ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF CLINICAL PHARMACOKINETICS AND MEDICAL SCIENCES
Published by Pharma Springs Publication Journal Home Page: https://pharmasprings.com/ijcpms/

Estimation of Risk Factors for Computer Vision Syndrome and Impact of Clinical Pharmacist

Bygari Sathyanarayana Reddy[1], Amasa Anusha[*1], Nallasiddu Sushma[1], Singareddypalli Nagabuushanachari Yogesh[1], Leela Prasad Babu K[2], Chinnikrishnaiah V[1], Swarnalatha D[1]

[1]Annamacharya College of Pharmacy, New boyanpalli, Rajampet (M), Y.S.R (Dist)-516126, Andhra Pradesh, India
[2]Department of General Medicine, Government General Hospital, Kadapa, Andhra Pradesh, India

Article History:

Received on: 05 Dec 2021
Revised on: 22 Dec 2021
Accepted on: 24 Dec 2021

Keywords:

Computer Vision Syndrome,
Ocular Symptoms,
Extra Ocular Symptoms

ABSTRACT

Computer use has become ingrained in our daily lives. The increased usage of computers has resulted in an increase in the number of people suffering from ocular symptoms that have been labelled as computer vision syndrome (CVS). It's impossible to pinpoint a single etiologic element that produces computer vision syndrome; instead, it's a complex mix of factors. It is a prospective, interventional study conducted on online carried out from December (2020) to may (2021). Data collected from online Google forms and the sample size enrolled in the study was 236. According to our study we come to know that males (62.1%) are more affected than females (37.9%) and 20-30 years age category subjects are more affected than 31- 40 years and also students are more affected when compared to females. The most common symptoms the most common symptoms that we observed in our study are eye burning, eye itching, watery eyes, blurred vision and dryness of eyes all these are ocular symptoms. Among extraocular symptoms most common are neck pain, back pain, headache, shoulder pain. The responses what we received are 236 members out of these 97 members are lack of knowledge while handling the computers, so after those who are having poor knowledge we provided a patient information leaflet and suggested them to follow the tips for 28 day period. After 28 day period 75% of the computer users gained knowledge.

*Corresponding Author

Name: Amasa Anusha
Phone: 7036700191
Email: Svanu3333@gmail.com

eISSN: 2583-0953

DOI: https://doi.org/10.26452/ijcpms.v1i4.257

Production and Hosted by

Pharmasprings.com

INTRODUCTION

Computer use has become an integral element of daily life. This increase in computer use has resulted in an increase in the number of people suffering from ocular complaints known as computer vision syndrome (CVS). The American Optometric Association defines computer vision syndrome (CVS) as "a complex of eye and vision problems related to activities that stress near vision and are experienced in relation to or during the use of computers."

If children play computer games too much, they may develop physical and psychological difficulties. With the right furnishings, proper posture, and good behaviours like taking rest breaks and limiting time spent playing computer games, you can reduce or eliminate these dangers [1].

Etiology

It's difficult to pinpoint a single etiologic element that causes computer vision syndrome, but it's likely a combination of factors.

Prolonged working hours, insufficient rest breaks, and continual looking at a single source are all common causes of computer vision syndrome.

Uncorrected Vision Problems

The severity of computer vision syndrome might be exacerbated by pre-existing uncorrected vision impairment. Because their glasses aren't meant for gazing at a computer, people who are issued eyeglasses must tilt their heads at strange angles. To stare at the computers, they assume postures that may or may not be ergonomically correct. Muscle spasms or soreness in the neck, shoulder, or back can result from such postures [2]. Computer Vision Syndrome and Digital Eye Strain are caused by a variety of factors. One typical problem is that our eyes were never designed to stare at items up close, whether on an electronic gadget or otherwise, for long periods of time. In reality, with a view distance of 20 feet, our eyes are normally at rest, thus gazing at something like a phone, tablet, phone, tablet, or computer, which is typically 18-24 inches away from us, puts additional strain on our eyes. Poor posture and device orientation are another factor that contributes to Computer Vision Syndrome and Digital Eye Strain. We frequently slouch over our electronic gadgets or place them in uncomfortable positions, which can cause neck, shoulder, and back pain [3].

Risk Factors of CVS

One typical problem is that our eyes were never designed to stare at items up close, whether on an electronic gadget or otherwise, for long periods of time. In reality, with a view distance of 20 feet, our eyes are normally at rest, thus gazing at something like a phone, tablet, phone, tablet, or computer, which is typically 18-24 inches away from us, puts additional strain on our eyes. Poor posture and device orientation are another factor that contributes to Computer Vision Syndrome and Digital Eye Strain. We frequently slouch over our electronic gadgets or place them in uncomfortable positions, which can cause neck, shoulder, and back pain [3] (Table 1).

