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SECTION 7. Medical sciences

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INFLUENCE OF THE PRINTED LOAD ON A CONDITION OF EXTRAOCULAR MUSCLES OF VISUAL SYSTEM

Summary. The study deals with evaluation of the time course of the state of extraocular muscles of the visual system in 199 pupils of three age groups in printed load, estimated from the ratio of the interference pattern parameters and the symmetry factor introduced by the author. Adaptation of the visual system to its own state (structural and functional organization) was found to occur in many cases due to asymmetric functioning of extraocular muscles. In long work at a close distance this initial (adaptive-compensatory) asymmetry, providing binocular vision, converges with asymmetry caused by visual stress and fatigue. Thus, the study identified three main ways of adapting to work at close distance.

Key words: interference patterns, coefficient of symmetry, binocular vision, printed load, extraocular muscles.

Visual work at close distance requires certain changes in the state of the tone of the extraocular muscles of the eyes, forming the visual system, in order to ensure the convergence of visual axes at the fixation object (convergence). In this case, extraocular muscles of the eyes can change their tone symmetrically, or asymmetrically [5,6,11].

The study of the effect of the text load on the functional state of the visual system in students of different age involved 119 children (60 boys and 59 girls) aged from 7 to 15 years.

The visual load was induced by dosed work in the form of reading and recognizing letters. According to age, each subject was given a fixed visual load in the form of Anfimov's tables. The font size for which was 10 (soft reading, SR) and 7 (hard reading, HR) typographic items. The study was conducted in two stages within two days. Each of the subjects performed both tasks, which involved searching and highlighting certain letter in the text of the table [3,7,10].

To carry out quantitative evaluation of the time course of the state of extraocular muscles, estimated by the ratio of interference patterns parameters, we introduced a symmetry coefficient [4]. This indicator was calculated before and after intense visual load with different types of printed load.

In soft reading, in a sufficient percentage of cases (53%), symmetry was enhanced (in comparison with the initial state). However, negative values of K in module were at least half less than positive ones (29%); i.e. initial and final parameters differed among themselves to a much lesser extent.

In hard reading in the group of boys, a larger number of individuals had a positive K (73%), which indicated that this type of visual load did little to support the symmetrical functioning of the muscular system. The modulus of negative K values was lower in almost all groups than in soft reading.

As for the age aspect, the coefficient K had different time course in groups of boys and girls. In the group of boys in hard reading positive K decreased with age with simultaneous decrease in the percentage of people who have it (60%). Negative K, having values close in magnitude with positive in the younger and older groups, with age was observed in a larger number of individuals. This indicates that with age, the boys' muscular system adapts to the text load and retains a certain stereotype of symmetric functioning even under adverse conditions. In the group of girls with an equal number of persons with positive and negative K, its values varied in different ways. The values of positive K increased with age, and the magnitude of negative K decreased with age.

The results of the study make it possible to consider different reactions in boys and girls to hard reading. In the group of boys with age, the tendency to more symmetrical functioning of the visual system increased, in the group of girls – vice versa. As our studies have shown, in many cases adaptation of the visual system to its own state (structural and functional organization) occurs due to asymmetric functioning of extraocular muscles.

In this case, the end result can be of three kinds. First, there may be an increase in the initial asymmetry or its appearance (in the case of the initial symmetrical functioning of the extraocular muscles of the right and left eyes). In this case, the values of the coefficient K will be positive. Secondly, if the symmetrical functioning or initial asymmetry remains, the coefficient K will be zero. Thirdly, if work at close range has resulted in a more symmetrical functioning of the visual system than before work, then the values of the coefficient K will be negative. Thus, we have identified three main ways of adapting to work at close distance.

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