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Distribution of the anterior, posterior, and total corneal astigmatism in healthy eyes

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Purpose: To evaluate the magnitude and axis orientation of the anterior, posterior, and total corneal astigmatism in normal healthy eyes of an Iranian population.

Methods: In a prospective cross-sectional study, ophthalmic and anterior segment parameters of 153 healthy eyes of 153 subjects were evaluated by Galilei dual Scheimpflug analyzer. The magnitude and axis orientation [with-the-rule (WTR), against-the-rule (ATR), and oblique] of the anterior, posterior, and total corneal astigmatism measurements (ACA, PCA, and TCA) were compared according to the age, sex, and other ophthalmic parameters.

Results: The mean ± SD age of the study population was 30 ± 5.9 years. The mean magnitude was 1.09 ± 0.76 diopters (D) for ACA, 0.30 ± 0.13 D for PCA, and 1.08 ± 0.77 D for TCA. Males had a significantly higher magnitude of PCA than females ($p = 0.041$). Most eyes had a WTR anterior astigmatism and an ATR posterior astigmatism. The WTR astigmatism had a higher mean magnitude compared to the ATR and oblique astigmatism in all the astigmatism groups, with a significant difference in the ACA and TCA groups ($p < 0.05$). PCA magnitude exceeded 0.50 D in only 7.8% of the subjects. ACA, PCA, and TCA were significantly correlated with each other and also had a significant correlation with the anterior and posterior maximum corneal elevation measurements ($p < 0.001$).

Conclusion: The results of this study although are limited due to the small number of participants and confined to our demographics, provided information regarding a population that was not described before and may be helpful in obtaining optimum results in astigmatism correction in refractive surgery or designing new intraocular lenses.

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