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ORIGINAL ARTICLE

# Prevalence of Computer Vision Syndrome and Its Related Factors in Employees of Sabzevar University of Medical Sciences

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## ABSTRACT

**Background:** Computers are an essential part of daily life. However, their usage can lead to vision issues, such as Computer Vision Syndrome (CVS). Accordingly, this study examines the syndrome among employees of Sabzevar University of Medical Sciences and explores the factors contributing to its occurrence.

**Methods:** This study examined 86 employees from three areas: students, education, and research. It was descriptive and analytical. A validated questionnaire was used to gather data on demographics and CVS symptoms. Screen and room brightness were measured using a Hagner S4 photometer. Data analysis was performed using t-tests and descriptive statistics in Stata.

**Results:** Among the 86 employees, 51 were female and 35 were male. The majority of individuals affected by CVS aged between 30 and 40. Thirty-one employees exhibited early signs of CVS, with the highest prevalence seen in the research department (46.15%). Gender was the sole contributing variable, with a higher prevalence among women ($p = 0.035$). The overall prevalence of CVS was 34.88%.

**Conclusion:** CVS is a prevalent syndrome among employees. Furthermore, female employees displayed a higher prevalence of CVS. To improve employee well-being and performance, ergonomic training and visual exercises should be trained and implemented in the workplaces.

**KEYWORDS:** *Visual Syndrome; Employees; Office Work; Occupational Health*

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## INTRODUCTION

In contemporary society, information technology and computers have become integral parts of everyday life, permeating all aspects of social activity, from educational institutions to workplaces. These technologies play a crucial role in shaping and advancing lifestyles, with their influence continually expanding and gaining significance [1]. With the advent of computers in the workplace, activities such as typing, reading, writing, and other related tasks have undergone significant transformation. While these changes have led to improvements in both the speed and quality of work, they have also introduced health-related issues, notably physical inactivity and sedentary behavior among individuals [2]. Among the occupational health and safety concerns associated with computer use, visual problems such as Computer vision syndrome (CVS) are among the most prevalent and widely reported [1]. This increased reliance on computers has led to an increase in the number of patients seeking treatment at ophthalmology clinics and eye care centers [3].

CVS is a collection of visual, ocular, and musculoskeletal symptoms that develop as a result of prolonged and continuous computer use. With the increasing integration of computers into work environments, users often spend several hours daily in front of screens. The most commonly reported symptoms include eye fatigue, irritation, burning sensations, blurred vision, and headaches. Recent studies suggest that the severity of these symptoms increases after extended periods of near work on screens, although the underlying physiological mechanisms remain not fully understood [4, 5].

Multiple studies have reported that the prevalence of CVS symptoms ranges between 64% and 90% among computer users. For example, a survey showed that approximately 75% of individuals working 6 to 9 hours daily in front of screens expressed visual complaints, whereas this figure is about 50% among those with shorter exposure. In an Indian study, 46.3% of computer users reported experiencing multiple CVS-related symptoms such as fatigue, dryness, and ocular pain. Similarly, in Brazil, 54.6% of call center operators exhibited signs of CVS. The intensity of symptoms correlates directly with visual demand and duration of computer use, with longer exposure leading to more severe symptoms. Surveys indicate that approximately 14.5% of patients seek ophthalmic consultation and burning eyes (77.2%) due to eye problems related to computer use, and the presence of CVS, which not only causes visual discomfort but also adversely impacts quality of life and productivity [6-8].

The results of the review study by Anbesu et al. indicated that the overall prevalence of CVS among office workers is 66%. Subgroup analysis based on different countries revealed that the highest prevalence was reported in Pakistan (97%) and the lowest in Japan (12%) [9].

Studies classify CVS-associated factors into personal and environmental categories. Personal factors include poor posture, incorrect viewing distance and angles, age, health conditions, and prolonged computer use. Environmental factors involve poorly designed workstations, inadequate lighting, low contrast or resolution, glare, and uneven lighting [10, 11]. Singh et al. studied 400 young adults (average age 22.5), finding that 20% experienced multiple ocular symptoms: 9% with eye pain, 8% with dry eyes, and 6% with watering or redness. Less than 5% reported other symptoms, while 9% had no symptoms [12].

