



## STUDY OF CENTRAL CORNEAL THICKNESS IN DIABETICS AND ITS RELATION WITH DURATION, SEVERITY OF DIABETIC RETINOPATHY AND HYPERGLYCEMIA ASSESSED BY GLYCOSYLATED HEMOGLOBIN

<b>Dr. Anuradha Saiyam</b>	SENIOR RESIDENT, Department of Ophthalmology, JAH Campus, G.R.M.C, Gwalior, M.P
<b>Dr. Varshika Patel</b>	JR 3 Department of Ophthalmology, JAH Campus, G.R.M.C, Gwalior, M.P
<b>Dr. D K Shakya</b>	PROFESSOR and HEAD OF DEPARTMENT, Department of Ophthalmology, Madhav Dispensary, JAH Campus, G.R.M.C Gwalior, M.P
<b>Dr. Yashaswi Goyanka*</b>	Senior Resident, Department of Ophthalmology, JAH Campus, G.R.M.C, Gwalior, M.P*Corresponding Author

**ABSTRACT** Central corneal thickness in Diabetics and its relation with Duration, Severity of Diabetic Retinopathy and Hyperglycemia assessed by Glycosylated hemoglobin **PURPOSE:** To study Central corneal thickness in 50 patients with type 2 Diabetes mellitus and assess its relationship with duration, severity and HbA1C levels. **METHODS:** The study was designed as observational cross sectional 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 patients were taken. A statistically significant relationship was found between Mean CCT and HbA1C and also with severity of Diabetic retinopathy. There was Insignificant Relationship between CCT and duration of Diabetes. **CONCLUSIONS:** This study demonstrate a statistically significant relationship between Central corneal thickness to the severity of DR and HbA1C levels. ( $p < 0.05$ )

**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 subjects.(2)(3)(4)

**AIMS -** Our aim is to study, central corneal thickness (using ultrasound pachymetry) in diabetics and its relation with Duration, Severity of Diabetic Retinopathy and Hyperglycemia assessed by Glycosylated haemoglobin.

### OBJECTIVES:

Measurement of CCT in diabetics and its relation with duration and severity of diabetic retinopathy.

Relationship between CCT and HbA1C levels.

### MATERIAL AND METHODS-

Prospective observational study was conducted on 50 patients for duration of 6 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 was 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-

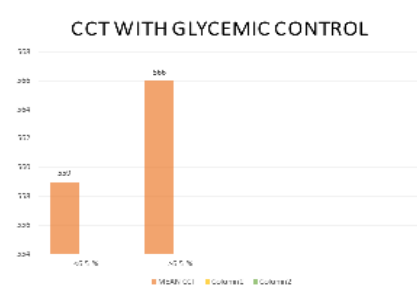
- Patients giving consent for the study
- Patients of age between  $\geq 30$  and  $\leq 70$  years of either gender
- Already diagnosed cases of diabetes and on medication

### EXCLUSION CRITERIA-

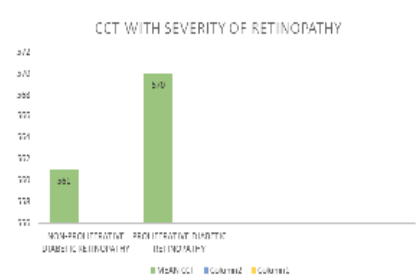
- History of any systemic disease except Diabetes
- History of Trauma
- Patient not willing to give consent
- Patients with any ocular pathology or surgery in either eye except diabetic retinopathy.
- Contact lens wearers.

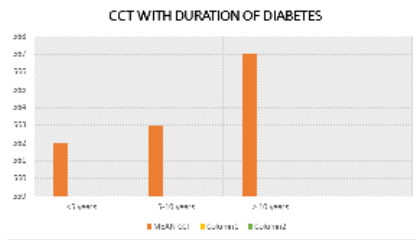
### OBSERVATION AND RESULT –

#### GRAPH 1 – CCT WITH GLYCEMIC CONTROL



#### GRAPH 2 - COMPARISON OF CCT WITH DURATION OF DIABETES





**GRAPH 3 - ASSOCIATION OF CCT WITH SEVERITY OF RETINOPATHY**

## DISCUSSION

This study mainly targeted towards the changes within central corneal thickness within diabetic patients and its relation with Duration , Severity of Diabetic Retinopathy and Hyperglycemia assessed by Glycosylated haemoglobin . A total of 50 patients participated in this study which we conducted in tertiary care hospital . Out of these 50 Diabetic patients, 35 were males and 15 were females. The mean age in diabetic group is 56.28 years with SD of 8.942. Of diabetic cases, majority had diabetes of 5-10 years duration.

In our study we found that Diabetes with HbA1C <6.5% had CCT  $559 \pm 7.30 \mu$  while those having HbA1C >6.5% had higher CCT, that is  $566 \pm 7.77 \mu$  , the difference being statistically significant ( $p=0.0014$ ) which revealed that there was significant association between CCT and HbA1C. Yesim Atley et al did a study on central corneal thickness (CCT) in diabetic patients and its association with glycemic control (HbA1c levels).

Out of 50 diabetics, majority had diabetes of 5-10 years duration with mean duration being  $7.24 \pm 3.44$  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 5 also concluded that there was no significant correlation between CCT and duration of diabetes.

Out of 50 Diabetic patients, 40 had non-proliferative diabetic retinopathy while 10 had proliferative diabetic retinopathy. Mean CCT was higher in patients having proliferative diabetic retinopathy ( $570.6 \pm 8.74$ ) than non-proliferative diabetic retinopathy ( $561.8 \pm 7.49$ ) and the difference was statistically significant (0.0023). There were studies which looked into correlation between severity of diabetic retinopathy and CCT. Studies by Yesim et al, Choo et al 5 and Mehmet et al 6 have shown no relation between the occurrence or severity of retinopathy with the CCT . However few other studies have shown increased CCT with worsening severity of the retinopathy.

Corneal endothelial changes and metabolic factors affecting the corneal stromal hydration have been postulated as the cause for the increased corneal thickness.

## 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. 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.
6. Mehmet Ozgur ZENGİNİ, Zeynep OZBEK2, Gul ARIKANI, İsmet DURAK3, Ali Does central corneal thickness correlate with haemoglobin A1c level and disease severity in diabetes type II [Internet]. [cited 2016 Jul 25]. Available from: <http://journals.tubitak.gov.tr/medical/issues/sag-10-40-5/sag-40-5-1-090534.pdf>