

PREVENTION OF OCULAR MORBIDITY AMONG MEDICAL STUDENTS BY PREVALENCE ASSESSMENT OF ASTHENOPIA AND ITS RISK FACTORS

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ABSTRACT

PURPOSE

To determine the prevalence of asthenopia and to identify modifiable risk factors in medical students. Therefore, as to provide with necessary instruction and precaution to reduce the occurrence of the ocular morbidity.

METHODS

A cross sectional observational study was conducted amongst 200 medical students who are using smart phone, laptop and computer to determine the relationship between asthenopia and related risk factors. Data were based on demographic features, type and duration of electronic items used and asthenopic symptoms was collected by self-administered questionnaire. The data was compiled and entered into excel sheet and analyzed by using appropriate statistical test. Statistical analysis was done using SPSS Version 20.

RESULTS

We found out of 96% students, 51.56% had moderate asthenopic symptoms. Most of the students had more than one asthenopic symptoms, in which headache (56.77%) was found to be the most common symptom followed by eye strain (50.52%), blurring of vision (40.62%) and redness (23.95%). Those who were using electronic devices for 4-10 hours, had more moderate to severe asthenopic symptoms about 85%. The ocular morbidity was found to be more among the smartphone users followed by laptops. There was association between ocular symptoms and type of electronic devices ($\chi^2=14.6$, $p < 0.006$) and duration ($\chi^2=25.6$, $p < 0.001$) of its use.

CONCLUSION

With this study we can identify the modifiable risk factors and excess use of electronic devices, therefore we can guide the students to limit the risk factors so that we can reduce the ocular morbidity.

KEYWORDS

Asthenopia; Headache; Medical Student; Risk Factors; Smart Phone.

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INTRODUCTION: In modern era of life the use of electronic devices (smart phone, lap top and computer) as a tool at work places, academic institutions, recreation activities and homes are very common. Several studies shown an association between computer use and visual health related symptoms (Computer vision syndrome CVS). Computer vision syndrome CVS has been defined by Rosenfield (2011); as combination of eye and visual problems attributed to the use of computer. Asthenopia is

one of type of CVS, can manifest itself through a variety of perceptive symptoms such as of vision, dryness, redness, watering, itching in eyes, gritty sensation, impaired reading, light sensitivity, diplopia, headache.¹ These symptoms are frequently associated while they are doing near work for reading and writing whereby eye accommodative and vergence processes are more intense.² It has become a significant public health problem in modern life due to regular use of smart phone, laptop and computers etc.³ These asthenopia symptoms can be severe enough to limit personal activities and further result in the development of age related eye disease.⁴ In India, the major symptoms related to computer use reported by the ophthalmologists were eyestrain, headache, tiredness and burning sensation, watering and redness.⁵ In this modern era the use of smartphones, e-book reading, video games,

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desktops, tablets, and laptops, had increased the prevalence of asthenopia.⁶ As per the American Optometric Association(AOA-2013); has defined CVS as a "complex of eye and vision problems related to activities, which stress the near vision and which are experienced in relation or during the use of computer."⁷ Prevalence of CVS in medical students 78.6%⁸ and prevalence of asthenopia is 46.3%.^{8,9}

AIMS AND OBJECTIVES: To determine the prevalence of asthenopia and to identify modifiable risk factors in medical students, so as to provide with necessary instruction and precaution to reduce the occurrence of the ocular morbidity in medical student.

METHODOLOGY: A cross sectional observational study was conducted amongst medical students who are using smart phone, laptop and computer to determine the relationship between asthenopia and related risk factors amongst the medical students in study period. The study was conducted in People's college of medical sciences and research centre, Bhopal (M.P) India. A pilot study was done in 30 students to validate self-administered questionnaire. 200 medical students were randomly selected for the study. Data were based on demographic features, type and duration of electronic items use, asthenopic symptoms and headache and was collected by self-administered questionnaire. Asthenopia was considered when two of the following symptoms were reported during and after work on electronic devices. Those symptoms were headache, blurring of vision, eye strain redness, gritty sensation, burning sensation, watering and itching in eye.

Our inclusion criteria were all the medical student who were willing to participate in study and who were using smart phone, lap top, computer and they were not suffering from any ocular disease. Exclusion criteria was history of any previous eye diseases and any injury to the eye.

The data will be compiled and entered into excel sheet and analyzed by using appropriate statistical test. Statistical analysis was done using SPSS Version 20.

