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## Organization of Ophthalmological Assistance to Students with Account of Morbidity and Medico-Social Risk Factors.

Tatarkova Yu V\*, Yaroshevich EA, Petrova TN, Chernov AV, and Goncharov A Yu.

N.N. Burdenko Voronezh State Medical University, 10 Studencheskaia Str., Voronezh, 394036, Russian Federation

### ABSTRACT

The article analyzes the incidence of diseases of the eye and its adnexa among university students of different profiles. The dynamics of primary and general morbidity rates for 2011-2016 has been determined, nosological forms of diseases have been studied, their level and specific gravity in the structure of eye diseases and its adnexa have been assessed according to official statistics and the results of medical examinations. The analysis of the obtained data showed a negative tendency to the growth of both general and primary morbidity of eye diseases and its adnexa. In the structure of eye morbidity, the leading place in the students is occupied by refractive errors, inflammatory eye diseases, strabismus, optic nerve and retinal diseases. The growth of diseases of the eye and its adnexa is associated with a high intensification of the educational process, the introduction of computerization in classrooms, an increase in visual loads, and, possibly, an increase in the contingent of students enrolling in a university with pathology of the organ of vision. In addition, students of most universities believe that qualified eye care is not always present and is not always available. Hence, it is important to improve the ophthalmologic service, especially the primary link, which is capable of addressing the prevention of morbidity, as well as disability with a focus on nosological diagnostics and medical and social prevention among students. A significant role in the implementation of this work belongs to educational organizations of different levels. In carrying out large-scale dispensary work at the next stage, a special role is assigned to a specialized student polyclinic, designed to ensure the effectiveness of preventive and recreational activities at the level of the educational institution.

**Keywords:** morbidity, students, diseases of the eye and its adnexa

*\*Corresponding author*

## INTRODUCTION

Over the last decade, the health status of young people has been deteriorating every year, moving from the field of the medical problem to the social one. The transformations taking place in the country reduced the possibility of implementing guarantees for free medical care and its preventive orientation, which led to social disadaptation of youth, the growth of chronic morbidity and disability of students in higher education institutions [1].

The most common pathology of the musculoskeletal system and diseases of the organ of vision. At present, almost 44% of students have visual disabilities and this figure is steadily growing from year to year, increasing by 3% - 7% annually. The increase in the incidence of students reduces the effectiveness of the educational process, and further restricts their professional activity [1,3].

The main cause of vision deterioration is myopia, the prevalence of which among Russian students is 44.5% and this indicator is constantly growing due to urbanization. As you move from course to course, the relative number of young people with higher degrees of myopia increases by 5% to 8%. Progression of myopia, leads to a decrease in visual acuity, is characterized by a high prevalence of complications and a frequent cause of primary vision impairment (17%) in the overall nosological structure. At the same time, it is now proved that 40-50% of blindness can be prevented with timely detection and qualified treatment [3].

The main causes of nearsightedness in students are associated with significant training loads, poor balance of the working and leisure conditions of young people, the widespread dissemination of electronic learning tools, as well as psychological factors. The complex of physical factors affecting the organ of vision is broadened: the need to perform accurate visual work on a luminous screen in the presence of brightness differences, flickering and blurring of the image. In the process of work, there are frequent re-adaptation of the eye to different brightness and distances, non-optimal light levels. The prolonged impact of inadequate visual loads, as well as the lack of measures to prevent visual impairment, can contribute to the prevalence of ametropia in students [5].

Ophthalmic centers offer a sufficient choice of modern methods for correcting myopia and treating its complications. However, their services are not always available to the majority of the population, and primarily to socially vulnerable groups, which include students. Carrying out measures for the prevention of myopia in students will create savings in budget funds in the field of health care. Therefore, the development of state measures to preserve and strengthen the health of young people is considered to be a priority in the reforms of domestic health care.

The foregoing, convinces us of the need for a comprehensive study of the prevalence of myopia among students and the factors that determine them, to develop ways to improve medical and preventive care.