Pathophysiology of CVS

Human eyes' concentrating processes are not the same for printed text and visual display units, and they respond in various ways. In terms of viewing distance, gaze angles, blinking rate, text appearance and need for accommodation, as well as the enlargement of a palpebral fissure while reading, there are significant differences between reading materials on printed text and computer. VDT letters are made up of pixels that are the result of the electrical beam impacting the phosphor-coated back surface of the screen, whereas printed letters are made up of well-defined characters throughout their whole surface. Each pixel is bright at the centre and becomes less luminous as it moves outward [4]. As a result, human eyes are unable to maintain focus on the pixel letters. Instead, due to the vertical orientation of gaze, which is preferred by computer users over reading a printed text, the focusing mechanism lags behind the computer screen. The dark focus is the name given to this place. As a result, the eyes are continually relaxing to their resting place of accommodation or dim focus, and they are always fighting to focus on the pixels character. The ciliary body's repeated focussing and refocusing of the eye generates eye fatigue and accommodative symptoms connected to CV. As a result of this accommodation lag, ocular symptoms associated with CVS develop [5]. Furthermore, pictures created by pixels and raster lack distinct edges, resulting in under stimulation of accommodation and lag of accommodation behind the screen owing to blurring text characters. The path-physiology of CVS is depicted in Figure 1.

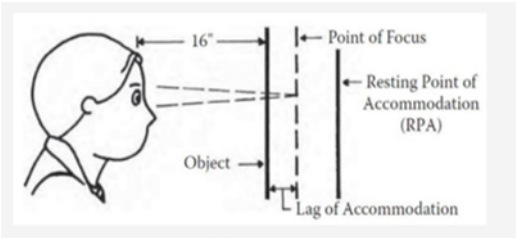

Figure 1: Focusing mechanism during viewing on a computer

Clinical Manifestations

Finding the specific causes of computer vision syndrome is difficult, but it is a result of a mix of variables. Prolonged working hours, insufficient breaks, and persistent looking at a screen are only a few of the major causes of computer vision syndrome [6]. CVS symptoms are divided into four categories, as shown in Table 2.

Diagnosis

The history of the patient is collected to discover the underlying reason as well as the existence of any general health problems, drugs used, or environmental variables that may be contributing to the symptoms associated to computer use.

To determine the extent to which vision may be compromised, tests are performed for both near and distant vision. For a full examination of CVS, many tests must be conducted by professional eye care personnel.

The following are some of the most essential types of tests:

Table 1: Risk Factors Contributing to Computer Vision Syndrome

S. No.	Factors	Causes
1.	Personal factor	Eye movement is restricted, and seated posture is poor. Incorrect viewing distances, viewing angles, etc. Taking no rest, Diseases of the eyes Medical conditions, Ageing.
2.	Environmental factor	Inadequate lighting Light is unbalanced between the computer screen and the environment.
3.	Computer factor	Low refresh rate, low resolution, and low contrast The glare from the monitor
4.	Visual related	Presbyopia is characterised by blurred vision, a sluggish shift in focus, double vision, and double vision.
5.	Extra-ocular related	Neck pain, Back pain, Shoulder pain

Table 2: Major Symptoms in Computer Vision Syndrome

Symptom Category	Symptoms	Possible Causes
Asthenopic	Eyestrain, Sore eyes, Tired eyes	Binocular vision, Accomodation
Ocular surface related	Dry eyes, Watery eyes, Irritated eyes, Contact lens problems	
Visual related	Blurred vision, Double vision, Presbyopia	Refractive error, Accommodation, Binocular vision, presbyopic correction
Extra-ocular related	Neck pain, Back pain, Shoulder pain	Computer screen location sitting position

1. Make sure your eyes are in good shape.
2. Muscles balance tests
3. Examinations of lodging facilities
4. Binocular vision tests
5. Tear function evaluations
6. Ergonomic assessment [5].

Prevention and Management

Taking care to regulate lighting and glare on the device screen, set optimal working distances and posture for screen viewing, and ensure that even slight vision abnormalities are correctly addressed are all part of preventing or reducing the visual difficulties associated with CVS or digital eyestrain. Artificial tears sold over the counter can help prevent and alleviate dry eyes. Even if your eyes feel OK, use them to keep them lubricated and avoid a repeat of discomfort. Your healthcare practitioner can advise you on the finest eye drops for you. Preservative-free lubricating drops can be used as frequently as needed. If you're taking preservative-containing drops, don't use them more than four times a day. Eye drops containing a redness remover should be avoided since they might exacerbate dry eye symptoms [7, 8]. When you seek expert aid with CVS management, there are three phases: detection, management, and follow-up.

