

Corneal anthropology: Ethnicity-based central corneal thickness measurements in managing corneal disorders

Dear Editor,

Ethnicity is known to affect the ocular and periocular measurements.^[1] Central corneal thickness (CCT) is the most heritable trait in the human body.^[2] Genome-wide association analysis in multiethnic Asian groups has shown genes that affect CCT and its variation between ethnic groups.^[3]

The difference in baseline CCT suggests that ethnicity may affect the prevalence and severity of certain corneal disorders. Asian ethnic groups have a fourfold more incidence of keratoconus and these patients present at a younger age and progress faster as compared to the Whites.^[4] Therefore, the treatment options for keratoconus may be customized on the basis of the ethnic origin of the individual. Population groups of African origin have been reported to have thinner corneas compared to the whites.^[5] Apart from African Americans, the Japanese have been reported to have thinner corneas compared to other ethnicities.^[6] CCT has been shown to be the strongest predictive factor for glaucoma progression, independent of intraocular pressure (IOP).^[7] Pachymetry-adjusted IOP values play a significant role in glaucoma management.^[8] In the Chennai Glaucoma study from South India, the urban group had a mean CCT of $520.7 \pm 33.4 \mu\text{m}$ and significantly lower in the rural group with glaucoma ($505.9 \pm 31.1 \mu\text{m}$).^[9] Another study from a nearby urban region (Bangalore, Karnataka) found similar CCT values and significantly lower than the internationally accepted CCT value ($545 \mu\text{m}$).^[10] The authors suggested the use of local ethnic group CCT to ascertain the pachymetry-corrected IOP.

Patient selection for refractive laser eye surgery and choice of surgical procedure (photorefractive keratectomy, laser *in-situ* keratomileusis, small incision lenticule extraction) should also be based on local ethnic CCT rather than the international accepted value.^[11] Endothelial cell density (ECD) has also been seen to vary between various groups. In a study, the Iranian population had lower ECD as compared to Indian and American groups.^[12] According to the authors, this may have a role to play in the lower incidence of pseudophakic bullous keratopathy in groups like the Japanese, who have higher ECD values.^[13]

Ethnicity-based clinical, genetic, and molecular research is still in infancy. Research on genes responsible for normal CCT variation is being done by candidate gene approach, familial linkage analysis, and genome-wide association studies.^[2] It has a great potential in the diagnosis, monitoring, and optimizing treatment options for corneal disorders. The term "corneal anthropology" should be used for ethnicity-based corneal research.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Rajan Sharma, Ashok Sharma

Cornea Centre, Chandigarh, India

Correspondence to: Dr. Ashok Sharma,
Director, Cornea Centre,
2463-2464 Sector 22 C Chandigarh - 160 022, India.
E-mail: asharmapgius@yahoo.com

References

1. Yu P, Nathan P, Meng CS. Periocular anthropometry of normal Chinese and Indian populations in Singapore. *JOJ Ophthal* 2019;7:555722.
2. Dimasi DP, Burdon KP, Craig JE. The genetics of central corneal thickness. *Br J Ophthalmol* 2010;94:971-6.
3. Cornes BK, Khori CC, Nongpiur ME, Xu L, Tay WT, Zheng Y, *et al.* Identification of four novel variants that influence central corneal thickness in multi-ethnic Asian populations. *Hum Mol Genet* 2012;21:37-45.
4. Pearson AR, Soneji B, Sarvananthan N, Sandford-Smith JH. Does ethnic origin influence the incidence or severity of keratoconus? *Eye (Lond)* 2000;14:625-8.
5. La Rosa FA, Gross RL, Orengo-Nania S. Central corneal thickness of Caucasians and African Americans in glaucomatous and nonglaucomatous populations. *Arch Ophthalmol* 2001;119:23-7.
6. Belovay GW, Goldberg I. The thick and thin of the central corneal thickness in glaucoma. *Eye (Lond)* 2018 ;32:915-23.
7. Gordon MO, Beiser JA, Brandt JD, Heuer DK, Higginbotham EJ, Johnson CA, *et al.* The ocular hypertension treatment study: Baseline factors that predict the onset of primary open-angle glaucoma. *Arch Ophthalmol* 2002;120:714-20.
8. Shih CY, Graff Zivin JS, Trokel SL, Tsai JC. Clinical significance of central corneal thickness in the management of glaucoma. *Arch Ophthalmol* 2004;122:1270-5.
9. Vijaya L, George R, Baskaran M, Arvind H, Raju P, Ramesh SV, *et al.* Prevalence of primary open-angle glaucoma in an urban south Indian population and comparison with a rural population. *Ophthalmol* 2008;115:648-54.
10. Sharma R, Nagaraja K S, Sujatha R, Prashant C N, Sharma S, Sharma A. Central corneal thickness and intraocular pressure in primary open angle glaucoma suspects in a south Indian population. Is it time for "corneal anthropology"? *Indian J Clin Exp Ophthalmol* 2020;6:542-8.
11. Lifshitz T, Levy J, Rosen S, Belfair N, Levinger S. Central corneal thickness and its relationship to the patient's origin. *Eye (Lond)* 2006;20:460-5.
12. Hashemian MN, Moghimi S, Fard MA, Fallah MR, Mansouri MR. Corneal endothelial cell density and morphology in normal Iranian eyes. *BMC Ophthalmol* 2006 6;6:9.
13. Matsuda M, Yee RW, Edelhauser HF. Comparison of the corneal endothelium in an American and a Japanese population. *Arch Ophthalmol* 1985;103:68-70.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online	
Quick Response Code:	Website: www.ijo.in
	DOI: 10.4103/ijo.IJO_385_21

Cite this article as: Sharma R, Sharma A. Corneal anthropology: Ethnicity-based central corneal thickness measurements in managing corneal disorders. *Indian J Ophthalmol* 2021;69:1338.

© 2021 Indian Journal of Ophthalmology | Published by Wolters Kluwer - Medknow