## MATERIALS AND METHODS

The method of investigation included several stages. The general population was analyzed (official statistical data of the ophthalmologic service of the Department of Health of the Voronezh Region (statistical forms No. 12, 14, 14DS, 17, 30, 39, 47)), and selective studies (based on the copying of data from outpatient cards and case histories ). A total of 1500 study cards were filled out, the total number of visits was 3200.

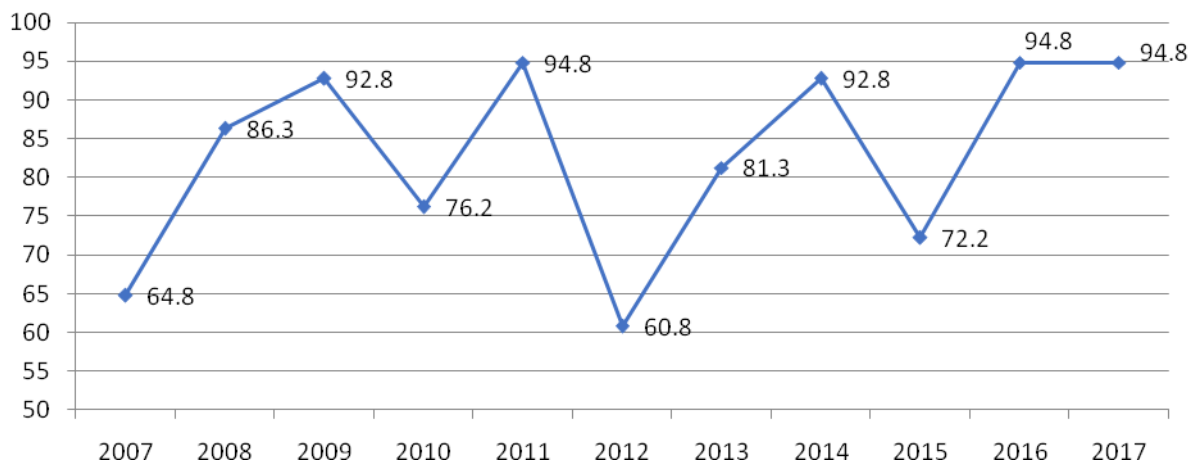
Forecasting of possible changes in incidence rates was carried out using methods of linear extrapolation of existing data trends. The coefficients for the equations of the linear dependence  $y(t) = a_0 + a_1t$  were selected by processing the data for previous years using the least-squares technique.

At the second stage of the research, a sociological survey of 1950 students was conducted using the questionnaire method. To this end, we developed a special questionnaire consisting of 46 questions grouped into 5 blocks. Questions of the questionnaire can be divided into three types: "closed", in which possible answers were indicated and it was necessary to choose one of them; "Open", which offered independent answers and dichotomous, requiring an answer "yes" or "no" and consists of relatively independent parts. All the collected material was encrypted and processed using standard statistical processing programs at the Computer Center of VSMU.

For statistical data processing, descriptive statistics methods, dynamic series analysis, Fisher exact method, chi-square, correlation-regression analysis, multivariate statistical analysis methods (component, cluster analysis, multiple regression) were used. The statistical processing is performed on the basis of the statistical analysis software package and the Chart Wizard in Microsoft Excel 2010, as well as the STATISTICA 6.0 application package.

**RESULTS AND THEIR DISCUSSION**

According to the health status of 48241 students from 14 universities in the Voronezh region, the incidence rate of the eye and its adnexa in 2017 per 1,000 students was 94.8. The tendency towards the growth of both general and primary morbidity in eye diseases is characteristic. The increase in the total incidence was 10.5%, and the primary incidence was 8.7%, respectively, in fig. 1.



**Fig 1: The dynamics of the overall incidence of diseases of the eye and adnexa among students of the Voronezh region (per 1000 students)**

The dynamics of cases of the prevalence of eye diseases in young people for the period under study, according to the indicators of visibility, was characterized by a decrease in incidence rates only in 2012 and 2015, which indicates an increase in the prevalence of the incidence in general. Using the method of approximating a dynamic series of indicators of the prevalence of eye diseases in people of young able-bodied age over a 4-year period, a prognosis of morbidity for the coming years is obtained, indicating a statistically significant increase in the incidence of eye diseases in young people (at  $R^2 = 0.674$ ). This fact requires more careful evaluation and appropriate correction, not only from the ophthalmological service, but also from the health authorities.

