

ORIGINAL ARTICLE

PREVALENCE OF COMPUTER VISION SYNDROME AMONG BANK EMPLOYEES

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Background: the importance of computer can't be ignored, but when it comes to banking business it becomes the norm and core component of the system. Long terms exposure to computer screen is also unhealthy for the eye. This study was aimed to determine the prevalence of computer vision syndrome (CVS) and its associated factors in bank employees of Peshawar City. **Methods:** This descriptive analytical study was conducted in different areas of Peshawar city. The study population was the bank employees working on commuter. Using multistage approach 289 participants were recruited for this study. The data collection tool was a comprehensive adapted questionnaire and data were analyses on SPSS-24. Comparison was made for assessing the association between time exposure and occurrence of CVS. Chi-square test was applied to see any significant association between the assessed parameters. **Results:** Result were based on a sample of 289 bank workers (Mean age 32.72±7.02 years) out of whom 266 (92.0%) were male and 23 (8.0%) were female. The apparent diagnosed eye diseases were found in 24.2% of employees while CVS was found in 77.2%. However, most of them had simple adverse symptoms associated with eye health which may probably be due to over exposure to computer screen. These symptoms included eye strain, pain, headache (68.9%), blurriness (67.5%), dryness (49.1%), blinking (46.7%), redness and irritations (44.3%). **Conclusion:** The prevalence of diagnosed eye diseases was high while CVS was positive in 77.2% for at least one symptom.

Keywords: Computer vision syndrome, vision, screen time, visual acuity, eye

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INTRODUCTION

In the current century, technology has completely transformed the workplace with over half of office workers now using computers which has significantly increased work efficiency.¹ The advancement of technology and communication science technologies has changed the way people operate. In developed countries 71% of those who are employed or self-employed use computers and the internet daily.² Employees spend most of their time in front of visual displays of electronic devices such as computers, laptops, smart phones and tablets which produces eye strain.³ Many of the children are also affected by the overuse of electronic devices with visual displays for playing games, text messaging on mobiles, and also completing their school homework in the modern era.⁴

Images and words on computer screens display small points of light called pixels, which are dull at the edges, and glowing towards the centre, making it hard for the human eye to keep up focus. Although technology has made the job very quick and easy, they have also introduced new health-related issue. Long-time exposure to light in certain occupations would be risky for the eyes' visual function.⁵ Anybody who works on a computer for an extended period each day is susceptible to vision issues. The term 'Computer Vision Syndrome' (CVS) sometimes known as 'digital eye strain' describes

the visual and ocular symptoms that some people have after reading textual content that has been electronically presented on an IT application.⁶ CVS is nowadays a major public health problem due to the increased use of electronic devices.⁷

Optometric Association of America (OAOA) explains CVS as a 'group of vision or eye related problems that are the outcome of prolong or overuse of computers, tablets or cell phone'.⁸ Eyestrain, headaches, blurred vision, dry eyes, and neck and shoulder pain are the symptoms of CVS that are most frequently reported. It is unclear why some people have these symptoms. Some academics claim that reading text presented on IT applications requires more effort from the eyes than reading text displayed on more conventional media, such as printed paper.⁹

The incidence of CVS is most common among computer users comprising bankers, clerks, software professionals, gamers, IT professionals, and physicians.¹⁰ Among medical professionals, radiologists are the most vulnerable group due to the distinctive nature of their job.¹¹ Prolong uses of digital electronic devices and computers are the main cause of CVS. According to The American Optometrists Association, 10 million per year eye examinations were done by optometrists for visual problems due to computer use.¹²

Symptoms of CVS vary from blurred vision, dryness of eyes, neck and shoulder pain, eye pain, and

headache. Symptoms that develop due to CVS are temporary and fixed on leaving the computer screen and rest for some time. Factors enhancing the symptom's maturity and severity include room illumination, screen brightness, posture and distance from the screen, etc.

Despite being easily preventable, about 60 million people in the world suffer from symptoms of CVS¹¹ and every year 1 million new cases are reported. People using computers mostly complain about the occurrence of tiredness which is very much common in every country nowadays.¹³ Symptoms of CVS mostly occur from poor lighting, reflection on screen, improper distance of view, uncorrected vision problems, poor posture, or a combination of these factors.¹⁴

A complete eye examination is required to evaluate CVS which shall consist of working history, medication use, various general health problems, or any environmental factors that come up with eye strain. Adding, a refraction test, visual acuity, and how the eye will focus well, move and work together is needed.¹⁵

The current study aimed to determine the prevalence and associated factors related to computer vision syndrome among bank employees in Peshawar.

