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RESEARCH ARTICLE

THE PREVALENCE OF COMPUTER VISION SYNDROME AMONG INFORMATION TECHNOLOGY STUDENTS IN A RURAL ENGINEERING COLLEGE

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ABSTRACT

Background: As computers become part of our everyday life, more and more people are experiencing a variety of ocular symptoms related to computer use. Computer Vision Syndrome (CVS), also referred to as digital eye strain describes a group of eye and vision related problems that result from the prolonged computer, tablet, E-reader and cellphone use. CVS may have a significant impact not only on visual comfort but also on occupational productivity.

Objective: To study the prevalence of Computer Vision Syndrome (CVS)using the Computer Vision Questionnaire among Information Technology (IT) students studying in a rural area in South India.

Methodology: The study covered 339students from a rural engineering college. Demographic data such as age, gender, socioeconomic status and medical history were collected and entered in the case study form. Clinical examination with a torch light was carried out in all subjects to exclude gross corneal abnormalities. Those screened who were found to be normal were handed over a questionnaire, based on the results on which they were grouped into those with CVS and those without CVS. The visual acuity and retinoscopic examination of all were also carried out. The data were collected and analyzed using chi-square test.

Results: The prevalence of CVS was found to be 55.46%.79.3% of those who worked on the computer for more than 3 hours per day and 76.08% of those sitting at a stretch on computer for more than 2 hours developed computer vision syndrome. Only 38.3% of those who took periodic breaks had symptoms of CVS while 82.0% of those who did not take a break developed CVS.

Conclusion: The prevalence of CVS among rural engineering students studying information technology was found to be 55.46%. This study revealed a positive association between total hours of work on computer per day, work at a stretch on computer, taking periodic breaks and computer vision syndrome.

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INTRODUCTION

The computer has become a common item in today's society. Computers have increased communications and have opened access to information like never before and at the same time prolonged exposure to the computer screen or the video display terminal (VDT) has been the cause of a visual and ergonomic disorder called "Computer Vision Syndrome" (CVS) or Computer and visual display terminals syndrome (CVDTS). CVS is a constellation of symptoms ocular as well as extraocular associated with prolonged use of visual display terminals. (Parihar *et al*., 2016) Computer Vision Syndrome (CVS) is defined by the American Optometric Association as a complex of eye and vision problems related to the activities which stress the near vision and which are experienced in relation to or during the use of computers (American Optometric Association (AOA) 1995). It encompasses a group of visual symptoms which crop up from the extended viewing of the VDT, when the demands of the task exceed the abilities of the viewer. Symptoms of CVS includes: blurred vision, red eyes, burning eyes, excessive tearing, double vision, headache, light/glare sensitivity, slowness in changing focus and changes in colour perception (Seshadhri *et al*., 2014). CVS is a highly prevalent condition in the general population producing symptoms for extended periods of time. It is strongly associated with ocular surface disease (Portello *et al*., 2011). Personal computers are one of the commonest office tools, used in almost all institutions and organisations, for a wide variety of vocational and/or non-vocational purposes. Hence, it

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is likely that CVS will continue to create a significant and growing contribution to reduced productivity at work, whilst also reducing the quality of life of the computer office worker. It is estimated that nearly 60 million people suffer from CVS globally, and that a million new cases occur each year in the 21st century. (Ranasinghe *et al*., 2016) This is a cross-sectional study performed on students of information technology studying in a rural engineering college in South India undertaken with the objective of assessing the prevalence of CVS in this group of students.

MATERIALS AND METHODS

This is a cross-sectional study to assess the prevalence of Computer Vision Syndrome in information technology students. All consenting students of the final year class of three rural engineering colleges studying information technology were serially recruited to the study if they fulfilled selection criteria.

Inclusion criteria: Computer using students aged 17 to 25 years were included. Students with corrected refractive errors were also included.

Exclusion criteria: Students with known eye conditions apart from refractive errors and those with uncorrected refractive errors.

The Sample size was calculated using the prevalence of CVS in information technology professionals of 69.3 % found by Seshadhri *et al*. in a study done in Chennai.[3] The sample size for a precision of 5% and a confidence level of 95% was found to be 329 students

Instruments: A questionnaire was used to obtain information about symptoms of computer vision syndrome and a score of 5 or more was considered suggestive of computer vision syndrome.

Sampling: After informed consent was received students were consecutively recruited to the study if they fulfilled selection criteria.

Study procedure: This is a cross-sectional study. Demographic data such as age, gender, and medical history were collected and entered in the case study form. Clinical examination with a torch light was carried out in all subjects to exclude gross corneal abnormalities. Those screened normal were administered the questionnaire. Based on the symptoms and response obtained from the questionnaire, the students were categorized into two groups, those without CVS and those with CVS. The visual acuity and retinoscopic examination of all students were also carried out. The mean values obtained on the score-sheet were compared in the two groups data was collected and analysed using the Chi-square test.