Separately, we analyzed the incidence of eye diseases in medical students. Among the examined students, emmetropia was detected in 348 (54.5%) people. Visual impairment was detected in 287 (45.5%) of students: hypermetropia - in 46 (7.6%) and myopia - in 222 (37.7%). The frequency of myopia spread among the students surveyed is 4.9 times higher than that of hypermetropia ( $p < 0.001$ ). At the same time, the percentage of pathology from year to year tends to increase by 3% - 7%. As you move from course to course, the relative number of students with higher degrees of myopia increases by 5% - 8%. Of the total number of students with refractive disorders, almost three-quarters were females ( $n = 198$  73.9%,  $p < 0.001$ ), both in the myopic group and in the hypermetropic group. At the same time, we did not find a statistically significant relationship between the degree of myopia and sex ( $p = 0.293$ ).

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The degree of violation of refraction is statistically significantly dominated by a mild degree, both in myopia ( $p < 0.001$ ) and in hypermetropia ( $p < 0.001$ ). Myopia mainly occurred during middle and high school, which is apparently associated with an increase in the load on the eyes of children during this period ( $p < 0.001$ ). 32.5% of students had a higher degree of visual impairment and were forced to engage in physical culture in special medical groups.

Only 177 (68.8%) students use vision correction tools: 81 students use glasses and 96 contact lenses. A third of freshmen (31.2%) do not use vision correction tools in general, although they need it. 63.6% of the students surveyed complain about eye discomfort in the form of fatigue 17%, redness of the eyes - 13%, which indicates an insufficient correction of refractive error of the eye, which leads to overstrain of the visual apparatus and manifests itself as a feeling of fatigue and redness of the eyes.

When asked about the reason for the lack of methods of vision correction, 33 (37.7%) of the student answered that they were not examined. Examined several years ago, points were written out, but there was no desire to wear 9 students (2.3%), 36 people (44.3%) refrained from answering.

In studying the hereditary history, it became known that out of 287 students with visual impairment, only in 88 (32.4%) at least one of the parents has a refractive error: 78 (88.6%) - myopia and 10 (11.4%) - hypermetropia.

The growth of diseases of the eye and its adnexa is associated with a high intensification of the educational process, the introduction of computerization in classrooms, an increase in visual loads, and perhaps with an increase in the contingent of students enrolling in a university with a pathology of the organ of vision, an increase in diseases of this class among students.

Dispersion analysis of the investigated risk factors showed that the age or duration of study in the university has the strongest influence on the development of myopia, in young men the force of its influence is 8.26% ( $P = 0.001$ ), the girls 10.41% ( $P = 0.001$ ). In second place - heredity or the presence of myopia in parents - 5.07% ( $P = 0.001$ ). The third place - the negative influence of the computer and chronic diseases - 1.59% ( $P = 0.01$ ).

Among the factors of the computer's negative impact on health, students first and foremost are flickering the monitor and X-ray radiation 8.36% ( $P = 0.001$ ), and ergonomics of the workplace and hypodynamia are not given much importance. It should be noted that only about half of the respondents know the basic preventive measures when working with a computer, and these measures are observed by less than 40% of students.

Calculation and evaluation of the force of influence, the construction of the hierarchy of the action of factors of different groups makes it possible to create a mathematical model of individual forecasting the origin and development of the pathology of vision in students. It is important to determine the list of risk

factors that can influence the level of the quantitatively predicted phenomenon and calculate the coefficients of the studied disease in intensive terms in general for the contingent and for each student individually. The method of individual prediction provides an opportunity to identify the risk groups for myopia development. It should be noted that according to the total amount of prognostic factors, based on which the degree of risk of myopia is determined in young people, a forecast group is established, a significant number of very significant adverse factors may have a significant effect on any gradation of one or a small number of factors included in the prognostic matrix. It follows that the main individual recommendations for the prevention of myopia in medical school students should be aimed at eliminating or weakening the effect of the most significant adverse factors.

