Commentary: Low-dose atropine: How clear is the view?

Myopia is an under acknowledged epidemic which has already affected nearly 30% of the world population in 2020. According to current projections, this number is expected to rise to 50% by 2050, of which 10% will be contributed by high myopia.[1] Myopia adversely impacts an individual's quality of life, particularly high myopia, which can be potentially blinding. It may increase the risk of cataract, glaucoma, and various posterior segment complications such as myopic maculopathy, retinal degenerations, posterior staphyloma, retinal detachment, choroidal neovascularization, and so on.[2] With predicted increase in myopia prevalence, one can only imagine its socioeconomic impact globally.

Needless to say, various pharmacological, behavioral, or optical measures have been tried and tested worldwide in order to halt or slow down its progression. Among these, atropine is the only medication found to be consistently effective.[3,4] Various low-to-moderate concentrations of atropine eye drops (e.g., 0.01, 0.025, 0.05, and 0.1%) have been tried with varying efficacy, and it is also known that side effects and rebound effects are dose dependent. Five-year results from ATOM2 study supported application of 0.01% atropine as the safest and most effective dose for restricting myopia.[5]

However, does atropine therapy have any side effects on the vision quality? In the following article, the authors have compared the optical quality of vision between two doses of atropine eyedrops, namely, 0.05 and 0.01%, using the Optical Quality Analysis System™ (OQAS; Visiometrics, Terrassa, Spain). The optical quality of retinal image is mainly affected by higher-order aberrations and scattered light. Traditionally, wavefront aberrometry systems have been used to measure these objectively. OQAS uses a newer technology of double-pass technique based on recording images from a point-source object

after reflection on the retina and a double pass through the ocular media.[6] This system has already been used to evaluate optical quality in patients undergoing keratorefractive and phakic IOL surgery,[7] patients with keratitis,[8] and presbyopic patients after photorefractive keratectomy.[9]

Several studies have evaluated the side effects of low-dose atropine drops as they are used in control of myopia progression, but till date, there is no study which has objectively evaluated the optical quality of vision after commencing atropine treatment. The authors have illustrated that the optical quality after 2 weeks following treatment with 0.01% atropine eye drops did not change, while it decreased with 0.05% eye drops. This further strengthens our rationale for using lower dose of atropine (0.01%) in myopic children in order to halt or slow-down myopia progression. A small percentage of children in the LAMP study (trials using 0.05, 0.025, and 0.01%) reported reduction in accommodation amplitude by 0.26D and dilation of pupils by 0.5 mm with 0.01% atropine, neither of which are clinically significant.[10] However, the authors of the current study, while comparing 0.01 and 0.05% atropine, found that children with mild myopia may need to begin wearing glasses while using 0.05% atropine eye drops. The decrease in predicted visual acuity at 20 and 9% contrast indicates that children treated with 0.05% atropine eye drops had poorer vision when reading materials with poor contrast. These effects were not seen with 0.01% atropine.

Most recent studies advocate the course of treatment of at least 2 years initially, with follow-up every 3 months with cycloplegic refraction. For myopic children, treatment with atropine 0.01% can be commenced as a night-time dose after discussing the potential side effects and expected benefits. Cycloplegic refraction must be repeated at 3–6 monthly intervals during this period of treatment. The required myopic correction should be worn at all times. If the child experiences near blurring, bifocal glasses may be offered. If photophobia occurs, tinted glasses or sunglasses may be used outdoors. As the authors have already pointed out, children on 0.05% atropine treatment may need better contrast conditions. Increased outdoor time and reduced screen time should be encouraged. During the follow-up visits, possible local side effects such as red eyes, allergy, and even systemic effects such as headache and tachycardia should be looked for. In case of continued myopia progression ≥ 0.5 D after 6 months, one may consider using a higher dose (0.05%) of atropine, keeping in mind the side effects and high discontinuation rate.

In conclusion, low dose (0.01%) atropine is the recommended concentration when commencing atropine treatment for myopia because its benefits clearly outweigh the side effects. Both children and parents need to be motivated for long-term compliance by educating them about consequences of high myopia. After all, the clinical and economic burden of this condition is only expected to increase in the near future.

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