Original Research Article

A Hospital Based Observational Study to Evaluate Post Covid Computer Vision Syndrome

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Abstract

Aim: The aim of the present study was to assess post covid computer vision syndrome.

Methods: The present study was conducted in the Department of Ophthalmology for 12 months .200 participants were included in the study.

Results: The female participants were the majority and accounted for 52%, while the males constituted 48%. Most of the patients belonged to 21-40 years of age. Concerning their education level, 17% were in primary school. Most of the children were from the city side, accounting for 64%, whereas those from the village were 36%. Headache was the most selected symptom followed by tearing, itching, blurred vision, eye pain eye redness, burning, excessive blinking and dryness. Other minor selected symptoms were double vision and colored halos around objects. Female gender was significantly associated with an increased risk of CVS as compared with males and participants in the higher age groups were significantly associated with a high prevalence of CVS as compared with participants in the age group of 13 to 15 years. Participants at intermediate and secondary schools were also at high risk of CVS. Lastly, symptoms experienced before COVID and increased severity of symptoms with COVID were also independent predictors (risk factors) of CVS among the studied participants.

Conclusion: A significant association between prevalence and demographic factors, such as age, gender, and education level, was established. A significant association between the prevalence of CVS and symptoms before and during the COVID-19 pandemic was also established. The main signs associated with CVS included headache, tearing, itchiness, blurred vision, eye redness, eye pain, and dryness.

Keywords: covid, computer vision syndrome

Introduction

Computer vision system (CVS), also known as digital eye strain (DES), is a common repetitive eye strain disorder with ocular symptoms including eyestrain, tired eyes, irritation, and blurred vision. CVS can also present with non-ocular symptoms, such as headache, neck, and shoulder pain. Risk factors include uncorrected refractive error, close working distance, small font size, and excessive exposure to intense light. [1–4] Management of CVS is preventative, including strategies such as appropriate correction of refractive errors, management of vergence anomalies, and blink training to maintain normal blinding patterns. [1,3,4]

Nowadays, looking at electronic screens has become an inseparable part of our lives. This was more exaggerated ever since the beginning of the coronavirus disease of 2019 (COVID-19) Pandemic. Extended hours of studying and spending leisure time on electronic screens may lead to increased prevalence of computer vision syndrome (CVS) which is known as digital eye strain. It is defined by the American Optometric Association as "a group of eye-and vision-related problems that result from prolonged computer, tablet, e-reader and cell phone use". [5] The most common manifestations of CVS are eye strain, headache, blurred vision, dry eyes as well as neck and shoulder pain. Additionally, poor

lighting, glaring at digital screens, improper viewing distances and poor sitting posture may exacerbate and worsen these symptoms.

Recent studies have shown that there are two categories of risk factors associated with CVS [6]: those that are of personal origin (such as poor posture while sitting, the incorrect distance between the eyes and the screen, the wrong viewing angle, the presence of medical conditions, and prolonged computer exposure) [7] and those that are computer and environmental factors (which include inadequate workstations, insufficient lighting, poor contrast and resolution, the increased presence of screen glare, excessive brightness, and light imbalance between the screen and the surrounding work environment). [8,9] For the past two decades, CVS has become a highly relevant health problem that affects the entire population. [10] A systematic review and meta-analysis study found that the pooled prevalence of CVS is 66%. [6]

In addition, the COVID-19 pandemic and the subsequent lockdowns have led to a significant increase in the use of ED worldwide. That massive increase in the use of ED has created a conducive environment for the development of CVS, which increases the risk of experiencing its associated visual, ocular, and extraocular symptoms. [11] During this global crisis, many people have experienced a significant increase in time spent on technology- related activities, such as working from home, participating in virtual meetings, and engaging in online entertainment. [12,13] This change in screen use habits has led to an increased risk of developing CVS. [14]

The aim of the present study was to assess post covid computer vision syndrome.

