



STUDY OF CENTRAL CORNEAL THICKNESS IN DIABETICS AND NON-DIABETICS

Dr. D K Shakya

Professor and Head of Department, Department of Ophthalmology, Madhav Dispensary, JAH Campus, G.R.M.C Gwalior, M.P

Dr. Yashaswi Goyanka*

Senior Resident Department of Ophthalmology, JAH Campus, G.R.M.C, Gwalior, M.P*Corresponding Author

ABSTRACT **PURPOSE:** To study Central corneal thickness in 50 Diabetic and 50 Non-Diabetic patients **METHODS:** The study was designed as observational comparative study conducted for duration of 6 months. Complete medical history, detailed local and systemic examination was done. Central corneal thickness was measured using Ultrasound pachymetry. **RESULTS:** 50 Diabetic, 50 Non-Diabetic patients were taken. Majority had diabetes of 5-10 year duration. Mean CCT was thicker in diabetic group ($563\mu\text{m}$) when compared with non-diabetics ($519\mu\text{m}$). The difference of mean CCT between the 2 groups was found to be significant ($p=0.000$). **CONCLUSIONS:** Diabetic patients exhibit a greater statistically significant average CCT than non-diabetics ($p=0.000$).

KEYWORDS : Central corneal thickness, Diabetes mellitus, Ultrasound pachymetry

INTRODUCTION-

Diabetes mellitus is a disease of a group of metabolic disorders where chronic hyperglycemia results due to defect in insulin secretion and/or action which is associated with long-term damage, dysfunction, and/or failure of various organs, especially the eyes, kidneys, nerves and blood vessels⁽¹⁾

In the cornea, diabetes mellitus has a detrimental or harmful effect on the morphology, physiology and the clinical appearance. These changes manifest in almost all the layers of the cornea.

This study mainly aims at comparing the corneal thickness changes which occur in diabetes mellitus.

Ultrasound pachymetry as an investigative tool which is a cost effective for evaluating the central corneal thickness in diabetic retinopathy cases and non-diabetic subjects⁽²⁾⁽³⁾⁽⁴⁾

AIMS - Our aim is to study, central corneal thickness (using ultrasound pachymetry) in diabetics and non-diabetics.

OBJECTIVES:

Comparison of CCT in diabetics and non-diabetics and its correlation with duration of diabetes.

MATERIAL AND METHODS-

Prospective observational comparative study was conducted on 100 patients for duration of 12 months in department of ophthalmology who visited ophthalmology OPD were taken for this study with full written and verbal consent with the entire study explained to the patient and patients attendants. After obtaining informed consent, complete slit lamp assisted ophthalmic examination including fundus examination was done. CCT measurements were measured with ultrasound pachymetry. RBS and HBA1c was measured.

PROCEDURE : Corneal pachymetry is a non-invasive ultrasonic technique for measuring corneal thickness, and has been used primarily in the evaluation of persons with corneal diseases and in the assessment of persons at risk for glaucoma. Ultrasonic corneal pachymetry is placed by performing an ultrasonic probe on the central cornea, after the cornea has been anesthetized with a topical anesthetic. It normally takes less than 30 seconds per cycle to complete measurements.

INCLUSION CRITERIA-

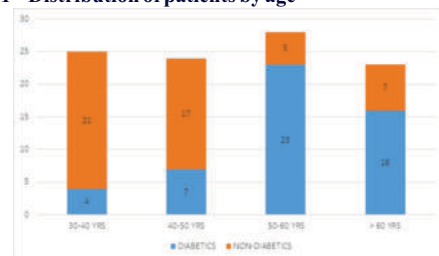
- Patients giving consent for the study
- Patients of age between ≥ 30 and ≤ 70 years of either gender.
- Already diagnosed cases of diabetes and on medication.
- Non-diabetic patients (RBS < 140 mg/dl)

EXCLUSION CRITERIA-

History of any systemic disease except Diabetes
History of Trauma

Patient not willing to give consent

- Patients with any ocular pathology or surgery in either eye except diabetic retinopathy.
- Contact lens wearers.

OBSERVATION AND RESULTS –**Graph 1 – Distribution of patients by age****Table 1 - MEAN CCT IN DIABETICS AND NON-DIABETICS**

PATIENTS	N	MEAN CCT (μ)	SD (\pm)	P-value
DIABETICS	50	563	24.56	0.0001
NON-DIABETICS	50	519	25.98	0.0001

Mean CCT was higher in diabetics than non-diabetics and the association was statistically significant ($p=0.0001$)

Table 2- COMPARISON OF CCT WITH DURATION OF DIABETES

DURATION	N	MEAN	SD (\pm)	P-VALUE
≤ 5 YEARS	17	562	7.54	
5-10 YEARS	25	563	8.79	0.292
>10 YEARS	8	567	7.98	

There was insignificant relationship between CCT and duration of diabetes ($p=0.292$).

DISCUSSION:

This study mainly targeted towards the changes within central corneal thickness within diabetic patients as compared to non-diabetic population.