Ethical considerations: All the data will be kept confidential and will be accessed only by the investigator and authorized personnel. Students with CVS were treated and educated about good practices of computer use.

RESULTS

The study involved 339 final year computer science and information technology (IT) students from three engineering colleges located in a rural area. After the study details were explained and written informed consent obtained the students were consecutively enrolled to the study from the class, All the students were in the age group of 18 to 25 years. Of the 339 students recruited to the study, 277 (81.71%) were in the 20 to 22 years old (Figure 1). Sixty one percent of the participants recruited to the study were male and 88 (58.28%) of the participants with CVS were males (Figure 2). There was a greater likelihood of developing CVS in male students (p=.003).

Table 1. Baseline Characteristics of the Participants

Variables	Participants with normal vision (%) n=151 (44.54%)	Participants with CVS (%) n=188 (55.46%)	Total Number (%) n=339 (100%)	p value
Gender				
Male	88 (58.28)	119 (63.30)	207 (61.06)	.003
Female	63 (41.72)	69 (36.70)	132 (38.93)	
Age (years)				
18-19 years	5 (3.31)	3 (1.59)	8 (2.36)	
20 - 21 years	90 (59.60)	97 (51.60)	187 (55.16)	.003
22 - 23 years	49 (32.45)	77 (40.96)	126 (37.16)	
¬24 years	7 (4.63)	11 (5.85)	18 (5.31)	
Mean Score on CVS Questionnaire	3.97	7.29	5.81	

The mean score on the eye symptoms questionnaire was 5.81. The mean score for those in the normal vision group was 3.97 and the mean score for the computer vision syndrome group was 7.29.

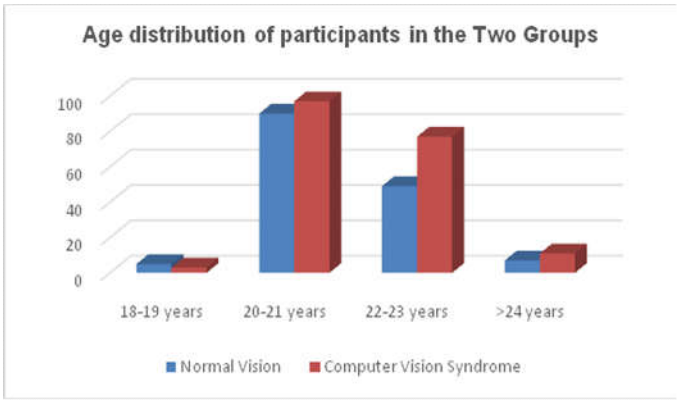

Figure 1. Age distribution

The majority of students were in the age group 20 to 23 years.

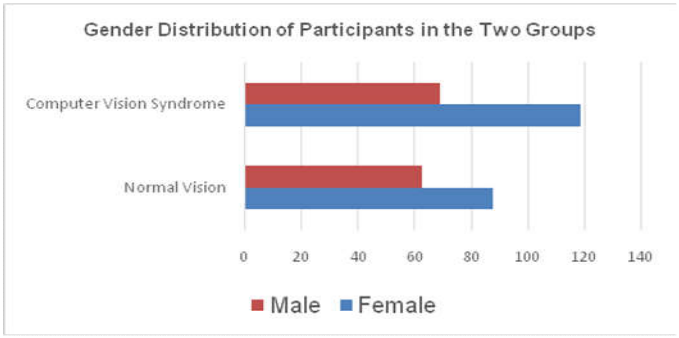

Figure 2. Gender Distribution

Male students seem to be at greater risk of developing CVS.

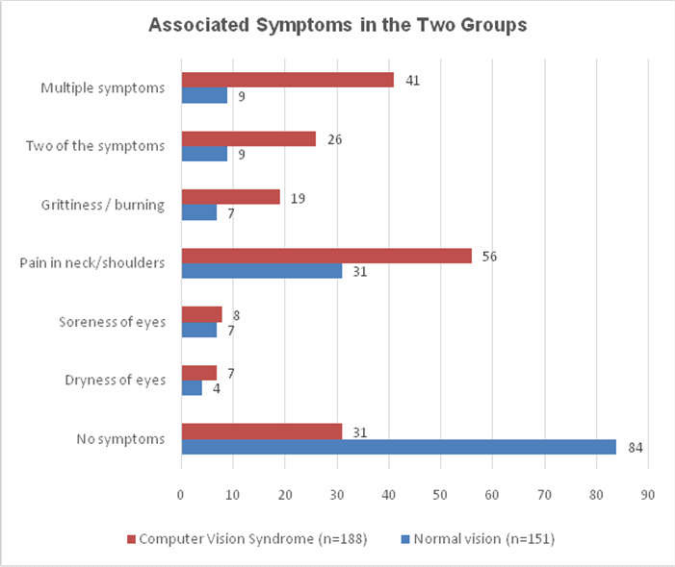

Figure 3. Associated Symptoms in the Two Groups

A larger number of students 137 (40.4%) experienced eye symptoms compared to 87 (25.7%) students who experienced pain in the neck and shoulders. Of the 339 students 35 (10.3%) experienced more than one symptom and 50 (14.7%) experienced multiple eye symptoms.

