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Myopia

Epidemiology and Strategies for Intervention

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Keywords

• Myopia • Prevalence • Prevention • Atropine • Review • Outdoor activity
• Sunlight exposure

Key points

- Myopia prevalence worldwide has been rapidly increasing and reaching epidemic rates in several East and Southeast Asian countries.
- A combination of genetic and environmental factors contributes to myopia development.
- Several interventions for myopia control have been proposed but require further validation.
- Increased sunlight exposure appears to reduce the incidence and slow the progression of myopia.
- Low-dose topical atropine (0.01%) is the most promising strategy for myopia control.

INTRODUCTION

At the turn of this twenty-first century, the World Health Organization (WHO) introduced a global initiative to eliminate the avoidable causes of blindness known as Vision 2020: The Right to Sight. Refractive errors were one of the five priorities selected based on its substantial worldwide burden of disease. From 1990 until 2010, it was estimated that uncorrected

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refractive error was the second leading cause of blindness [1]. Myopia is one of the most common causes of correctable visual impairment in the developed world and leading cause of preventable blindness in the developing world. Worldwide, myopia rates have been rapidly increasing and have become a major public health concern in East and Southeast Asian countries such as Taiwan, Singapore, Korea, Japan, China, and Hong Kong. Epidemiologic data suggest that 80% to 90% of school-aged children in some communities have myopia. Although the increase of myopia has not reached epidemic proportions in North America, Europe, or Australia, myopia prevalence has increased across all ethnic groups. Thus, the WHO recognizes myopia's heavy economic and societal costs. In regards to the need for additional health care services, it has been estimated that the annual cost of correcting distance vision impairments in the United States is between US$3.9 and US$7.2 billion [2], whereas Singaporeans spend $959 million per year [3]. This dollar amount does not take into account the functional impairments and disruptions that low distance vision can have on a person's daily-living activities.

Although myopia is thought of as a benign condition requiring spectacles, contact lenses, or surgical procedures to correct simple refractive errors, patients with high myopia are at risk for visually significant sequelae. Pathologic myopia is often defined as ≥ -6.00 diopters (D) or axial length ≥ 26.5 mm with any posterior myopia-specific abnormality. The mechanical stress of ocular growth causes thinning and tractional changes to the various layers and structures within the eye. Common complications include posterior staphyloma, retinal pigment epithelium and choroidal atrophy, and subretinal hemorrhages. Retinal detachments occur more often in high myopia. The risk of increasing axial length also correlates with the risk of glaucoma and cataracts. Breaks in Bruch membrane or lacquer cracks can occur and predispose patients to choroidal neovascularization (CNV) [4]. CNV is the most common vision-threatening complication, occurring in 5.2% to 11.3% of patients [5]. Bearing all these complications in mind, a recent systemic review found that pathologic myopia was ranked as the first to third most frequent cause of blindness in 6 population surveys. There is also substantial evidence that untreated myopic CNV substantially impacts best-corrected vision. Baseline studies of these patients have found that 20% of patients were legally blind (visual acuity $<$20/200), and this number increased to 53% to 96% with follow-up [5].

Currently, the clinical care for myopia includes correcting refractive errors. The combination of increasing myopia prevalence and resultant economic and societal costs have heightened interest in developing novel strategies to prevent the development and retard the progression of myopia. This article first explores the changing epidemiologic trends in myopia prevalence. Although treatment guidelines have not been introduced, the article then discusses the often-controversial myopia interventions aimed at decreasing the disease's worldwide morbidity.