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FACTORS AND PREVENTATIVE MEASURES OF THE VISUAL ORGANS PATHOLOGY AMONG STUDENTS

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Abstracts

Topicality. The urgency of the article is determined by a large number of students with a visual organs disorder, which causes anxiety both to doctors and teachers, as vision is one of the most important analyzers of the human body, which provides full dynamic information about a color, a form, a distance, the world around us, etc. The goal of this research is to synthesize the causes of the visual organs pathology and the ways of preserving the sense of vision. ***Methodology*** of the research is the analysis of scientific and methodological cited literature, the survey of students on the use of computer and mobile devices. ***Results:*** the factors of the visual organs pathology have been generalized, they may be hereditary, congenital and acquired. Hereditary factors of the visual organs pathology are transmitted from parents to children, or through generations. Congenital factors of the visual organs pathology can have negative effects on the fetus during pregnancy. The reason for the acquired diseases is the disease of internal systems and organs, primarily diseases of ORL organs and cardiovascular pathologies, as well as bad habits, inappropriate nutrition, environmental conditions and the work with displays. Many-hours-long reading from the monitor provokes the visual syndrome and generally worsens the eyesight. Students are obsessed with the computer and mobile technologies, leaving out of account their negative impact. Consequently, the authors emphasize the need to adhere to the rules of using the computers and mobile devices, to provide special exercises for prevention and vision correction, which are to increase the level and intensity of metabolic processes in the human body, and blood circulation are to be enhanced. These regular special exercises affect both the work of eye muscles and the visual acuity positively. ***Conclusions.*** The visual organs pathology can be prevented by doing the therapeutic exercises and the exercises for relaxation, as well as by following both general and special recommendations such as a proper display arrangement and regular breaks.

Key words: students, visual organs pathology, factors of influence on the visual analyzer, prevention, correction.

Наталія Захожа, Ольга Касарда, Володимир Захожий, Оксана Усова, Андрій Гаврилюк. Фактори патології органів зору в студентів та їх профілактика. ***Актуальність*** статті зумовлена значною кількістю студентської молоді з порушенням зору, що викликає тривогу як у медиків, так і в педагогів, адже зір – один із найголовніших аналізаторів організму, який забезпечує отримання повної динамічної інформації про колір, форму, віддаль, навколишній світ тощо. ***Мета роботи*** – узагальнення причин патології органів зору та способи його збереження. ***Методологія дослідження*** – аналіз науково-методичної літератури, опитування студентів щодо користування комп'ютерними й мобільними пристроями. ***Результати.*** Узагальнено фактори патології зору, які можуть бути спадковими, вродженими та набутими. Спадкові передаються від батьків або через покоління. До вродженої патології можуть призвести негативні впливи на плід у період вагітності. Причиною набутих є захворювання внутрішніх систем й органів, передусім хвороби ЛОР-органів та серцево-судинні патології, шкідливі звички, нераціональне харчування, екологічні умови, а також робота з дисплеями. Багатогодинне читання з монітора провокує зоровий синдром і загалом погіршує зір. Студентська молодь надто захоплюється комп'ютерними й мобільними технологіями, незважаючи на їх негативний вплив. Тому науковці наголошують на необхідності дотримання правил користування комп'ютерами й мобільними пристроями, наводять спеціальні вправи для профілактики та корекції зору, завдяки яким підвищуються рівень й інтенсивність обмінних процесів в організмі, посилюється кровообіг. Регулярне їх виконання позитивно впливає як на роботу м'язів ока, так і на гостроту зору. ***Висновки.*** Керуючись як загальними, так і спеціальними рекомендаціями, такими як належна організація роботи з дисплеями, регулярні перерви, використання вправ для розслаблення та лікувальної гімнастики, можна запобігти патології зору.

Ключові слова: студенти, патологія зору, фактори впливу на зоровий аналізатор, профілактика, корекція.

