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COMPUTER VISION SYNDROME AND ITS RISK FACTORS AMONG MEDICAL STUDENTS OF A TERTIARY CARE CENTRE IN ODISHA: A CROSS-SECTIONAL STUDY

¹Dr Sumita Sharma and ²Dr Sandeep Kumar Ratha

^{1&2}PG Resident

¹Department of Community Medicine and ²Department of General Medicine
IMS & SUM Hospital, Siksha 'O' Anusandhan(Deemed to be University)
Bhubaneswar, Odisha, India

ABSTRACT

Background: The enormous use of digital device like Computer, tablets and android mobiles though making our lifestyle much easier, but welcoming terrible disease like Computer Vision Syndrome(CVS) and disrupting the direction of our life. The young generation people are more addicted to this digital world, hence affected a lot from this CVS.

Objective: To determine the prevalence of CVS, associated risk factors and to assess the preventive measures taken by undergraduate medical students while using computers.

Methodology: A cross-sectional descriptive study was conducted among 477 undergraduate medical students in IMS & SUM Hospital, Bhubaneswar, Odisha, India. The data were collected by Epicollect-5 and analysed by using SPSS v21 software. Appropriate statistical tests were applied for observing the significant associations with p value <0.05.

Results: The prevalence of CVS was found to be 83.22% among the undergraduate students. The final year students(49.87%) reported more symptoms of asthenopia as compare to 2nd year(15.61%) and 3rd year(34.50%) MBBS students. The most significant risk factors related to excessive computer use were online classes, high brightness of the screen and very close sitting before computer.

Conclusion: It is a necessity to create awareness regarding computer vision syndrome and its preventive measures among all healthcare personnel.

Keywords: Digital eye syndrome, CVS, vision, medical students, Risk factors.

INTRODUCTION

Today the entire world is going through the Computer era.(1)The massive use of digital device like Computer, tablets and android mobiles has increased substantially in recent years across the world.(2) Though it makes our lifestyle much easier and beautiful but its excessive use has become extremely dangerous just as the bitterness of excessive lemonade, which has become a major driver in disrupting human life. In each and every field starting from the government to private sector, in trades and commerce, in banks, factories, educational institutions, for research and development, even in supermarkets and healthcare setup, the crucial role of computer is indescribable.(3)

The term Computer vision syndrome (CVS) is coming into notice when people were complaining of uncomfortable, painful, and irritable vision. It is one of the alarming public health issues related to digital technology i.e., android cell phones, tablets and computers. Symptoms regarding our Vision and visual disabilities are very common now a days because of high demand of computer use in all fields.(4) Using computers had become a necessity of 21st century. However, their usage, even for 3 hour per day, led to health risk of developing computer vision syndrome (CVS), low back pain, tension headaches and other psychosocial stress.(5)

Computer operators are reporting more vision problems as compare to noncomputer office workers. The prevalence of CVS ranges from 64% to 90% among computer users. It is recorded around 60 million people suffer from CVS globally. A number of investigators have reported that in India, visual symptoms occur in 75% to 90% of computer workers. A survey released by the National Institute for Occupational Safety and Health (NIOSH) showed that nearly 22% of computer workers have been facing the problems of musculoskeletal disorders.(6)

These days, university students especially medical students are spending more time on digital device like computer and laptops as well as android cell phones, staring from online at the screen for studying and for research work. There have been several studies reporting an increased prevalence of CVS among computer users, specifically medical students.(7)

Very little research has been performed to document the effects of computer use on the physical health of Indian users especially among college students and young generation employees. Hence this study aims to assess the prevalence of CVS, associated risk factors and the preventive measures taken by undergraduate medical students while using computers.