MATERIAL AND METHODS

This was a descriptive analytical study to find the prevalence and associated factors of complex eye problems in bank workers of major banks in Peshawar from 1st Feb to 31st Jul 2022. A random sampling technique was used for selection of the participants. Only those employees who were using the computers were recruited in the study. The subjects of either gender spending more than 6 hours of time in front of computer screens regardless of having symptoms of CVS were included in the study while candidates with known case of eye and vision problem other than CVS, not willing to participate, wearing glasses for eyesight problems, or using medication for eye symptoms were excluded.

The data collection tool was comprehensive adapted questionnaire consisting of a total of 15 questions. Reverse scoring was done. After the approval from the AS&RB of the Khyber Medical University and the Ethics Committee, permission from bank administration was obtained for the study. After taking the informed consent (verbal and written), data were collected from the participants. The participants were encouraged to fill in the questionnaire on the spot, as to avoid any chance of filling using help from any reference sources. The collected data were tabulated into MS Excel Sheet. Chi-square test was applied for determining the difference between the groups. The data was analysed using SPSS-23.

RESULTS

Out of 289 participants having mean age 32.72 ± 7.02 years, 266 (92.0%) were men and 23 (8.0%) were

women. Among the employees, 95 had 1–5 years of computer experience, 108 had 6–10 years, 54 had 11–15 years, 17 had 16–20 years, and 15 were using computer over 20 years. In our study, 216 (74.7%) computer users usually had distance of 2 feet between eyes and reading material while 43 (14.9%) were keeping 3 feet distance and 30 (10.4%) had 4 feet distance. Majority of the users i.e., 218 (75.4%) spent more than 5 hours in front of the screen and 24.6% worked for 1–4 hours (Table-1).

Among the participants 149 (51.6%) were wearing glasses while working at computer; 159 (55.0%) had no effect on their driving/night vision. The outcomes of eye health and other health consequence may also associated to type of computer (desktop or laptop) used at office and house. In this regard 242 (83.7%) used desktop and only 47 (16.3%) were using laptop. The results show that 70 (24.2%) were having eye problems diagnosed during last years while 219 (75.8%) had no apparent diagnosed case. However, most of them had simple adverse symptoms associated with eye health, which may be probably due to over exposure to computer screen. The mean duration using the computer was 9.08 ± 5.8 years (Range: 1–30 years).

The eye was physically assessed by principle investigator. The results in this regards revealed that 223 (77.2%) were positive for one of more symptoms while 66 (22.8%) were negative. The health problems other than eye, were also explored and the result indicates 249 (86.2%) of bank employees had neck pain and 230 (79.6%) of them experienced shoulder pain while using the computer. This condition was aggravated among those who used computer in office as well at home as 181 (62.6%) participants also worked on computer at home. Only 108 (37.4%) were not using computer other than workstation.

Pain in and around the eyes was reported by 237 (82.0%) of computer users. It was observed in 76 (80%) in early time of screen use (1–5 years) and its frequency was increased to 95 (88%) over a period of additional 4 years. However these differences were non-significant ($p=0.09$). Headache was reported by 68.9% and affected 80% of employees in their first 1–5 years, decreasing to 74.1% among those with 6–10 years of exposure ($p=0.0001$). Blurred near vision was prevalent among 67.5% of the participants and it was found in 51.6% subjects during 1–5 years of exposure while during 6–10 years of exposure, its was seen in 79.6% users compared to 20.4% with normal vision ($p=0.0001$) (Table-2).

Irritated/dry/red eyes/excessive tearing was observed in 49.1% of the employees. The percentage of these symptoms was high in those who had more than 20 years of screen exposure. It was also relatively more prevalent among those who worked 6–10 years on computer screens compared to those who had less exposure time. The differences were not statistically

significant ($p=0.144$). Other symptoms included changes in colour vision found in 46.7% users. Changes in colour vision during 6–10 years of exposure was seen in 59.3% cases compared to 40.7% of normal unaffected eyes ($p=0.01$). Twitching of eyelids was reported by 44.3% subjects. Twitching of eyelids during 1–5 years of work was seen in 32.6% participants, while it increased to 57.4% during 6–10 years and was 48.1% during 11–15 years of exposure. These findings were totally based on clinical assessment of eye during the data collection.

