THE IMPACT OF SCREEN TIME ON EYE HEALTH: CLINICAL IMPLICATIONS AND PREVENTION

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Abstract

The increased use of digital devices has led to a surge in screen time, significantly impacting eye health. The effects include computer vision syndrome, digital eye strain, and a rise in myopia, particularly among children.**Objective:** This article aims to evaluate the impact of screen time on eye health, identify the underlying mechanisms, and summarize effective prevention strategies.**Methods:** A literature review was conducted on scholarly articles published since 2020, using databases such as PubMed, Scopus, and Google Scholar. The search focused on epidemiological studies, physiological mechanisms, and mitigation efforts related to screen time.**Results:** Studies indicate that increased screen time is associated with a rise in eye complaints, such as dry eyes, visual fatigue, and accommodation disorders. Risk factors include blue light exposure, improper viewing distances, and prolonged device usage. Prevention measures such as the 20-20-20 rule, blue light filters, and ergonomic workplace adjustments have proven effective in reducing symptoms.**Conclusion:** Excessive screen time negatively affects eye health, particularly among the younger population and office workers. Public education and the implementation of preventive strategies are needed to minimize this impact.

Keywords: screen time, eye health, computer vision syndrome, blue light, prevention.

Introduction

The use of electronic devices such as smartphones, tablets, and computers has increased significantly in recent years, which has implications for eye health, particularly among children

and adolescents. One major issue arising from excessive use of these devices is computer vision syndrome (CVS), characterized by symptoms such as eye fatigue, blurred vision, dry eyes, and headaches.[1] Additionally, prolonged exposure to electronic devices has contributed to the rising prevalence of myopia, which can develop into a serious vision problem if not promptly addressed.[2]Therefore, it is essential to explore the mechanisms and effects of screen time on eye health, particularly in the context of myopia and CVS. This study aims to further review various risk factors, pathophysiological mechanisms, and preventive measures to mitigate the negative effects of electronic device usage.

Methods

This study employs a literature review method by analyzing various sources. Literature searches were conducted using Google Scholar and Mendeley, covering the years 2019–2024. Keywords used in the literature search were Impact of Screen Time on Eye Health: Clinical Implications and Prevention

Discusion

The increased use of electronic devices in everyday life, which leads to increased screen time, significantly affects eye health. One of the most common impacts is computer vision syndrome (CVS), which involves symptoms such as dry eyes, visual fatigue, and blurred vision. In addition, excessive screen exposure has also contributed to the growing prevalence of myopia, particularly among children and adolescents. This section further discusses the mechanisms, risk factors, and prevention efforts that can reduce the negative effects of electronic device usage.

1. Pathological Mechanisms

Prolonged screen exposure can reduce blinking frequency, leading to dry eyes and irritation. This occurs because the moisture on the eye's surface decreases due to less frequent blinking.[3] Furthermore, exposure to blue light emitted from screens can damage the retina and increase oxidative stress, which can harm the eyes in the long term.[4] Some studies suggest that excessive blue light exposure is linked to accelerating
age-related macular degeneration (AMD), which affects central vision.[5] Additionally, eye strain caused by prolonged screen use occurs due to the continuous work of the eye's accommodation muscles. This can lead to visual fatigue, worsening refractive disorders such as myopia. One study found that children who spend more time in front of screens tend to have an increased prevalence of myopia compared to those who spend less time exposed to screens.[6]

2. Risk Factors and Vulnerable Populations

Children and adolescents are particularly vulnerable to the negative effects of screen time due to the ongoing development of their visual systems. Research shows that longer screen time in children is linked to an increased risk of myopia, which may continue into adulthood if not properly managed.[7] Additionally, workers who spend much of their time in front of computers experience similar symptoms, such as eye fatigue and CVS. Poor posture and insufficient rest exacerbate this issue, especially for those who work long hours without breaks.[8] Environmental factors such as poor lighting and high screen contrast also contribute to eye strain. Studies suggest that improper screen positioning can worsen eye strain.[9]

3. Prevention and Management Strategies

Several methods can be adopted to reduce the negative impact of screen time. One of these is the 20-20-20 rule, which requires individuals to look at an object 20 feet away for 20 seconds every 20 minutes to reduce eye strain.[10] Additionally, the use of blue light filters or blue light-blocking glasses can reduce blue light exposure, which can damage the retina and disrupt the body's circadian rhythm.[11] Ergonomic adjustments, such as aligning the screen at eye level, can also help reduce eye strain caused by prolonged device use. Research shows that optimal screen settings and lighting can reduce the prevalence of CVS.[12]

4. Implementation Challenges and Policy Recommendations

Although these preventive measures are effective, challenges in their implementation remain. One challenge is the lack of awareness about the effects of screen time, both among parents and educators, which leads to uncontrolled device usage habits, especially in children.[13] Moreover, access to protective devices like blue light filters is still limited for many people, making mitigation efforts difficult.[14] Educating the public and raising awareness about the importance of managing screen time is essential, especially among children. A holistic approach involving healthcare providers, educators, and parents is needed to limit excessive electronic device use.[15]

Conclusion

Excessive use of electronic devices, particularly among children and adolescents, has become a major cause of eye health issues, such as computer vision syndrome (CVS) and increasing myopia rates. Blue light exposure from screens, eye strain from prolonged device usage, and poor ergonomic positioning contribute significantly to worsening these conditions. Therefore, preventive measures such as applying the 20-20-20 rule, using blue light filters, and ensuring proper posture are necessary to mitigate the negative effects of screen time. Children

and adolescents, whose visual systems are still developing, are especially susceptible to the harmful effects of screen time, which may lead to more severe vision problems in the future. Efforts to reduce these risks must include raising awareness and educating parents, educators, and healthcare professionals about the importance of managing electronic device use. Policies that limit device usage in schools and homes, along with providing protective tools like blue light- blocking glasses, are crucial to safeguarding children's eye health. Overall, while technology brings many benefits, its impact on eye health must be given more serious attention. Further research and supportive policies for managing screen time are needed to minimize future vision problems.

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