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Influence of Gadgets on the Vision of Preschool Children

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Annotation: It is impossible to imagine modern children without the latest scientific and technical achievements and mobile technologies. However, uncontrolled use of gadgets increasingly leads to complaints not only about functional changes in the work of organs and systems of the body, but also to the occurrence of various diseases. It has been established that long-term use of gadgets can contribute to the development of organic ophthalmological pathologies, and significant stress on the musculoskeletal system, especially with prolonged work at the computer, can lead to posture disorders. All this, of course, negatively affects the health of children.

Keywords: myopia, accommodation spasm, asthenopia, psycho-emotional stress.

Introduction: Vision plays a key role in human life, especially in the educational process. The eye is the main channel for receiving information, so early detection of vision problems in schoolchildren is extremely important, as it can negatively affect the perception of educational material and even affect intellectual development. Eye health is often underestimated, which leads to advanced cases of diseases that can cause serious visual impairment or refraction.

The ability to clearly see objects at a certain distance depends on the accommodation of the eye - the ability of the lens to change its shape due to the contraction of the ciliary muscles. This determines visual acuity. Problems with visual acuity, such as difficulty visualizing objects, are often associated with refractive errors of light (e.g., myopia, hyperopia, astigmatism), abnormalities of the intraocular media (e.g., cataracts), and diseases of the nervous system (e.g., glaucoma, neuritis).

Modern technology has become an integral part of everyday life, especially for children and adolescents. Long-term and excessive use of gadgets can cause vision problems, including decreased visual acuity, myopia, and computer vision syndrome. Constant work with digital devices exacerbates these negative trends. Forecasts indicate an increase in the number of people with myopia - by 2020, their number is expected to reach 2.5 billion worldwide, compared to 1.6 billion previously.

In 2021, the World Health Organization released its first global report on vision, highlighting that visual impairment and blindness affect 2 billion people, half of which could be prevented or cured. Factors that contribute to the development of myopia include prolonged visual strain at close range and lack of time spent outdoors.

In Asia, the prevalence of myopia among children reaches approximately 29%, which is 5% higher than in Western countries. According to WHO, uncorrected refractive errors can lead to blindness in up to 43% of the population (WHO, 2019). In this regard, the Count Down 2020 initiative was launched on World Sight Day to prevent blindness and improve vision worldwide. Using a computer daily for more than 4 hours or using a device for more than 8 years increases the likelihood of developing symptoms of computer vision syndrome.

Purpose of the study. Studying the impact of gadgets on children's vision

Materials and methods. Analysis of research articles and literature.

Results and discussions. Radiation from screens of modern gadgets has a negative impact on vision. When using digital devices, a condition known as asthenopia often occurs, which can be a harbinger of serious ophthalmological diseases. Asthenopia manifests itself in the form of visual fatigue caused by prolonged strain on the eyes. This condition can be caused not only by using gadgets, but also by prolonged work with text or failure to follow reading rules. However, it is impossible to completely

abandon the use of mobile devices and computers in the modern world. Therefore, it is important to follow certain rules when working with screened devices, such as regular breaks, sufficient lighting and correct posture [1,3,4,5].

Research shows that simply turning on a TV in a room where a child under 3 is playing can have a negative impact. "Background TV" reduces the quality and intensity of a child's interactions with other children and parents. Children develop and cope better when they interact with older children or adults, which promotes higher quality and more purposeful play.

An analysis of 18 scientific papers devoted to the relationship between media devices and the risk of developing myopia and myopia progression in children and adolescents allows us to draw certain conclusions [12,14]. The main risk factor, according to most studies, is the time spent in front of screens [14,15]. Myopia is defined as a condition in which the spherical equivalent refraction of the eye is ≤−0.5 diopters with relaxed accommodation [12,13].

Most authors note the negative impact of media devices, citing objective data, in particular, indicating the increased harm of smartphones and computers compared to tablets and televisions. Increased time using smartphones and computers is associated with worsening refraction and an increase in the length of the eyeball, as well as an increased risk of myopia [4]. Some Indian studies have also found a link between refractive errors and watching television.

In addition to the time of use, decreased physical activity, Western dietary habits, and high socioeconomic status due to greater access to technology have been considered risk factors [2,5,8,11,14,15].

The special accommodation and convergence requirements of the eyes when working with digital screens make people with uncorrected or inadequately corrected refraction more vulnerable. The proximity of smartphones to the eyes may negatively affect distance visual acuity, while the effect of computers in this regard has not been confirmed. Stopping the use of mobile devices may lead to an improvement in both subjective sensations and objective vision indicators [12]. Active outdoor recreation and living in rural areas are considered protective factors [10,11].

