Annals of R.S.C.B., Vol. 24, Issue 1, 2020, pp. 515- 519
Received 18April2020; accepted 23June2020

The Effect Of Short-Termfluctuation Of Glycemic Control Over Central Corneal Thickness In Newly Diagnosed Diabetic Patients.

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ABSTRACT
To study the relationship between central corneal thickness(CCT) and short-term glycemiclevel fluctuations inpatients with newly diagnosed type-II diabetes mellitus attending our hospital.METHODS: Prospective study done in 100 patientsin the department of Ophthalmology, Meenakshi Medical College hospital and Research Institute. Patients with newly diagnosed type-II diabetes mellitus who attended during July to December 2019, in the state of hyperglycemia on presentation satisfying our inclusion criteria were selected.CCT wasmeasured in both hyperglycemic and euglycemic state in same individuals within a period of one month. RESULT:It was found there is not much of changes in the values of CCT in both hyperglycemic and euglycemic state in short period of time of one month. CONCLUSION: There was no difference in central corneal thickness in hyperglycaemic and euglycemic state measured in same individuals which was achieved within a span ofone month.

I. Introduction

AIM and Objectives

The study is done to see if there is a relation of central corneal thickness to hyperglycaemic state and euglycemic state in same diabetic individuals.

METHODS

One hundred patients with type-II diabetes mellitus who were in hyperglycaemic state postprandially, who were referred from out patients departments of Meenakshi medical college and research institute, Enathur, Kanchipuram was chosen for this prospective study. The CCT of these patients were measured before starting treatment for hyperglycaemia. Same patients were called after a month for check-up. Post-prandial blood sugar was done. The patients who had achieved euglycemic state were subjected to measurement of CCT. If the patient still not in euglycemic state patient is referred again to Diabetic and General Medicine OPD for further management and were not included in the study.

INCLUSION CRITERIA

1. Newly diagnosed Type-II diabetes mellitus patient in hyperglycaemic state (post-prandial more than 200mg/dl upto 400mg/dl).
2. Individuals attained euglycemic level (≥50 mg/dl of blood glucose level drop from initial values post-prandially).

EXCLUSION CRITERIA

1. Individuals who have failed to attain euglycemic level within a span of one month.
2. Known diabetic patients.

3. Patients with nephropathy (serum creatinine >1.2mg/dl and / or urine microalbumin > 30mcg/min)
4. patients with hypertension.
5. Patients with diabetic retinopathy.
6. Patients on long term medications- Tuberculosis, Bronchial Asthma, Rheumatoid arthritis.
7. Patients in whom optical biometry could not be done- due to corneal pathology.
8. Patients who have undergone previous ocular surgery

II. Results and discussion

In present study, our aim was to analyse CCT in diabetic patients without retinopathy, with the hypothesis that patients with diabetic retinopathy might also show increase in CCT related to metabolic changes of the cornea. Diabetes mellitus (DM) is a common disease and it is the leading cause of blindness all over the world.It occurs in two forms: Type-I(insulin dependent) and Type-II (non-insulindependent). It is also regarded as a group of disorders which results in hyperglycaemia. This hyperglycaemia is due to insulin deficiency in type-I DM and defective insulin function in type-II DM. DM gains ocular importance because of complications related to hyperglycaemia., Diabeticretinopathy. It is also has other manifestations such ascorneal disorders - punctuate epithelial keratopathy, recurrent corneal erosions, persistent epithelial defects, and endothelial damage. The metabolic status of the cornea is affected by the changes in blood glucose levels.Chronic metabolic stress caused by hyperglycaemia has shown to lead to alterations at cellular level which affect the corneal endothelial cells, which are being responsible for maintaining stromal hydration through endothelial pumping mechanism. Thus, it is hypothesised that central corneal thickness (CCT) may change in accordance with the irregularities of blood glucose levels.It was found that there was no difference in central corneal thickness between hyperglycaemic and euglycemic state in type-II diabetes mellitus patients achieved at one month.

The euglycemic state in our study was defined as PPBS measured by 2 hourof < 200mg/dl along with a drop of 50 mg/dl from the hyperglycaemic state in a period of one month, post-prandially. We included patients with drop in blood sugars of a minimum of 50 mg/dl post-prandially. We looked for changes at one month since that was the routine follow up protocol for diabetic patients to recheck blood sugars in our hospital. We also excluded patients with renal disease as the fluid accumulation in these patients may lead to altered corneal hydration. The mean CCT in the one hundred patients studied was 502.20±25.05 microns in the hyperglycemic state and 503.38 ± 25.18 microns in the euglycemic state. There was no difference in the CCT between hyperglycemic and euglycemic state. There are few studies which have looked into corneal changes in hyperglycaemic and euglycemic state for a longer period, and it was found that there is thicker central cornea and a change in endothelial layer manifesting as loss of endothelial cell count. In a study done in 1999 it was concluded as corneal endothelium should still be considered as a tissue under continuous metabolic stress with consequent high vulnerability, especially in diabetic individuals.

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Total sample size = 100
Significance level = 1%

Table 1. Baseline characteristics of the study patients

Total number of patients who achieved euglycemia	87
Number of males	22
Number of females	65
Average age (years)	43.7
Range of age (years)	35-55

Table 2: CCT in hyperglycemic and euglycemic states

Glycemic status	Mean(microns)±SD	Range(microns)
Hyperglycemia	502.20±25.05	440 to 560
Euglycemia	503.38±25.18	446 to 566

(p=0.167)

Table 3: Number of patients showing changes in CCT in both euglycemic and hyperglycemic states

Total no. of patients	87
No. of patients showing increase in CCT on achieving euglycemic state	47
No. of patients showing decrease in CCT on achieving euglycemic state	32
No. of patients showing no change in CCT on achieving euglycemic state	8

III. Conclusion

On prospective study of correlation of glycaemic control and central corneal thickness in individuals who are newly diagnosed diabetics attending our hospital's out patient department and being referred to our department for ocular examination was included in our study after consent to take part in the study. The patient is enrolled into our study when the post-prandial value is >200mg/dl. Central corneal thickness was measured before starting the treatment for hyperglycaemia. Same individuals were called in after a period of one month and was reviewed with post-prandial blood sugar level and CCT was repeated to those who have achieved euglycemia according to our inclusion criteria. On correlating the values it was found that there is no changes in the CCT due to fluctuations of blood glucose level within short period of time of one month.Based on our study there was no difference in central corneal thickness between both euglycemic and hyperglycemic state detected in same type-II diabetes mellitus patients in a period of one month.

There was no effect of short-term fluctuations (1 month) in blood sugars on CCT in newly diagnosed type-II diabetes mellitus. The patients included in the study were those without other possible reasons of hypothesis for causing fluctuations in the CCT.

Sources of support: nil
Conflicts of interest: nil

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