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Visual acuity in teenagers depending on the spectral composition of artificial lighting

The work is dedicated to research of the distinctive sight abilities of people of a young age, depending on the illumination source spectral composition. The researches were performed with two groups of young people: school children aged between 12 and 14 and students aged between 20 and 24. Visual acuity of the school children amounted to 1.0 and no more; visual acuity in the students' group was not less than 2.0. The distinctive ability was assessed using error number in distinction of Landolt's rings on the Golovin-Sivtsev's tables. Efficiency of a standard incandescent lamp of $T_c=2500$ K, of a warm white light-emitting diode lamp of $T_c=2500$ K and of a cold white light-emitting diode lamp of $T_c=6500$ K were compared at the same illuminance of 450 ± 3 lx. It was found that for school children, when using a cold white light-emitting diode lamp, error number during distinction of Landolt's rings (table lines 7–9) was 1.5–2 times higher than when using warm white light sources. And the warm white light emitting diode lamp showed slightly better test values than the incandescent lamp. Error number in the student group was minimal. It was random in character and did not depend on the spectrum of the lamp used. It is supposed that the obtained results were caused by the fact that warm white light emitting diode lamps have the narrowest spectral band in the yellow-orange interval. Thus, they form a clearer image on the retina with minimum chromatic aberrations of an eye. The obtained data suggest that it may be better to use warm white illumination sources in school classrooms.

Recent Publications

1. Zak P P and Ostrovsky M A (2012) A potential danger of light emitting diode illumination for eyes of children and teenagers. *Svetotekhnika* 3:4–6.
2. Zakgeim A L (2012) Light-emitting diode illumination system: energy efficiency, visual perception, safety for health (a review) *Svetotekhnika* 3:12–21.
3. Behar-Cohen F et al. (2011) Light-emitting diodes (LED) for domestic lighting: any risks for the eye? *Progress in Retinal and Eye Research* 30:239–257.
4. Qian Y F et al. (2013) Transfer from blue light or green light to white light partially reverses changes in ocular refraction and anatomy of developing guinea pigs. *Journal of Vision* 13:16.

Biography

Anna S Andryukhina completed her Graduation from Russian National Research University of N.I. Pirogov in 2016. She is an Ophthalmologist, Doctor-intern of MONIKI of M F Vladimirovsky.

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