Materials and Methods

The present study was conducted in the Department of Ophthalmology, Patna Medical College and Hospital and Multicentric Hospital, Patna, Bihar, India for 12 months 200 participants were included in the study.

Inclusion criteria included who encountered covid-19 and used their laptops or tablets or mobile phones or any video terminal devices during studying for at least one month before the study.

Exclusion criteria included participants with known ocular pathology like glaucoma, strabismus, severe trauma, undergone refractive surgery for vision correction within the last 6 months or other ocular or eyelid surgeries that may affect the ocular surface health. Also, participants with underlying systemic illness like hypertension, diabetes, autoimmune disorders or using medications that have known visual side effects like (isotretinoin, bisphosphonates, cyclosporine, tetracyclines,

hydroxychloroquine, anti-tuberculosis and anticholinergics) and those who apply topical eye drops other than artificial tears (corticosteroids, antibiotics, antivirals, glaucoma medications, anesthetics or mydriatics) were excluded from the study.

Data Collection and Study Tools

Questionnaires were designed and sent to experts for content validity before administering to the participants. The questionnaires used were standardized to provide consistency, reliability, and validity in quantitative analysis. The data were collected via an online self-administered questionnaire sent to the sample of the participants selected through emails. Sociodemographic characteristics, such as age, gender, education level, parents' education, and occupation, were assessed first. The primary endpoint of the questionnaire was to determine the prevalence of CVS using the frequency and intensity of the symptoms experienced by the participants according to the Computer Vision Syndrome Questionnaire (CVS-Q). [15] The frequency was evaluated as follows for each of the 16 components of the questionnaire: never, which means no symptom at all and is given a score of 0; occasionally, which means sporadic or once a week and is given a score of 1; often, which means at least twice weekly and is given a score of 2. The intensity was evaluated similarly but had only two categories: moderate is given a score of 1; intense is given a score of 2. Then, for each symptom, the frequency score was multiplied by the intensity score, and the result was adjusted as follows: $0 = 0$; 1 or $2 = 1$; $4 = 2$. The recorded result for each of the 16 symptoms was added to give a total score. A total score >6 was considered a CVS case.

Data Analysis

The standard computer program IBM SPSS Statistics for Windows, version 20.0 (IBM Corp., Armonk, NY, USA) was used to enter, organize, tabulate, and analyze data. Social sta- tus and demographic data were tabulated and articulated as the percentage and frequency of the total participants. Pie charts and bar graphs were used to illustrate the frequency distribution of the different variables. The chi-square test was used to test the significance of the association of the stated variables. The analysis covered the significant association between the prevalence of CVS and demographic characteristics, the relationship between CVS symptoms before and during the COVID-19 pandemic, and the opinion of the participants toward their health status performance during the COVID-19 pandemic period. Multivariate logistic regression analysis was used to assess the participants' independent predictors (risk

factors) of CVS. A p-value less than 0.05 was considered statistically significant.

Results

Table 1: Demographic characteristics of the study participants

	Variables	N	%
Gender	Girls	104	52
	Boys	96	48
Age	<20 years	20	10
	21-40	64	32
	41-60	90	45
	>60 years	26	13
Area	Urban	128	64
	Rural	72	36
Education level	Primary	34	17
	Secondary	40	20
	Uneducated	24	12
	Bachelor's/associate degree	102	51
Chronic disease	Asthma	8	4
	Diabetes	8	4
	Hereditary blood disease	4	2
	Other	10	5
	Do not have any chronic disease	162	81

The female participants were the majority and accounted for 52%, while the males constituted 48%. Most of the patients belonged to 21-40 years of age. Concerning their education level, 17% were in primary school. Most of the children were from the city side, accounting for 64%, whereas those from the village were 36%.

