genders. Equal numbers of controls were selected. Patients were subjected to best corrected visual acuity measurement, slit lamp biomicroscopy, IOP measurement. After pupil dilatation with 1% tropicamide eye drops, stereoscopic retinal photographs were acquired, and macular thickness and retinal vessel caliber were measured using OCT. **Results:** Out of 72 patients, males were 42 and females were 30. Thickness of fovea in group I was 2.16 and in group II was 2.24, center was 257.1 in group I and in group II was 262.3, superior parafovea was 334.5 in group I and 338.1 in group II, superior perifovea was 291.4 in group I and 297.3 in group II, inferior parafovea was 329.1 in group I and 334.5 in group II, inferior perifovea was 280.4 in group I and 283.4 in group II, nasal parafovea was 335.1 in group I and 339.2 in group II, nasal perifovea was 308.3 in group I and 311.5 in group II, temporal parafovea was 320.1 in group I and 327.4 in group II, temporal perifovea was 277.4 in group I and 285.4 in group II. **Conclusion:** Authors found that there was decreased retinal thickness in the fovea and temporal areas in diabetic patients than non- diabetic subjects.
Key words: Diabetic, Diabetic retinopathy, Perifovea, Retina

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INTRODUCTION

According to World Health Organization (WHO), more than 422 million people worldwide have diabetes mellitus (DM), and the number is increasing with an expected number of 552 million by 2030.[1] Diabetic retinopathy (DR) is a frequent ocular complication and one of the leading causes of blindness in developed countries.[2] DR is common in the first 5 years duration of type 1 diabetes and all the patients with type 2 diabetes have some form of DR after 20 years from the onset. Thus, a protocol is needed to identify the individuals at great risk of blindness, before permanent changes in the retina occur.[3]

Clinical features of DR are undetectable at early stages. Traditional methods for evaluating DR, including slit-lamp biomicroscopy and stereo fundus photography, are relatively insensitive to small pathological changes in the retina. In addition, highly sensitive fluorescein angiography is invasive and not suitable for repeated examination.[4] Optical coherence tomography (OCT) is a rapid, noninvasive, and useful imaging technology for cross-sectional and tomographic imaging in biological tissues, which is especially useful for quantitative and qualitative assessment of macula. OCT can provide objective documentation of retinal structural changes in eyes with DR even when the changes are not evident through slit lamp biomicroscopy or angiography.[5]

Several studies have elucidated changes in the retinal thicknesses in patients with diabetes. Increases or decreases in retinal thickness have been reported in diabetes with or without DR, respectively, and various mechanisms have been proposed to be responsible for these changes.[6] The

present study was conducted to assess thickness of retina in diabetic patients.

MATERIALS & METHODS

The present study was conducted in the department of Ophthalmology. It comprised of 72 patients of diabetic retinopathy of both genders. Equal numbers of controls were selected. All were informed regarding the study. Ethical approval was obtained from institute prior to the study.

General information such as name, age, gender etc. was recorded. Ocular- and systemic-related conditions, family history of diabetes, treatment of diabetes, smoking and alcohol intake. Patients were subjected to best corrected visual acuity measurement, slit lamp biomicroscopy, IOP measurement. After pupil dilatation with 1% tropicamide eye drops, stereoscopic retinal photographs were acquired, and macular thickness and retinal vessel caliber were measured using OCT. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 72		
Gender	**Males**	**Females**
Number	42	30

Table I, graph I shows that out of 72 patients, males were 42 and females were 30.

