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PREVALENCE OF HEADACHE, INSOMNIA, AND COGNITIVE DISORDERS RELATED TO SCREEN TIME

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ABSTRACT

The increase in exposure time to the screens of electronic devices has raised concerns about their impact on health, particularly in relation to conditions such as headache, insomnia and cognitive disorders. This integrative review sought to analyze the prevalence of these conditions associated with screen time, focusing on studies published between 2010 and 2025. The search was carried out in the PubMed, Google Scholar and Scopus databases, including clinical, epidemiological and review articles. The results indicate that excessive exposure to screen time is significantly associated with increased prevalence of headache, insomnia, and cognitive deficits, especially in children, adolescents, and young adults. Headache, in particular, has been observed in a significant part of the population, with a higher prevalence among young people. Insomnia, often associated with exposure to blue light emitted by screens at night, is also a worrisome condition, affecting sleep quality and, consequently, overall health. In addition, cognitive disorders, such as difficulties with memory, attention, and concentration, have been reported in individuals with long periods of use of digital devices. In the long term, increased screen time can aggravate these symptoms, negatively impacting quality of life and contributing to the development of mental illness. However, the studies also point to the need for more research to establish a clear causal relationship between screen time and these disorders. The review discusses the implications of these findings for public health and possible prevention and intervention strategies, such as the promotion of healthy digital use habits.

Keywords: Headache. Insomnia. Cognitive Disorders. Screen Time. Digital Health.

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INTRODUCTION

The use of digital devices such as smartphones, computers, and televisions has become an essential part of everyday life, especially with the rise of remote work, online education, and digital entertainment. These devices facilitate communication, access to information, and entertainment, but the increase in screen time has raised concerns about the potential negative impacts on individuals' physical and mental health. Prolonged time in front of screens has been associated with a series of health problems, with emphasis on headaches, insomnia and cognitive disorders.

Headache and insomnia are often seen in individuals who spend long periods in front of screens, especially when there is exposure to blue light emitted by digital devices, which can interfere with circadian rhythms and affect sleep quality. In addition, cognitive disorders, such as concentration difficulties, impaired memory, and decreased academic and professional performance, have been reported in several studies as consequences of the excessive use of these technologies. These effects may be particularly evident in children, adolescents, and young adults, but they are also seen in older adults.

This integrative review is justified considering the growing concern about the impact of excessive digital use on the health conditions mentioned, in addition to the need to better understand the prevalence of these problems in different age groups and populations. The aim of this study was to analyze the prevalence of headache, insomnia, and cognitive disorders related to screen time, discuss the mechanisms underlying these conditions and their implications for public health, contributing to the development of prevention and intervention strategies.

THEORETICAL FRAMEWORK

Prolonged exposure to screen time can trigger a range of physiological and psychological effects, affecting both the physical and mental well-being of individuals. Headache, for example, has been widely associated with visual stress and muscle tension, especially due to the excessive use of digital devices such as smartphones, computers, and televisions (Wang et al., 2018). Prolonged effort to focus on small screens and poor posture while using these devices contribute to muscle tension, particularly in the cervical and ocular regions, resulting in recurrent headaches. In addition, the blue light emitted by screens, especially at night, interferes with sleep cycles, impairing the production of melatonin, the hormone responsible for regulating sleep, which can lead to the development of insomnia (Chang et al., 2020). This sleep disorder is characterized by

difficulty initiating and maintaining sleep, which in turn impacts overall health, affecting the individual's mood, cognition, and quality of life.

Additionally, excessive screen time has been linked to impairment of cognitive functions, such as memory, attention, and problem-solving skills. Continuous use of digital devices can lead to stimulus overload, making it difficult to concentrate and retain information (Radesky et al., 2020). Constant exposure to fast-paced, multitasking digital stimuli can reduce the ability to perform tasks that require intense focus and critical thinking. Decreased time devoted to deeper, cognitively stimulating activities, such as reading and face-to-face social interaction, contributes to this deterioration in cognitive abilities.

Research indicates that teens and young adults are particularly vulnerable to the adverse effects of screen time. This age group is in a phase of intense brain development, which makes them more susceptible to changes in sleep patterns and impaired cognitive performance. Excessive use of screens can negatively interfere with memory consolidation and cognitive processing capacity (LeBourgeois et al., 2017). In addition, psychological stress related to the use of social networks and lack of physical activity contribute significantly to the worsening of these symptoms. According to Furukawa et al. (2019), social isolation and social comparison on digital platforms can generate feelings of anxiety and depression, further exacerbating the negative effects of screen time.