Although early treatment of CVS yields positive outcomes, many users experience complications due to a lack of awareness about the underlying causes of their problems [13]. Erum Shahid reported the prevalence of various symptoms of computer vision syndrome, including headache, eye fatigue, eye watering, redness, blurred vision, and neck pain. Headache was the most prevalent, affecting 69 patients (46%), followed closely by tired eyes in 67 patients (45%). The least common symptom was watering of the eyes, observed in 23% of the subjects (3]. Mark Rosenfield's study also identified eye fatigue and dryness as common issues, and previous research suggests that up to 90% of computer users are affected by CVS [14]. Conversely, Qasemi assessed users' awareness of CVS as very low [15].

Since CVS is increasingly becoming a major public health issue worldwide, and given the lack of specific data on its prevalence and related factors of CVS among the staff at Sabzevar University of Medical Sciences, this study was conducted to assess the prevalence of CVS and its associated factors among administrative employees. Understanding the particular personal and environmental factors affecting this group can lead to more effective strategies for reducing symptoms and preventing the syndrome, thereby improving eye health and overall quality of life. Additionally, the findings of this research could help develop targeted and efficient intervention programs for university officials and public health authorities.

## MATERIALS AND METHODS

The present study was a descriptive-analytical, cross-sectional investigation aimed at determining the prevalence of Computer Vision Syndrome (CVS) and its associated factors among employees of Sabzevar University of Medical Sciences. To evaluate the prevalence, a validated checklist was used, which included demographic questions and items related to symptoms of CVS.

A self-administered questionnaires supplemented by observational checklists were used to collect sociodemographic data, symptoms_of CVS (such as itching, burning, dryness, blurred vision or photophobia) [16], details of computer usage, potential risk factors such as computer viewing angle, the brightness of the surrounding environment, use of adjustable office chairs, and height-adjustable document holder or keyboards, which can affect the prevalence of CVS [17], were considered. Additionally, knowledge of computer users was described as understanding the meaning of CVS [18]. The data collection was carried out by an optometry BSc degree graduate. A supervisor was also involved in monitoring data collection and checking the completeness of the questionnaires. We distributed the checklist to all 86 administrative employees across three divisions: Student Affairs, Educational Affairs, and Research Vice-Chancellorships. According to an ophthalmologist's assessment, individuals reporting at least three ocular or non-ocular symptoms indicative of visual syndrome were classified as exhibiting early signs of CVS and were then referred to an optometrist for a comprehensive eye examination.

The inclusion criteria for the study specified that participants had to spend at least six hours per day in front of a computer screen for a minimum of three consecutive months, possess relatively good eye health, and not have ocular diseases that could influence CVS symptoms. Participants also needed to be volunteers who were well-informed, had given their consent, and expressed satisfaction to take part in the study. Exclusion criteria included individuals undergoing treatment for chronic eye conditions such as keratoconus, cataracts, glaucoma, or other ocular diseases; those unable to participate throughout the study period due to medical reasons, general health issues, emergencies, or hospitalization; and those who experienced temporary or permanent changes in their work or daily activities that prevented them from working with a computer.

To investigate the effect of environmental factors on eye health, a photometer model Hagner S4 was used to measure both screen and room brightness. The device was placed at the appropriate distance from the user's eyes during measurements to accurately reflect screen luminance, recorded in candelas per square meter (cd/$m^2$). For screen brightness, the measurements were taken with the device positioned at the user's eye level while working, at their usual viewing distance from the monitor. Room brightness was assessed locally at each participant's workstation between 8–10 am and 12–2 pm, corresponding to the start and end of working hours. Ambient illumination was recorded in lux (lx), and multiple measurements were conducted to account for variability, with the lowest and highest levels during these times documented.

Both the distribution of the checklist and the brightness measurements were performed simultaneously to ensure consistency in environmental conditions. Data analysis was carried out using Stata software, employing t-tests and descriptive statistics such as mean and standard deviation. The variables investigated as potential risk factors included screen brightness, room lighting, and duration of daily computer use. These factors were chosen because existing evidence suggested that inappropriate screen luminance and suboptimal ambient lighting could contribute to eye strain and increase the risk of CVS. Additionally, longer daily exposure to computer screens was hypothesized to correlate with a higher prevalence of symptoms, making these environmental and behavioral variables crucial for identifying modifiable risk factors to reduce CVS among employees.

## RESULTS

The present study was conducted on 86 employees working in three areas: education (42), student (31), and research vice-chancellors (13) with an average work experience of 5 years. The highest number of employees had a bachelor's degree (Table 1). Based on the results, 31 people were identified with early symptoms of visual syndrome. Among the participants, only 30.9% had a specific disease, 63.11% of whom were using a specific drug that did not affect eye function. , and only 1 person had a history of surgery. Also, About 57% of participants had previously visited an ophthalmologist. Among people with computer vision syndrome, 83.33% had no family history of any eye disease, and 94.44% of affected people were known to be free of any specific disease.

