EDITORIAL

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A Global Public Health Threat: The Myopia Epidemic

Küresel Bir Halk Sağlığı Tehdidi: Miyopi Salgını

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Myopia, the most common refractive error affecting distance vision, was previously considered to be primarily related to genetic predisposition; however, today it has become a global silent epidemic directly linked to lifestyle, digitalization, environmental conditions, and rapid urbanization (1-4).

The term "myopia epidemic" covers two distinct but related issues. The first is an increase in the overall prevalence of myopia. The second is a rising prevalence of high myopia, which is associated with a higher rate of pathological outcomes (5).

According to projections by the World Health Organization and independent epidemiological research institutions, the global prevalence of myopia is expected to rise from 27% in 2010 to 52% by 2050 (a 2.6-fold increase). By 2050, myopia and high myopia (greater than -5.00 D or -6.00 D) are estimated to affect approximately five billion and one billion people, respectively. Currently, in East and Southeast Asian countries (including Singapore, Japan, South Korea, China, Hong Kong, Macau, and Taiwan), myopia and high myopia rates among adolescents and young adults have reached 70-90% and 10–20%, respectively. In European and North American countries, myopia prevalence remains in the 30-40% range (1-4).

Early educational onset, intensive academic programs, increased use of smartphones, tablets, and computers, along with prolonged near work (excessive accommodative load), trigger biochemical mechanisms that cause premature elongation of the eye's axial length (1-3).

One of the most critical factors in myopia development is sunlight exposure and time spent outdoors. Sunlight stimulates the retinal release of dopamine, a neurotransmitter that suppresses axial eye elongation. Conversely, increased indoor activity and insufficient sunlight exposure reduce retinal dopamine levels, promoting excessive ocular growth (1,3,6-9).

On the other hand, intense urbanization limits children's access to open spaces with a wide field of vision. Constantly being in enclosed and confined spaces eliminates the need to focus on distant objects, forcing the eye's refractive mechanism to adapt to near focus (1,6-9).

The fundamental dimensions of the myopia crisis encompass quality-of-life changes, psychosocial impacts, serious medical risks, and substantial global economic burdens. Unmanaged myopia—which disproportionately affects educated youth—can hinder academic progress. Furthermore, permanent vision loss from high myopia-related structural alterations may restrict career opportunities. Beyond functional limitations, individuals with severe refractive errors often experience psychological distress due to concerns over progressive vision loss, fear of dependence, and exclusion from social or physical activities (1,4,10,11).

High myopia significantly elevates the risk of secondary ocular pathologies, including cataracts, glaucoma, retinal detachment and myopic macular degeneration, all of which can lead to irreversible blindness (5).

The financial burden on the global economy is immense. It includes direct correction costs (standard or custom spectacles, contact lenses, pharmaceutical drops and solutions, and refractive surgery), management of high myopia complications, and complex surgical procedures. In Asian adults, the annual direct cost of myopia correction is estimated at US$328 billion (11).

Current options for controlling myopia progression include optical correction such as bifocal spectacle lenses, progressive addition spectacle lenses, undercorrection, orthokeratology, multifocal contact lenses; increased exposure to outdoor activities, the use of atropine eye drops and surgical techniques such as PRK, LASIK, SMILE, and ICL (these surgeries do not eliminate the underliying structural risks; they may increase them). In recent years, specialized myopia-control spectacle lenses utilizing myopic defocus technology (such as DIMS or HAL) have been clinically proven to retard axial elongation and are gaining widespread clinical adoption (1,12).

Behavioral modifications play a key supportive role. These include maintaining a reading distance of at least 30–40 cm, curbing digital device addiction, and adhering to the 20-20-20 rule—taking a 20-second break every 20 minutes of near work to look at an object at least 20 feet (approximately 6 meters) away to relax ocular accommodation (1,12,13).

Outdoor time is widely recognized as a critical factor in delaying myopia onset and slowing its progression. Encouraging children to spend at least two hours outdoors daily in natural sunlight has been shown in clinical studies to reduce the risk of developing myopia by 30–50% (1-3,12-14).

Consequently, key global public health policies targeting the myopia epidemic focus on reforming school curricula, incentivizing clinical interventions, and limiting screen exposure. Treating the issue as an urgent public health crisis, several East and Southeast Asian nations have instituted targeted regulations:

China: The National Health Commission mandated at least two hours of daily outdoor activity in schools and a 10-minute break for every 30 minutes of study. Schools with "glass classroom/transparent classroom/open classroom" architecture were built in pilot regions to maximize natural light. Under the 2021 "Double Reduction" policy, the government radically restructured the education system by restricting private tutoring to alleviate academic pressure, eliminating written exams for first- and second-graders, and capping homework loads. Additionally, the National Press and Publication Administration limited online gaming for minors under the age of 18 to three hours per week (specifically from 8 PM to 9 PM on Fridays, weekends, and public holidays), explicitly citing the protection of pediatric ocular health (9,13).

Taiwan: The "Tian-Tian 120" (Daily 120) initiative, jointly managed by the Ministries of Education and Health, mandates that elementary and preschool children spend at least 120 minutes outdoors every day (14).

Singapore: Under the Ministry of Health's National Myopia Prevention Programme, free annual eye screenings are conducted starting from kindergarten. Low-dose atropine drops (0.01%-0.05%) are subsidized for high-risk or rapidly progressing children, and advanced optical modalities (such as orthokeratology and specialized defocus lenses) are integrated into standard clinical pathways (15).

In Türkiye, while the Ministry of Health has established a "National Vision Screening Program," a holistic public health framework dedicated to combating the myopia epidemic has yet to be fully realized.

In conclusion, the myopia epidemic is a global public health threat that requires a collaborative approach involving not only the optical industry and ophthalmologists but also public health policies and education systems. Health and education policies should encompass active control systems that aim to mandate early childhood eye screenings and outdoor activities in schools, reduce or balance digital dependence, facilitate access to therapeutic eye drops and optical devices and develop a holistic approach and care model that also considers the psychological well-being of patients.

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