Graph I Distribution of patients

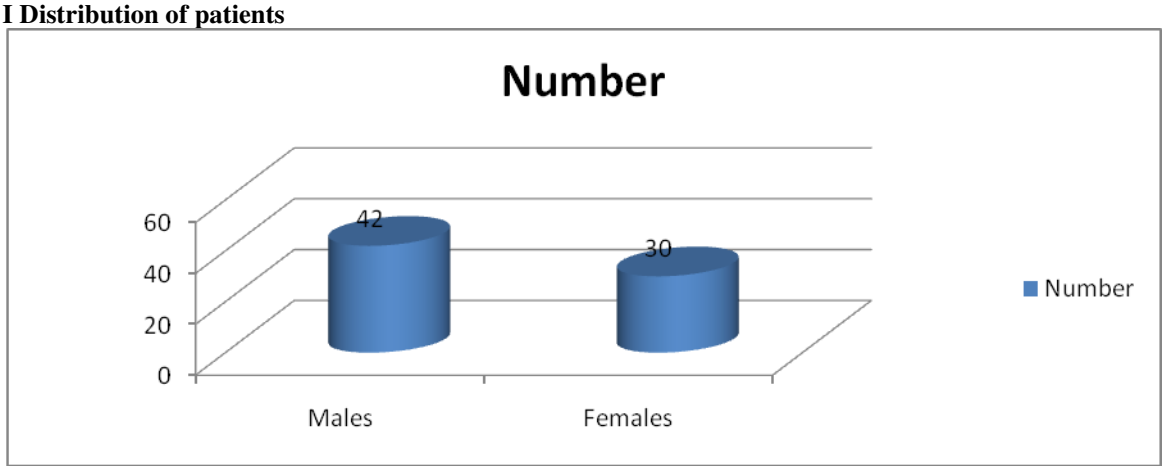
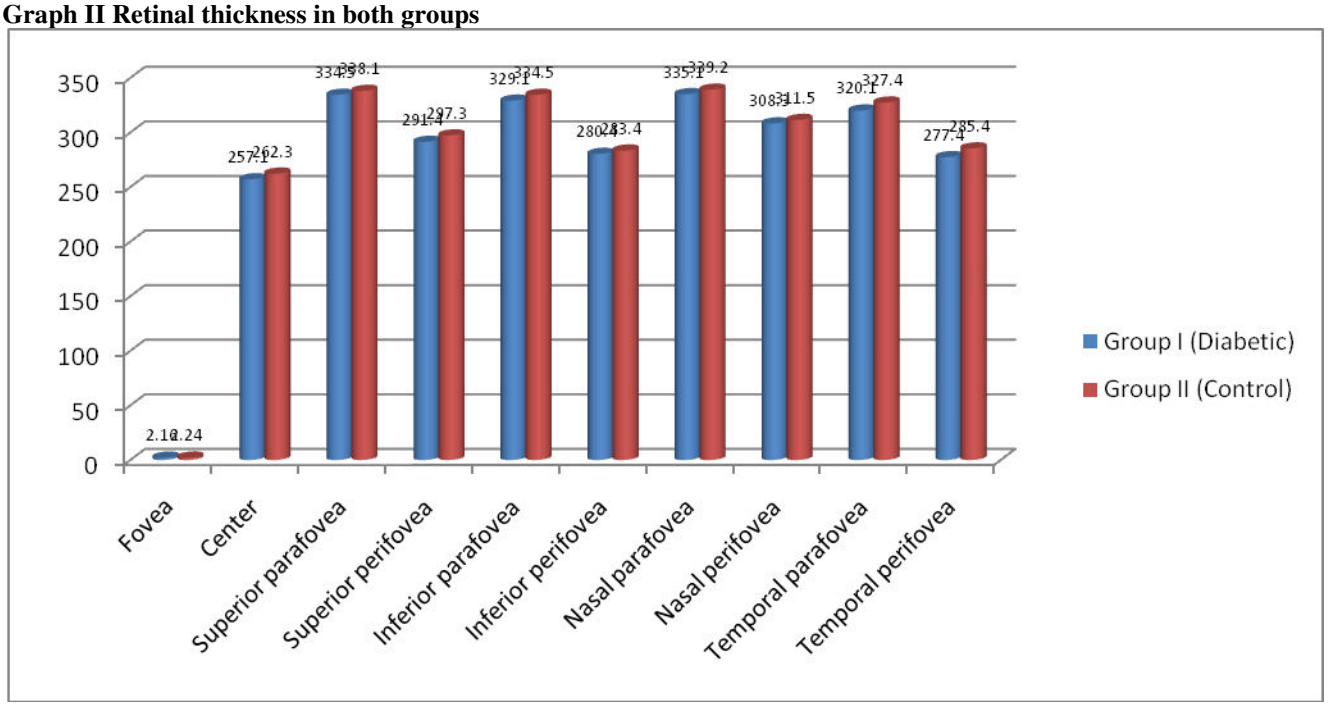


Table II Retinal thickness in both groups

Parameters (µm)	Group I (Diabetic)	Group II (Control)	P value
Fovea	2.16	2.24	0.01
Center	257.1	262.3	0.12
Superior parafovea	334.5	338.1	0.24
Superior perifovea	291.4	297.3	0.42
Inferior parafovea	329.1	334.5	0.14
Inferior perifovea	280.4	283.4	0.15
Nasal parafovea	335.1	339.2	0.25
Nasal perifovea	308.3	311.5	0.17
Temporal parafovea	320.1	327.4	0.05
Temporal perifovea	277.4	285.4	0.02