The highest number of affected and healthy individuals was in the age range of 30 to 40 years.

Although the research department had fewer personnel than the educational and student departments, the number of people with CVS was higher (46.15%). Additionally, the group with 10-15 years of work experience was smaller (9 people) compared to other departments, yet they exhibited the highest percentage of the syndrome (44.44%).

The results of Table 1 show that the prevalence of CVS in the study population was 36.04%. Only gender had a significant relationship with the incidence of this syndrome (p-value = 0.035); %45.10 of women and %22.86 of men were affected. In different age groups, the proportion of affected people decreased with age, but this change was not statistically significant (p-value = 0.179). Also, none of the variables of the field of activity (p-value = 0.700), previous job (p-value = 0.701), work experience (p-value = 0.467), and education (p-value = 0.309) showed a significant relationship with the incidence of the syndrome.

Table 2 shows that eye and non-eye problems significantly affected employees and were caused by continuous computer use. Symptoms such as dry eyes or foreign body sensation at 18.60% and eye fatigue or pain at 37.21% were identified as the most common eye problems, while blurred vision and light sensitivity were also significant at 32.56% and 25.58%, respectively. On the other hand, non-eye problems also included general body fatigue and neck, shoulder, and back pain with a prevalence of 29.07% and 55.81%, respectively as the most common symptoms. Also, headache, which is one of the most common symptoms of working with a computer and can be caused by continuous eye movements, stress, and environmental conditions such as light and noise, was observed with a prevalence of 27.91% among employees. Most people (81 people) used a desktop computer; there was no significant difference between the two groups based on the distance between the eyes and the monitor screen.

Table 3 shows that affected individuals spent less time looking around when using a computer. Their rest periods were also shorter: 36.48% compared to 63.5% for healthy individuals. The study showed that the distance from their eyes to the computer screen was over 40 centimeters. Also, 69 people used both natural

***Table 1.*** Prevalence of computer vision syndrome based on demographic characteristics

| Variable | Total N | Affected (%) | Healthy (%) | p-value |
|---|---|---|---|---|
| Age | | | | |
| <30 | 30 | 12 (40%) | 18 (60%) | 0.179 |
| 30-40 | 32 | 14 (43.75%) | 18 (56.25%) | |
| >40 | 24 | 5 (20.83%) | 19 (79.17%) | |
| Gender | | | | |
| Female | 51 | 23 (45.10%) | 28 (54.90%) | 0.035 |
| Male | 35 | 8 (22.86%) | 27 (77.14%) | |
| Field of Activity | | | | |
| Educational | 42 | 14 (33.33%) | 28 (66.67%) | 0.7 |
| Research | 13 | 6 (46.15%) | 7 (53.85%) | |
| Student | 31 | 11 (35.48%) | 20 (64.52%) | |
| Previous Employment | | | | |
| Yes | 19 | 6 (31.58%) | 13 (68.42%) | 0.701 |
| No | 66 | 24 (36.36%) | 42 (63.64%) | |
| Work Experience | | | | |
| >5 years | 32 | 12 (37.50%) | 20 (62.50%) | 0.467 |
| 10-May | 23 | 10 (43.48%) | 13 (56.52%) | |
| 15-Oct | 9 | 4 (44.44%) | 5 (55.56%) | |
| >15 years | 22 | 5 (22.73%) | 17 (77.27%) | |
| Education | | | | |
| Associate Degree or Lower | 16 | 3 (18.75%) | 13 (81.25%) | 0.309 |
| Bachelor's Degree | 38 | 15 (39.47%) | 23 (60.53%) | |
| Master's Degree | 32 | 13 (40.63%) | 19 (59.38%) | |

***Table 2.*** Frequency distribution of symptoms related to computer vision syndrome

| Symptoms | Frequency | Frequency(%) |
|---|---|---|
| Ocular Problems | | |
| Eye fatigue/pain | 32 | 0.372 |
| Blurred vision | 28 | 0.326 |
| Light sensitivity | 22 | 25.60% |
| Dry eyes/burning/foreign body | 16 | 18.60% |
| Redness/tearing | 7 | 8.10% |
| Non-Ocular Problems | | |
| General body fatigue | 25 | 29.1% |
| Neck/shoulder/back pain | 48 | 55.8% |
| Headache | 24 | 27.9% |

