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Foveal shape variation among gender and ethnicity

Purpose

We explored foveal profile variation related to gender and ethnicity using spectral domain optical coherence tomography (OCT).

Methods

One eye of 224 healthy participants of white (n=76), South Asian (n=78), and black (n=70) ethnicities were included. Mean age was 24 ± 6 years and 68% was female. From a $20^\circ \times 10^\circ$ Spectralis OCT (Heidelberg, Germany) B-scan with brightest foveal reflex, we manually obtained 1) retinal thickness at the centre of the foveal reflex (RTfr); 2) foveal base width (FBW), temporally (TeBW) and nasally (NaBW) where RTfr remained constant including two microns to consider the OCT's lateral measurement error; and 3) temporal and nasal foveal slope angles (TeFA and NaFA) between the edge of the foveal base and one degree eccentricity on either side. The effect of ocular magnification on scan length were accounted for by incorporating corneal curvature values prior to OCT acquisition.

Results

RTfr was significantly increased in white (229 ± 20) versus South Asian (219 ± 15) and black subjects ($214 \pm 14 \mu\text{m}$; $P < 0.0005$), and in males (225 ± 19) compared to females ($218 \pm 16 \mu\text{m}$; $P = 0.008$). A significantly wider FBW was observed in South Asians (253 ± 86) versus whites ($207 \pm 81 \mu\text{m}$; $P = 0.001$) but not blacks (233 ± 88), and in females (250 ± 91) compared to males ($198 \pm 67 \mu\text{m}$; $P < 0.0005$). Temporally, the base width was significantly wider ($P < 0.0005$) and foveal slope steeper ($P = 0.009$) when compared to nasally. A narrow FBW was associated with thicker retinas ($\rho = -0.310$; $n = 224$; $P < 0.0005$), and a steeper foveal slope nasally (NaFA; $\rho = -0.424$; $P < 0.005$) but not temporally ($P = 0.11$). South Asians were found to have significantly wider NaBW ($P = 0.002$) and flatter NaFA ($P < 0.0005$) compared to whites and blacks. Temporally, there were no differences between ethnicities ($P > 0.05$). Females presented wider TeBW and NaBW (both $P < 0.005$), and flatter NaFA ($P = 0.046$) compared to males.

Conclusions

In a healthy population, variability in foveal architecture is apparent between ethnicities and genders. A thinner retina is associated with a wider foveal base width. Significantly thicker central retinas and narrow NaBW were found in whites, while South Asians show significantly wider NaBW and flatter NaFA. Females present significantly thinner central retinas, wider BW (total, Na and Te), and flatter NaFA. Physiological properties of the foveal profile may allow better understanding of pathological changes seen in conditions affecting the fovea.