MATERIALS AND METHODS

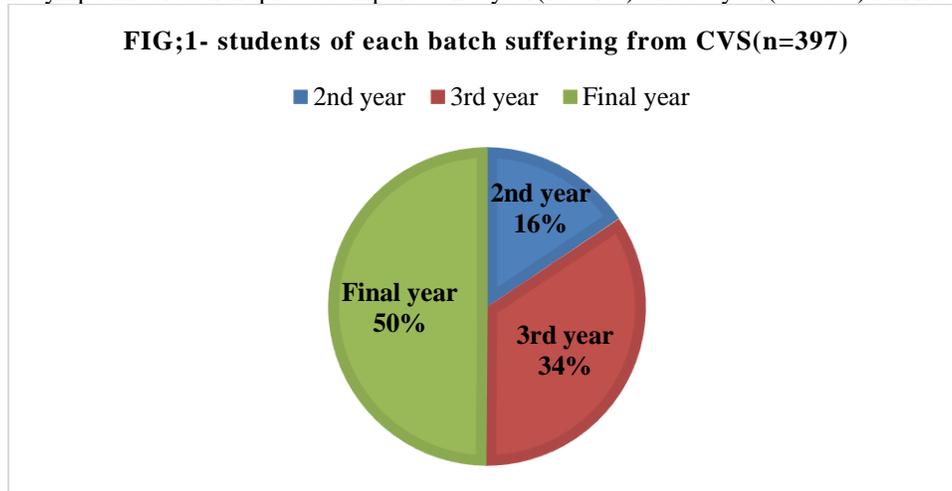
This was a cross-sectional study conducted among a total of 477 undergraduate MBBS students of a medical college of Bhubaneswar, Odisha, a state situated eastern part of India. The study was approved by institutional ethical committee. The study was carried out in January 2021, when the lockdown was over and students came to hostel for appearing university exam. The students of 2nd year, 3rd year and final year were interviewed in their hostel premises through one-to-one questionnaire method by using Epicollect5. Their participation was on voluntary basis. All those students who used computer in last 1 month preceding the date of interview were included in the study. Those who were absent on that day and those who did not give consent to participate were excluded. The questionnaires developed by the investigators were internally validated by 2 ophthalmologist and one medicine as well as one community professor, after that a pretesting of study was done on 15 students.

The pre-tested structured questionnaire tool included the demographic profile of participant, duration of computer use per day, symptoms faced during past 1 month period, type of refractive error present in each individual and frequency of break taken by participants while working on computers. The authors are defined the outcome variable CVS as “a complex of eye and vision problems arise due to the close contact of computer for a longer time period.” The eye symptoms were considered as redness, burning sensation, headache, blurring vision, dry eyes and musculoskeletal pain. The symptoms experienced by the participants were categorised into non, mild(transient symptoms remain for few minutes to hours), moderate(persist for few hours and subsides after taking rest) and severe(needs ophthalmic consultation) visual problems as per the computer use.

The data were analysed using the standard statistical software packages version 21(SPSS v21). All the descriptive data were presented as percentages. The categorical variables are analysed by applying chi-square for observing the significant association between each variable and outcome.

