

Central Corneal Thickness (CCT) in Open Angle Glaucoma and Glaucoma Suspects in Calabar, Nigeria

Dennis G. Nkanga<sup>1,2,§</sup> Affiong Andem Ibanga<sup>1,2</sup>  
Elizabeth D. Nkanga<sup>2</sup> Bassey A. Etim<sup>1,2</sup> Kennedy  
U. Nwachukwu<sup>2</sup> and Pius O. Ogba<sup>3</sup>

<sup>1</sup>Department of Ophthalmology, University of Calabar, PMB 1115, Calabar, Cross River State, Nigeria.

<sup>2</sup>Department of Ophthalmology, University of Calabar Teaching Hospital, Calabar

<sup>3</sup>Zerah Eye Hospital and Laser Centre, Plot 103 Ibom Layout, Calabar.

Corresponding author: Dennis G. Nkanga  
Email: zeraheyceneter@yahoo.com

**Introduction:** Central Corneal Thickness (CCT) is a measurement of the thickness of the central 3mm of the cornea.<sup>[1]</sup> It has gained increased significance in glaucoma evaluation and management. This resulted from the observed relationship between CCT and intraocular pressure (IOP) levels.<sup>[2-4]</sup> CCT varies with age and also among ethnic groups. The Ocular Hypertension study found significantly thinner corneas among African Americans<sup>[5-7]</sup>. The purpose of this study was therefore to determine to what extent CCT affected IOP and thus management decisions in glaucoma patients and suspects<sup>[8,9]</sup>.

**Methods:** A cross sectional study design was chosen. Ethical approval was obtained from the research ethics committee of the University of Calabar Teaching Hospital (UCTH). All consecutive patients seen in the eye clinic of UCTH who were diagnosed with Chronic open angle glaucoma or as Glaucoma suspects from January 2013 to December 2013, were included after an informed consent was obtained for the study. For the purpose of this study a glaucoma suspect is defined as an adult who has one of the following findings in at least 1 eye:

- an optic nerve or nerve fiber layer defect suggestive of glaucoma (enlarged cup-disc ratio, asymmetric cup-disc ratio, notching or narrowing of the neuro-retinal rim, a disc hemorrhage, or suspicious alteration in the nerve fiber layer)

- a visual field abnormality consistent with glaucoma
- an elevated IOP greater than 21 mm Hg

If however two or more of these findings are present, a diagnosis of Primary Open Angle Glaucoma (POAG) was defined, especially with the presence of risk factors, such as age above 50

Table 1: Age and sex distribution in the Study sample

Age group (years)	Male	Female	Total
0-29	16(13.01%)	37(27.82%)	53(20.70%)
30-49	50 (40.65%)	46(34.59%)	96(37.50%)
50-69	40(32.52%)	44(33.08%)	84(32.81%)
70-100	17(13.82%)	6 (4.51%)	23(8.98%)
Total	123(100%)	133(100%)	256(100%)

years, family history of glaucoma, and black race as well as the absence of a direct aetiologic factor. IOP was measured by Goldmann Applanation Tonometry (GAT). CCT was measured by handheld contact ultrasound pachymeter (Reichert ipac).

Table 2: Mean CCT by Age

Age group (years)	Mean CCT OS(um)	Mean CCT OD(um)
0-29	548.55+/- 39.63(53)	549.31±41.04(52)
30-49	531.65+/-37.22 (96)	532.62±35.45( 96)
50-69	523.51+/-33.97(83)	525.55±35.09(83)
70-100	517.74±38.09(23)	518.83±38.45 (23)
Total	531.26±37.90 (255)	532.48±37.82 (254)

Data entry and analysis was performed using STATA 12. Results were summarized in frequencies, percentages and means.

**Results:** The study sample was 256; 133(51%) females, 123(48%) males. The mean age was 45.52years ±17.82. Mean CCT was 530µm. An inverse relationship between CCT and age was seen; mean CCT of 518.29µm and 548.93µm for the oldest age and youngest age groups respectively. The mean IOP was 15.84 mmHg and CCT adjusted values for IOP varied from ±7 to ±11mmHg, (mean 9.20mmHg). The required adjustments are read directly from the display screen of the iPac Reichert pachymeter which shows both the CCT and calculated adjustment for IOP. Over 50% had adjusted IOP values of ≥ 1.5mmHg, while 36% had adjusted values of ≥3mmHg.

Discussion: The CCT adjusted values for IOP varied from +/-7 to +/-11 mmHg. This is a significant adjustment in IOP values which is the major modifiable risk factor in the management of glaucomatous neuropathy. Some studies which used linear and mathematical (Orssengo-Pye) algorithms take adjustments in IOP of 1.5mmHg or greater as measurement-significant outcome which was the case for over 50% of patients in our cohort.[10,11] IOP adjustments of 3mmHg or greater has been described as outcomes-significant results and this was the case for at least 36% of the patients in our study. Increasing age is a known risk factor for glaucoma, but it remains to be elucidated if the progressive thinning in CCT with age confers an independent risk factor.

Conclusion: There was a significant adjustment in IOP after accounting for CCT in glaucoma suspects and glaucoma patients seen in Calabar, Nigeria. Routine CCT measurements at diagnosis should be part of a minimum package of care in the management of open angle glaucoma in Nigeria as this is likely to modify target IOP during treatment.

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