Наталья Захожа, Ольга Касарда, Владимир Захожий, Оксана Усова, Андрей Гаврилюк. Факторы патологии органов зрения студентов и их профилактика. ***Актуальность*** статьи обусловлена значительным количеством студенческой молодежи с нарушением зрения, что вызывает тревогу как у медиков, так и в педагогов, ведь зрение является одним из главных анализаторов организма, обеспечивает получение полной динамической информации о цвете, форме, расстоянии, окружающем мире и т. п. ***Целью*** данной работы является обобщение

причин патологии органов зрения и способы его сохранения. ***Методология исследования*** – анализ научно-методической литературы, опрос студентов по использованию компьютерных и мобильных устройств. ***Результаты.*** Обобщены факторы патологии зрения, которые могут быть наследственными, врожденными и приобретенными. Наследственные передаются от родителей или через поколение. К врожденной патологии могут привести негативные воздействия на плод в период беременности. Причиной приобретенных являются заболевания внутренних систем и органов, прежде всего, болезни ЛОР-органов и сердечно-сосудистые патологии, вредные привычки, нерациональное питание, экологические условия, а также работа с дисплеями. Многочасовое чтение с монитора провоцирует зрительный синдром и ухудшает зрение. Студенческая молодежь слишком увлекается компьютерными и мобильными технологиями, несмотря на их негативное влияние. Поэтому авторы подчеркивают необходимость соблюдения правил пользования компьютерами и мобильными устройствами, приводят специальные упражнения для профилактики и коррекции зрения, благодаря которым повышается уровень и интенсивность обменных процессов в организме, усиливается кровообращение. Регулярное их выполнение положительно влияет как на работу мышц глаза, так и на остроту зрения. ***Выводы.*** Руководствуясь как общими, так и специальными рекомендациями, такими как надлежащая организация работы с дисплеями, регулярные перерывы, использование упражнений для расслабления и лечебной гимнастики, можно предотвратить патологии зрения.

Ключевые слова: студенты, патология зрения, факторы воздействия на зрительный анализатор, профилактика, коррекция.

Introduction. In today's conditions, the load on sight is particularly widespread, which is characterized by significant changes in the nature and conditions of visual work associated with the use of information and communication technologies. Computers and mobile phones that support many features and, of course, the Internet, are indispensable for students. However, excessive reading from a computer monitor, tablet, or smartphone negatively affects the lens of the eye. From the internal overheating it collapses and becomes cloudy. This manifests itself in a cut in the eyes and noise in the head [2].

Of course, in today's life, it's hard for students to do without laptops, tablets, gadgets and smartphones. However, there are two issues that await those who often use these electronic media. The first is the probability of the development of true or false myopia, the so-called myopia. The difference between these two pathologies lies in the fact that when true short-sightedness is an extension of the eyeball, that is, it is extracted and distorts the image. As a result of myopia, muscle spasm occurs, so the picture loses its sharpness. The second problem is the development of dry eye syndrome, which is due to the fact that a person is too fond of what is happening on the screen and forgets to blink, so that the eyes are hydrated naturally.

Work on a computer, even in spite of high-quality monitors with a special protective coating, reduces visual acuity, mobility of the eye; disrupts refraction and accommodation, binocular vision and a sense of color. The degree of fatigue directly depends on the nature of the user's activity. Conditionally distinguish 4 categories of works by computer:

- reading information from the monitor screen (reading, viewing files, etc.);
- operations for entering information;
- combined operations (text editing, writing and debugging programs, etc.);
- use of computer graphics (drawing, work with design programs, etc.).

Of course, the greatest risk of a negative impact of the computer on vision is on individuals who regularly perform work in categories III and IV. According to American researchers, after 45 min. Continuous work on the computer appear the first signs of asthenopia (visual fatigue), after 2 hours. - the work of the visual analyzer is violated, and after 4 hours. - changes of irreversible nature begin. In such information-rich countries as the US and China, according to the statistics in 2016, the number of people with short-sightedness was 40% and 70% respectively (given the fact that 50 years ago, such people in China were 10-20%) [5]. In Ukraine, short-sightedness is manifested in every fourth inhabitant. Unfortunately, in virtually all schools and institutions of higher learning, students, students and teachers systematically ignore the basic rules of work at the computer.

