POOR LIGHTING AND VISUAL IMPAIRMENTS AMONG ADMINISTRATION WORKERS

Marina Samuneva-Zhelyabova[1], Ivaylo Zhelyabov[2]

[1]Department of Occupational Medicine, Faculty of Public Health "Prof. Dr. Tz. Vodenicharov", Medical University—Sofia
[2]Teva Pharmaceuticals

ABSTRACT

Introduction: *Typical for modern society is the use of computers for both professional and non-professional activities. This is the reason for a significant impact not only on visual comfort but also on occupational productivity. Between 64% and 90% of computer users experience symptoms such as eyestrain, headaches, ocular discomfort, dry eye, diplopia, and blurred vision after prolonged computer use.*

Administration workers are exposed to daily forced work pose and prolonged work on the computer and in most workplaces there is poor lighting. This fact intensifies all the negative symptoms related to the problems with vision.

Aim: *The aim of our study is to find the relationship between poor lighting and visual impairments among administration workers.*

Materials and Methods: *A sociological method—a survey, was used . The results of the study were presented using descriptive statistics. The study was conducted among 386 workers in administration. The male participants were 15.8%, and 84.2% were female.*

Results: *Participants who reported burning in the eyes were 69%, 65.3% had dry eyes, and 42.5% of the participants had flashes or black spots in front of the eyes. The part of participants who worked in poor lighting was 54%. The results from health analyses of the data from mandatory routine preventive exams for 2020 showed that the share of eye diseases was 92.14% of all examined workers. The part of newly diagnosed eye diseases was 45.7%. The largest share of workers had myopia, followed by workers with presbyopia, hypermetropia, astigmatism and one worker with optic neuritis.*

Conclusion: *The results from the questionnaire show that there are many risk factors and symptoms which predispose to the appearance of eye diseases among workers. The health analyses confirm this statement. It is necessary to take emergency measures to limit these factors.*

Keywords: *administration workers, eye diseases, poor lighting*

INTRODUCTION

Characteristic of modern society is the use of computers for both professional and non-professional activities. This fact has a significant impact not only on visual comfort but also on professional productivity. Between 64% and 90% of computer users have symptoms that may include eye fatigue, headache, eye discomfort, dry eyes, diplopia, and blurred vision after prolonged computer use (1).

Characteristic of the daily work of the employees in the administration is that they work in a forced working position, their work is on a computer, there is a lack of good lighting in most workplaces, psychophysical overexertion is common. These facts exacerbate all the negative symptoms associated with vision problems among these workers.

Asthenopia is a condition characterized by non-specific ocular symptoms, such as ocular fatigue, blurred vision, itching in and around the eye, difficult reading, frontal and occipital headache, diplopia, pain inside or behind the eye, burning or tears in the eye, dryness, irritability, gritty or pulling sensation in the eyes (2,). Symptoms often appear after reading, working with

a computer or driving. It is defined as eyestrain (4,5,6,7,8). Asthenopia occurs at a significant rate and represents a significant cause of health problems and lack of efficiency associated with work in adults exposed to daily work with computers (9).

The American Optometric Association defines vision-related symptoms in computer users as a combination of computer-related vision problems. It has been found that up to 90% of computer workers may have asthenopia (10). The prevalence of visual symptoms increases significantly in individuals who spend more than 4 hours a day working on a computer (11).

According to an Australian study of more than 1,000 computer workers, 63.4% reported symptoms of asthenopia. The share of participants with visual impairments decreases to 25.2% when an optimized, ergonomic desk and frequent work breaks are provided. It is not clear whether asthenopia during computer use is age-related, but it has been found to be higher in women (12).

It was found that in the presence of uncorrected astigmatism, the symptoms of asthenopia increase. The uncorrected astigmatism significantly reduces visual acuity and thus eyestrain and headaches increase (3).

Presbyopia also can be a problem for workers who spend long periods of time on a computer (13). They most often occur when viewing desktop monitors placed at fixed viewing distances and viewing angles (14,15). A combination of factors that cause the symptoms of asthenopia, such as uncorrected visual disturbances and poor lighting, can aggravate the symptoms of asthenopia (16).

AIM

The aim of our study is to find the relationship between poor lighting and visual impairments among administration workers and to make measures to limit the harmful factors due to which are intensifying the visual disturbances among these workers.

