

Comparison of Measurement of Corneal Thickness in Glaucoma Patients: A Prospective Institutional Based Study

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ABSTRACT

Background: Corneal thickness measurement plays a crucial role in diagnosis and managing a case of glaucoma. The aim of the present study is to compare corneal thickness amongst normal patients and patients of glaucoma.

Materials and Methods: The present study was conducted in the Department of Ophthalmology, Rajshree Medical Research Institute & Hospital, Bareilly, Uttar Pradesh (India). Patient's demographic detail including chief complaint and drug history were recorded in a predesigned performa. Topical anaesthesia was given and probe tip was held perpendicular to the central cornea. Readings of both left and right eye were recorded. All the data was arranged in a tabulated form and analysed using SPSS software. Data was expressed as percentage and mean± standard deviation.

Results: The present prospective study enrolled 200 subjects, out of these only 54 presented with glaucoma and rest 146 had minor ophthalmic problems so they were added to the control group. A total of 400 eyes were examined and there were 105 eyes that had glaucoma. There was 35.3% (n=39) glaucoma eyes who had CCT less than 530 micron and 47.1% eyes (n=137) whose CCT was less than 530 micron. The CCT of 52.9% eyes in control group and 64.2% eyes of Glaucoma group was above 530 micron.

Conclusion: Central corneal thickness varies amongst normal subjects and glaucoma patients. There was not much difference between both the groups in our study. In our study there were 35.3% (n=39) glaucoma eyes who had CCT less than 530 micron and 47.1% eyes (n=137) whose CCT was less than 530 micron. The CCT of 52.9% eyes in control group and 64.2% eyes of Glaucoma group was above 530 micron.

Keywords: Cornea, Glaucoma, Intraocular.

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INTRODUCTION

Corneal thickness measurement plays a crucial role in diagnosis and managing a case of glaucoma.¹ Various studies have shown that there is variation in intraocular pressure according to thickness of cornea.^{2,3} Since glaucoma is considered one of the prime causes of blindness in the world, therefore early and prompt management of glaucoma is necessary. Glaucoma is basically optic neuropathy with defects in visual field that are generally associated with raised intraocular pressure. Hereditary, raised intraocular pressure and myopia are considered risk factors for glaucoma. The gold standard for measuring intraocular pressure is Goldmann Applanation tonometer. But since it varies with corneal thickness and rigidity, so measurement of corneal thickness is mandatory.

Studies have shown that thick corneas resulted in overestimation of intraocular pressure.² A study conducted by ocular hypertension treatment showed that patients with lower central corneal thickness are at increases risk of open angle glaucoma. The risk

is up to 70% higher with 40µ decrease in central corneal thickness.^{3,4} Various new advancements and instrumentation have been developed to measure intraocular pressure and central corneal thickness. Recently corneal thickness is measured by ultrasonic pachymetry but it carries a risk of infection and damage to epithelium of cornea. The aim of the present study is to compare corneal thickness amongst normal patients and patients of glaucoma.

MATERIALS AND METHODS

The present study was conducted in the Department of Ophthalmology, Rajshree Medical Research Institute & Hospital, Bareilly, Uttar Pradesh (India). In this study patients reporting to the department with any ocular problem who were above 40 years of age were included in the study. Patients who were less than 40 years, patients with any history of corneal surgery or pathology, patients who were lens wearers were excluded from the study. All

the patients were informed about the study and a written consent was obtained from all in their vernacular language. Ethical committee clearance was obtained from the institute's ethical board. Patient's demographic detail including chief complaint and drug history were recorded in a predesigned performa. Initially slit lamp examination and fundoscopy was done in every patient. Visual acuity of each patient was recorded. With patient in sitting

position and eyes fixated at a distant object central corneal thickness was measured using sonomed 200 pachymeter. Topical anaesthesia was given and probe tip was held perpendicular to the central cornea. Readings of both left and right eye were recorded. All the data was arranged in a tabulated form and analysed using SPSS software. Data was expressed as percentage and mean± standard deviation.