Table-1: Time spent daily in front of computer screen

Time	Frequency	Percentage
30 Minutes	5	1.7
1 Hour	11	3.8
2 Hour	13	4.5
4 Hour	21	7.3
5 Hour	21	7.3
>5 Hours	218	75.4

Table-2: Association of exposure time and related problems [n (%)]

Duration	Associated Problems		p
	Yes	No	
Pain in and around the eyes			
1–5 Years	76 (80)	19 (20)	0.09
6–10 Years	95 (88)	13 (12)	
11–15 Years	40 (74.1)	14 (25.9)	
16–20 Years	12 (70.6)	5 (29.4)	
21 Years and above	14 (93.3)	1 (6.7)	
Total	237 (82)	52 (18)	
Headache			
1–5 Years	76 (80)	19 (20)	0.0001
6–10 Years	80 (74.1)	28 (25.9)	
11–15 Years	26 (48.1)	28 (51.9)	
16–20 Years	10 (58.8)	7 (41.2)	
21 Years and above	7 (46.7)	8 (53.3)	
Total	199 (68.9)	90 (31.1)	
Blurred near vision			
1–5 Years	49 (51.6)	46 (48.4)	0.0001
6–10 Years	86 (79.6)	22 (20.4)	
11–15 Years	35 (64.8)	19 (35.2)	
16–20 Years	13 (76.5)	4 (23.5)	
21 Years and above	12 (80)	3 (20)	
Total	195 (67.5)	94 (32.5)	

Table-3: Comparison of exposure time and CVS symptoms [n (%)]

Duration of screen exposure	Eye Problems		p
	Yes	No	
Irritated/dry/red eyes/excessive tearing			
1–5 Years	39 (41.1)	56 (58.9)	0.144
6–10 Years	61 (56.5)	47 (43.5)	
11–15 Years	27 (50)	27 (50)	
16–20 Years	6 (35.3)	11 (64.7)	
21 Years and above	9 (60)	6 (40)	
Total	142 (49.1)	147 (50.9)	
Changes in colour vision			
1–5 Years	37 (38.9)	58 (61.1)	0.01
6–10 Years	64 (59.3)	44 (40.7)	
11–15 Years	18 (33.3)	36 (66.7)	
16–20 Years	8 (47.1)	9 (52.9)	
21 Years and above	8 (53.3)	7 (46.7)	
Total	135 (46.7)	154 (53.3)	
Twitching of eyelids			
1–5 Years	31 (32.6)	64 (67.4)	0.0001
6–10 Years	62 (57.4)	46 (42.6)	
11–15 Years	26 (48.1)	28 (51.9)	
16–20 Years	2 (1.8)	15 (88.2)	
21 Years and above	7 (46.7)	8 (53.3)	
Total	128 (44.3)	161 (55.7)	

DISCUSSION

Nowadays, a significant trend of early and extensive digital technology exposure and people are increasingly interfacing with digital screens from relatively younger ages, with screen media becoming an ubiquitous component of daily life. Bank staff is at risk of computer vision syndrome due long-term exposure to the computer screen. This is because of increased reliance on the computer and other instruments related to information technology. Consequently, eye illness is becoming a public health issue.

Studies estimate that Computer Vision Syndrome (CVS) affects over 50% of computer users. While symptoms are typically temporary, they often re-occur and can become chronic, significantly impacting person’s wellbeing. Ocular fatigue can be assessed through a combination of subjective and objective measures such as eyestrain, blinking patterns, visual performance and retinal features, each providing unique insights into visual discomfort and strain. However, it is important to note that the correlation between subjective reports of discomfort and objective measurements is not always straightforward or consistent.¹⁶ A study on students as computer users was carried out where the time duration of screen exposure was investigated for eye health outcome. Results showed that screen exposure in the first year of life significantly increased the risk of astigmatism, with the highest risk (3.1 folds) occurring during the first year. Both cumulative years of exposure and daily screen time were associated with increased astigmatism risk.¹⁷ A similar study on university students in the United Arab Emirates (UAE) found that among regular computer users, 53.3% experienced visual issues and headaches, 54.8% reported burning eyes, and 48% had eye fatigue. Female users were more susceptible to eye problems than males.¹⁸ A study on CVS from Nigeria indicates that headache was common in 61.4%, followed by eye strain in 57.8%, and blurred vision in 50.6% of the participants. The length of time spent using a computer, the number of hours spent daily, the height of the computer screen, and taking breaks while using a computer were risk variables that were strongly linked to CVS in that study.¹⁹ In our study, eye pain was a prevalent symptom among computer users affecting 82% of the participants. A cross-tabulation analysis revealed that 80% of users reported eye discomfort during the initial phase of computer use, with this percentage increasing to 88% after four additional years of exposure. Although this increase suggests a trend toward worsening symptoms over time, the differences did not reach statistical significance. Headaches were the second most common significant complaint at 68.9% ($p<0.05$), followed by blurred near vision at 67.5% ($p<0.05$). Our study revealed significant results