Table II, graph II shows that thickness of fovea in group I was 2.16 and in group II was 2.24, center was 257.1 in group I and in group II was 262.3, superior parafovea was 334.5 in group I and 338.1 in group II, superior perifovea was 291.4 in group I and 297.3 in group II, inferior parafovea was 329.1 in group I and 334.5 in group II, inferior perifovea was 280.4 in group I and 283.4 in group II, nasal parafovea was 335.1 in group I and 339.2 in group II, nasal perifovea was 308.3 in group I and 311.5 in group II, temporal parafovea was 320.1 in group I and 327.4 in group II, temporal perifovea was 277.4 in group I and 285.4 in group II.

Graph II Retinal thickness in both groups



DISCUSSION

For many years, diabetic retinopathy was considered a form of vasculopathy. The osmotic stress from hyperglycemia is the pathophysiological mechanism of increased intraretinal vascular permeability and variable degrees of intraretinal capillary closure, resulting in macular edema and ischemia.[7] Recent studies suggest that neurodegeneration plays an important role in the pathogenesis of DR. Histological studies of autopsy samples have revealed that the alternation of the metabolic pathways in diabetes can potentially cause neural cell degeneration in the retina.[8] The present study was conducted to assess thickness of retina in diabetic patients.

In this study, out of 72 patients, males were 42 and females were 30. Couper et al[9] conducted a study in which 26 diabetic patients without diabetic retinopathy and 26 normal participants without any retinal and optic nerve diseases underwent ophthalmic examination, fundus photography, and OCT imaging. Temporal inferior retinal vessel diameters were measured using OCT. Also, we measured macular thickness in nine ETDRS subfields using Cirrus OCT. The mean age in the diabetic group was 61.5 years and in the control group, 55.5 years. Wider retinal arterioles and venules were found in patients with diabetes compared with healthy subjects (120 µm versus 96 µm, p<0.005 and 137 µm versus 120.5 µm, p value <0.001, respectively). In patients with type 2 diabetes mellitus, central macular thickness was significantly thinner than that of control eyes (243.5 µm versus 269.9 µm, p value <0.001).

Optical coherence tomography (OCT) is a new medical diagnostic imaging technology which can perform micrometer resolution cross-sectional or tomographic imaging in biologic tissues. The operation of OCT is analogous to ultrasound B-mode imaging, except that light is used rather than acoustic waves.[10] OCT application has been demonstrated in the normal human anterior eye and retina in patients with selected macular abnormalities and glaucoma. In patients with diabetes and diabetic retinopathy, single measurements of central foveal thickness using OCT correlate with visual acuity and are a successful means of monitoring macular thickening before and after laser therapy.[11]

We observed that thickness of fovea in group I was 2.16 and in group II was 2.24, center was 257.1 in group I and in group II was 262.3, superior parafovea was 334.5 in group I and 338.1 in group II, superior perifovea was 291.4 in group I and 297.3 in group II, inferior parafovea was 329.1 in group I and 334.5 in group II, inferior perifovea was 280.4 in group I and 283.4 in group II, nasal parafovea was 335.1 in group I and 339.2 in group II, nasal perifovea was 308.3 in group I and 311.5 in group II, temporal parafovea was 320.1 in group I and 327.4 in group II, temporal perifovea was 277.4 in group I and 285.4 in group II.

Stana et al[12] assessed mean retinal thickness of ten areas. The mean thickness of the fovea was 215.8 ± 18.9 µm in the diabetes group and 222.0 ± 18.6 µm in the control group (p = 0 04). The mean thickness of the temporal parafovea was 319.9 ± 16.7 µm in the diabetes group and 326.0 ± 14.4 µm in the control group (p = 0 01). The mean thickness of the temporal perifovea was 276.4 ± 27.9 µm in the diabetes group and 284.8 ± 17.4 µm in the control group (p = 0 02). There were no significant differences in retinal thickness between groups in other areas (p> 0 05).

Regression analysis revealed that decreased retinal thickness of the temporal perifovea was associated with a higher HbA1c level.

CONCLUSION

Authors found that there was decreased retinal thickness in the fovea and temporal areas in diabetic patients than non-diabetic subjects.

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