MATERIALS AND METHODS

A sociological method—a survey (questionnaire), was used. The results of the research were presented with descriptive statistics and Chi-square test. Another method which we used was a documentary method—data from health analyses for a 4-year period from mandatory routine preventive exams.

For the period September–November 2020, 386 employees working in administration were surveyed. The average age of the participants was 46.65±9.45 years. The youngest respondent was 23 years old, the oldest was 63 years old. Both were female.The oldest male participant was 58 years old. The distribution by sex showed that 82% of participants were women and 18% were men. The respondents with total lenght of service over 10 years were 82% and those with special length of service were 58.9%.

RESULTS

The first results, which we will present you, are based on subjective perception—from the questionnaire. The first question which we asked was „Do you work in poor ligthing?“. The results show that 57.6% gave a positive answer and 43.4% gave a negatiive answer. The distribution by sex shows that positive answer was given by 14% of the surveyed men and 86% of the surveyed women, and a negative one—by 2.1% of the men and 97.9% of the women (Fig. 1).

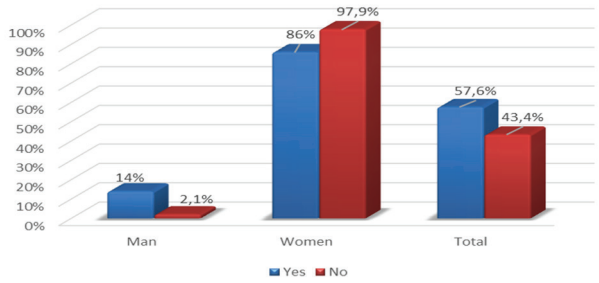

Fig. 1. „Do you work in poor ligthing?“—distribution by sex

To the question of the presence of flashes and black spots in front of the eyes positive answer was given by 53.1% of the participants and negative answer—by 46.9%. The distribution by sex shows that positive answer was given by 1.9% of the men and 98.1% of women, and negative answer of the question was given by 15% of the men and 85% of the women (Fig. 2).

The next question we asked the participants was “Do you have burning in the eyes?”. The results show

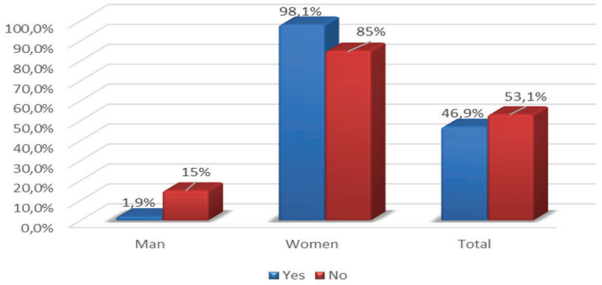

Fig. 2. „Do you see flashes or black spots in front of your eyes?“—distribution by sex

that 69% gave a positive answer and 39% answered in the negative. The men who gave a positive answer were 1.3% and the women were 98.7%. Negative answer to the question was given by 25.7% of the men and 74.3% of the women (Fig. 3).

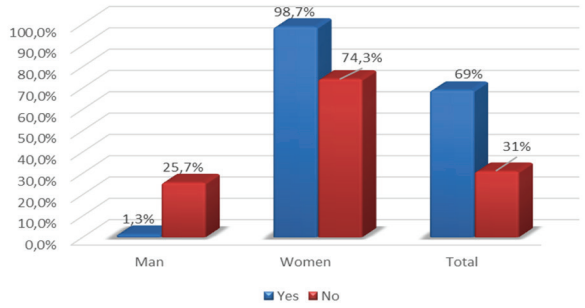

Fig. 3. "Do you have burning in the eyes?"—distribution by sex

The last question was "Do you have frequent headaches?" Positive answer was given by 71.7% of the participants and negative—by 28.3%. The distribution by sex shows that the men who gave a positive answer were 1.3% and the women were 98.7%. The distribution of negative answers was 28.1% of the men and 71.9% of the women (Fig. 4).

