

Original Research Article

Prevalence of asthenopia among computer operators in Central India and effectiveness of educational intervention

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ABSTRACT

Background: Objective was to study the prevalence of asthenopic symptoms among computer operators in central India and assess the change in their practices related to factors affecting asthenopia symptoms and relief measures..

Methods: Longitudinal Educational Interventional Study, done on 150 employees of computer based company offices of Bhopal city in duration of 3 months from August 2018 to October 2018 after obtaining Ethical clearance from the institutional ethics committee and they were asked to fill a pre-tested questionnaire, after obtaining their verbal consent. Other relevant information was obtained by personal interview and inspection of their working area. The data was entered in MS excel and analysis was done using Epi-info 7 software.

Results: Among the 150 participants studied, the overall prevalence of asthenopia (at least 1 symptom present) is 87.3%. The prevalence of various asthenopic symptoms varied from 85.3% (eye fatigue) to 18.7% (blurring of vision). With educational intervention, significant change was observed in symptoms and relief measures.

Conclusions: Prevalence of asthenopia was found to be quite high in computer operators, especially in those who started its use at an early age. Individual as well as work-related factors were found to be associated with asthenopia.

Keywords: Asthenopia, Computer operators, Prevalence

INTRODUCTION

Asthenopia refers to the group of visual discomfort symptoms such as impaired reading performance, light sensitivity, blurred vision, diplopia, and perceptual distortions.^{1,2} Increasing rates of such complaints have been reported in various fields of work with the change of lifestyle and the spread of personal computers.³ These asthenopic symptoms serve as a hindrance and limit personal activities and additionally result in potentially speeding up the development of age-related eye diseases.⁴ From the already done researches, it is quite evident that excessive usage of computers adversely affect visual health.⁵⁻⁹ The adverse health effects on eyes include

asthenopic symptoms such as eyestrain, tired eyes, irritation, redness, blurred vision and double vision. A range of eye and vision-related symptoms have been together known as Computer vision syndrome (CVS) and has been a recognised health problem for over 20 years.^{10,11} The synonyms of CVS are visual fatigue (VF) and digital eye strain (DES), reflecting the variety of digital devices linked to potential problems and not just computers alone. Given the massive growth in digital device usage in recent years, many millions of individuals of all ages are at risk of DES.¹² The symptoms of asthenopia are usually transient and relievable; the condition can cause significant, frequent, discomfort for computer users and may lead to substantial

economic consequences when vocational computer users are affected through increased errors and more frequent breaks.¹³ Looking to the huge population at risk of developing asthenopia associated with computer use, mobiles and other such electronic devices, it may take an epidemic form in the near future. Therefore, identifying risk factors of asthenopia is of great importance to improve visual function and decrease the risk of visual fatigue. The aim of the study was to estimate the prevalence of asthenopic symptoms among computer operators and assess the change in their practices related to factors affecting asthenopia, symptoms and relief measures.

METHODS

The study was Longitudinal Educational Interventional Study done on 150 employees of computer based company offices of Bhopal city in duration of 3 months from August 2018 to October 2018 after obtaining Ethical clearance from the institutional ethics committee. The institutions in which employees engaged in computer related work for at least 5 hrs each day were chosen. These included banks, IT firms, and computer training centres. After obtaining permission from the head of respective institutions, all workers willing to participate in the study were taken. The purpose of study was explained to them. Questionnaire was administered to them to assess the duration of computer use, their knowledge about background variables leading to asthenopia, the present prevalence of Asthenopic symptoms amongst the study participants and relief measures were taken to combat them. Test of vision was done using Snellens and jaegers charts to identify the unmet need of refraction. The participants were educated about the preventive measures to combat the symptoms by using proper IEC materials. Pamphlet explaining the purpose of study was distributed to the study participants containing the following-Rule of 20-20-20, Position your screen at an arm length, and at a level below eyes, Screen brightness at 50% to prevent glare, Blink eye frequently, Humidifier should be present, Correct posture, Anti-glare screens and Optimal lighting of room. At the end of three months, same questionnaire was administered to evaluate the decrease in symptoms amongst them. The data was

entered in MS excel and analysis was done using Epi-info 7 software.

RESULTS

In the present study, maximum participants belonged to the age group of 26-30 years (25.32%), followed by 31-35 years (17.33%), 51-55 years (15.34%) and least belonged to the age group of 46-50 years (3.34%). 67.3% participants were male and 32.7% were females. The relation of age and gender to asthenopic symptoms was found insignificant ($p>0.05$). Most of the participants were using computers for over 5-10 years (31.3%), followed by less than 5 years (26%), more than 15 years (24%) and 10-15 years (18.6%) (Table 1).

Table 1: Duration of computer use.

	Frequency (%)
Duration of computer use (in years)	
Less than 5	39 (26)
5-10	47 (31.3)
10-15	28 (18.6)
More than 15	36 (24)
Total	150 (100)
Average duration of computer use (hours per day)	
Less than or equal to 3	18 (12)
4-6	66 (44)
6-8	42 (28)
More than 8	24 (16)
Total	150 (100)

The average duration of computer use per day amongst 44% participants is 4-6 hours, 6-8 hrs in 28%, more than 8 hrs in 16% and only 12% participants used computers for less than or equal to 3 hours (Table 1).

Assessment of background variables for asthenopia was done before and after the educational intervention. It was seen that there was significant change in practices before and after the intervention with $p<0.05$ in terms of number of breaks taken, distance from the computer screen and its level with respect to eyes (Table 2).

