HYGIENIC ASSESSMENT AND PREVENTION MORBIDITY OF PUPILS IN THE USE OF DIGITAL DEVICES AND THE INTERNET

Kurbanbaeva Amangul Zhaylaubayevna
Research Institute of Sanitation, Hygiene and Occupational Diseases Ministry of Health of the Republic of Uzbekistan

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Abstract. *Studies have shown that children who are heavy users of digital devices and the Internet are more likely than children who are moderate or non-users of digital devices and the Internet to have endocrine-related complaints and nutritional and metabolic disorders. They also have symptoms such as arousal, feeling run down, stuffiness, excessive thirst, anxiety and fear. They complain of weakness and fatigue, difficulty in waking up in the morning, dizziness, drowsiness and absent-mindedness, tiredness and pain in the eye area, blurriness, flashes before the eyes, sand in the eyes, tinnitus and stuffiness in the ears, shortness of breath or puffiness, pain in the right abdomen, bitter, sour taste in the mouth, red spots on the face, lower back pain in the kidney area. To minimize the negative impact of digital devices and the Internet on children's well-being, strict regulation of working hours and hygiene measures are necessary.*

Keywords: *pupils of general education schools, digital devices, Internet, health complaints, prevention.*

INTRODUCTION

Modern digital devices and social networks have become an integral part of the younger generation. Mobile phones, tablets, laptops and computers have become a means of communication and a way to obtain information, entertainment and learning. However, the introduction of digital technologies into everyday life has negative consequences for the health of children.

The use of digital devices implies a decrease in physical activity and an increase in sedentary work [7]. Literature evidence confirms that uncontrolled use of gadgets and the Internet negatively affects various body systems. Many studies have proven the link between the use of gadgets and children's health, and the strong influence of gadgets on both their physical and mental health has been established [2, 5, 8].

There is evidence that computer use in children leads to tension, fatigue and increased morbidity [6]. The most typical symptoms of regular and prolonged stay at the screen of digital devices are dry eyes, headaches, back pain, and overstrained hand muscles. constipation and many others [3, 4]. The main syndromes by frequency of occurrence are distributed as follows: computer visual syndrome, carpal tunnel syndrome, spinal syndrome, respiratory, pulmonary, same thoracic syndrome, congestive, venous, aka vascular syndrome [1].

Thus, it follows from the literature that the continuous and uncontrolled use of digital devices and the Internet has a negative impact on various body systems and on the health of the younger generation, there is a risk of developing cardiovascular diseases, various diseases of the eyes, motor system, gastrointestinal organs, mental disorders.

At present, an urgent hygiene problem is the question of what should be the balance between the use of digital technologies, the Internet and other activities (physical activity, reading books, socializing with peers, spending time outdoors, etc.), what measures will reduce the negative consequences of using digital devices and the Internet and preserve good physical and mental health of children.

RESEARCH OBJECTIVE

Assessment of the impact of digital devices and the Internet on the morbidity rates of pupils in general education schools in Tashkent and to development of preventive measures.

RESEARCH METHODS AND MATERIAL

Pupils of general education schools in Tashkent aged 11 to 17 years old. Depending on the use of digital devices and the Internet, all children were divided into 2 groups: the main group - pupils who use digital devices and social networks a lot and for a long time (491 respondents) and the control group - pupils who rarely or do not use digital devices and social networks (409 respondents).

The morbidity of pupils of general education schools in Tashkent was studied by a survey method using screening-testing on the questionnaire "Screening survey on the study of pupils' morbidity".

The questionnaire consists of 3 blocks. One of the blocks consists of 49 questions, which are aimed at identifying complaints characteristic of changes in various organs and body systems. When summarizing the results of the screening questionnaire, the question numbers were marked, to which positive answers were given with options "rarely" and "often" were noted. The obtained data were processed by grouping individual diseases into nosological units and classes of diseases according to the International Statistical Classification of Diseases 10th revision (ICD-10).