***Table 3.*** Prevalence of computer vision syndrome according to its associated variables

| Variables | Diagnosed with Syndrome (%) | Healthy (%) | Total (%) | p-value |
|---|---|---|---|---|
| Type of Work | | | | |
| Internet browsing | 24 (43.6) | 31 (56.4) | 55 | |
| Typing | 25 (43.1) | 33 (52.9) | 58 | |
| Email | 17 (45.9) | 20 (54.1) | 37 | |
| Graphics | 2 (45) | 6 (75) | 8 | 0.05 |
| Gaming | 2 (66.7) | 1 (33.3) | 3 | |
| Office automation | 24 (35.8) | 43 (64.2) | 67 | |
| Other | 7 (38.9) | 11 (61.1) | 18 | |
| Distance to Screen | | | | |
| Less than 30cm | 8 (44.4) | 10 (55.6) | 18 | |
| 30-40cm | 1 (33.3) | 2 (66.7) | 3 | 0.739 |
| More than 40cm | 22 (33.8) | 43 (66.2) | 65 | |
| Bulb Type | | | | |
| Fluorescent | 30 (37.0) | 51 (63.0) | 81 | 0.65 |
| Incandescent | 1 (20) | 4 (80) | 5 | |
| Breaks During Work | | | | |
| Yes | 19 (32.8) | 39 (67.2) | 58 | 0.361 |
| No | 12 (42.9) | 16 (57.1) | 28 | |
| Mobile Use (hours) | | | | |
| Less than 1 hour | 16 (34.8) | 30 (65.2) | 46 | 0.793 |
| More than 1 hour | 15 (37.5) | 25 (62.5) | 40 | |
| Reflection on Screen | | | | |
| Yes | 10 (47.6) | 11 (52.4) | 21 | 0.204 |
| No | 21 (32.3) | 44 (67.7) | 65 | |
| Looking Around | | | | |
| Yes | 27 (36.5) | 47 (63.5) | 74 | 0.001 |
| No | 4 (33.3) | 8 (66.7) | 12 | |

and artificial light while working. Among those studied, 58 took breaks while using the computer. 71 people used an adjustable computer chair.

Table 2 shows that both eye and non-eye issues greatly affected employees from constant computer use. The most common eye symptoms included: dry eyes or foreign body sensation (18.60%), eye fatigue or pain (37.21%), blurred vision (32.56%), and light sensitivity (32.56%). Non-eye issues included general body fatigue and neck, shoulder, and back pain, with prevalences of 29.07% and 55.81%. Headaches can come from long eye movements, stress, or things like light and noise. About 27.91% of employees reported having them.

Factors like computer work type and ergonomic behaviors influence computer vision syndrome prevalence (Table 3). Improving the working environment and adhering to ergonomic principles can reduce symptoms, though further research is needed on lighting, distance, and breaks. The highest prevalence occured during internet searching (63.43%) and typing (43.10%), both significantly linked to the syndrome ($p = 0.05$). Furthermore, eye-to-screen distance less than 30 cm or over 40 cm showed no significant association ($p = 0.739$), but maintaining proper distance may help lessen symptoms. Additionally, the operator's position relative to windows does not significantly impact syndrome occurrence ($p = 0.644$), highlighting the importance of appropriate environmental conditions in the workplace. In mobile phone usage, the highest prevalence of the syndrome was among individuals who send the most messages, and looking around while working was significantly associated with a reduced risk of developing the syndrome.

## DISCUSSION

CVS is a syndrome and by definition, a syndrome is a collection of symptoms. In the study by Rosenfield M. (2016), CVS is characterized by the presence of at least 3 symptoms including dry eyes, blurred vision, and headache [19]. The use of computers and video display terminals has caused major changes in the routine professional behaviors of millions of people. In our study, the most common ocular complaints, in descending order, were eye Eye fatigue/pain, blurred vision, light sensitivity, dry eyes/burning/foreign body and redness/tearing.

The high prevalence of eye fatigue (asthenopia) complaints (46.3%) in computer operators in this study is consistent with the results of similar studies by Agarwal et al. on 150 computer users at Teerthanker Mahaveer University, India, and Mocci et al. on employees of an Italian bank, which were reported as 53% and 31.9%, respectively [7, 16].