Table 2: Frequency of eye symptoms reported during COVID-19

Eye symptoms	N	%
No symptoms	96	48
Headache	80	40
Feeling that sight is worsening	24	12
Colored halos around objects	16	8
Increased sensitivity to lights	20	10
Difficulty focusing near vision	22	11
Double vision	16	8
Blurred vision	42	21
Dryness	32	16
Heavy eyelids	18	9
Eye pain	38	19
Eye redness	34	17
Excessive blinking	30	15
Tearing	60	30
Feeling of foreign body	18	9
Itching	48	24
Burning	32	16

Headache was the most selected symptom followed by tearing, itching, blurred vision, eye pain eye redness, burning, excessive blinking and dryness. Other minor selected symptoms were double vision and colored halos around objects.

Table 3: Logistic regression analysis of risk factors of CVS among the pupils

Factors	*p*-Value
Gender	
Male	Ref
Female	0.038
Age groups	
13 to 15 years	Ref
16 to 17 years	0.003
6 to 12 years	0.009
School Level	
Primary	Ref
Secondary	0.006
Uneducated	0.042
Experienced symptoms before COVID	
No	Ref
Yes	<0.001
The severity of symptoms increased with COVID	
No	Ref
Yes	<0.001

Female gender was significantly associated with an increased risk of CVS as compared with males and participants in the higher age groups were significantly associated with a high prevalence of CVS as compared with participants in the age group of 13 to 15 years. Participants at intermediate and secondary schools were also at high risk of CVS. Lastly, symptoms experienced before COVID and increased severity of symptoms with COVID were also independent predictors (risk factors) of CVS among the studied participants.

Discussion

Computer vision syndrome (CVS) has become a significant public health issue across all age groups due to the increased use of electronic devices, such as computers, laptops, smartphones, tablets, and e-readers. [16,17] The American Optometric Association defines CVS as a group of complications correlated to vision and eye that result from prolonged digital screen view. [16,18] This syndrome is associated with various symptoms, such as "eye strain, blurred vision, dry eyes, headache, and neck and shoulder pain". CVS can also lead to eye irritation, redness, or burning. [19] Using a computer or any digital device for more than 3 h a day may lead to an experience of CVS. Furthermore, approximately 60 million individuals are diagnosed with CVS globally, where a million new CVS cases transpire annually. [20]

The female participants were the majority and accounted for 52%, while the males constituted 48%. Most of the patients belonged to 21-40 years of age. Concerning their education level, 17% were in primary school. Most of the children were from the city side, accounting for 64%, whereas those from the village were 36%. Headache was the most selected symptom followed by tearing, itching, blurred vision, eye pain eye redness, burning, excessive blinking and dryness. Other minor selected symptoms were double vision and colored halos around objects. Regarding the signs and symptoms of CVS, headaches were the most selected symptoms by the participants, closely followed by tears. Other significant cases of itching, blurred vision, redness, eye pain, and excessive blinking were reported. A study by Shanta kumari N et al [21] on computer vision problems among university students suggested that headache was the main symptom reported because of the extensive use of computers for long hours, which resulted in eye fatigue. The authors of Iqbal Met al [22] also reported blurred vision and eye redness among medicine students. Other studies [23,24] reported eye dryness as one of the symptoms of CVS. Therefore, on the basis of evidence from the literature and the current study, it can be concluded that the probability of occurrence of eye symptoms in children with CVS is high. The current study established a significant association between the prevalence of CVS and symptoms experienced before and during the COVID-19 pandemic. In addition to headache as the main sign reported, tearing and itchiness of the eyes were among the most commonly reported symptoms. In a previous study [29], the most typical symptoms reported were itchiness and dryness of the eye. The reported main risk factors were a pre-existing ocular disease, myopia, excessive screen time, and reduced outdoor activities. Similar reported results were established in studies by Loebis R et al and Li R et al. [24,25]

Female gender was significantly associated with an increased risk of CVS as compared with males and participants in the higher age groups were

significantly associated with a high prevalence of CVS as compared with participants in the age group of 13 to 15 years. Participants at intermediate and secondary schools were also at high risk of CVS. Lastly, symptoms experienced before COVID and increased severity of symptoms with COVID were also independent predictors (risk factors) of CVS among the studied participants.

Conclusion

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