Questions 10.1 - were aimed at identifying possible diseases of the endocrine system, nutritional and metabolic disorders (class IV), 10.2-10.9 - mental and behavioural disorders (class V), 10.10-10.16 - nervous system (class VI), 10.17-10.20 - diseases of the eye and its apparatus (VII class), 10.21-10.22 - diseases of the ear and mastoid (VIII class), 10.23 - diseases of the circulatory system (IX class), 10.24-10.28 - diseases of the respiratory system (X class), 10.29-10.37 - diseases of the digestive system (XI class), 10.38-10.39 - diseases of the skin and subcutaneous tissue (XII class), 10.40-10.49 - diseases of the genitourinary system (XIV class). Analysis of positive answers revealed children with probable pathology who needed in-depth examination by specialised doctors.

Statistical analysis was performed using Microsoft Excel 2016 and Statistica 10.0 software package. Pupil's t-test was used to determine the reliability of the difference between the mean values. Differences in arithmetic mean values were considered reliable at $p<0.05$.

RESEARCH RESULTS

Analysis of questionnaire survey results showed that in the main group, 22.8±1.89% of pupils had complaints related to the endocrine system, eating and metabolic disorders. In the control group, 17.8±1.89% of respondents had such complaints. In addition, children had complaints and symptoms indicating mental and behavioural disorders. In the main group. 26.4±1.94% of the respondents had such cases, whereas in the control group, 18.9±1.94% of the respondents had such cases ($p<0.01$). Thus, 31.4±2.09% of children of the main group and 20.5±2.00% of the control group had such mental disorders as anger, aggressiveness, bad mood, pessimism ($p<0.001$), 22.1±1.87% of the main group and 14.4±1.74% of the control group of

pupils had frequent mood changes, fear, anxiety, as well as compulsive movements such as nibbling clothes or hair, licking or biting lips, biting nails (38.5±2.20 vs. 27.1±2.20%, p<0.001). In addition, there were cases of reluctance to go to school (41.1±2.22% of children of the main group, 27.1±2.20% of children of the control group (p<0.001), as well as reluctance to communicate with parents and friends (24.6±1.94% of children of the main group, 16.8±1.85% of children of the control group (p<0.01).

The data analysis showed that after using digital devices and the Internet, children were agitated, feeling broken (23.8±1.92% of children in the main group, 19.8±1.97% of children in the control group); feeling stuffy, excessive thirst (14.9±1.61% of children in the main group, 14.7±1.75% of children in the control group); feeling anxious, feeling afraid (14.9±1.61% of children in the main group, 11.0±1.55% of children in the control group). The percentage of complaints when using digital devices and the Internet related to mental and behavioural disorders showed that pupils in the main group, compared to pupils in the control group, were 1.4 times more likely to indicate the presence of symptoms indicative of various mental and emotional disorders.

The results of the screening test indicate that 48.3% of the examined children in the main group (26.5±1.99% with "rare" and 21.8±1.86% with "frequent" cases) and 41.0% in the control group (21.5±2.03% with "rare" and 19.5±1.96% with "frequent" cases) have diseases of the nervous system (p<0.05), which indicates an increased risk of such diseases in pupils in the main group. When general school children were asked about the complaints and symptoms from the nervous system, they responded as follows: in the main group - 44.2±2.24% mentioned headaches and heaviness in the head, while in the control group this figure was 34.7±2.35% (p<0.01); sleep disorders (long time of falling asleep, insomnia) - 42,8±2,23% in the main group against 30,6±2,28% in the control group (p<0,001); weakness and fatigue - 26,1±1,98% in the main group and 23,0±2.08% in the control group; difficulty in waking up in the morning - 63,4±2,17% in the main group and 52,3±2,47% in the control group (p<0,001); dizziness - 25,7±1,97% in the main group and 17,8±1,89% in the control group (p<0.01); syncope - 98.8±0.49% in both groups; drowsiness and absent-mindedness - 37.5±2.18% in the main group and29.8±2.26% in the control group (p<0.05). Thus, children of the main group, in comparison with children of the control group, 1.2 times more have complaints about problems on the part of the nervous system (p<0.05).

