Invited Commentary

Atropine, 0.01%, for Myopia Control

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Slowing the progression of myopia, rather than simply treating the symptoms of blurred distance vision, has only recently gained wide popularity among clinicians, despite being studied for decades. Atropine, 1%, eye drops have long been available for cycloplegia and was the original dose studied for myopia control, but more recently, much lower concentrations have been investigated to slow myopia progression while minimizing rebound effects (loss of accrued benefit after discontinuing treatment) and adverse effects such as photophobia and near blur. Four of 6 randomized myopia control studies comparing atropine, 0.01%, with placebo reported significant slowing of myopia progression,[1-6] but only 3 of the 6 reported significant slowing of eye growth.[1,3,5] Repka et al[7] reported the first randomized clinical trial conducted in the US, to our knowledge, and they showed no slowing of myopia progression or eye growth with nightly administration of atropine, 0.01%, eye drops.

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It is unlikely that the lack of a treatment effect was due to poor study retention or compliance with medication. There was better than 90% participant retention over 2 years, the retention was similar between the treatment and control groups, more than 90% of participants reported at least 76% adherence to the eye drop regimen, and the report of excellent adherence was confirmed by the return of unused medication ampules.[7]

Potentially, low-concentration atropine eye drops may work better for Asian children than White children. Four studies conducted in Asia reported significant slowing of myopia progression,[1-4] although only half of them reported significant slowing of eye growth.[1,3] None of the 3 studies conducted on primarily White children reported significant slowing of myopia progression,[5-7] and only one of them reported significant slowing of eye growth.[5] The difference between findings in Asian and White children may include differences in pigmentation of the iris, length of study, age of children studied, and rate of myopia progression. Atropine binds to melanin, so darker irises may result in slower release and longer active time for the drug, which may yield higher effectivity in Asian children, who generally have darker irises. Myopia control studies longer than 1 year frequently do not report additional accrual of treatment effect, so longer atropine, 0.01%, clinical trials conducted in White children (all 2-year studies) may be less likely to report a significant effect than studies of Asian children, which are mostly 1 year in length. Myopia progression slows with age, so atropine, 0.01%, studies of White participants that included older children (up to age 16 years) may be less likely to report a significant effect than studies of Asian children where 3 of 4 studies limited age to 12 years, although the study by Repka et al[7] also had a maximum age of 12 years. Interestingly, subgroup analyses of the study by Repka et al[7] indicated that East Asian children progress faster when administered atropine eye drops, but the small sample size of East Asian children makes it difficult to draw meaningful conclusions.

The question of rebound effect is important when the treatment is effective but less important when the treatment is ineffective. In the study by Repka et al,[7] participants discontinued treatment after 24 months but were examined at 30 months. Instead of comparing myopia progression and eye growth during treatment to after treatment, the authors compared myopia progression and eye growth from baseline to 24 months and from baseline to 30 months. Unsurprisingly, they found little difference, but it remains to be seen if they found little difference because there is truly no rebound effect, because the amount of time followed after treatment discontinuation was too short, or because there was not a significant treatment effect to begin with.

Overall, clinical trials investigating atropine, 0.01%, for myopia control, including the well-done study by Repka et al,[7] indicate that stronger concentrations of atropine should be considered for first-line treatment of myopia progression, especially when considering eye growth outcomes in White children.

ARTICLE INFORMATION

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Published Online: July 13, 2023. doi:10.1001/jamaophthalmol.2023.3076

Conflict of Interest Disclosures: Dr Walline reported grants from the National Institutes of Health (NIH) (grants U10 EY023204, 023206, 023208, 023210), nonfinancial support from Bausch + Lomb for contact lens solutions for an NIH grant, and personal fees from Myoptechs as a member of the medical advisory board outside the submitted work. Dr Berntsen reported grants from the National Eye Institute, nonfinancial support from Bausch + Lomb, and personal fees from Visioneering Technologies outside the submitted work. No other disclosures were reported.

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