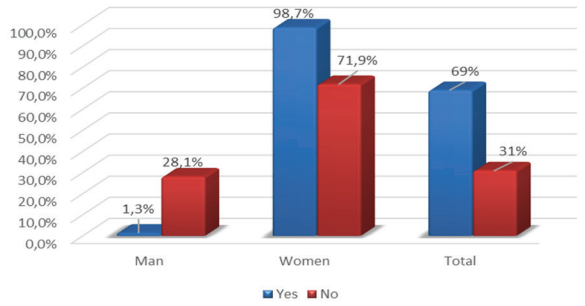

Fig. 4. "Do you have frequent headaches?"—distribution by sex

The results of objective data are presented by health analyses (data from mandatory routine preventive exams) for a 4-year period—2017–2020. These results were received from the mandatory periodic preventive medical examinations of the employees. The results show that the number of eye injuries has increased every year. In 2017 year they were 258 and four years later—in 2020, they already were 317. The examined workers for 2017 were 280, for 2018 year—283, for 2019 year—282, and for 2020, they were 258. It makes a strong impression that for each year the number of examined workers was less than the number of discovered eye diseases. This indicates that there were workers with more than one ophthalmological disease (Table 1).

If we focus on the cases of hyperopia and astigmatism, which are important for the presence of asthenopia, we will see that the cases of hyperopia are variable, but in 2020 year they were the highest—54, and 2017, they were 46. It is noteworthy that the cases of astigmatism have increased every year and if in 2017 they were 13, in 2020 they already were 82 (Table1).

DISCUSSION

The symptoms of asthenopia are common among administration workers, because their work is associated with daily computer work. According to the Portuguese Ergophthalmology Survey the longer we use the electronic devices (more than two hours) the more severe the complaints and rates of ocular surface changes (17,8). Chronic dry eye is likewise supported by clinical findings, and it remains the most common complaint and reason for patients to seek an eye clinic (19,20).

The results of our study show that dry eyes are common among women. A number of studies confirm our claim (21). Symptoms of eye fatigue or dry eye sensation can be mixed and confusing. In addition, they are common among women (22).

The cases of workers with astigmatism increase every past year. Many researchers state that astigmatism must be correctected, because uncorrected astigmatism also results in asthenopic symptoms (3). However, the effect of asthenopic symptoms increases in hypermetropic astigmatism because of increased accommodative effort in order to overcome hypermetropia.

Table 1. Diagnoses of eye injures for a 4-year period among workers in administration

Diagnoses	2017	2018	2019	2020
Hyperopia	46	47	48	54
Myopia	117	102	107	105
Astigmatism	13	38	59	82
Presbyopia	81	85	84	76
Total	258	272	298	317

Based on our study, headache is common among workers in administration. Other studies confirm our results. Headache, eye ache, and blurry vision are the most frequent asthenopic symptoms and it has also been found that the refractive error is the most frequent finding of asthenopia followed by convergence insufficiency and latent squint in presbyopic (23) patients. Another study has also found that headache was most frequent symptoms of asthenopia reported by (24) refractive subjects, especially those having astigmatism.

CONCLUSION

The results of the survey show that there are many risk factors and symptoms that predispose to the occurrence of eye diseases and asthenopia among administration workers. Health tests confirm this statement. Urgent measures need to be taken to limit them, namely: correction of astigmatism is needed and optimal ophthalmic hygiene in the workplace. It is necessary to annually conduct mandatory periodic medical examinations by an ophtalmologist and computer glasses must be provided by the employer, if necessary. The introduction of an appropriate physiological regimen of work and rest according to the nature of work is very important. In this case the breaks have to be frequent and short.

Address for correspondence:
Marina Samuneva-Zhelyabova
Department of Occupational Medicine
Faculty of Public Health
„Prof. Dr. Tz. Vodenicharov“
Medical University—Sofia
8 Byalo More St
Sofia
e-mail: msamuneva@gmail.com

