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Letter to the Editor

Ocular biometry in Aboriginal and Torres Strait Islander patients undergoing cataract surgery

Variations in ocular anatomy form the basis of understanding the development and management of ocular disease, and help to determine associations between anatomy and disease. Epidemiological studies have found associations between ocular anatomy and the pathogenesis of disease, such as higher rates of angle-closure glaucoma in Alaskan Eskimos and higher incidence of myopia in Chinese.

A recent study by Yoon *et al*. examined ethnic variation in biometric parameters in New Zealand. Outreach surgical services in Australia rely on consignments of intraocular lenses. Consideration of ethnic variations may be helpful in rationalizing appropriate consignments. To date, there has been no profile of biometric parameters in Aboriginal and Torres Strait Islanders (ATSI) compared directly to the non-ATSI population.

We conducted a retrospective analysis of IOLMaster biometry measured from patients as part of their pre-operative cataract work-up. Data were recorded from a 6-month period between March to August 2016, with only complete right eye data included in this study. We compared ATSI patients with non-ATSI patients. Biometric parameters of keratometry, axis of astigmatism, corneal power, axial length, anterior chamber depth and white-to-white ratios measured by the IOLMaster 500 (Carl Zeiss, Jena, Germany). The intraocular lens power for emmetropia was calculated using the A-constant 118.4 and the SRK-T formula.

Data for 143 individuals were assessed, of which 61 were ATSI (43%) and the results are summarized in Table 1. Mean age for the ATSI cohort was 4.7 years younger than the non-ATSI cohort, which reached statistical significance. There was a statistically significant difference between the two cohorts with the ATSI cohort measuring longer axial lengths with lower corneal curvatures at the flat (K1) and steep (K2) meridians. Despite these differences however, there was no statistically significant difference in cylinder power, nor ideal IOL power as calculated by the SRKT formula when aiming for emmetropia.

Table 1. Comparison of non-ATSI and ATSI ocular biometry in pre-operative cataract assessment

	Non-ATSI Mean ± SD	ATSI Mean ± SD	*p*-value
Age (years)	66.3 ± 13.0	61.6 ± 10.2	0.02*
Axial length (mm)	23.53 ± 0.84	23.86 ± 1.11	0.04*
K1 (D)	43.23 ± 1.38	42.60 ± 1.48	0.01*
K2 (D)	44.28 ± 1.40	43.73 ± 1.68	0.03*
Cyl (D)	1.04 ± 0.93	1.13 ± 0.57	0.54
Axis (°)	87 ± 56	82 ± 47	0.60
ACD (mm)	3.18 ± 0.37	3.29 ± 0.42	0.09
WTW (mm)	11.88 ± 0.39	11.88 ± 0.51	0.98
IOL power via SRK/T -emmetropia (D)	21.01 ± 2.16	21.04 ± 1.82	0.92

**p*-value statistically significant.

These results indicate that despite a statistically significant difference in axial length and keratometry, this discrepancy was not preserved in either cylinder or ideal IOL power, when comparing the two cohorts. There is suggestion that the longer axial lengths recorded in the ATSI cohort is negated by the flatter corneal curvatures. Furthermore, the younger mean age for the ATSI cohort is perhaps reflective of the increased prevalence of cataract risk factors such as previous trauma, poorly-controlled diabetes, ultraviolet exposure and higher rates of smoking. A second possible explanation is the presence of more advanced cataracts in older ATSI patients, where axial length measurements cannot be measured by partial coherence interferometry. However, this study did not evaluate the portion of patients requiring A-scan applanation ultrasonography for axial length measurements.

Clinically, the finding of longer axial length measures in ATSI has potential implications particularly in the administration of retrobulbar anaesthesia. In our clinical experience, we find retrobulbar anaesthesia tends to be favoured in an ATSI population as it achieves akinesis of the extraocular muscles. The finding of longer axial lengths in this cohort may suggest an increased risk of ocular perforation that should be considered during pre-operative planning.

Compared with other similar published studies in different ethnic groups, we note axial lengths of ATSI patients are similar to Indigenous populations in this region, such as the Pacific Islanders and Maoris (Table 2).

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Table 2. Comparative axial length measures in various ethnic groups

Study	Ethnicity	Mean AL (mm)
Hoffman *et al.*[1]	Caucasian	23.43
Lim *et al.*[2]	Mongoloid (Malay)	23.55
Pan *et al.*[3]	Indian	23.55
Yoon *et al.*[4]	Pacific	23.66
Yoon *et al.*[4]	Maori	23.71
Our study	**Aboriginal and Torres Strait Islanders**	**23.94**
Cui *et al.*[5]	Mongoloid (Chinese)	24.07

Bolded study to identify results from our study.

This study serves as a starting point for the analysis of ethnic variations in the ATSI population compared with the non-ATSI cohort. Possible areas of future investigation include an assessment of refractive status compared with ocular biometry and postoperative refractive outcomes in an ATSI cohort.

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