Astigmatism and its Components in 6-Year-Old Children

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ABSTRACT

PURPOSE: To (1) report the prevalence of refractive (RA), corneal (CA), and internal astigmatism (IA), (2) examine their variation with gender, ethnicity and refraction, and (3) examine the effect of gender, ethnicity, and spherical equivalent refraction on the relationship between CA and RA, in a population of 6-year-old children.

METHODS: The Sydney Myopia Study is a population-based survey of refraction and eye health of 6-year-old children. A random cluster design was used to recruit children from schools across Sydney, Australia, during 2003-4. Data collection used a detailed questionnaire and comprehensive eye examination. Keratometric (Zeiss IOLMaster) and cycloplegic auto-refraction (Canon RK-F1) data from right eyes were analysed.

RESULTS: Of 2238 eligible children, 1765 (78.9%; 50.7% boys) had parental consent to participate. Overall prevalence of RA (≥1.0D) was 4.8% (95% confidence interval {CI} 3.8-6.1%), CA (≥1.0D) 27.7% (CI 23.8-32.3%), and IA (≥1.0D) 21.1% (CI 19.0-23.5%). The RA axis was fairly evenly distributed, with predominance of oblique axis (39.1%; CI 35.9-42.6%). CA axis was mainly with-the-rule (75.1%; CI 72.6-77.8%), while IA axis was mainly against-the-rule (76.7%; CI 74.2-79.3%). After adjustment for multiple variables, girls had significant, marginally greater mean CA and IA than boys. East Asian and South Asian children had significantly greater prevalence and mean RA and CA than European Caucasian children. There were no significant ethnic differences of mean IA. Compared to reference (spherical equivalent {SE} 1.01-1.50D), mean RA and CA increased significantly with more hyperopic and more myopic refractions. Mean IA was significantly greater only for hyperopic refractions (SE>2.00D).

CONCLUSIONS: The prevalence of astigmatism found in this population of 6-year-old children was relatively low, and showed significant variation with ethnicity. The data suggest that emmetropization for RA occurs by a compensatory process between CA and IA.