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COMPUTER EYE SYNDROME IN CHILDREN AGED 3 TO 6 YEARS

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SUMMARY

Purpose: To detect visual disturbances, major symptoms and relationship between them in children between the ages of 3 and 6 years, who spend some time in front of a computer.

Material/Methods: In the present study 2823 children attending 23 kindergartens in the city of Pleven, were given inquiry cards. Those with completed questionnaires were examined for visual acuity and convergence. In cases with low vision the children were invited for a detailed eye examination in the Eye Clinic at the University Hospital "Dr G. Stranski" - Pleven.

Results: A total of 2332 children responded and were examined (1174 girls and 1158 boys). The age of children is from 3 to 6 years. We found 303 children with subjective complaints in a close work, 163 with low vision and 18 with impaired convergence. Regarding the duration of stay in front of a computer – 159 children stay over 3 hours a day in front of video display, 1228 children spend about 1 hour a day in front of a computer and 945 children do not play on a computer.

Conclusion: Nowadays more and more children use computers for recreational purposes at home. From our study it became clear that preschool children overuse their stay in front of computer.

Keywords: computer eye syndrome, preschoolers, computer,

INTRODUCTION

Video displays (computers, laptops, tablets, mobile phones) occupy a large part of everyday life of modern people. With prolonged staring at them, either for work or for entertainment purposes a number of complaints may occur. They include eye strain, headache, irritation, redness, dry eyes, blurred vision, double vision, pain in the neck and shoulders. This symptom complex is seen as an independent nosological unit – computer eye syndrome. The reason for it can be ocular (eye surface abnormalities or accommodative spasm) and/or ergonomic [1]. When working with video display eyes are under an excessive burden due to frequent saccades (rapid eye movements), continuous focusing using accommodation, directing the eyes inward for fixation of adjacent object (convergence). Usually there are no complaints if the stress does not exceed the compensatory capabilities of the eye. Problems appear when one of the mechanisms of the eye for near vision is impaired. Each of these mechanisms is the result of overloading of the ciliary muscles and extraocular muscles. Uncorrected refractive errors such as hypermetropia and astigmatism can cause discomfort during long staring at a video display. In terms of ergonomics, computer eye syndrome can develop in poor lighting, glare on the computer screen, improper viewing distances, poor posture area [2].

AIM

The aim of our study was to detect visual disturbances, major symptoms and relationship between them in children aged 3 and 6 years, who spend some time in front of a computer.

MATERIAL AND METHODS

In the present study, 2823 children attending 23 kindergartens in the city of Pleven were given questionnaires which were completed by parents. Parents of 198 children refused to complete the questionnaires. Some of the questions were directed towards the effect and duration of the use of visual display units (in particular computers), namely:

1. Does the child report for any of the following symptoms when handling at a close distance?:
   - the letters are blurry or play in front the eyes: yes / no
   - feeling of pressure or heaviness in the eyes: yes / no
   - mild pain in the forehead or temples: yes / no
   - drowsiness: yes / no
   - tearing and photophobia: yes / no
2. Does the child watch the TV closer? : yes /no
3. Does the child play computer games? : yes (more than 3 hours per day) / yes (about 1 hour per day) / no

We explored visual acuity (on one eye and both eyes) using a cardboard visual table with children's images from five meters away, and the convergence of children with completed questionnaires from their parents. In 293 cases the children were not examined due to absence for various reasons from the kindergarten. In the presence of low vision children were invited for a comprehensive eye examination in the Eye Clinic of University Hospital "Dr. George Stranski" – Pleven. The attending children were again examined for visual acuity and after applying eye drops (Cyclogyl 3x1 in 15 min.) for cycloplegia their refraction was examined objectively with auto refractometer.

RESULTS

A total of 2332 children were interviewed and examined – 1174 girls and 1158 boys between the ages of 3 and 6 years.

The parents of the corresponding number of children gave a positive answer to those questions:

1. Does the child report any of the following symptoms when handling at a close distance?:

- the letters are blurry or play in front the eyes: 10 children

- feeling of pressure or heaviness in the eyes: 42 children

- mild pain in the forehead or temples: 142 children

- sleepiness: 34 children

- tearing and photophobia: 75 children

2. Does the child watch the TV closer? : 745 children

In relation to the duration of occupation with computer we separate the answers according to age as follows: how many of 3, 4, 5 and 6 years old children play computer over 3 hours, how about one hour and how do not stand in front of computer. The results are presented in Table 1.