Based on the findings, the prevalence of computer vision syndrome in the study population was reported to be 36.04%, which was lower than in other similar studies [3, 20]. One possible reason for this difference could be related to the type of activities individuals engage in and the duration of time spent on computer use, which differ from the conditions of the participants in this study. Among the demographic factors, only gender had a statistically significant relationship with the prevalence of this syndrome, with 74.19% of CVS sufferers being women. In a review by Fentahun Adane et al., the results of eight eligible studies showed that the prevalence of computer vision syndrome (CVS) among computer users in Ethiopia was 73.21%. The highest prevalence of CVS was reported among bank employees at 73.76%, and the most common symptom was blurred vision, which was observed in 34.26% of users [21], which is consistent with the results of this study (32.56%). This symptom can be caused by severe eye fatigue and indicates possible damage to vision and the need to rest and adjust the light conditions.

In a study by Eva Artime-Ríos et al., examining computer vision syndrome in healthcare workers, they concluded that the prevalence of computer vision syndrome was 56.75% in 622 of the study subjects, which was higher compared to the results of this study. The reasons for this can be attributed to the different types of work and rest periods during work, with office workers having more time to rest due to the type of task assigned. In the aforementioned study, this syndrome was significantly associated with female gender and morning shifts with rotating shifts in the group of physicians and surgeons, and with female gender, work experience between 10 and 20 years, and duration of exposure to screens and software in the group of nurses. In general, a high prevalence of CVS was observed among healthcare workers, and risk factors were related to job affiliation [22]. In the present study, gender was also significantly associated with the prevalence of computer vision syndrome (p-value = 0.035), which showed a higher prevalence of the syndrome among women. Hormonal changes in women, particularly during pregnancy and menopause, as well as stress and psychological pressures, can affect eye health and increase the likelihood of visual problems [23].

Given that the prevalence of computer vision syndrome among the research assistant staff was high compared to their population, the reason for this can be attributed to their greater use of computers to perform research activities, including searching the Internet and typing. According to the results, these two types of computer use also had a statistically significant relationship with the prevalence of CVS.

In this study, the most common ocular and non-ocular complications were reported as eye fatigue or pain, neck pain, shoulder pain, and back pain, respectively, which was consistent with the study of Samawati et al. and the study of Azimi et al. [3, 13]. In the study of Amar Das et al. on the subject of computer vision syndrome, musculoskeletal problems, and stress among visual display terminal users in Nepal, the prevalence of CVS was 89.4%. More than eight out of ten participants in the study reported at least one visual and musculoskeletal symptom. Work-related stress, which was moderate to difficult to control, was present in 36.7% of the study population. The average daily computer use was 7.9 ± 1.9 hours. Eye fatigue (63.3%), dry eyes (57.8%), and headache (56.9%) were reported as common symptoms of CVS vision, and there was no statistically significant relationship between CVS vision, musculoskeletal symptoms, and stress with gender [24]. This is in contrast to the results of this study, which stated that non-ocular problems such as general body fatigue and neck, shoulder, and back pain were the most common symptoms, with a prevalence of 29.07% and 55.81%, respectively. The reason for this can be attributed to the type of work, the duration of computer use, and in particular, the rest intervals during computer use, since the duration of each task in the studied personnel is short and the personnel have the opportunity to rest their eyes and skeleton.

Monitor brightness and local lighting in this study, like the study by Azimi Khorasani et al. [13], did not show any effect on the development of computer vision syndrome, although studies have shown that these factors can contribute to eye fatigue. Among the reasons for this are factors such as the physical and environmental differences between these studies, as well as the importance of focusing on other variables, including the duration of exposure to the screen and eye relaxation techniques. Also, improving the working environment and adhering to ergonomic principles can reduce symptoms, though further research is needed on lighting, distance, and breaks.

## CONCLUSION

Continuous use of computers and video display terminals has caused numerous ocular and non-ocular problems in users. The high prevalence of computer vision syndrome and ocular problems such as dry, blurred vision, and eye fatigue indicates the need for preventive measures. Demographic factors, especially gender, have a significant impact on the prevalence of these problems, which should be considered in intervention programs. To improve the situation, it is recommended to take regular breaks, adjust the ambient light, use anti-glare filters, and educate users on correct computer work methods. Also, policies should be developed to reduce the duration of work in some areas and improve the ergonomic conditions of the workplace. Continuous information and education of users on visual and skeletal care will play an important role in reducing the prevalence of such problems.

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All authors have approved the final manuscript and are responsible for all aspects of the work.

**AI Statement**
During the preparation of this work, the authors used ChatGPT to assist with the initial translation of some sections from Persian to English and for language editing and grammar improvement. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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