regarding the effects of prolonged computer use on ocular health. However, it is important to note that the number of participants with over 20 years of computer use experience was relatively low in our study population. This may have been due to factors that long-term computer users might have moved into management positions with reduced screen time, potentially excluding them from our study criteria.

Past studies showed that prolonged computer use leads to health issues among both workers and students, including repetitive strain injuries, stress, vision disorders, and musculoskeletal problems. Previously, it was noted that the conditions, particularly carpal tunnel syndrome and computer vision syndrome were more prevalent among workers than students. Workers using computers for more than 4 hours daily faced the highest risk of developing these health conditions.²⁰

It is challenging to determine how many new occurrences of neck discomfort are linked to computer use because the majority of studies on the topic are retrospective. A UK population study of adults aged 18–75 years found that 17.9% experienced neck discomfort over a 12-month period.²¹ Our findings reveal that 86.2% of participants experienced neck discomfort, while 79.6% reported shoulder discomfort during computer use. These results may also be correlated with the type and position of device used at work and at home. In this study, desktop computers were used by 83.7% respondents, while mobile devices accounted for only 16.3%.

In addition to the amount of time spent using the desktop, eye and eyesight issues are also related to bad lighting, reflection, illumination variation, vision issues, and unsuitable workstation layout.²² Long-term use of electronic display systems has also been linked to the McCollough phenomenon, a temporary visual anomaly that causes black and white things to seem colored.²³ According to a study by Binyousef *et al*²⁴, the prevalence of dry eye among the workers was 59.0% with severe symptoms. They also suffered from poor performance, having trouble concentrating at work, compared to 17.1% of person with mild and 22.7% with moderate eye dryness. Their study also showed that workers with severe eye problems reported significantly higher impaired work hour (35.8%) compared to those with moderate (6.1%) or mild symptoms (7.1%). According to a study on 150 bank employees investigated for CVS, each participant regularly using a computer for 1–16 hours daily, majority (85%) of the subjects used protective measures (eye-glasses and computer screen guards), but still 68.7% subjects experienced the eye symptoms. The most frequent symptoms were headache (45.4%), itching (38.6%), photophobia (38.0%), visual blur (37.3%) and eye aches (28%). However, overall prevalence of CVS was

29.3%.²⁵ In another study in Ethiopia, among 304 bank employees using computer, a relatively higher (73%) prevalence of CVS was found and working continuously on computers for over 20 minutes doubled the risk of CVS, while eyeglass wearers had triple the risk compared to non-wearers. These symptoms were found associated with un-healthy posture and time duration of the computer usage. Break at different interval was predictor of safety and it prevented the tearing. Using spectacles and seating in the proper position while using the computer for longer time were separately linked to development of eye problems.²⁶ In our study, approximately 52% of the participants were wearing glasses while working on the computer and approximately half (49.1%) of the employees experienced irritated, dry, or red eyes but was statistically non-significant when using a computer for a prolonged period of time.

Other significant symptoms included altered color perception, and eyelid twitching. The alterations in colour perception were 59.3% as compared to 40.7% of the normal during 6–10 years of computer exposure. Eyelid twitching was 32.6% during the first five years, 57.4% during 6–10 years, and 48.1% through 11–15 years of using computer. These findings highlight the substantial impact of computer use on visual health.

CONCLUSION

Prevalence of computer vision syndrome in bank employees was quite high as compared to prevalence reported in general population. Wearing eyeglasses and sitting in the proper position when using the computer for longer than 20 minutes may reduce the onset of computer vision syndrome.

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