Graph 1: Showing cases of glaucoma

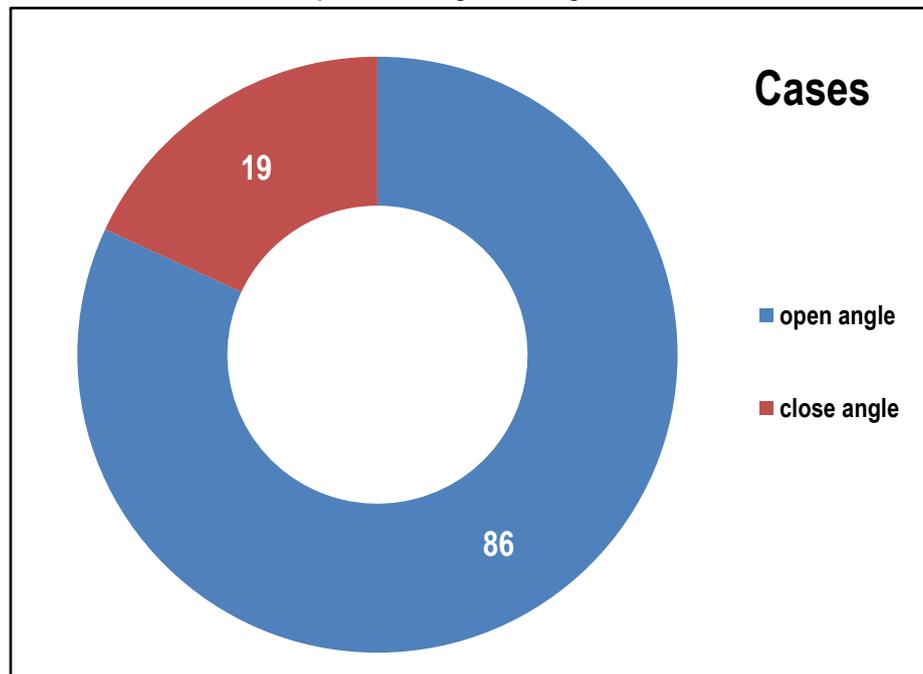


Table 1: Mean values of thickness of central cornea

AGE GROUP	N	CCT (MEAN+/- SD)
40-50	196	531.27 +/-35.32
51-60	114	522.54 +/-47.15
61-70	74	516.18 +/-86.65
71-80	14	498.87 +/-98.53
81-90	2	500.01 +/-69.21

Table 2: Classification of Group according to CCT

CCT	CONTROL	GLAUCOMA
<530u	137/47.1%	39/35.8%
>530u	154/52.9%	70/64.2%
Total	291	109

RESULTS

The present prospective study enrolled 200 subjects, out of these only 54 presented with glaucoma and rest 146 had minor ophthalmic problems so they were added to the control group. A total of 400 eyes were examined and there were 105 eyes that had glaucoma.

Out of 105 eyes of glaucoma, 86 eyes had open angle glaucoma and 19 had close angle glaucoma.(Graph 1)

Table 1 shows the mean values of central corneal thickness. There were 195 eyes of age group 40-50 years who had mean thickness of 631.27 ± 35.32U. There was one patient of 81-90 years of age whose CCT was 500.01 ± 69.21U. The least CCT

was in age group 71-80 years. Seven patients have mean levels of 498.87 ± 98.53U.

Table 2 shows the comparison of Central corneal thickness amongst patients of glaucoma and control group. There was 35.3% (n=39) glaucoma eyes who had CCT less than 530 micron and 47.1% eyes (n=137) whose CCT was less than 530 micron. The CCT of 52.9% eyes in control group and 64.2% eyes of Glaucoma group was above 530 micron.

DISCUSSION

In a study done by Bardados showed that the mean thickness of cornea amongst black population was 529.8um and that amongst

white population was 545 μ m.⁵ But in a study conducted by Shimmyo et al showed that African Americans had thinner cornea but there was no difference in the central corneal thickness amongst Asian, Whites and Hispanic patients.⁶ In a study conducted by Tsung Ho et al⁷ over 104 patients showed that the mean central corneal thickness was 539.55 \pm 38.113 μ m. In our study There were 195 eyes of age group 40-50 years who had mean thickness of 631.27 \pm 35.32 μ m. There was one patient of 81-90 years of age whose CCT was 500.01 \pm 69.21 μ m. The least CCT was in age group 71-80 years. Seven patients have mean levels of 498.87 \pm 98.53 μ m. There was 35.3% (n=39) glaucoma eyes who had CCT less than 530 micron and 47.1% eyes (n=137) whose CCT was less than 530 micron. The CCT of 52.9% eyes in control group and 64.2% eyes of Glaucoma group was above 530 micron. In a study conducted by Nissan showed that using probe for measurement of central corneal thickness resulted in inaccurate readings as probe has the tendency to displace the tear film by 7-40 μ m resulting in thinning of the epithelium.⁸ Goldmann Applanation tonometer is used for the measurement of intraocular pressure. But this pressure is influenced by corneal thickness, curvature, rigidity and axial length. In a study conducted by Ehlers et al, to note the effect of intraocular pressure on central corneal thickness showed that GAT most accurately determined the intraocular pressure when the central corneal thickness was 520 μ m.^{2,9} The age range of our present study was between 40-85 years. This group was comparable to the study conducted by Bindu M et al,¹⁰ the conducted a study to compare central corneal thickness and intraocular pressure using Goldmann Applanation Tonometer and Rebound Tonometer. Intraocular pressure is greatly influenced by central corneal thickness. Thick corneas result in higher intraocular pressure. Another method used in experimental animal models for the measurement of intraocular pressure is rebound tonometry.¹¹ In a study conducted by Kawanna et al showed good linear correlations when ultrasonic pachymetry and Orbscan II were compared in patients with keratoconus, but it also showed lower readings with Orbscan II when used in thin corneas.¹² Few limitations of our study were that the sample size was small and follow up was not done.

CONCLUSION

Central corneal thickness varies amongst normal subjects and glaucoma patients. There was not much difference between both the groups in our study. In our study there were 35.3% (n=39) glaucoma eyes who had CCT less than 530 micron and 47.1% eyes (n=137) whose CCT was less than 530 micron. The CCT of 52.9% eyes in control group and 64.2% eyes of Glaucoma group was above 530 micron.

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