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Prevalence and associated risk factors of myopia in adults: A narrative review

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Abstract

Myopia is one of the most common refractive disorders affecting adults worldwide and has emerged as a significant public health concern due to its increasing prevalence and associated ocular complications. Although myopia has traditionally been considered a childhood condition, recent evidence suggests that myopia onset and progression may continue into adulthood. The rising burden of digital device usage, prolonged near work, reduced outdoor activity, urbanization, and educational pressures have contributed to the increasing prevalence of myopia among adults. This narrative review aims to summarize current evidence regarding the prevalence of adult myopia and its associated demographic, genetic, environmental, occupational, and lifestyle-related risk factors. Literature published in peer-reviewed journals indexed in PubMed, Scopus, Web of Science, and Google Scholar was reviewed. Studies indicate substantial geographic variations in prevalence, with East and Southeast Asian countries reporting the highest rates. Genetic predisposition, parental history of myopia, extensive near work, prolonged screen exposure, higher educational attainment, and limited outdoor activity are consistently associated with adult myopia. Additionally, occupational exposure involving intensive visual tasks and urban living environments have been identified as important contributing factors. Adult myopia is associated with increased risk of retinal detachment, glaucoma, cataract, myopic maculopathy, and visual impairment, thereby affecting quality of life and socioeconomic productivity. Understanding the epidemiology and risk factors of adult myopia is essential for developing preventive strategies, early interventions, and public health policies aimed at reducing the burden of visual impairment.

Keywords: Myopia; Adults; Prevalence; Risk Factors; Refractive Error; Near Work; Screen Time; Public Health

1. Introduction

Myopia, commonly referred to as short-sightedness, is a refractive condition in which parallel rays of light focus anterior to the retina when accommodation is relaxed, resulting in blurred distance vision. It has become one of the leading causes of visual impairment globally and poses a growing public health challenge due to its rapidly increasing prevalence and associated ocular complications (1). The prevalence of myopia has risen substantially over recent decades across both developed and developing countries, particularly in urban populations and highly educated communities (2). Historically, myopia was considered a condition primarily affecting children and adolescents; however, emerging evidence suggests that the onset and progression of myopia may continue into adulthood (3). Adult myopia is increasingly recognized as an important clinical and epidemiological issue because of the long-term risk of pathological ocular complications such as retinal detachment, glaucoma, cataract, choroidal neovascularization, and myopic maculopathy (4). These complications can lead to irreversible visual impairment and reduced quality of life.

Globally, the prevalence of myopia varies significantly between regions. East and Southeast Asian countries report the highest prevalence rates, where up to 80–90% of young adults may be affected (5). In contrast, prevalence rates in

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Europe and North America generally range between 20% and 50% (6). Projections suggest that nearly half of the world's population may become myopic by the year 2050, indicating an alarming increase in the burden of refractive disorders (7). Several factors contribute to the development and progression of adult myopia. Genetic predisposition has been consistently identified as a major determinant, particularly among individuals with one or both myopic parents (8). Environmental and lifestyle factors such as prolonged near work, extensive use of digital devices, reduced outdoor exposure, educational attainment, occupational visual demands, and urbanization have also been implicated (9). The increasing dependence on smartphones, computers, and electronic learning platforms has further intensified concerns regarding digital eye strain and visual health among adults.

In recent years, the COVID-19 pandemic has accelerated screen exposure and indoor lifestyles, potentially exacerbating the progression of myopia among both children and adults (10). Increased work-from-home practices and virtual learning environments have substantially altered visual behaviour patterns worldwide. Understanding the prevalence and associated risk factors of myopia in adults is essential for designing effective preventive measures, screening programs, and public health interventions. Although several studies have explored childhood myopia, comparatively fewer reviews have focused specifically on adult populations. Therefore, this narrative review aims to synthesize current evidence regarding the epidemiology, prevalence, and associated risk factors of myopia among adults.

Objectives

- To review the prevalence of myopia among adults globally.
- To identify demographic, genetic, environmental, and lifestyle-related risk factors associated with adult myopia.
- To summarize current evidence regarding occupational and behavioral influences on myopia.
- To discuss the public health implications and complications associated with adult myopia.

2. Methodology

A narrative review of literature was conducted using electronic databases including PubMed, Google Scholar, Scopus, and Web of Science. Relevant articles published in English from 2000 to 2025 were reviewed. Keywords used for the search included "adult myopia," "prevalence of myopia," "risk factors of myopia," "near work," "screen time," "urbanization," "digital device use," and "myopia progression." Original research articles, systematic reviews, epidemiological studies, and review articles related to adult myopia were included. Articles focusing exclusively on paediatric populations without relevance to adults were excluded.

