VIEWPOINT

Myths in Myopia Epidemiology and Treatment

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Introduction

Practicing evidence-based medicine requires constant effort to acquire, assess, and implement new knowledge that improves our care. Since 2013, more than 1000 publications per year have discussed myopia,[1] many challenging existing medical beliefs. As in other areas of medicine, ophthalmologists are expected to translate new knowledge into their clinical practice as well as manage their demanding clinical schedule. However, practicing clinicians, including ophthalmologists, are sometimes slow to discard medical myths contradicted by available evidence. This is especially true in fields with rapidly evolving research, such as myopia. The goal of this Viewpoint is to highlight examples of common beliefs about myopia epidemiology and control that are not evidence based and to consider corrective educational strategies.

Myth 1: Substantial Myopia Only Affects Asian Populations

East Asian countries do have very high myopia prevalence, with up to 90% of young adults affected, while rates in Europe and North America are much lower (up to 42%).[2] The rapid rise of myopia among East and Southeast Asian individuals over the last 70 years has been attributed to educational pressure and indoor lifestyle culture with lower amounts of time spent outdoors. For many years, myopia was considered largely a genetic condition. However, changes in the educational systems and lifestyles of these populations, including urbanization, appear to contribute to the increase in myopia prevalence. Today, we recognize that although genetics plays a role, there is no evidence of a fundamental difference in genetics of myopia between Asian individuals and European individuals. Although not to the extent seen in East Asia, recent studies are reporting an increase in the prevalence of myopia in the US and Europe.[2] Therefore, children with myopia and perhaps even incipient myopia worldwide should be offered early detection, evaluation, and management of myopia to avoid delaying care.

Myth 2: School-Aged Myopia Is Not Dangerous

A common belief is that school-aged myopia is not dangerous but can be readily managed and is a foreseeable outcome as our eyes adapt to current lifestyles. Humans adapt constantly to opportunities and threats in their environment, such as changes in weather patterns, urbanization, and food supplies. Thus, having myopia might be an adaptive strategy to environmental changes. While school-aged myopia may not be dangerous to all children, 1 study found that 54% of children with myopia onset by age 7 or 8 years developed high myopia.[3] High myopia is associated with higher risk of developing serious sight-threatening eye diseases, such as glaucoma, retinal detachment, macular degeneration, and cataract. Thus, effective myopia management to reduce high myopia prevalence needs to be introduced in childhood to slow or halt the progression of myopia in these most at-risk children, thereby enabling a better long-term quality of life. A proactive strategy of early detection, including measurement of refractive error with cycloplegia and when possible axial length, could help to identify preschool children with high-risk profiles of a particular population, such as those with emmetropia or low hyperopia, allowing diagnosis and treatment as early as possible.

Myth 3: Substantial Myopia Does Not Progress in Adults

Myopia progresses in children as their eye grows. In young adults, normal eye growth typically ceases, so it is commonly held that myopia does not progress in adults. While most myopia progression does occur during childhood and adolescence, some young adults do have progression. A study in Singapore including individuals with a longitudinal natural history of myopia found that most patients had myopia stabilization in young adulthood.[4] However, about 18% of young adults had substantial myopia progression. Risk factors associated with this late progression were Chinese ethnicity and female sex. Reports of myopia progression are not limited to Asian populations. For example, in a study[5] conducted at the US Air Force Academy, a clinically significant myopic shift of −0.50 diopters or greater was seen in 55.1% of cadets with myopia. Monitoring and managing myopia in adults is important, especially if axial length progression is observed. Development of effective approaches to avoid high myopia development and reduce the incidence of pathological myopia in adults is needed.

Myth 4: Undercorrection of Myopia May Stop Progression

In the past there was a commonly held opinion that undercorrection of myopia was an effective strategy to slow progression. Even today some parents believe that wearing undercorrected lenses will prevent myopia from worsening. The origin of this belief may be a 1965 study[6] that suggested that undercorrection reduced myopia progression compared with full myopic correction. Alternatively, undercorrection has included advice to remove the glasses for near work, as an attempt to reduce accommodative demand for near work. Over time, clinical trials have found no evidence to support undercorrection with single vision lenses to reduce myopia progression.[7] Evidence suggests undercorrection of myopia may even lead to higher progression of myopia and may stimulate axial length growth.[7] Similarly, there is limited evidence to support use of part-time wear of

spectacles.[8] Thus, full correction of myopia remains the preferred practice for vision-related quality of life.