It is important to note that a necessary condition for preserving the overall and visual performance of students, preventing rapid eye fatigue and visual impairment is to provide natural and artificial lighting that meets hygiene standards. The hygienic value of illumination lies in the fact that it determines the tone of the central nervous system and affects the condition of the visual analyzer.

To characterize the light conditions of the rooms under study, we calculated the indices of both natural and artificial illumination. The results are shown in tab. 1.

**Table 1: Analysis of the illumination of the educational facilities of the university (M ± m)**

	KEO, %	Norm, %	AORP, lx	Norm, lx	UMPP, W / m <sup>2</sup>	Norm W / m <sup>2</sup>
Study room. general hygiene (1st floor)	1,2±0,2	1,25	200±50	400	16	20-24
Study room cytology, histology and embryology (2nd floor)	1,7±0,1		220±30		18	
Lecture room	1,3±0,3		250±20		23	
When using multimedia projectors	0,7±0,1		120±10 (80-160)		13	

Note: KEO - natural light factor; AORP - absolute illumination of the working surface; UMPP is the specific power of the luminous flux.

According to the data presented in tab. 1, it can be concluded that the conditions of the light regime of the educational premises of the university in many respects do not correspond to hygienic standards. The discrepancy between the parameters of the light regime in normative documents is to some extent due to the wrong orientation of the building of the main building of the academy relative to the sides of the world: part of the windows of the auditoriums are facing to the north-east. In addition, the low level of natural illumination is due to the abundance of old tree plantations planted close to the building. The main reason for the low level of artificial lighting is the insufficient number of operating fluorescent lamps and their power. Attention is drawn to insufficient illumination when using multimedia projectors when reading lectures, the use of which requires obscuring the audience, but does not eliminate the need for students to note the illustrative teaching materials.

When studying preventive measures used by students to improve vision, we found the following: 58 (20.2%) of students take biologically active supplements or vitamins to improve vision 9.5% regularly do gymnastics for the eyes.

The analysis of the prevalence of eye diseases and its adnexa apparatus testifies to the need to optimize the activity for early diagnostics, treatment and, especially, prevention of eye diseases in student's years. At the same time, it should be emphasized that the system of primary ophthalmic care for students, where the bulk of medical care is provided to ophthalmic patients, is inherent in all the shortcomings inherent in the current state of health. To a large extent, they are caused by organizational costs and irrational distribution and use of human resources. Negative point is the reduction in the number of staff of the ophthalmological service in the region, as a result - a decrease in the number of visits of ophthalmologists to the outpatient

clinic. The reasons for the decrease in availability of outpatient eye care are widespread discrepancy equipment ophthalmic surgeries approve the procedure for the provision of eye care, staff shortages, lack of an algorithm for early detection of eye diseases at the place of study of young people. Students of most universities believe that qualified eye care is not always present and is not always available.

Hence, it is important to improve the ophthalmologic service, especially the primary link, which is able to solve the issues of prevention, morbidity, and disability with a focus on donosological diagnostics and medical and social prevention among students. A significant role in the implementation of this work belongs to educational organizations of different levels. In carrying out large-scale dispensary work at the next stage, a special role is assigned to a specialized student polyclinic, designed to ensure the effectiveness of preventive and recreational activities at the level of the educational institution.

### CONCLUSION

Thus, the high risk of the onset and progression of myopia, characteristic of student youth, requires the organization of a permanent system of medical and social monitoring of eye protection. Our studies have made it possible to clarify and supplement the current data on the prevalence of eye diseases and its appendages, including myopia among students in the Voronezh region, which can be used as a basis for planning activities to improve specialized ophthalmic care for the population. The surveillance system should include monitoring the impact of various risk factors and timely elimination of adverse events. To this end, it is necessary to divide young people into groups of ophthalmologic health to provide them with adequate medico-prophylactic, therapeutic and health care, as well as the introduction of medical and social certification of the families in which they are brought up to provide feasible medical and social support. In educational institutions, regardless of their type, it is necessary to repeatedly increase the amount of work on hygiene education and education. Hygienic education of students should be organized as a multi-level system. The first level includes questions that are relevant for all students with risk factors; in the second - providing for a differentiated, purposeful work among university students of different profiles; in the third - individual work on the correction of behavioral stereotypes and lifestyle of young people.

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