If reading from a computer monitor, tablet or smartphone did not hurt the eyes, e-book makers would not have the incentive to come up with new electronic devices directly for reading, since modern portable laptops and tablets are no less ergonomic and comfortable. However, compared to the e-book, they are lagging behind in terms of eye gain, precisely because hours-long reading from the monitor provokes a dry eye syndrome, a computerized visual syndrome, and generally worsens vision. The fact is that the phone

works like a microwave oven, on similar waves. If the impact is long - the likelihood of damage increases. In the brain and in many tissues there is a blood circulation, due to which the impact of a mobile phone is not so strong, because the tissues are refreshed with blood. One should not think that there is any harm at all, but the effects of the waves are at least somewhat weakened. Particularly suffering from the mobile phone those parts of the body that do not wash the blood, and therefore remain outside the system of thermoregulation of the body, in particular, the lens of the eye. According to the World Health Organization, the use of a mobile phone for more than 1 year. The day is markedly worsening both by sight and hearing. Israeli scientists have come to the conclusion that people who often use a cell phone for a long time may develop cataracts over time [3].

The purpose of the work is to synthesize the factors of visual impairment and to justify the necessity of using various means for its preservation.

The research methodology is the processing of information provided by students of the 1–2 year course at the Lesia Ukrainka Eastern European National University on the use of computer and mobile technologies.

Results of the research and their discussion. A survey of students at the above university allowed the following results: about 60% of students use a personal computer and a mobile phone for more than three hours a day, of which about two hours are spent on homework. More than 20 % of students use computers and mobile phones for more than two hours during the day.

Working with displays, about 60% of students have complaints of reduced visual acuity, difficulty in their eyes, a feeling of «dusty» eyes, blurred vision, reddening of eyeballs. In addition, about 50 % of the respondents feel general tiredness, headache, difficulty in remembering, flying flies and iridescent circles in front of their eyes.

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Concerning the performance of the interviewed exercises for the eyes while working with the computer, their number is too low - about 15%. The reasons for such neglect of their own health should be ignorance of the respondents regarding the need for their implementation, ignorance of the correct methodology, consistency, lack of time.

About 20% of students do not consider displaying harmful to view. In their opinion, the visual analyzer is negatively affected by stressful situations, poor nutrition, ecology, etc. And this fact is not objectionable. Indeed, stress, inappropriate nutrition, and inadequate environmental conditions are harmful not only for sight. However, in the case of using computer and mobile communications, the main risk factors for vision impairment are: non-compliance with work and rest; incorrect organization of the workplace; incorrect monitor setting; inadequate level of illumination, etc. The visual load during work on a computer increases as a result of constant moving of a view from a screen to a keyboard and a paper text. In addition, the static posture during work, the uniformity of movements and the irrational organization of the workplace can lead to musculoskeletal disorders that

For people who work for a long time on a computer, every 40-45 minutes. arrange a break, leave the workplace and do gymnastics for the eyes, at least the easiest. For example, the following exercises [1]:

1. Close the eyes firmly and open wide. Repeat 5-6 times at intervals of 30 seconds.
2. Without turning his head, look up, down, left and right, and then up and down diagonally.

3. Choose the closest item located and fix it look at 3-4 s. Then translate the look at the object that is located a bit further. Continue the chain in the distance, and when the number of objects reaches 15, repeat everything in reverse order.

In order for the eyes to get tired as little as possible, when organizing the workplace, you should take into account 3 main factors: illumination; table and monitor placement; pose at work. Minimum illumination of the surface of the table: when using incandescent lamps 150 lux and 300 lux at fluorescent lamps. Total illumination in the room - within 300-500 lux. The recommended power of a table lamp is 60-80 Watts. The lamp must have a tight shade.