RESULTS: A total of 200 questionnaires were distributed to the medical students and 192 (96%) questionnaires were returned. 08 questionnaires were excluded as the participants failed to submit the questionnaires sheet. So the total number of questionnaires analyzed for the study was 192.

Age (Year)	Male N=105(54.68%)	Female N= 87 (45.31%)	Total N=192 (%)
20	4	2	6(3.13%)
21	11	13	24(12.50%)
22	32	9	41(21.35%)
23	37	15	52(27.08%)
24	12	22	34(17.71%)
25	9	26	35(18.23%)

Table 1: Demographic distribution of study subjects according to age & gender

Out of 192 students 27.08% students were 23 years followed by 22year of age group.

Gender	Severity			Chi Square Value	P Value
	Mild	Moderate	Severe		
Male (n=105)	10(9.52%)	53(50.47%)	42(40%)	7.92	0.019
Female (n=87)	19(21.83%)	46(52.87%)	22(25.28%)		
Total (n=192)	29(15.10%)	99(51.56%)	64(33.33%)		

Table 2: Distribution of study subjects according gender & severity of asthenopia

We found out of 192 students, 51.56% students had moderate and 33.33% had severe asthenopic symptoms. Both male and female students had moderate asthenopic symptoms, 50.47% and 52.8 respectively. Severe asthenopic symptoms were noted more in male students 40% and 25.28% in female students.

Symptoms	Smart phone	Laptop	Computer	Total (N=192)	Chi Square Value	P -Value
Headache	57	46	2	109(56.77%)		
Blurring of vision	31	36	11	78(40.62%)		
Eye strain	47	41	9	97(50.52%)		
Watering	22	3	9	34(17.70%)		
Burning	4	5	2	11(5.72%)		
Redness	22	18	6	46(23.95%)		
Grittiness	7	4	3	14(7.29%)		
Itching	9	2	6	16(8.33%)		

Table 3: Symptoms of Asthenopia according to type of device

In this survey most of the students had suffered more than one symptoms, in which headache, eye strain and blurring of vision was noted by the most of the students. Headache 56.77% was found to be the most common symptom of ocular morbidity in medical students followed by eye strain 50.52%, blurred vision 40.62% respectively.

Symptoms	1-4 hour	4-8 hour	8-10hour	Total	Chi Square Value	P Value
Headache	45(41.28%)	52(47.70%)	12(11%)	109	42.0	0.001
Blurring of vision	30(38.46%)	37(47.43%)	11(14.10%)	78		
Eye strain	47(48.45%)	49(50.51%)	11(11.34%)	97		
Watering	9(26.47%)	18(52.94%)	7(20.58 %)	34		
Burning	2(18.18 %)	8(72.72%)	1(9.09%)	11		
Redness	21(45.65%)	16(62.5%)	9(19.56%)	46		
Grittiness	3(21.42%)	9(64.28%)	2(14.28%)	14		
Itching	2(12.50%)	4(25.0%)	10(62.5%)	16		

Table 4: Symptoms of Asthenopia according to duration of usage of electronic devices

		Severity			Chi Square Value	P Value
		Mild (n=29)	Moderate(n=99)	Severe(n=64)		
Devices	Smart phone(n=114)	18(62.06%)	67(67.67%)	29(45.31%)	14.6	0.006
	Laptop n=59	7(24.13%)	21(21.21%)	31(48.43%)		
	Computer n=19	4(13.79%)	11(11.11%)	4(6.25%)		
Duration	1-4 hrs	15(51.72%)	14(14.14%)	8(12.5%)	25.6	0.001
	4-8hrs	8(27.58%)	34(34.34%)	18(28.12%)		
	8-10hrs	6(20.68%)	51(51.51%)	38(59.37%)		

Table 5: Severity of Asthenopia according to type of electronic devices & duration of usage

In this study most of the student who were using electronic divices for 4-10 hours had more moderate to severe symptoms of about 85%. The ocular morbidity was found to be more amongs the smartphone users followedby laptops users.

There was association between ocular symptoms and type of electronic devices ($\chi^2 = 14.6$, $p < 0.006$) and duration ($\chi^2 = 25.6$, $p < 0.001$) of its use.