2.1. Prevalence of Myopia in Adults

Myopia prevalence has shown a substantial increase globally over the past few decades. Epidemiological studies demonstrate marked regional differences influenced by ethnicity, education, lifestyle, and urbanization (11). East Asian countries such as Singapore, South Korea, China, and Japan report the highest prevalence rates among adults and young adults. Studies conducted in these regions indicate that myopia affects nearly 80–90% of university students and young urban populations (5). In Western countries, adult myopia prevalence is comparatively lower but continues to rise steadily. Reports from the United States indicate that adult myopia prevalence increased from approximately 25% in the early 1970s to over 40% in recent decades (12). Similar increasing trends have been reported in European populations (13).

India has also witnessed a progressive rise in myopia prevalence due to urbanization, increased educational pressures, and widespread use of digital devices. Urban populations demonstrate significantly higher prevalence compared to rural populations (14). Several Indian studies have identified increasing rates of refractive errors among college students, healthcare workers, and office employees exposed to prolonged near work activities.

Adult-onset myopia has also gained increasing attention in recent years. Evidence suggests that approximately one-third of myopia cases in Western populations may develop during adulthood (3). Myopia progression during early adulthood, particularly between 20 and 30 years of age, has been documented in multiple longitudinal studies (15).

2.2. Genetic Factors Associated with Myopia

Genetic predisposition plays a crucial role in the development of myopia. Family history remains one of the strongest predictors of myopia development among adults (8). Individuals with one myopic parent have a significantly higher risk of developing myopia, while the risk increases further when both parents are myopic. Twin and familial aggregation studies have demonstrated strong heritability of refractive errors (16). Genome-wide association studies have identified multiple genetic loci associated with ocular growth, retinal signaling pathways, and scleral remodeling involved in myopia development (17).

However, genetic predisposition alone cannot explain the rapid increase in global myopia prevalence. The interaction between genetic susceptibility and environmental exposures is believed to play a significant role in the manifestation and progression of adult myopia (18).

2.3. Environmental and Lifestyle Factors

2.3.1. Near Work and Educational Pressure

Near work activities such as reading, studying, computer usage, and prolonged smartphone use are consistently associated with myopia development and progression (19). Adults involved in occupations requiring sustained near visual tasks are at greater risk of developing refractive changes. Educational attainment has also been strongly linked with myopia prevalence. Higher education levels are associated with increased near work demands and reduced outdoor exposure (20). University students and professionals engaged in intensive academic or office-based activities exhibit higher rates of myopia compared to the general population.

Several studies suggest that prolonged accommodation and visual stress during near work may contribute to axial elongation and refractive changes in susceptible individuals (21). Continuous reading at short working distances and inadequate visual breaks may further aggravate visual strain.

2.3.2. Digital Screen Exposure

The widespread use of smartphones, tablets, computers, and other electronic devices has significantly increased screen exposure among adults. Excessive screen time has emerged as an important risk factor associated with visual fatigue, accommodative stress, and progression of myopia (22). Digital device use increased dramatically during the COVID-19 pandemic due to remote work and online education (10). Adults spending prolonged hours on screens frequently report symptoms such as eye strain, headache, blurred vision, dry eyes, and reduced visual comfort.

Blue light exposure, reduced blink rate, close viewing distances, and prolonged uninterrupted near focus may contribute to digital eye strain and refractive changes (23). Although causal relationships continue to be investigated, several epidemiological studies support an association between prolonged screen use and increasing myopia prevalence.

2.3.3. Outdoor Activity and Sunlight Exposure

Reduced outdoor activity is one of the most consistently reported environmental risk factors associated with myopia (24). Time spent outdoors appears to exert a protective effect against myopia development. Exposure to natural sunlight is believed to stimulate dopamine release within the retina, which may inhibit axial elongation of the eye (25). Adults with limited outdoor exposure due to occupational or lifestyle factors may therefore have increased susceptibility to myopia progression.

Studies using objective measures such as conjunctival ultraviolet autofluorescence and serum vitamin D levels have demonstrated inverse associations between outdoor exposure and myopia prevalence (26).

2.3.4. Occupational Factors

Occupational exposure involving prolonged near work and visual concentration significantly contributes to adult myopia. Office workers, healthcare professionals, laboratory personnel, software engineers, and students frequently engage in sustained visual tasks requiring prolonged accommodation (27). Computer-based occupations are particularly associated with digital eye strain and refractive stress. Inadequate ergonomic practices, poor lighting conditions, reduced blink frequency, and extended working hours may aggravate visual fatigue and contribute to refractive instability (28).