Table 1.

Question	Answers		
Does your child play on a computer?	Yes (more than 3 hours per day)	Yes (about 1 hour per day)	No
Years	Number of children		
3	13	210	308
4	23	260	258
5	62	365	223
6	61	393	156

For normal visual acuity we accepted visual acuity ≥0.8 with one eye. Of the examined children with such visual acuity were 2096 children. The children playing on a computer over 3 hours with reduced vision in one eye were 6 and in both eyes – 4 children. From the ones playing about 1 hour, 27 were with reduced visual acuity in one eye, and 42 – in both eyes. Of the children who do not stay in front of a computer, 34 were with reduced vision in one and 50 – with low visual acuity in both eyes. 73 children did not cooperate in the examination of visual acuity.

Unfortunately, because of the low number of respondents to the invitation for detailed eye examination in Eye Clinic – Pleven for a lot of children playing over 3 hours and about 1 hour on a computer (whose preliminary examination in kindergartens gave low visual acuity in one or both eyes) we could not determine the type of refraction anomaly and apply an appropriate treatment. Refraction survey data cannot be objective and serve as a conclusion for the type and degree of refractive errors in children, staying long in front of a video display. The results are presented in Table 2:

Table 2.

Refraction anomaly	Number of children playing on computer		
	Over 3 h	About 1 h	No
Hypermetropia	4	5	5
Myopia	1	0	0
Astigmatism	0	7	6
Astigmatism combined with Hypermetropia	1	4	5
Astigmatism combined with Myopia	0	3	1

The results of the examination of convergence are presented in Table 3.

Table 3.

Convergence	Number of children playing on computer		
	Over 3 h	About 1 h	No
Preserved	159	1218	937
Unsustainable	0	7	4
Weakened	0	2	4
Absent	0	1	0

DISCUSSION AND CONCLUSION

Today more and more children use computers for recreational purposes at home. In 2000, a national survey on the use of home computer in children showed the following (Lucile Packard Foundation, 2000):

• Suitable for children from 2-5 years: 27 minutes per day;

• Suitable for children from 6-11 years: 49 minutes per day;

• Suitable for children from 12-17 years: 63 minutes per day [3].

From our research it is clear that preschoolers overdo their stay on the computer. For this reason they are exposed to a high degree of risk of discomfort, fatigue, blurred vision, headaches. Some features make children more susceptible to the occurrence of computer eye syndrome, namely:

- children have low self-control - computer games lasting for hours leads to accommodative tension with or without symptoms. This tension of accommodation may occur earlier and go unnoticed;

- children have good adaptation abilities, often they cannot understand that they have a reduced vision because they think it is normal to see in such way or they fear that their parents will forbid the playing of computer games so they don't share their problems with the parents;

- ergonomics of computers is not consistent with the height of young children, leading to increased pressure;

- children rarely think to take care of their workplace and often work in poor lighting conditions because their mesopic vision is better than that of adults.

Ophthalmologists should comply with these features and properly guide parents seeking advice. In case of complaints of children, characteristic for computer eye syndrome, the ophthalmologist must take the following steps:

- examination of visual acuity;

- examination of refraction and determining the need of correction of refraction anomaly;

- recommending correction, if necessary;

- instructions for hygiene-dietary regimen the child must obey: each hour work with computer - 15 minutes rest;

- specifying with the parent of the duration of computer use by the child depending on his age;

- recommendations for ergonomics in the workplace – sufficient height of the chair, correct position of the screen, good lighting without glare [4].

Typically, these measures are sufficient to remove the problems noticed by parents associated with computer eye syndrome in children. Unfortunately we have to note that the health knowledge of the population is very low. Parents do not know that children should be examined prophylactically by an ophthalmologist. Furthermore, parents seldom notice the signs of a visual problem in children – squinting, rubbing and frequent blinking [5]. This slows the application of therapy by a specialist and can have serious health consequences for children.

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