It was also found that pupils who exceeded the recommended norm for the time of using digital devices were 1.3 times more likely to suffer from diseases of the eye and its appendage apparatus compared to children who followed the recommendations for using such devices. In the main group, where pupils exceeded the norm of use, 25.3±1.96% of children experienced these problems, while in the control group, where children used digital devices within the norm, this percentage was approximately 19.4±1.96% (p<0.05). Additional data obtained from the pupil survey indicated the specific diseases related to the eye and its appendages experienced by the pupils. Thus, about 47.7±2.25% of the pupils from the main group and 36.6±2.38% of the control group reported eye fatigue and eye pain. Blurred images also manifested in 25.1±1.96% of pupils in the main group versus 19.8±1.97% of students in the control group (p<0.05). The sensation of flickering in front of the eyes was indicated by 14.5±1.59% of pupils in the main group against 12.5±1.64% in the control group. The sensation of sand in the eyes was reported by 13.8±1.56% of pupils in the main group and8.8±1.40% of pupils in the control group (p<0.05). 25.3±1.96% of children in the main group and 19.4±1.96% of children in the control group had complaints about

the visual analyser, such as eye fatigue, eye pain, blurred images, flickering sensation in front of the eyes and sensation of sand in the eyes.

The study showed that 19.6±1.80 per cent of children in the main group had complaints about hearing and 17.1±1.90 per cent of children in the control group. In addition, 22.2±1.90% of children in the main group and 19.3±2.00% of children in the control group complained of tinnitus and stuffiness (no significant differences).

In addition, analysis of the screening test questionnaires revealed that among the pupils of the main group, 21.8±1.90% had circulatory system complaints, while the control group had 17.4±1.90% (no significant difference).

The surveyed pupils 30.5±2.10% of the main group and 27.7±2.20% of the control group had respiratory complaints. The surveyed pupils in the main group compared to those in the control group were more likely to have problems such as shortness of breath or puffiness (21.9±1.90% vs. 16.6±1.80%, $p<0.05$); runny nose, cough, nasal congestion (50.9±2.30% vs;) wheezing, loss of voice, and sore throat (26.9±2.00% vs. 28.4±2.20%); fever, chills, and fever (26.3±2.00% vs. 24.2±2.10%); and. 26.5±2.00% of pupils in the main group and 18.6%±1.90% in the control group ($p<0.01$) felt brokenness.

It was also found that pupils of the main group complained 1.1 times more often about problems with the digestive system (23.7±1.92% vs. 21.1±2.02% of pupils of the control group): complaints about toothache and carious teeth were revealed (34.2±2.14 vs. 27.8±2.22%; $p<0.05$). Right subcostal pain was rarely observed in pupils of the main group (18.3±1.75% vs. 14.4±1.74%; $p<0.05$). It was also found that 21.2±1.84% of pupils in the main group and 20.5±2.00% of pupils in the control group had complaints of a bitter, sour taste in the mouth ($p<0.01$). Examination of children of the main and control group revealed (respectively): white or yellow plaque on the tongue (12.8± 1.51% vs. 11.7±1.59%); breath odour (29.5±2.06% vs. 26.4±2.18%,); nausea, belching, heartburn (30.5±2.08% vs. 26.4±2.18%); abdominal pain (36.0±2.17% vs. 32.5±2.32%); diarrhoea or constipation (25.9±1.98% vs. 25.2±2.15%); faeces with blood, mucus, pus (4.9±0.97% vs. 5.1±1.09%). It was also found that pupils of the main group had symptoms of skin and subcutaneous fibre diseases 1.6 times more often than pupils of the control group. This percentage was 17.1±1.70% in the main group and 10.4±1.51% in the control group ($p<0.01$). In 25.5±1.97% of the main group and 17.1±1.86% of the control group of children, the appearance of red spots on the face after using digital devices and the Internet was observed. The examined pupils had allergic reactions to certain foods, drinks, and odours (rash, itching, peeling, red spots, swelling, lacrimation. nasal discharge, sneezing, coughing, breathing difficulties, etc.). In the main group, 25.5±1.97% of children had these complaints and in the control group 17.1±1.86% ($p<0.01$).