Shift work and insufficient sleep have also been investigated as potential contributors to ocular fatigue and refractive disturbances, although evidence remains limited.

2.4. Urbanization and Socioeconomic Factors

Urbanization has been strongly associated with increasing myopia prevalence worldwide (29). Urban populations are more likely to experience lifestyle patterns characterized by indoor living, intensive education, reduced outdoor activity, and greater digital device dependence. Population-based studies demonstrate significantly higher prevalence rates of myopia among urban residents compared to rural populations (30). Socioeconomic development and modernization may indirectly influence visual behavior patterns and increase exposure to environmental risk factors. Additionally, higher socioeconomic status is often associated with greater educational attainment and occupational demands, which may contribute to increased risk of myopia.

2.5. Complications of Adult Myopia

Adult myopia is not merely a refractive inconvenience but a condition associated with potentially sight-threatening complications. High myopia significantly increases the risk of retinal detachment, glaucoma, cataract formation, posterior staphyloma, choroidal neovascularization, and myopic maculopathy (31). Pathological myopia is a major cause of irreversible visual impairment globally. Progressive axial elongation may result in structural degeneration of retinal and choroidal tissues (32). The risk of visual disability increases substantially with increasing degrees of myopia.

Myopia also negatively affects quality of life, academic performance, occupational productivity, and psychological well-being (33). Dependence on corrective lenses, frequent ophthalmic evaluations, and surgical interventions impose additional economic burdens on individuals and healthcare systems.

2.6. Prevention and Control Strategies

Public health strategies targeting modifiable risk factors are essential to reduce the burden of adult myopia. Encouraging outdoor activities, reducing excessive screen exposure, promoting ergonomic visual practices, and implementing regular eye examinations are important preventive measures (34).

The 20-20-20 rule, which recommends taking a 20-second visual break every 20 minutes while viewing screens, may help reduce accommodative stress and digital eye strain. Proper lighting conditions, maintaining adequate viewing distance, and limiting continuous near work are also recommended. Recent advances in myopia control include pharmacological interventions such as low-dose atropine, orthokeratology lenses, multifocal contact lenses, and peripheral defocus spectacle lenses (35). Although most evidence currently focuses on pediatric populations, emerging studies suggest potential benefits in young adults with progressive myopia.

3. Discussion

The increasing prevalence of adult myopia represents a significant global public health challenge. Evidence from epidemiological studies demonstrates substantial geographic and ethnic variation in prevalence rates, with East Asian countries experiencing particularly high disease burden (5). Rapid urbanization, increased educational demands, and changing lifestyle patterns have contributed significantly to this global trend. The interaction between genetic susceptibility and environmental exposures appears central to myopia development. Individuals with strong familial predisposition may be particularly vulnerable when exposed to excessive near work, prolonged screen time, and reduced outdoor activity (18). Modern technological advancements have transformed occupational and recreational behaviour patterns. Extensive use of digital devices and prolonged indoor lifestyles have become increasingly common among adults, especially following the COVID-19 pandemic (10). These changes may further accelerate the prevalence and progression of myopia.

Adult myopia is clinically important because progression may continue beyond adolescence. Longitudinal studies indicate that refractive changes and axial elongation may persist during early adulthood (15). Therefore, regular ophthalmic screening and early intervention remain essential. The burden of myopia extends beyond refractive correction alone. High myopia is associated with severe ocular complications that may lead to permanent visual impairment and reduced quality of life (31). Public health initiatives focusing on awareness, preventive strategies, and timely management are therefore necessary.

4. Conclusion

Myopia among adults has emerged as an increasingly prevalent refractive disorder worldwide. The condition is influenced by a complex interaction of genetic, environmental, occupational, and lifestyle-related factors. Prolonged near work, digital screen exposure, limited outdoor activity, urbanization, educational pressures, and familial predisposition are among the major contributors associated with adult myopia. The growing prevalence of myopia poses significant clinical, social, and economic challenges due to its association with potentially sight-threatening ocular complications. Early identification of risk factors and implementation of preventive measures are essential to reduce disease burden and preserve visual health.

Future research should focus on longitudinal adult populations, mechanisms underlying adult-onset myopia, and the effectiveness of preventive interventions in adult age groups. Public health policies promoting healthy visual behavior and regular ophthalmic screening may help mitigate the increasing burden of adult myopia.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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