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THE IMPACT OF GADGETS ON THE HEALTH OF PRESCHOOL CHILDREN

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Abstract
The article examines the impact of excessive use of digital devices on the development of specific pathological conditions in preschool children (3–6 years old). Based on a systematic analysis of modern research, the main diseases associated with prolonged screen time are identified, including obesity, sleep disorders, digital visual fatigue (CVS), motor development delay, and attention deficit hyperactivity disorder (ADHD). The pathophysiological mechanisms of these conditions are described in detail: from neurohormonal shifts to sensorimotor deprivation. Particular attention is paid to preventive measures aimed at reducing the risk of developing these diseases, including screen time regulation, organization of physical activity, and hygiene of the digital environment.

Keywords: Preschoolers, gadgets, diseases, obesity, ADHD, digital visual fatigue, sleep, physical inactivity, cognitive development, prevention

Introduction

In recent decades, digital technologies have become an integral part of the daily lives of even the youngest members of society – preschool children. Smartphones, tablets and televisions are used not only for entertainment purposes, but also in educational practice. However, the growing availability and unlimited use of these devices has raised concerns in the medical community, especially in the context of the potential impact on the physical and mental health of children.

Modern research points to a link between excessive screen time and the development of a number of specific pathological conditions. Among the most common are obesity caused by decreased physical activity and eating disorders; insomnia and other sleep disorders caused by exposure to blue light and disruption of circadian rhythms; digital visual fatigue (computer vision syndrome), associated with prolonged visual strain; delays in motor development and sensorimotor deprivation; and attention deficit hyperactivity disorder (ADHD), associated with dopaminergic system overload and impaired attention regulation.

Understanding the mechanisms of formation of these conditions in preschoolers allows not only to identify risk groups, but also to develop effective preventive

measures. This article aims to systematize scientific data on the pathogenesis of these diseases, their relationship with the use of gadgets, as well as to formulate recommendations for their prevention.

Obesity in preschoolers as a result of excessive use of gadgets

Obesity in preschool children (3-6 years) is becoming one of the most alarming problems of modern society. According to the World Health Organization, the number of overweight children is steadily growing, and experts increasingly call excessive use of digital devices one of the key reasons. Smartphones, tablets and televisions, which have taken a firm place in everyday life, affect the level of physical activity, eating behavior, metabolism and sleep of the child - all these factors play a decisive role in the development of obesity.

Pathogenetic mechanisms

Long screen time is associated with a passive, sedentary lifestyle. Children who are addicted to gadgets spend less time in active games, violating the recommended level of physical activity (at least 180 minutes a day for children under 5, according to WHO recommendations). Energy expenditure decreases, and with the same or increased caloric content of food, it leads to a positive energy balance and weight gain.

Watching videos or playing games while eating reduces awareness of eating behavior. The production of leptin (the satiety hormone) is suppressed, and the level of ghrelin (the hunger hormone) can increase, which leads to overeating. As a result, the child does not recognize satiety signals, and hyperphagia develops.

The use of gadgets is often accompanied by eating sweets, snacks and carbonated drinks, which aggravates the caloric load. At the same time, such products contain practically no dietary fiber, which disrupts digestion and accelerates the formation of abdominal obesity. Blue light from screens suppresses the production of melatonin, disrupting circadian rhythms. Chronic lack of sleep is associated with increased cortisol levels and decreased insulin sensitivity, which contributes to lipogenesis and the accumulation of fat mass, especially in the abdominal area.

Scientific data

- According to a study published in the journal Pediatric Obesity (2021), preschoolers who spent more than two hours a day in front of screens had a 30-40% higher risk of obesity compared to children with limited digital time.
- A cross-sectional study of more than 500 children in South Korea found that having a television in a child's bedroom was directly associated with higher than normal

BMI and lower physical activity.

- The American Academy of Pediatrics recommends that children ages 2–5 have no more than 1 hour of screen time per day, primarily educational content, under adult supervision.
- According to a study published in JAMA Pediatrics (2020), each additional hour of screen time was associated with an average of 15 to 20 minutes less sleep time in preschoolers.
- A review of over 30 studies (Tang et al., 2021) found that children who used technology an hour before bed were twice as likely to have difficulty falling asleep.

You should avoid using gadgets during meals and before bed. This helps normalize eating behavior and improve sleep quality. It is important to create conditions for daily active games in the fresh air and stimulate interest in active activities. The role of parents in this is key: the child copies the behavior of adults.

It is not recommended to use gadgets as a way to "appease" or "calm" a child during meals. Forming correct eating habits at an early age reduces the risk of obesity in the future.

Table 1: The main effects of gadgets on the health of preschoolers

Health aspect	Impact
Physical activity	Decreased activity, non-compliance with WHO recommendations (180 minutes per day).
Body composition	Increased body mass index, risk of obesity due to unhealthy diet.
Motor skills	Negative impact on fine motor skills and sensory processing.
Dream	Decreased quality and duration of sleep, risk of disorders with screen time more than 1 hour per day.
Behavior	Decreased self-regulation, aggression, inattention.
Cognitive development	Suppresses speech and attention development, but with moderate use has potential for learning.