METHODOLOGY

Study Design

It is a prospective, interventional study conducted on online.

Study Period

Study would be conducted from December (2020) to May (2021).

Source of Data

Data would be collected from online Google forms.

Sample Size

Estimated sample size is about 200-250 patients.

Data Collection

Data collection will be done by using the following documents, Self-prepared, structured, validated questionnaire forms were prepared to collect the data.

1. Self-prepared, structured, validated questionnaire forms were prepared to assess the Risk

Table 3: Differentiation of severity of symptoms (Age: 20-30, Gender: Female, Occupation: student, Count: 75)

Symptoms	Never	Occasionally	Often
Eye Burning	22	49	4
Eye Itching	34	40	1
Feeling of a foreign Body	49	23	3
Watery eyes	27	37	3
Excessive blinking of eyelids	54	18	11
Eye Redness	39	29	3
Pain in the eyes	29	40	7
Heavy eyelids	44	22	6
Eye Dryness	50	18	9
Blurred Vision	33	32	7
Double Vision	55	14	10
Difficulty in focusing on near objects	41	27	6
Increased Sensitivity to light	32	26	7
Do you experience any colour halos after using computer	44	22	17
Feeling that sight is worsening	41	28	9
Headache	13	42	6
Neck pain	20	32	20
Back pain	17	35	23
Shoulder pain	34	31	10
Wrist pain	42	27	6
Numbness in hands	49	21	5

factors for computer vision syndrome and knowledge among computer users.

2. Validation was done by filtering the participants who are using computers at least 3hours per day since one year and they are within the age group of 20-40 years.

3. We included the participants who are having the symptoms of CVS occasionally & often or always.

4. Among 13 ocular symptoms 8 symptoms are mandatory to diagnose CVS.

Study Procedure

Survey has been conducted on CVS in the survey few questions have been framed. The answers for these questions are like Never, Occasionally, Often & always. Out of these options we have considered only occasionally, often & always. We also framed the questions regarding the knowledge about usage of computers. Out of these questions we have filtered the participants, who are having CVS symptoms and low knowledge about usage of computers. For the filtered participants, we suggested to follow some counselling tips for 28 days of period. After the 28days of period we framed same questions with different options, decrease, no change and knowledge based questions are also given to assess the computer users after counselling.

Statistical Analysis

1. Microsoft excel will be used for recording the data of recruited subjects. All the graphs and tables were created using Microsoft excel.

2. We used descriptive statistics like mean, median, standard deviation and paired T test will be used to assess demographic characteristics features of subjects included in the study.

RESULTS AND DISCUSSION

A total 236 responses were collected from December 2020 to April 2021 for a period of 5 months through online Google forms. All 236 respondents showed their willing to participate in this study and

Table 4: Differentiation of severity of symptoms (Age: 20-30, Gender: Female, Occupation: Employee, Count: 16)

Symptoms	Never	Occasionally	Often
Eye Burning	3	12	1
Eye itching	9	5	2
Feeling of a foreign Body	11	5	4
Watery eyes	6	6	2
Excessive blinking of eyelids	9	5	1
Eye Redness	9	6	2
Pain in the eyes	7	7	1
Heavy eyelids	11	4	1
Eye Dryness	12	4	1
Blurred vision	8	7	1
Double vision	10	5	2
Difficulty in focusing on near objects	10	5	1
Increased Sensitivity to light	7	7	1
Do you experience any colour halos after using computer	11	4	5
Feeling that sight is worsening	11	4	3
Headache	4	7	3
Neck pain	2	11	1
Back pain	5	8	1
Shoulder pain	7	9	2
Wrist pain	11	4	1
Numbness of hands	8	7	1

submitted their inform consent. Gender Wise Distribution was depicted in Figure 2. We take the age group 20-30 years old and next from the age group 31-40 years depicted in Figure 3. In this study, most of the samples are students 166(70.4%) and remaining are employees 70(29.6%).