Questionnaire data analysis showed that 13.3±1.50% of pupils in the main group and 12.7±1.60% of pupils in the control group had complaints about the genitourinary system: lower back pain in the kidney area, (23,2±1.90% of children in the main group vs. 18,1±1,90% of children in the control group); lower abdominal pain (20,2±1,80% vs. 18,3±1,90%); nocturnal involuntary urination (6,1=1,10% vs. 5,9±1,20%); a large amount of urine excreted at 1 time (more than 500 ml) (15.7±1.60% vs. 14.2±1.70%); a small amount of urine excreted at 1 time (less than 100 ml) (23.8±1.90% vs. 21.3±2.00%); and other complaints.

Thus, studies have shown that children who use digital devices and the Internet intensively are more likely than children who use digital devices and the Internet moderately or not to have

endocrine, nutritional and metabolic complaints. Children who are heavy users of digital devices and the Internet have symptoms such as agitation, tiredness, stuffiness, excessive thirst, anxiety and fear. They also experience weakness and fatigue, difficulty waking up in the morning, dizziness, drowsiness and absent-mindedness, tiredness and pain in the eye area, blurred, blinking eyes, sand in the eyes, tinnitus and stuffiness in the ears, shortness of breath or puffiness, right subcostal pain, bitter, sour taste in the mouth, red spots on the face, lower back pain in the kidney area.

The figure summarises the percentage of sun-eyed pupils who have complaints about different body systems when using technological tools and the internet.