Sleep disturbances in preschool children and the impact of screen time

Sleep plays a crucial role in the development of the brain, memory, emotional regulation and immunity of the child. For preschoolers (aged 3-6 years), the optimal duration of sleep should be 10-13 hours per day. However, with the increase in screen time, a stable tendency is recorded for the duration and quality of sleep in children to decrease. Sleep disorders can manifest themselves both in difficulties falling asleep and in intermittent or superficial sleep, which in turn affects the behavior and general psychophysical state of the child.

The blue spectrum of light emitted by smartphone and tablet screens reduces the production of melatonin, a key hormone that regulates circadian rhythms. This is especially dangerous when using devices 1–2 hours before bedtime: the biological clock is disrupted, and the child cannot fall asleep on time.

Rapidly changing images, sounds and emotionally charged content increase the excitability of the central nervous system. This leads to overexcitation, anxiety and disruption of the sleep phase. Many children experience mood swings, anxiety, crying or even nightmares after watching cartoons or games. The longer a child uses a gadget in the evening, the later he goes to bed. Over time, this creates a chronic sleep deficit, which can affect growth, cognitive development and even metabolism. In families where gadgets replace traditional bedtime rituals (reading a book, talking with parents), children are more likely to suffer from fragmented sleep and night awakenings.

Preventive measures

Screen Time Limit: It is necessary to follow the recommendations of WHO and AAP: no screen time is recommended for children under 18-24 months, and for preschoolers - no more than one hour per day, with an emphasis on quality content. It is important to encourage other types of activities: reading, walking, active and creative games.

Creating screenless zones: Avoiding the use of gadgets during meals and in the bedroom can help improve sleep and strengthen family ties. Setting clear rules for device use can help create healthy digital habits.

Control and involvement: Parents should be actively involved in choosing digital content, setting up parental controls to limit access to inappropriate material, and encouraging shared use of devices to help strengthen the relationship with their child.

Promoting physical activity: Every day it is necessary to provide at least 180 minutes of active activities - through active games, walks and sports. Passive time in front of the screen should be replaced by active and developmental forms of leisure.

Parents' education: It is important to educate parents about the pros and cons of using gadgets - through educational seminars and information resources. This will help them to consciously approach the formation of digital behavior in children.

Health monitoring: Regular checks of the child's vision, posture and psycho-emotional state are necessary for timely detection of problems. If there are signs of gadget addiction - for example, increased irritability without access to devices - it is worth contacting a specialist.

Recommendations for limiting screen time:
According to the American Academy of Pediatrics (AAP), children under 18–24 months should not be allowed to use screens at all, and preschoolers are recommended to have no more than one hour a day of quality, educational content. Instead of screen time, it is important to encourage alternative activities such as reading books, playing outdoors, and creative activities.

Organizing gadget-free zones: It is necessary to exclude the use of electronic devices in children's bedrooms and during meals. This helps improve the quality of sleep and strengthen family communication. To form the right habits, it is important to establish clear rules for using gadgets.

Parental control and active participation: Parents are required to independently select educational and useful content for children, as well as use parental control functions to limit access to inappropriate materials. Spending time with your child on gadgets helps strengthen the emotional connection.
Encourage physical activity: It is recommended that children get at least 180 minutes of active play and exercise daily, whether through active games, walks, or sports. Passive screen time should be replaced with more interactive and developmental activities.

Educational work with parents: It is important to educate parents about the potential risks and benefits of using gadgets through workshops and educational resources. This will help them manage their children’s digital habits more effectively.

Monitoring the child's health: It is necessary to regularly monitor the child's vision, posture and psycho-emotional health. If signs of gadget addiction appear, such as irritability or anxiety when there is no access to devices, you should contact specialists.

Gadgets have a dual effect on preschoolers: On the one hand, they provide educational opportunities, but on the other hand, they can cause harm to health if used unsupervised. Parents and teachers need to be aware of these effects and take preventive measures to ensure the harmonious and healthy development of children. Further research is also needed to study the long-term effects of digital technologies and create more precise recommendations for their use.
Conclusion:

Digital devices can be both beneficial and harmful in the lives of preschoolers: on the one hand, they are developmental resources, on the other, they pose health risks when used uncontrollably. It is important for parents and teachers to understand these impacts and take preventive measures, thereby ensuring the harmonious development of the child. In the future, more research is needed to better understand the long-term effects of the digital environment and develop more accurate recommendations.

Conclusions:

The use of gadgets by preschoolers has a complex impact on their health and development. On the one hand, gadgets provide access to educational materials that promote the development of logic, memory, and creative skills. On the other hand, excessive screen time is associated with serious risks: obesity, sleep disorders, behavioral and cognitive problems. To minimize harmful effects, strict restrictions on screen time, content quality control, and active parental involvement are necessary. The balance between digital technologies and traditional forms of learning and play is key to a child's healthy development.

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