A total of 100 patients participated in this study which we conducted in tertiary care hospital. Out of these 100 participants, 50 patients were Non-diabetic and rest 50 were Diabetic who were already diagnosed with type 2 diabetes mellitus with diabetic retinopathy.

Patients of different age groups were analysed by sub-dividing them into 4 sub-groups with a minimum age limit of 30 years. 4 patients in diabetic group and 21 patients under non-diabetic group are within the age group of 30-40 years. 7 patients in diabetic group and 17 patients in

non-diabetic group are within the age group of 40-50 years. 23 patients in diabetic group and 5 patients under non-diabetic group are within the age group of 50-60 years. 16 patients in diabetic group and 7 patients in non-diabetic group are in the age group of 60 years and above.

The mean age in diabetic group is 56.28 years with SD of 8.942, whereas in non-diabetic group it is 46.32 years with SD of 10.279. 52% were males and 48% were females. Of diabetic cases, majority had diabetes of 5-10 years duration.

In our study we found that mean CCT of 50 diabetics patients were 563 μm and that of non-diabetics were 519 μm . The mean CCT in diabetic group was thicker when compared with non-diabetics. The difference between the 2 was statistically significant ($p=0.0001$) which concluded that there was significant association between diabetes and central corneal thickness.

Significantly thicker CCT values in diabetic population as compared to non-diabetics had been reported in various studies. N. Busted et al (1981) (5), Claramonte et al (2006), Su et al (2009), Ozdamar et al (2010), Abdul ghani et al (2013), Stor Paulsen et al (2014)(6), Calvo Maroto et al(2015)(7), Mehmet et al (2016) reported that CCT was higher in diabetics than non-diabetics.

Out of 50 diabetics, majority had diabetes of 5-10 years duration with mean duration being 7.24 ± 3.44 years. CCT tends to increase with duration of diabetes. Highest mean CCT was found in patients with longer duration of diabetes >10 years i.e. $567\pm 7.98 \mu$, followed by 5-10 year duration i.e. $563\pm 8.79 \mu$ and least mean CCT was found among diabetics having duration less than 5 years i.e. $562\pm 7.54 \mu$ but the difference was statistically insignificant ($p=0.292$). Yasser et al and Choo et al(8) also concluded that there was no significant correlation between CCT and duration of diabetes.

Most studies and the present study showed that diabetic eyes had increased CCT when compared to non-diabetic subjects.

CONCLUSION -

A significant correlation was found between increase CCT and diabetes.

The importance of measuring CCT in diabetic patients should be mandatory especially in preoperative work up of refractive surgery, for donor tissue evaluation prior to keratoplasty, long term contact lens users etc. Thicker central corneas associated with DM should be taken into consideration while obtaining accurate IOP measurements in diabetic people. This may help to identify patients at higher risk of developing severe complications thus enabling the ophthalmologist to treat their disease more accurately. Although diabetic retinopathy leads to severe vision loss, keratopathy should also be recognised as a major complication in diabetic patients. The CCT in diabetics signifies overall functional and morphological status of cornea.

As positive correlation was found between disease duration and CCT, a simple non-invasive test in form of ultrasound pachymetry might help in identification of those patients with DM who could be at higher risk of developing severe systemic and ocular complications, enabling better control of disease.

REFERENCES -

1. Abdulghani YS, Ali TO. Correlation between Central Corneal Thickness and Diabetes in Sudanese Patients. *Natl J Med Res.* 2013;3(4):309-11.
2. Association AD. Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care.* 2004 Jan 1;27(suppl 1):s5-10.
3. Type 2 Diabetes ADA Diagnosis Criteria: Type 2 Diabetes ADA Diagnosis Criteria. 2016 Mar 24 [cited 2016 Oct 1]; Available from: <http://emedicine.medscape.com/article/2172154-overview>
4. Rocha G, Garza G, Font RL. Orbital pathology associated with diabetes mellitus. *Int Ophthalmol Clin.* 1998;38(2):169-79.
5. Busted N, Olsen T, Schmitz O. Clinical observations on the corneal thickness and the corneal endothelium in diabetes mellitus. *Br J Ophthalmol.* 1981 Oct 1;65(10):687-90.
6. Stor-Paulsen A, Singh A, Jeppesen H, Norregaard JC, Thulesen J. Corneal endothelial morphology and central thickness in patients with type II diabetes mellitus. *Acta Ophthalmol (Copenh).* 2014 Mar 1;92(2):158-60.
7. Calvo-Maroto AM, Cerviño A, Perez-Cambrodi RJ, García-Lázaro S, Sanchis-Gimeno JA. Quantitative corneal anatomy: evaluation of the effect of diabetes duration on the endothelial cell density and corneal thickness. *Ophthalmic Physiol Opt.* 2015 May;35(3):293-8.
8. Choo M, Prakash K, Samsudin A, Soong T, Ramli N, Kadir A. Corneal changes in type II diabetes mellitus in Malaysia. *Int J Ophthalmol.* 2010;3(3):234-6.