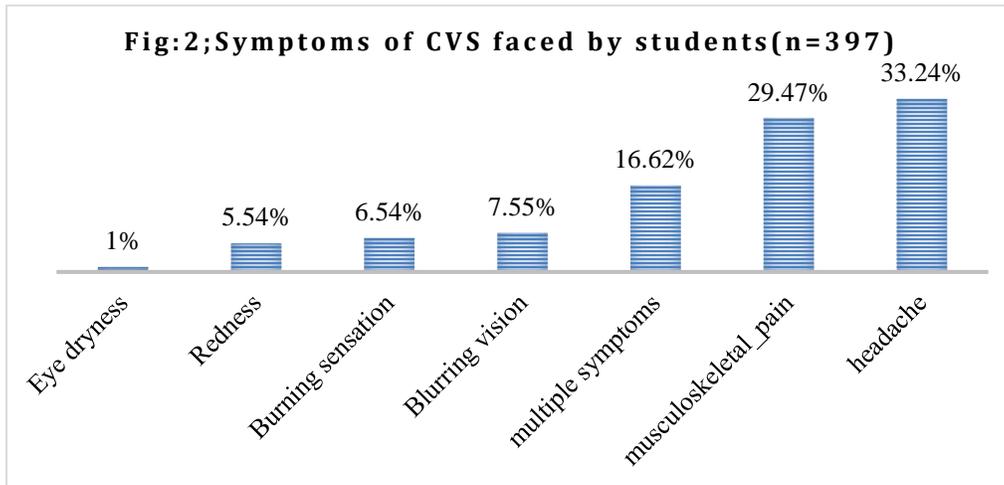
RESULTS

There were a total 477 participants interviewed in the study. Among them 273(57.2%) were female participants and rest 42.7% were male participants. All most all students use computers for daily studying. The mean age was 23.5years with a range minimum from 18 years to maximum of 30 years. The mean duration of using computer per day was 5.5 hours. Among the total students around 397(83.22%) reported at least single symptom of CVS, which shows very high prevalence. The final year students (49.87%) reported more symptoms of asthenopia as compare to 2nd year(15.61%) and 3rd year(34.50%) MBBS students.(see Fig:1)



According to the demographic data, female participants 244 (61.4%) was observed to have higher risk of CVS as compare to male participants i.e.,153(38.5%).Out of 397 students those have symptoms of CVS, 248(62.4%) are myopic, 23(5.7%) are hypermetropic, and 14(3.5%) are astigmatic. There are 112(28.2%) students do not have any type of refractive error. The presence of refractive errors like myopia and astigmatism showed significant association with CVS(p=0.003 and p=0.04 respectively) but hyperopia was not associated with CVS.

The most frequently reported symptoms were headache 132(33.24%), pain on neck and shoulder 117(29.47%), blurring vision 30(7.55%), burning sensation 26(6.54%) and redness of eyes 22(5.54%). The rest 66(16.62%) students suffered from more than one symptom.(see Fig:2)



There are around 276(69.52%) students suffered from mild CVS, whereas 102(25.69%) faced moderate type of symptoms and rest 19(4.78%) are having severe symptoms of CVS. Almost all participants use computer for daily online classes, as there was complete shutdown of colleges strictly followed in the university. The association between the presence of CVS and each risk factor was analysed which is depicted in below.[see Table1]

Variables	Groups	Computer vision syndrome			p value
		Positive	Negative	Total	
Duration of studying	3-5 hours/day	68(17.12%)	48(60%)	296(62.05%)	0.00001*
	5-7 hours/day	81(20.40%)	22(27.5%)	103(21.59%)	
	>7 hours/day	248(62.4%)	10(12.5%)	78(16.35%)	
Taking breaks	Yes	294(74.05%)	63(78.75%)	357(74.84%)	0.377
	No	103(25.94%)	17(21.25%)	120(25.15%)	
Frequency of taking breaks	Every 20 minutes or less	97(24.43%)	27(33.75%)	124(25.99%)	<0.08
	Every 20-40 minutes	219(55.16%)	38(47.5%)	257(53.87%)	
	Every 40-60 minutes	81(20.40%)	15(18.75%)	96(20.12%)	
	>40 minutes				
Brightness of the screen	Dull	158(39.79%)	29(36.25%)	187(39.20%)	0.001*
	Bright	202(50.88%)	46(57.5%)	248(51.99%)	
	Very bright	37(9.31%)	5(6.25%)	42(8.80%)	
Distance from the screen	< 45cm	366(92.19%)	56(70%)	422(88.46%)	0.00001*
	>45cm	31(7.80%)	24(30%)	55(11.53%)	

*p value statistically significant

Discussion

The study reveals very high prevalence(83.22%) of computer vision syndrome among a total of 477 medical students. Such high prevalence of CVS among medical and engineering students were depicted by M. Logaraj et.al in Chennai.(8) Abdullah et.al mentioned of 95% prevalence of CVS among medical students in Saudi Arabia.(9) Another study carried out in Pakistan and Malaysia reported the prevalence rate as 90.5% and 89.9% respectively.(10,11)

Female gender were observed to have more risk as compare to male students. The statements are agreed by in regard to gender, females were observed to have more risk of CVS. This association agrees with the findings by Straker et al. and other studies conducted in Sri Lanka, Chennai and United Arab Emirates.(8,12,13)