In clear weather from direct sunlight, blinds or curtains of translucent tones should be used to avoid direct light glare.

The best posture behind the desk: the spine has a perpendicular position relative to the surface of the seat and the floor; shoulders are on the same line; both arms are freely lying on the table; bending of the elbow does not exceed 20; the feet rest entirely on the floor, that is, the legs are bent at right angles in the hip and knee joints. The back is tightly pressed against the back of the chair.

To avoid spoiling your eyesight on a computer, the desktop and monitor should be properly positioned:

• It is desirable to place the desktop directly in front of the window or the left end to it (if left, then the right end);

• The table should be of such width that the distance to the screen was 60-70 cm, but at the same time it was possible to work with the keyboard in the immediate vicinity of the user (30-40 cm);

• The monitor should be installed almost perpendicular to the table, slightly higher than the user's eye level, so that it looks at the screen at an angle of 10 ° from the top down.

Before you start working on your computer, you need to set the proper contrast and brightness of the monitor. These options are individually tailored for each user. In general, the contrast should not be too low, and the brightness is too high. The optimal balance of the colors of the background and the text is determined by the principle of opposite tones: white - black, yellow - blue, red - green. It should also avoid a large contrast between the brightness of the screen and the brightness of the surrounding space.

Since sunlight has many valuable and necessary properties for health, then you need to ensure that the room gets as much sunshine as possible. It is advisable to have white walls in the room, which evenly reflects the incident light on them, which increases the indoor illumination. It should be borne in mind that objects of white color reflect 60-80% of incident light on them, objects of light tone (yellow, cream) – 50–60 %, dark (brown, red, gray) - 20-30%. Weak illumination leads to excessive eye strain. However, a strong source of light can cause blindness.

Even in the ancient gymnastics system included exercises in the form of various movements of the eyes (turns, circular movements). Undoubtedly, they are beneficial, because trained muscles that control eye movements, activate blood circulation in this area and well relieve fatigue after mental work. After such exercises, a person feels much more cheerful. At the heart of the positive effect, which is discussed, there are certain functional relationships between the ocular nerve and the nerve cells of the brain vessels. We offer several exercises that remove eye fatigue. It is not difficult to perform them, the main thing in this matter is regularity.

1. Fast blinking eyes for 1–2 minutes. Exercise improves blood circulation, it should be done sitting.

2. Move the focused view to the left corner of the eye, then move it horizontally to the right angle. Repeat 8 times.

3. Extend the index finger to the level of the nose and carefully focus on it. Gradually pull the finger to the nose, shifting the look until it begins to double in your eyes. Repeat this exercise 7 times.

4. In the clockwise direction, rotate the eyes one way and then go to the other. There will be enough five repetitions.

5. Look directly in front of you 2–3 s. Then place your finger at a distance of 25–30 cm from your eyes, translate the look at the beam and look at it 3–5 s. Lower your arm. Repeat 10–15 times. Running standing. Exercise reduces eye fatigue. Those who use glasses should perform the exercise without removing them.

6. Close the eyelids and gently massage them with circular finger movements for 1 min. Executing sitting. Exercise helps relax muscle and improves blood circulation.

7. Try to translate the view from a close object to the far and vice versa. If there are unpleasant feelings, it is advisable to change the pace of the task being performed. As a rule, such training complex should be

performed daily, and it will not be harmful if you do it in the morning and evening, supplemented by general developmental exercises and breathing gymnastics.

The training of ciliary muscle was one of the first proposed and started to be applied by Ukrainian ophthalmologist Professor AI Dashevsky in his practice. These were daily exercises for 10-15 minutes with concave lenses. In front of the eye (each one separately), he put a faint lens (starting at 0.5 D) for as long as the visual acuity that first decreased, did not rise to the baseline. Gradually, the power of the lenses increased to such an extent that it could overcome the eye. Of course, after such training, the visual acuity improved, and with each passing day the output power of the lenses, as well as the power of the lenses, from which the exercise ended, increased. This training can be conducted both for one eye and for each turn.