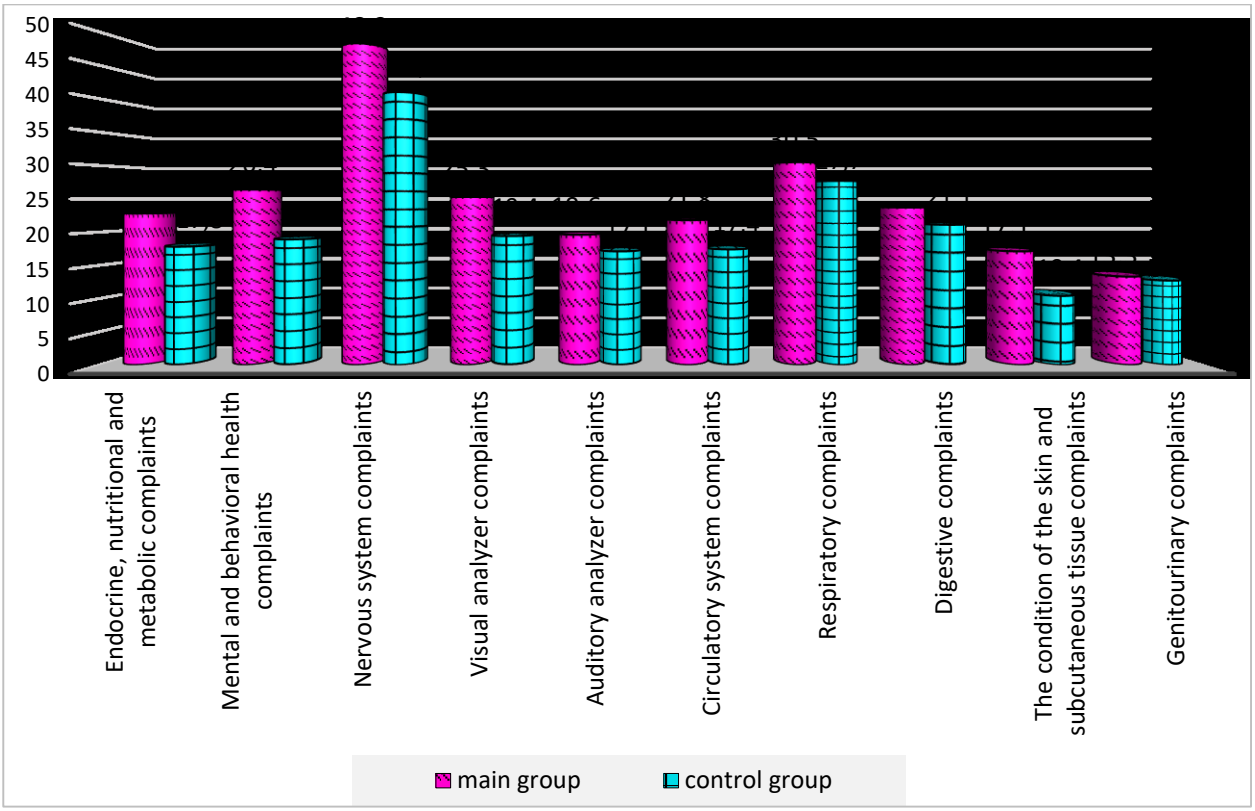

Figure 1: Percentage of pupils with complaints about different body systems.

The results of the study show that strict regulation of working hours and sanitary and hygienic measures are necessary to minimise the adverse effects of technical devices and the Internet on pupils' bodies. For this purpose, it is important to comply with workplace organisation and safety standards, as well as health and safety exercises. Recognising the risks and developing appropriate skills will help to maintain and improve children's mental and emotional well-being.

The optimal screen size for a schoolchild is a 17-inch monitor. It is necessary to correctly calculate the distance to the monitor - it is about 45-60 cm. and it should be below eye level. Proper lighting - natural light falling on the left can also reduce the development of visual pathology. At night, the lamp should illuminate only the document, but not the monitor screen. This will help to avoid glare, which complicates work.

It is necessary to educate pupils about the observance of sanitary and hygienic norms and rules when working with computers. It is also important to improve computer equipment to improve learning conditions and prevent negative effects on children's health.

Conclusions.

1. Children who use digital devices and the internet intensively are at risk of developing various symptoms that relate to endocrine disorders, metabolic disorders, psychological and behavioural status, visual and auditory analyser disorders., neuromuscular and genitourinary systems, and allergic reactions.

2. In order to reduce the negative impact of using digital devices and the Internet on children's health, it is necessary to introduce a set of measures to improve the conditions of their use.

REFERENCES

1. Волкова Е.Е., Лукьянова Е.А., Проценко В.Д. Длительная работа за компьютером и ее негативное влияние на функции организма // Вестник Российского университета дружбы народов. Серия: Медицина. – 2006. - №2. – С. 86-89.

2. Королева М.В. Влияние компьютерных игр на физическое и психическое здоровье детей // Международный студенческий научный вестник. – 2015. – № 5-3. - С. 440-441.

3. Мартынова З.Е. Влияние компьютера на жизнь и здоровье учащихся // Crede Experto: транспорт, общество, образование, язык. – 2014. - №2. – С. 212-221.

4. Титова В.В. Киберпатология: результаты исследования и пути профилактики // Вестник МГОУ. 2017. №4.

5. Чомаева М.Н. Компьютер как фактор вредного воздействия на здоровье человека // Международный журнал гуманитарных и естественных наук. – 2020. - №7-2. – С. 9-11. doi:10.24411/2500-1000-2020-10874.

6. Шуленина Н.С. Влияние компьютерных средств обучения на психофункциональные показатели и состояние здоровья школьников // Сибирский педагогический журнал. – 2004. - №2. – С. 159-164.

7. Kapil U, Bhadoria AS. Television viewing and overweight and obesity amongst children // Biomed J. – 2014. - №37(5). – P. 337-338. doi: 10.4103/2319-4170.125654.

8. Rashid SMM, Mawah J, Banik E, Akter Y, Deen JI, Jahan A, Khan NM, Rahman MM, Lipi N, Akter F, Paul A, Mannan A. Prevalence and impact of the use of electronic gadgets on the health of children in secondary schools in Bangladesh: A cross-sectional study // Health Sci Rep. – 2021. - №4(4): e388. doi: 10.1002/hsr2.388.