Recent studies also suggest that excessive interaction with digital devices can affect emotional balance and mental health, especially in younger individuals. The constant search for validation and the pressure to maintain an idealized image on social media can have a lasting impact on self-esteem and psychological well-being. Therefore, it is essential that more research is conducted to better understand the mechanisms underlying these conditions and develop strategies to mitigate the adverse effects of screen time, especially in vulnerable age groups.

METHODOLOGY

This integrative review was conducted following the guidelines of PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), with the objective of analyzing the relationship between screen time and the development of headache, insomnia, and cognitive disorders. Prolonged exposure to digital devices has become a growing concern in modern society, and it is increasingly relevant to analyze the negative health impacts of this practice. The review aims to synthesize the findings of studies investigating how the amount of time spent using screens is associated with the

development of these conditions, which affect a significant number of the world's population.

The search for articles was carried out in the PubMed, Google Scholar and Scopus databases, covering studies published between 2016 and 2024. The temporal criterion was established to ensure the relevance and timeliness of the data, since the impact of screen time on the conditions studied has been a growing area of interest in the most recent research. For the selection of articles, descriptors such as "headache", "insomnia", "cognitive disorders" and "screen time" were used, applying the Boolean operators "AND" and "OR" to combine the terms and refine the results, ensuring that the selected articles directly addressed the research theme.

The inclusion criteria were clinical and epidemiological studies and reviews that addressed the relationship between screen time and the conditions mentioned, prioritizing articles that directly investigated the effects of screen time on health conditions. Articles with small sample sizes, studies that did not directly address the topic, or that were not peer-reviewed were excluded, as these criteria could compromise the validity and reliability of the conclusions.

After data extraction, information was organized on the prevalence of the conditions analyzed, the age groups most affected, the characteristics of screen time (such as daily duration, type of device used, and the activities performed while using screens), and the severity of the symptoms observed. This approach allowed for a detailed look at how screen time can affect different age groups and the most common impacts associated with these conditions.

To assess the methodological quality of the studies included in the review, the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) tool was used. The application of this tool allowed the studies to be classified according to the clarity and completeness of the information provided, ensuring that the selected articles had an adequate level of scientific rigor. Based on this assessment, the studies were rated for their reliability, providing a solid basis for analyzing the results. This methodology allowed a critical and in-depth review of the impacts of screen time on health, with emphasis on headache, insomnia, and cognitive disorders.

RESULTS AND DISCUSSIONS

The results of this review indicate that the prevalence of headache, insomnia, and cognitive disorders is significantly increased among individuals who spend more than four hours a day in front of screens, especially in adolescents and young adults. Several studies

suggest that excessive use of electronic devices can negatively affect physical and mental health, influencing sleep quality, cognitive function, and the incidence of headaches.

HEADACHE AND SCREEN TIME

Headache was observed in 32% of participants in studies on screen time, and among adolescents and young adults, the prevalence was 50%. These findings corroborate the results of a Brazilian study conducted by Silva et al. (2020), which found a significant association between increased screen time and the development of headache, especially among young people who use mobile devices for a long time for educational and recreational purposes. The Brazilian research also suggests that the overload of visual stimuli, such as the intensity and brightness of screens, can contribute to the increase in headache, since constant eye strain can generate muscle tension.

In addition, studies such as that of Rosenfield (2016) highlight the relationship between screen time and computer vision syndrome (CVS), characterized by symptoms such as eye strain, headache, blurred vision, and neck and shoulder pain. These symptoms occur due to prolonged strain on the eye muscles when focusing on close screens, especially when there is little variation in the field of vision. Another relevant factor is the rate of blinks, which is significantly reduced during the use of digital devices, leading to eye dryness and aggravating symptoms of visual discomfort.

In a review study conducted by Sheppard and Wolffsohn (2018), it was found that prolonged exposure to screens can contribute to the development of migraines, especially in predisposed individuals. This is due to the impact of the blue light emitted by digital devices, which can overstimulate the trigeminal nerve and trigger pain crises. These findings suggest that reducing screen time and using blue light filters may be effective strategies to minimize the negative impact on eye and neurological health.

INSOMNIA AND BLUE LIGHT EXPOSURE

Insomnia was also identified as a prevalent condition among participants, with 40% of individuals who used electronic devices for more than five hours a day reporting difficulty sleeping. Studies show that exposure to blue light emitted by digital device screens interferes with the production of melatonin, a hormone essential for the sleep cycle.

The study by Chang et al. (2020) indicates that exposure to blue light at night contributes substantially to the worsening of insomnia symptoms. This effect is particularly pronounced among adolescents, as observed in a Brazilian study conducted by Souza et al. (2019), which found a high incidence of sleep disorders among young people who spent

hours in front of screens before bedtime. In addition, the research by Souza et al. (2019) highlights that the interruption of the circadian cycle due to exposure to light from digital devices has had a significant impact on the sleep quality of Brazilian adolescents, with direct effects on academic performance and emotional well-being.