DISCUSSION: The result of study showed that most of the students belong to the age group 20-25 years. Mean age group was 22.8 years, among them 54.68% were males and 45.31% were females. Reddy et al 2013 had reported 89.9% Of 795 students had CVS and headache was most common symptoms, watering 4.3%.¹⁰ Study done by Cheng Han et al 2013, they found average age was 21.4 years, male students were 58.7 and females were 41.3.¹¹ Study done by jyoti thomas et al they found 54.69% male students and 45.31%.¹² female students. In our study Severity of symptoms was mild in 24.13% students, moderate in 42.92% students and severe in 43.75% students. Study done by jyoti thomas et al showed similar such findings 62.4% had mild symptoms, 31.7% had moderate symptoms and 5.9% had severe symptoms.¹² Bali et al 2007 had reported 82.1% had

headache and 97.8% had eye strain.⁵ Reddy et al 2013 had reported headache 19.7% was the most common symptoms¹⁰ In our study we found headache 56.74% was the most common symptom followed by eye strain 50.52%. Akinbinu et al T.R.2014 reported 30.9% had headache.⁷ In present study we found blurring of vision 40.62 % and watering 17.70%. Redness is high prevalent 40.2% and 40.7% in study done by Shrivastava and Bobhate 2012 and Talwar et al (2009) respectively.^{13,14} But in study by Logaraj et al; 2014 redness symptoms variable ranging from 13.9% and 23.3%.¹⁵ In present study we found redness in 23.95% student. In our study those students who were using electronic device for 8-10 hrs had severe (59.37%) and moderate (51.51%) asthenopic symptoms respectively.

Symptoms	Bali et al. 2007	Shrivastava and Bobhate 2012	Logaraj et al. 2013	Reddy et al. 2013	Akinbinu et al. 2014	Gupta R et al. 2014	Jyothi Thomas et al. 2014	Our study
Headache	82.1	-	-	19.7	30.9	41.4	-	57.77%
Blurring of vision	-	-	-	-	10.1	8	36	40.62%
Eye strain	97.8	-	32.3	16.4	30.9	32.50	62	50.52%
Watering	66.4	-	-	-	10.8	22.20	-	17.70%

Burning	-	40.2	40.7	-	-	-	39	5.72%
Redness	61.2	-	-	-	4.3	9.60	23	23.95%
Grittiness	-	-	-	-	-	14.07	-	7.29%
Itching	-	-	-	-	-	-	-	8.33%

Table 6: Comparisons of frequency of common asthenopic symptoms (%) reported in the literature by different authors

CONCLUSION: With advances technology and dependency on information technology, computer has become a common tool in colleges, universities and workplace. Literature indicate that prolonged viewing of video display terminals (VDT) is associated with visual and musculoskeletal symptoms.

CVS has been reported to affect all walks of life and children are equally affected. While most ministries of education in developing are advocating modernisation of libraries, building and furnishing computer laboratories and enhancing ICT application in teaching and learning there is not much literature on the impact of computer on children's vision in the developing countries.

CVS significantly impairs workplace productivity and reduces the quality of the life by placing unusual strain on the human physical well-being.

Further studies are recommended to be carried among adults at the college and universities for the purpose of informing development of implementable and effective measures to reduce the health impact of computer technology health.

In our study we also observe that, as the duration of computer use increases it increase the asthenopic and related symptoms. Asthenopic symptoms can be reduced by following guideline.¹⁶

- Blink more often (12- 18/ min).
- Take break frequently (20-20 rule) after every 20 minutes look at distant object at least 20 feet away for 20seconds.
- Modify work place.
- Exercise and stretch eyes.
- Monitor display quality - choose a setting in which refresh rate and resolution both are high number.
- Adjust the brightness of computer screen.
- Minimum glare: use anti glare screen to avoid eye strain if possible, paint white background with a darker, colour with a matte finish.
- Use proper lighting: avoid exercise or under lightning.
- Exercise even when sitting - stand up, move about or exercise arms, legs back neck and shoulder frequently.
- Plenty of water intake and tear substitute as and when required.

CVS may take an epidemic form in near future. It is also imposing economic burden over financial infrastructure pertaining to decrease in working efficiency at work place. Early evaluation, diagnosis, intervention and education may prevent the symptoms associated with CVS. Appropriate diagnosis and treatment of existing vision problems and control or elimination of environmental factors can

effectively reduce the symptoms associated with computer use.

Ethic committee approval was not mandated as it did not involve any intervention or trial.

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