Table 2: Background variables for asthenopia before and after intervention.

Background variables for Asthenopia		Pre- freq (%)	Post- freq (%)	P value
How many breaks do you take during working hours (over a span of 5 hrs)	<3	110 (73.33)	88 (58.66)	0.0073
	>3	40 (26.67)	62 (42.34)	
What is the average distance of your eyes from the computer	less than or equal to 20 cm	26 (17.33)	5 (3.33)	0.000359
	20-30 cm	87 (58)	102 (68)	
	more than 30 cm	37 (24.66)	43 (28.67)	
What is the level of the computer screen with respect to the eye	above the eye level	16 (10.14)	13 (8.2)	0.00008
	at the eye level	97 (64.8)	64 (42.9)	
	below the eye level	37 (25)	73 (48.9)	

Table 3: Symptoms and relief measures of asthenopia before and after intervention.

	Pre	Post	P value
Symptoms present			
Headache	99 (66)	84 (56)	0.076
Redness of eye	101 (67.3)	99 (66)	0.806
Eye Fatigue	128 (85.3)	95 (63.3)	0.000013
Watering	110 (73.3)	98 (65.3)	0.133
Blurring of vision	28 (18.7)	14 (9.3)	0.019
Double vision	54 (36)	54 (36)	1
Burning /itching / grittiness	70 (46.7)	61 (40.7)	0.29
Dryness	66 (44)	63 (42)	0.726
What do you do to get relief from these symptoms			
Rub eyes	63 (42)	50 (33.3)	0.121
Close eyes momentarily	121 (80.7)	138 (92)	0.0043
Wash eyes	107 (71.3)	122 (81.3)	0.042
Antiglare screen	12 (8)	38 (25.3)	0.000056
Optimum brightness mode	40 (26.7)	102 (68)	0.00001
Special glasses	30 (20)	35 (23.3)	0.49
Do you wear the prescribed glasses on a regular basis	38 (25.3)	52 (34.7)	0.078
Have you ever consulted an ophthalmologist for any of the above	39 (26)	57 (38)	0.026

Assessment of presence of symptoms was done before and after the educational intervention. The overall prevalence of asthenopia (presence of at least 1 symptom) was 87.3% (131). The decrease was seen in all the symptoms (Headache, redness of eye, eye fatigue, watering, blurring of vision, double vision, burning, itching, grittiness and dryness) but statistically significant decrease was seen in eye fatigue and blurring of vision ($p < 0.05$). Their knowledge of relief symptoms was also assessed in which there was significant change in closing eyes momentarily, washing them, use of antiglare screen, optimum brightness mode and consultation to an ophthalmologist (Table 3).

DISCUSSION

Computers and electronic multimedia devices have become the part and parcel of our lives and are virtually found in every human involving domain. As the growing dependence on these gadgets, the hazards on humans are growing continuously. The prime concern is the ever rising visual discomforts amongst the users. Though the usage of computers varied from individual to individual, there was some using it for more than 15 years and for more than 8 hours a day. In the present study, the overall prevalence of asthenopia (at least 1 symptom present) is 87.3%. The prevalence of various asthenopic symptoms varied from 85.3% (eye fatigue) to 18.7% (blurring of vision). In a study conducted by Bhandari et al in Gujarat, asthenopia was reported in 194 (46.3%) subjects during or after work on computer.² The prevalence of asthenopic symptoms was 57% in a study conducted by et al.¹⁴ The decrease in symptoms after education intervention was significant i.e. $p < 0.05$, for both eye fatigue and blurring of vision.

Though, in the present study, no correlation has been done between the presence of asthenopic symptoms and duration of work in computers, various studies across the globe have given mixed results like the study by Hanne et al in which there was significant difference in occurrence of asthenopia amongst those working on computers of less than 6 hours a day v/s more than 6 hours a day, but in the study by Mocci et al, there was no such association, be it number of hours a day or duration in years.^{9,15}

As per the findings of Bhandari et al, taking small frequent breaks prevents and distance more than 30 cms from computer screen decreases the occurrence of asthenopic symptoms; therefore, the rule of 20-20-20 was explained, and significant change ($p < 0.05$) in taking breaks was seen amongst the participants.² Jaschinski et al found that the increase in distance of viewing computer screens decreased the eyestrain, hence it was explained that minimum of 30 cms distance should be maintained and it was observed that in significant numbers, the distance of viewing the screen increased ($p < 0.05$).¹⁶ Though the distance is individually adjusted, Taptagaporn et al in their study suggested a viewing distance of 50-70 cms.¹⁷

Bhandari et al found a significant association between asthenopic symptoms and the level of computer screen.² They found that symptoms were less amongst those who kept the computer screen below their eye level. In the educational intervention, it was explained how the level of computer screen can affect the eye strain, and in the post survey, it was noticed that practice of keeping computer screen below the eye level was seen significantly.

Though many relief measures and demerit of rubbing eyes was explained, practice change was seen significantly improving for closing eyes momentarily, washing eyes, antiglare screen usage, and optimum brightness mode and consulting an ophthalmologist for already identified problems.

CONCLUSION

The present study suggest that the asthenopic symptoms as common trouble amongst computer operators. Behaviour change by educational intervention can increase their knowledge of predisposing factors leading to asthenopia which alone can help in decrease of the symptoms. Also, small relief measures told to them prove to be very beneficial. The treatment of asthenopia is within the reach of computer users, and if not, then early treatment from ophthalmologist should be taken.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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