Undoubted interest is the technique of training and restoration of vision, developed by English physician M. Corbett. It is based on the principles of relaxation of ocular and ciliary muscles, which account for the bulk of the loads during visual perception. According to M. Corbett, the muscles surrounding the eyeball provide not only the movements of the eye, but also can affect the size of its longitudinal axis. Therefore, by special training exercises, bringing the focal length to the retina at short-sightedness or farsightedness, you can achieve the effect that gives the glasses. Of course, these exercises do not produce as fast a result as wearing glasses. However, their influence is deeper and more natural, and this beneficial effect extends even to the character of a person, contributing to a good mood.

The practical recommendations of M. Corbett are that:

• In no case can you keep a book (laptop, tablet, etc.) on your lap while reading. In this position, the cervical vertebrae are inclined forward, the carotid arteries are slightly flattened, which complicates the blood supply, in addition, the larynx contracts, which reduces the depth of inhalation;

• The distance from your eyes to a book or other object of information must be varied, not necessarily keeping the property poses. On the contrary, it is recommended to move the stool, throwing it hard on the back, or straightening out, pull up the legs to avoid their «squeezing» and spasms;

• For deterioration of visibility when working with a computer, it is recommended to use a «protracted breath» technique, which contributes to increasing the insatiability and as a consequence - essential relaxation of the upper limb, trunk and cervical vertebrae. Reception is the removal of air from the lungs through the compressed lips with a slight hissing while the body tilt is tilted forward. Naturally, there should be a corresponding deep breath beforehand. Depth of visual perception improves already from the second slow inspiration. If all the exercises for the eyes are accompanied by proper breathing, their results will be manifested more quickly;

• Put your fingers in the center of your forehead so that your hands cover your eyes. Do not squeeze the eyeballs and restrict the ability to move freely with the eyelids. Such artificial eclipse significantly accelerates the process of relaxing muscles and improves blood circulation;

• In the morning it is useful to work in front of the mirror several movements with eyelashes and eyebrows. In most cases, people with low vision are accompanied by a feeling of heaviness. These exercises expand and deepen the circulation of blood, massage the lacrimal glands and their excretory canals, and therefore extremely useful, especially after night sleep.

The program for correction of visual impairment should include morning hygienic gymnastics, special training gymnastics, physical culture pauses, etc. However, one should be careful about physical exercises, correct dosage loading, alternating with pauses for rest, filling exercises for visual training, relaxation and breathing regulation. It is necessary to refrain from prolonged static exercise, exercises of high intensity, which can lead to increased intraocular pressure, impaired ciliary muscle performance. Exclude high intensity exercises; limit sharp inclination, jumps, exercises with shaking of the body and inclining of the head, moving on skates, etc.

Discussion. The problem of pathology of the eyesight in children and young people is disturbed by many scholars. They indicate the main causes of this phenomenon, recommend various corrective and preventive measures, the effectiveness of which is indisputable. However, it is said that one of the factors of visual impairment, including short-sightedness, is the many hours of computer work and the excessive use of mobile devices. This serious illness can adversely affect the quality of life. Therefore, teachers and parents need to be vigilant and timely pay attention to this problem.

Conclusions and perspectives of further research. It is known that a large amount of information on computer and mobile communications students receive through a visual analyzer. Therefore, visual

impairment refers to the most massive deviations in their state of health, which greatly reduces performance. In the case of ocular pathology, there is a complex of motor defects due to reduced visual acuity. Therefore, it is necessary to provide assistance to those who already have vision problems, as well as to take seriously the prevention and hygiene of the eyes, and to apply various ways of its preservation. Physical therapy, therapeutic and correctional exercises, massage, physiotherapy plays an important role in the prevention of vision and its restoration. This technique should be applied not only in medical institutions, but also in high school in physical education classes and at home.

The prospect of further research we see in the search for and improve the methods of preventing the vision of student youth in the process of physical education.

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