The above study reported with a mean age of 23.5 years and no association of age with CVS. Similar findings were found by a few studies. However, study conducted by Ranasinghe et al. found a significantly higher prevalence of CVS among above 40 years population as compared with those aged less than 20 years.(12)



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Refractive errors like myopia and astigmatism are significantly aggravated the symptoms of computer vision syndrome. In contrast to the study conducted by Ghufraan A. Abudawood showed no significant association between refractive errors like myopia and hypermetropia with CVS but there was association between astigmatism and CVS symptoms(<0.001).(7) Other experimental studies showed a significant increase in symptoms with uncorrected residual astigmatism.(14,15) If refractive errors are not corrected they contribute to the symptoms of CVS.

The most frequently reported ocular symptoms were headache in 33.24% followed by musculoskeletal pain in neck and shoulder(29.47%). Other symptoms included redness, burning sensation, blurring vision and eye dryness (5.54%, 6.54%,7.55%, and 1% respectively). There are various studies reported with frequency of burning sensation in 33% of medical and dental students, 54.8% of university students, and 32.3% of medical students.(8,10,14) Headache in CVS is explained by the constant need to adjust the eyes by contracting the extraocular muscles and ciliary muscles to maintain the lens in the accommodating phase.

Focusing and refocusing are required throughout the time, repeatedly to see in different distances from the screen to the keyboard and to work documents, leading to eye muscle fatigue causing headache. Eye strain was experienced by 14% of students and blurred vision in 11.4%, both are associated significantly with deem room lightning.(7) Increased sensitivity to light was observed in 60.2%, specifically and significantly among students using higher screen brightness.(16)

The result showed highly statistically significant risk factors were duration of studying, distance from the screen as well as brightness of the screen with p value <0.001. Duration of studying using computers was the most significant risk factor, in which the longer time exposure to computer more extent of symptoms.(8,10) Consistency with the similar results seen in other study conducted by Hassan et al. and a report by the American Optometric Association. Furthermore, authors reported that among CVS-positive group, students who spent more than four hours were at significantly at higher risk of CVS than who spent less than four hours. The fact was strengthening by Reddy et al. who found a significantly higher CVS among students who used computers for more than two hours. Hence longer the duration, the longer the complaint last even after work.(11)

There is no association between frequency of taking breaks and symptoms of CVS, which is supported by the same finding in previous studies. However, visual discomfort can be reduce by taking short breaks every 30 minutes of using computer.(17) Students who were not taking breaks at all during studying (8.8%) significantly associated CVS.(18) In accordance to the fact, visual symptoms reported significantly among computer users who were not taking frequent breaks in previous studies.(19)

Most of the students (92.19%) viewed computers at a distance of less than 45cm which resulted significantly in more CVS symptoms. Similarly, Hassan et al. found that students who used computers at a distance of less than 50 cm were prone to higher risk of CVS.(20) According to American Optometric Association, the recommended viewing distance was suggested to be 20–28 inches.(19)

There is a few Limitations found in this study as it is a single cantered study. Reporting bias is there as CVS is diagnosed based on self-reported symptoms without ophthalmic examination. Pre-existing medical or ocular conditions were not mentioned separately hence overestimation of CVS prevalence may be comminated the results.

Conclusion

Computer vision syndrome (CVS) is alarming among undergraduate medical students, with excessive headache, musculoskeletal pain, blurring vision, burning sensation, tearing, and dryness in eyes being the most common symptoms. The study has shown higher prevalence of CVS is associated with female gender, myopia and astigmatism like refractive errors, long time exposure to computers, using bright screen and close distance from computer screen.

The students used to take preventive measures like taking breaks for few minutes in between the session of using computer. Advice of applying the 20-20-20 rule should be followed by all students recommended by the investigators. There is severe risk of vision loss if not treated by time or precautions not followed at proper time. It has been proved that CVS-related symptoms lessen the productivity of work. There is a need to create awareness among students regarding health effects specially about the adverse effect of prolonged computer use and the preventive measures in order to reduce CVS symptoms.



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