Table 2. Details of Computer Use in the Two Groups

Factors	Normal Vision (%) 151 (44.54%)	Computer Vision Syndrome (%) 188 (55.46%)	p value
Total hours of daily work on computer			
1-3 hours	117 (77.5)	58 (30.9)	<0.001
>3 hours	34 (22.5)	130 (69.2)	
Taking periodic breaks			
Yes	127 (84.1)	79 (42.0)	<0.001
No	24 (15.9)	109 (58.0)	
Hours spent at a stretch on computer			
0-2 hours	128 (84.8)	115 (61.2)	<0.001
>2 hours	23 (15.2)	73 (32.8)	

There was a highly significant (p<.001) difference between the two groups in

- the total hours of daily work on the computer - 130 (69.2%) of the CVS group spent over 3 hours compared to 34 (22.5%) in the normal vision group,
- taking periodic breaks – 109 (58.0%) of the CVS group did not take periodic breaks compared to 24 (15.9%) in the normal vision group.
- hours spent at a stretch on the computer - 73 (32.8%) of the CVS group spent more than 2 hours at a stretch on the computer compared to 23 (15.2%) in the normal vision group,

DISCUSSION

In a study on 2,500 office workers in Sri Lanka, Ranasinghe *et al*. found a prevalence of CVS in 67.4%. (Ranasinghe *et al*., 2016) A similar study conducted by Armugam (Seshadhri *et al*., 2014) among information technology professionals in Chennai found a prevalence of CVS of 69.3% while Logaraj et in Chennai found a prevalence of 81.9% (176/215) among engineering students and 78.6% among medical students. (Logaraj *et al*., 2014) The prevalence of computer vision syndromes found in our study in final year engineering students was 55.46%. Regarding the total number of hours spent working on computer per day, approximately half the students i.e. 175(51.6%) of students were working less than 3 hours per day on the computer compared to the remaining 164 who spent more than 3 hours working on the computer. 79.3% of those working more than 3 hours were found to have CVS. In the study conducted by Arumugam, 66.5% of computer professionals were working for 7-10 hours, 33.5% for more than 10 hours. (Ranasinghe *et al*., 2016) In our study, 130 (79.3%) of the 164 students who worked on the computer for more than 3 hours per day and 73 (76.0%) of the 96 students who worked at a stretch on the computer for more than 2 hours developed symptoms of CVS. 206 students took periodic breaks in between while 133 did not. 130 (82.0%) of those who did not take a break developed CVS. Of the 206 students who took periodic breaks only 79 (38.3%) developed CVS. The study by Logaraj *et al*. also found that students who took frequent breaks were at lower risk of developing symptoms of CVS compared to those who worked at a stretch on the computer. (Logaraj *et al*., 2014) In our study a 137 (40.4%) students experienced various eye symptoms such as dryness of eyes, soreness of eyes, gritty sensation in the eyes and burning of the eyes compared to 87 (25.7%) students who experienced pain in the neck and shoulders. Of the 339 students 35 (10.3%) experienced more than one symptom and 50 (14.7%) experienced multiple eye symptoms. Gowrishankeran *et al*. found that the major factors associated with CVS are either environmental (improper lighting, display position and viewing distance) and/or the user's visual abilities (uncorrected refractive error, oculomotor disorders and tear film abnormalities (Gowrisankaran and Sheedy, 2015). In order to minimise the risk factors of CVS young people who use computers must be trained in the proper steps to be take in good practices of computer use including both environmental factors and visual abilities. Significant eye symptoms related to video display terminal use often occur and should not be underestimated. The increasing use of electronic devices with flat -panel display should prompt users to take appropriate measures to prevent or to relieve the eye symptoms arising from their use. (Porcar *et al*., 2016)

Conclusion

The present study showed that there is moderate prevalence of computer vision syndrome among engineering students. There was significant association between incidence of computer vision syndrome in students who took periodic breaks and those who did not. There was also significant association between total hours of working time on computer per day and the number of hours spent at a stretch on the computer and computer vision syndrome.

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