

Difference of refractive status before and after cycloplegic refraction: the Lhasa Childhood Eye Study

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Abstract

Purpose

To compare the differences between cycloplegic and noncycloplegic refraction as well as associated factors in grade one students of primary schools, and explore the effectiveness of noncycloplegic refraction for refractive error screening.

Study design

Cross-sectional study.

Methods

A school-based study of 1856 students was conducted in Lhasa, Tibetan Plateau, China. Cycloplegia was achieved with two drops of 1% cyclopentolate and 1 drop of Mydrin P at a 5-min interval. Autorefractometry was performed under both cycloplegic and noncycloplegic conditions. Bland–Altman analysis, receiver operating characteristic curve analysis, univariate and multiple linear regression models were used for analysis.

Results

Of the 1856 children enrolled, 1830 (98.60%) completed all procedures. The average age was 6.83 ± 0.46 years. 965 (52.73%) children were boys and 1737 (94.92%) were Tibetan. Overall, there was a significant difference between cycloplegic and noncycloplegic SE of 0.90 ± 0.76 D ($P < 0.001$). However, the intra-class coefficient correlation (ICC) for cylinder between these two methods was high (ICC = 0.941, 95% CI, 0.935–0.946). Larger differences between cycloplegic and noncycloplegic SE were associated with hyperopic RE and higher cylindrical value ($P < 0.001$). The prevalence of myopia, emmetropia and hyperopia with and without cycloplegia was (3.93% vs 14.59%), (9.95% vs 45.8%) and (86.21% vs 39.56%), respectively. Myopia, emmetropia and hyperopia based on noncycloplegic refraction was defined as $SE \leq -0.625$ D, $-0.625 < SE \leq 0$ D, and $SE > 0$ D, respectively.

Conclusions

Lack of cycloplegia leads to underestimation of hyperopia, with overestimation of myopia and emmetropia. Larger hyperopic refraction exhibited greater difference between cycloplegic and noncycloplegic refraction.

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