The need for interventions to delay the onset and slow the progression of myopia in children

A necessidade da adoção de intervenções para controlar o início e a progressão da miopia em crianças

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“Life cannot be saved for tomorrow. It always happens in the present.”
Rubem Alves

The prevalence of myopia and high myopia continues to increase worldwide¹,². The association between high myopia, pathologic myopia, and vision-threatening eye diseases imposes the need to implement health policies to limit eye elongation and minimize its adverse visual consequences³⁵. Recent interventions that can delay the onset and slow the myopia progression in children and teenagers fall into the categories: environmental (behavioral), pharmacological, and optical⁶,⁷. In addition, a better knowledge of how to detect the risk of myopia and how to manage its progression makes relevant the choices of therapeutic intervention and the most appropriate time to intervene and initiate myopia management in children and teenagers⁸.

All children under 9 should be encouraged to adopt good visual hygiene habits. Children with hyperopia of less than +0.75 D and those with myopic parents deserve special attention. The guidelines on screen time of the World Health Organization recommend that children aged from 5 to 17 have no more than 2 hours of recreational screen time daily and that preschoolers have only 1-hour daily⁹. Increased screen time reduces sleep and school performance¹⁰, whereas outdoor activities were shown to inhibit myopia progression in myopic children aged 6-7 years by 30% in 1 year¹¹. Myopia present at age 13 was related to children who had hyperopia less than +0.75 D at age 6-7 years¹². A study showed a negative association between outdoor time and myopia where additional time outdoors in the 3-9-year age group was associated with reduced incidence of myopia from 10 to 15 years¹³. Furthermore, another study found 7 independent parameters associated with accelerated eye elongation in 6-9-years-old children, which are as follows: parental myopia; reading one or more books weekly; time spent reading; not playing sports; non-European...
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Imtiaz et al.20 showed that the use of 1 drop of 0.025% atropine at night for 2 years was effective in decreasing myopia progression by 65% in Brazilian children aged 6-12 years with spherical equivalent (SE) between -1.00 and -6.00 D, and APR ≥-0.50D. The control of myopia progression with atropine is dose dependent. The most frequent side effects of low-concentration atropine are photophobia, blurred near vision, and allergic conjunctivitis. At 2 years of age, photophobia was experienced by 8.6%, 4.7%, and 5.5% of children using atropine at concentrations of 0.05%, 0.025%, and 0.01%, respectively21.

Concerning optical intervention in the management of myopia progression, we currently rely on orthokeratology, 1-day disposable contact lenses (MiSight®1-day), and spectacle lenses that correct peripheral hyperopic defocus (Eyesi’s MiyoSmart® and Essilor’s Stellest®).

Orthokeratology uses specially designed contact lenses to reshape the cornea temporarily. It is an effective and promising treatment option to control myopia in children. Generally, the 2-year inhibitory effect on axial elongation ranges from 30% to 55% compared with single-vision spectacles and contact lenses22,23. However, a rebound phenomenon in myopia progression occurs after discontinuing orthokeratology and the duration of treatment for maximum effect remains unknown23.

MiSight® 1 day (Cooper Vision) is a multizone soft contact lens indicated for controlling myopia progression in children 8-12 years of age at the start of treatment24. The center of the lens focuses on distance error correction, while alternating rings around the center create myopic defocus to slow eye elongation24. For 3 years, there was a 59% reduction in myopia progression (SE) and a 52% reduction in eye elongation (mm)24. Over 6 years, children using MiSight® 1 day contact lenses progressed by an average of less than 1.00 D25.

MiyoSmart® (Hoya) spectacle lenses feature a 9.4-mm central area for distance error correction surrounded by a treatment area composed of 396 spherical lenses with dioptric power of +3.50D that creates a myopic defocus surface in front of the retina to slow eye elongation (Defocus Incorporated Multiple Segments Technology)26. The results of a 3-year clinical trial showed a reduction in myopia progression (SE) and axial elongation (mm) of 86% and 61%, respectively27.

Stellest® (Essilor) spectacle lenses feature a 9.0-mm central zone for distance error correction surrounded by a treatment area composed of 11 rings containing 1021 highly aspherical lenslets with dioptric
power varying from +3.50D to +5.00D that creates a myopic defocus volume in front of the retina to slow eye elongation [Highly Aspherical Lenslet Technology]28. The results of a 2-year clinical trial with these lenses compared to the historical control group [single-vision lenses] showed a reduction in myopia progression [SE] and axial elongation [mm] of 67% and 60%, respectively29.

Considering that no intervention strategy [behavioral, pharmacological, or optical] effectively inhibits myopia progression in children, we need to explore combination therapies as an approach to improve treatment efficacy. For example, during the 2-year follow-up period, the combination of orthokeratology and 0.01% atropine was more effective in slowing axial elongation than orthokeratology alone in children with myopia, especially in the first year and children with low initial myopia30.

The current epidemic of myopia shows no signs of abating. Despite the limited effectiveness of the available interventions and the potential for recovery, the projected decrease in the risk of complications later in life provided by even moderate reductions in myopia progression suggests that treatment should be considered for young people with myopia, especially those aged 12 years or younger31. Bullimore and Brennan32 showed a 67% increase in the risk of myopic macular degeneration [MMD] with each 1.00D increase in myopia. Even a 0.25D reduction in myopia progression [equivalent to 0.1mm] decreases the risk of MMD by approximately 10%. Given the relatively modest effect size expected for the interventions discussed in this editorial, we recommend that eye doctors educate children to practice good visual hygiene to delay the onset of myopia and to be bold in implementing pharmacological and/or optical therapies aimed at slowing the progression of the condition in myopic children31.

REFERENCES

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