A study conducted by Carter et al. (2016) reviewed the effects of blue light on sleep and concluded that using screens before bed reduces sleep latency, shortens the duration of deep sleep, and negatively affects circadian rhythm regulation. In addition, recent research points out that insomnia associated with screen time can lead to the development of psychiatric disorders, such as anxiety and depression, particularly in young populations.

COGNITIVE DISORDERS AND IMPACT OF SCREEN TIME

Regarding cognitive disorders, such as concentration difficulties and memory problems, 25% of participants with excessive screen time had these symptoms. The study by LeBourgeois et al. (2017) suggests that digital stimulus overload can impair brain neuroplasticity, resulting in attention and memory deficits.

The lack of face-to-face social interaction, associated with excessive time on social networks and digital games, is another factor that contributes to the worsening of these symptoms. According to research by Oliveira et al. (2021), the excessive use of mobile devices can reduce the attention span of children and adolescents, in addition to limiting socialization and cognitive activities outside the digital environment. The research by Oliveira et al. (2021) also warns of the increase in anxiety among young people due to constant exposure to social networks, which can further intensify the impairment of cognitive functions.

Researchers such as Small et al. (2020) argue that excessive screen time can reshape neural circuits in the brain, reducing the ability to focus and promoting a pattern of continuous distraction. This effect has been observed especially among adolescents and young adults, who frequently switch between multiple devices and applications, compromising the ability to process information deeply.

Another relevant aspect is the impact of screen time on child development. A study by Madigan et al. (2019) pointed out that children exposed to screens for prolonged periods have delays in language and cognition development, as well as difficulties in motor skills and social interactions. These findings reinforce the importance of moderate use of digital devices, especially in critical phases of brain development.

CHALLENGES IN RESEARCH AND FUTURE PROSPECTS

Despite the clear association between screen time and observed disorders, there are still significant gaps in research, such as the need for longitudinal studies to assess the long-term effects of screen time on mental and cognitive health. Additionally, most studies conducted to date have focused primarily on young populations, which highlights the importance of expanding research to other age groups, including adults and the elderly.

The study by Furukawa et al. (2019) already suggests that research on the effects of screen time on adults and older adults is crucial, since these populations are also increasingly exposed to the use of digital devices, but the consequences of this use are still largely unknown. Recent studies point out that excessive screen use among older adults may be associated with increased risk of cognitive decline and dementia, especially due to reduced physical activity and social interaction.

Additionally, more research is needed to understand effective interventions to mitigate the adverse effects of excessive screen use, such as implementing strategies to reduce screen time and promoting healthy sleep habits and cognitive activities. The use of blue light filters, regular breaks in the use of devices and the practice of physical and social activities are some of the strategies suggested to reduce negative impacts.

Therefore, although screen time is an inevitable reality in the digital age, it is essential that measures are adopted to minimize its harmful effects on health. Public policies, educational campaigns, and medical interventions can play a crucial role in raising awareness among the population about the risks associated with the excessive use of electronic devices. The future of research on this topic should focus on personalized approaches for different age groups and user profiles, ensuring that the use of technology is balanced and beneficial for mental and cognitive health.

CONCLUSION

Increased screen time has been shown to be strongly correlated with the development of headache, insomnia, and cognitive disorders, especially in adolescents and young adults, groups that are particularly vulnerable to these impacts due to their stage of brain development and patterns of intensive use of digital devices. Prolonged exposure to blue light emitted by screens, a sedentary lifestyle, and the overload of digital stimuli are crucial factors that contribute to the worsening of these symptoms. The reviewed literature also indicates that the lack of physical activity and face-to-face social interaction can potentiate the adverse effects of excessive screen time. In this context, it is essential to promote education about the healthy use of electronic devices, including limiting screen

time, taking regular breaks, and practicing physical activities, as preventive and therapeutic measures.

However, this study has some limitations that should be considered. First, most of the studies analyzed were cross-sectional, which makes it difficult to determine causality between screen time and the health conditions mentioned. In addition, the sample of studies was predominantly composed of young populations, limiting the generalizability of the results to other age groups. The diversity of methodologies and the heterogeneity in the populations studied may also have influenced the interpretation of the results.

For future investigations, it is recommended to conduct longitudinal studies that can track the effects of screen time over time, providing a more accurate view of the long-term impacts on mental and cognitive health. In addition, it is important to include a wider range of age groups in research, as well as investigate the most effective interventions to mitigate the negative effects of excessive screen time, such as educational programs, eye health protection technologies, and healthy sleep-related behaviors. Such approaches can provide a solid basis for the development of public policies and health strategies aimed at preventing disorders associated with the excessive use of electronic devices.

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