Myth 5: Myopia Control Treatment Is Only Necessary to Prevent Severe Myopia

Current consensus is to slow myopia progression at an early stage to prevent progression to high myopia. Treating all children with myopia or incipient myopia could prevent some children from developing high myopia and sight-threatening complications. In addition, there is evidence that the onset of myopia can be prevented or delayed with lifestyle recommendations, such as an increase in outdoor time, suggesting management could eventually include most children, not just those likely to develop severe myopia. Today, myopia control treatment is typically proposed to slow down the progression of myopia at any severity. Future research may allow customized treatment for children based on their age and severity of myopia. This will require ophthalmology, optometry, primary medical care, educators, researchers, and policymakers working together to study and promote lifestyle choices and active treatments which favorably impact myopia development and quality of life.

Discussion

Translation of new knowledge from published studies into clinical practice takes many years. It is a 3-step process from awareness to acceptance to adoption. Even when the evidence is strong to incorporate such strategies into clinical practice, old beliefs and myths surface from time to time. Medical myths develop during training and may be difficult to dispel. Myopia knowledge, assessment skills, and attitudes required for evidence-based practice should be taught early in training. Clinical guidelines for myopia control in ophthalmology with frequent updates should reduce poor outcomes by ensuring timely adoption of proven treatments. Continuing medical education can dispel myths and increase incorporation of new evidence regarding myopia epidemiology and control among all practitioners. The evidence base supporting myopia control measures needs to be deepened with important information on duration of effective treatment and durability of that treatment. Research funding agencies need to support short-term studies (5-10 years), but also develop a mechanism to obtain very long-term outcomes (≥20 years) in myopia control.

ARTICLE INFORMATION

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REFERENCES

1. National Library of Medicine. PubMed search. Accessed February 3, 2024. https://pubmed.ncbi.nlm.nih.gov/?term=myopia&sort=date&timeline=expanded

2. Vitale S, Sperduto RD, Ferris FL III. Increased prevalence of myopia in the United States between 1971-1972 and 1999-2004. *Arch Ophthalmol*. 2009;127(12):1632-1639. doi:10.1001/archophthalmol.2009.303

3. Hu Y, Ding X, Guo X, Chen Y, Zhang J, He M. Association of age at myopia onset with risk of high myopia in adulthood in a 12-year follow-up of a Chinese cohort. *JAMA Ophthalmol*. 2020;138(11):1129-1134. doi:10.1001/jamaophthalmol.2020.3451

4. Foo LL, Tan CS, Noel B, et al. Factors influencing myopia stabilisation in young myopic adult Singaporeans. *Br J Ophthalmol*. Published online August 27, 2023. doi:10.1136/bjo-2023-323680

5. O'Neal MR, Connon TR. Refractive error change at the United States Air Force Academy–class of 1985. *Am J Optom Physiol Opt*. 1987;64(5):344-354. doi:10.1097/00006324-198705000-00008

6. Tokoro T, Kabe S. Treatment of the myopia and the changes in optical components. report II. full-or under-correction of myopia by glasses. *Nippon Ganka Gakkai Zasshi*. 1965;69(2):140-144.

7. Lawrenson JG, Shah R, Huntjens B, et al. Interventions for myopia control in children: a living systematic review and network meta-analysis. *Cochrane Database Syst Rev*. 2023;2(2):CD014758. doi:10.1002/14651858.CD014758.pub2

8. Prousali E, Haidich AB, Dastiridou A, Tzamalis A, Ziakas N, Mataftsi A. Part-time versus full-time spectacles for myopia control (PARMA study): a randomized clinical trial. *Cureus*. 2022;14(6):e25995. doi:10.7759/cureus.25995