REFERENCES

1. Rosenfield M., Computer vision syndrome: a review of ocular causes and potential treatments, 2011, Ophtalmic and Psychological Optics, Vol. 31, Issue 5, p. 502-515, ISSN 0275 – 5408, https://doi.org/10.1111/j.1475-1313.2011.00834.x;
2. García-Muñoz Á, Carbonell-Bonete S, Cacho-Martínez P., Symptomatology associated with accommodative and binocular vision anomalies. J Optom. 2014;7(4):178-92;
3. Mohamud M., Frequency of presenting clinical features of asthenopia (ocular fatigue) in refractive patients, 2017, Ophthalmology Pakistan, Vol 7, No 03, ISSN 2518-2110 (Print), ISSN 2518-234x (Online);
4. Kowalska, M., Zejda, J. E., Bugajska, J., et al. "Eye symptoms in office employees working at computer stations." Medycyna Pracy 62(2011): 1–8;
5. Rosenfield, M. "Computer vision syndrome: a review of ocular causes and potential treatments." Ophthalmic and Physiological Optics 31(2011): 502-515;
6. Kanitkar, K., Carlson, A. N., and Richard, Y. "Ocular problems associated with computer use."2005. Accessed January 22, 2015. http://www.reviewofophthalmology.com/content/d/features/i/1317/c/25354/;
7. World Health Organization. "Update on visual display terminals and workers' health." WHO offset publication 99(1987);
8. Vilela M. A. P., Pellanda L. C., Cesa C. C., Castagno V. D., Asthenopia Prevalence and Risk Factors Associated with Professional Computer UseA Systematic Review, 2015, International Journal of Advance in Medical Science, Vol. 3, No. 2—November 2015, 2327-7238/15/02 051-10, doi:10.12783/ams.2015.0302.03;
9. Ostrovsky A, Ribak J, Pereg A, Gaton D. Effects of jobrelated stress and burnout on asthenopia among hightech workers. Ergonomics. 2012;55(8):854-62;
10. Thomson DW. Eye problems and visual display terminals-the facts and the fallacies. Ophthal Physiol Opt 1998; 18:111–119;
11. Rossignol AM, Morse EP, Summers VM & Pagnotto LD.Visual display terminal use and reported health symptomsamong Massachusetts clerical workers. J Occup Med 1987;29: 112–118;
12. Dain SJ, McCarthy AK & Chan-Ling T. Symptoms in VDU operators. Am J Optom Physiol Opt 1988; 65: 162–167.
13. Riva MA, Arpa C, Gioco M. Dante and asthenopia: a modern visual problem described during the Middle Ages. Eye. 2014;28(4):498;
14. Wajuihian SO. Frequency of asthenopia and its association with refractive errors. African Vision and Eye Health. 2015 Aug 21;74(1):7-pages;
15. American Optometric Association. Healthy vision on the job is everyone's business. Available at: URL:www.aoa.org/x14313.xml;
16. Bali J, Neeraj N, Bali RT. Computer vision syndrome: A review. J Clin Ophthalmol Res. 2014;2(1):61;
17. Vaz F. T., Henriques S. P., Silva D. S., et al, Digital Asthenopia: Portuguese Group of Ergophthalmology Survey, 2019, Acta Med Port, Apr;32(4):260-265, ISSN: 1646-0758, https://doi.org/10.20344/amp.10942;
18. Parihar J. K., Vaibhav Kumar Jain, Piyush Chaturvedi, Jaya Kaushik, Gunjan Jain, Ashwini K.S. Parihar, Computer and visual display terminals (VDT) vision syndrome (CVDTS), Medical Journal Armed Forces India, Volume 72, Issue 3, 2016, Pagrs 270-276, ISSN 0377-1237, https://doi.org/10.1016/j.mjafi.2016.03.016;
19. O'Brien P. D., Collum L. M. T., Dry eye: diagnosis and current treatment strategies, Curr. Allergy Asthma Rep., 4 (2004), pp. 314-319;
20. Schaumberg D. A., Sullivan D.A., Buring J. E., et al. Prevalence of dry eye disease among US men: estimates from the Physicians' Health Studies Arch. Ophthalmol., 127 (2009), pp. 763-768;
21. Sharma A., Hindman H., Aging: A Predisposition to Dry Eyes, 2014, Journal of Ophtalmology, Article ID 781683, https://doi.org/10.1155/2014/781683;
22. van Tilborg, Mirjam M.; Murphy, Paul J.; Evans, Katharine S., Impact of Dry Eye Symptoms and Daily Activities in a Modern Office, Optometry and Vision Science: June 2017 - Volume 94 - Issue 6 - p 688-693 doi: 10.1097/OPX.0000000000001086;
23. Ali M, Hussain A, Malik Z., Presentation and objective findings in asthenopic patients at a tertiary eye care hospital. Al-Shifa J Ophthalmol. 2006;2(2):48-53;
24. Wajuihian SO, Frequency of asthenopia and its association with refractive errors, African Vision and Eye Health. 2015 Aug 21;74(1):7.