Long-term use of gadgets can cause eye fatigue and instability of movements, which negatively affects brain function and leads to nervous tension. Insufficient motor activity and incorrect postures while using devices have a negative impact on the formation of the musculoskeletal system, leading to posture disorders. Excessive passion for gadgets can lead to deterioration of neuropsychic development, decreased concentration, increased excitability and anxiety, as well as sleep disorders and the formation of addiction. A child immersed in the virtual world can show aggression when trying to limit the time of using gadgets and demonstrate irritability.

Computer and smartphone screens emit significantly more blue light (380–500 nm) compared to traditional light sources, which has been linked to digital eye strain symptoms. Research shows that longer daily smartphone use increases the incidence, prevalence, and likelihood of multiple eye symptoms. Multivariate analysis found that smartphone use, prolonged screen time, and mobile gaming were independent risk factors for digital eye strain in children [7,8,9]. Although smartphones are more commonly associated with eye problems, increasing evidence suggests that video games may have a negative impact. This may be due to increased eyelid muscle strain caused by focusing on a screen. The effect has been exacerbated during the COVID-19 pandemic due to increased time spent on media devices.

The relationship between myopia and outdoor activity has been extensively studied in recent years [4]. Reducing the time spent outdoors is considered a key risk factor for the development and progression of myopia. In contrast, exposure to natural light may have a protective effect. Children who spend more time outdoors and are exposed to bright light tend to have a lower risk of developing myopia. The protective effect of time spent outdoors may be due to exposure to light with shorter wavelengths, as well as increased levels of dopamine and vitamin D, the synthesis of which is stimulated by outdoor time. Therefore, it is important to increase daily exposure to light and outdoor activity. In addition,

time spent outdoors promotes the development of focusing skills on distant objects, which has a positive effect on eye health, although the link with myopia remains controversial. Research suggests that more time spent in outdoor sports and activities is associated with a lower risk of myopia, compared with indoor sports [9].

The correct formation of the musculoskeletal system and posture of a child depends on many factors, including the structure of the spine and chest, the position of the head, shoulder girdle and limbs, as well as the development of skills to maintain correct posture from early childhood. The skeleton completes its formation by the age of 20-23, so at school age, the skeletal system of students remains elastic and susceptible to deformation, which can lead to disorders. The formation of these skills occurs in elementary school, where computer programs, educational portals and electronic libraries are increasingly used [14,15]. The introduction of gadgets into the lives of children affects not only their consciousness and cognitive abilities, but also physiological processes. Sleep cycles, memory mechanisms, attention indicators change, and changes in physical development and the formation of posture are also observed. As previous studies have shown, the intensive use of information technology can reduce mental performance, slow down intellectual development and provoke anxiety and hyperactivity in children. Thus, the organization of educational and entertainment events using electronic devices requires careful hygienic regulation and control [13,14].

Observations of the posture of young schoolchildren while working at a computer for 45 minutes revealed that they spend 55.5 to 59% of the time in a position that is not optimal. During this period, the load on the child's musculoskeletal system is high, and prolonged use of computer equipment can lead to posture and work posture disorders.

Health problems are just one of the negative aspects of the influence of modern technologies on childhood. At a young age, imaginative thinking is only just forming, so it is important to use all channels of perception for full development. Electronic devices provide vivid visual images and auditory sensations, but limit tactile, tactile and olfactory impressions. This leads to one-sided development and the omission of important sensory information [5,6]. Regular and uncontrolled use of gadgets by preschoolers can lead to the following consequences: decreased interest in studying the material due to addiction to frequent changes in vivid images, inability to concentrate for a long time, decreased motivation to complete complex tasks, rapid loss of interest in monotonous activities, lack of independence in choosing methods for solving problems and control, as well as decreased activity in communication with the teacher.

Conclusions. The impact of gadgets on children's lives extends far beyond changes in thinking and learning ability, affecting physiological processes as well. Changes in sleep cycles, memory and concentration functions, as well as in physical development and posture indicators are observed. Research shows that excessive information exposure can negatively affect mental performance, slow down the development of intelligence and provoke anxiety and hyperactivity in children. Therefore, parents need to carefully monitor that gadgets do not lead to problems in the child's life, and reasonable and moderate use of electronic devices, on the contrary, can contribute to development and adaptation to modern realities.

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