

Change in Ocular Accommodation Over the Day in Children Using 0.05% Low Dose Atropine

Purpose:

Low dose atropine is currently used as a treatment method to slow the progression of myopia in children. This study investigates whether accommodative ability changes throughout the day after the instillation of 0.05% atropine drops.

Methods:

Ten children aged 7-15 years who were habitually using 0.05% atropine eyedrops for myopia management participated in this study. Each child instilled atropine drops the night before the study and came in the next day for study visits at three time points (morning, midday, afternoon). Each visit included objective measurements of accommodation using a Grand Seiko autorefractor (amplitude) and MEM retinoscopy (accuracy). Accommodative amplitude was measured using a 0.9mm sized letter positioned at multiple accommodative demands (3D, 5D, 8D, 10.5D, and 15D). Five repeated measurements were taken at each demand. The average spherical equivalent for each demand was compared to identify the maximum amplitude. MEM retinoscopy was performed at a test distance of 33cm using a level 2 text card and loose lenses to neutralize the reflex (positive values indicate a lag of accommodation). Accommodative findings at the three time points were compared using one-way ANOVA analysis.

Results:

The group mean accommodative amplitude for each time point was $7.18 \pm 1.47D$, $7.19 \pm 1.57D$, and $8.11 \pm 1.15D$ for morning, midday, and afternoon, respectively. There were significant differences between timepoints ($p = 0.01$, one-way ANOVA) with the significant comparisons identified by post hoc Tukey ($p < 0.05$) as both morning versus afternoon and midday versus afternoon. The group mean accommodative accuracy for each time point was $0.55 \pm 0.72D$, $0.50 \pm 0.68D$, and $0.55 \pm 0.73D$, respectively. These findings were not statistically significantly different across time ($p=0.27$).

Conclusion:

Clinical assessment of accommodative accuracy at 33cm revealed no difference throughout the day in children using 0.05% atropine. However, accommodative amplitude increased in the afternoon as objectively measured by the Grand Seiko autorefractor. This indicates that there are changes in accommodation as atropine wears off throughout the day that may not be detected with tests at a single, fixed viewing distance.

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