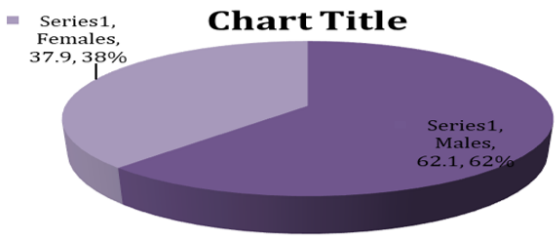

Figure 2: Gender Wise Distribution

In this study, from the below collected data represented in Figure 4, Figure 5 and Table 3, Table 4, Table 5 respectively we found that between age (20-30) in students category among both genders males are more affected. Categorization of subjects based on with and without knowledge represented in Table 6.

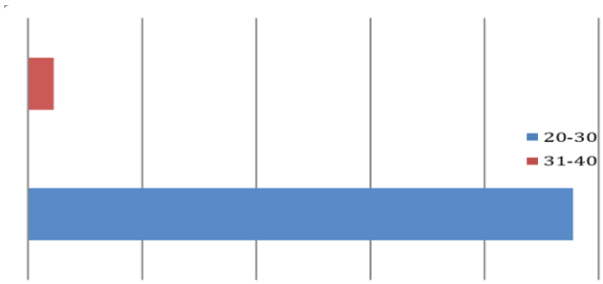

Figure 3: Age Wise Distribution

In this study, out of 236 people 97 people have no knowledge about computer use and we provided the counselling points and (74.08%) people had followed the counselling points and they have recovered from symptoms and remaining (25.92%) people had not followed counselling points.

Limitations of the Study

A possible limitation of this study is the tendency for social desirability bias. Study was restricted to only students and employees which could have extended to general population. Since it is an online study there are more chances for educated persons to check internet and answer the questionnaire.

Table 5: Differentiation of severity of symptoms (Age: 31-40, Gender: Male, Occupation: Employee, Count: 9)

Symptoms	Never	Occasionally	Often
Eye Burning	1	8	1
Eye itching	5	8	-
Feeling of a foreign Body	3	4	-
Watery eyes	3	4	2
Excessive blinking of eyelids	2	2	4
Eye redness	1	5	2
Pain in the eyes	6	7	1
Heavy eyelids	2	2	1
Eye Dryness	4	3	4
Blurred vision	8	3	2
Double vision	6	1	-
Difficulty in focusing on near objects	6	2	1
Increased Sensitivity to light	7	1	2
Do you experience any colour halos after using computer	5	2	-
Feeling that sight is worsening	1	4	-
Headache	1	5	3
Neck pain	1	5	3
Back pain	1	6	2
Shoulder pain	1	7	1
Wrist pain	4	5	-
Numbness of hands	5	2	-

Table 6: Categorization of subjects based on with and without knowledge

Categorization	No. of people (N=236)	Percentage
With knowledge	138	58.474
Without knowledge	98	41.525

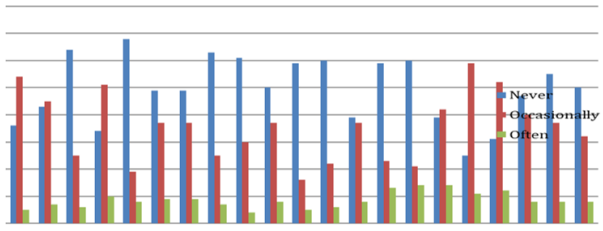

Figure 4: Differentiation of severity of symptoms (Age: 20-30, Gender: Male, Occupation: student, Count: 95)

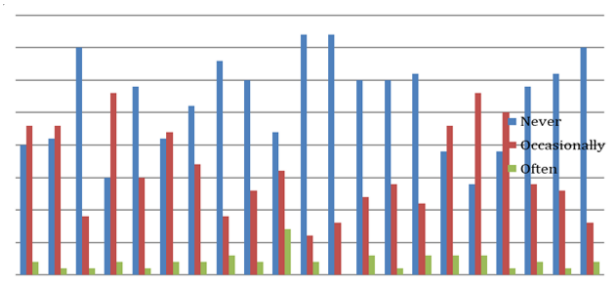

Figure 5: Differentiation of severity of symptoms (Age: 20-30, Gender: Male, Occupation: Employee, Count: 45)

CONCLUSION

According to our study we come to know that males (62.1%) are more affected than females (37.9%) and 20-30 years age category subjects are more affected than 31- 40 years and also students are more affected when compared to females. The most common symptoms the most common symptoms that we observed in our study are eye burning, eye itching, watery eyes, blurred vision and dryness of eyes all these are ocular symptoms. Among extraocular symptoms most common are neck pain, back pain, headache, shoulder pain. The responses what we received are 236 members out of these 97 mem-

bers are lack of knowledge while handling the computers, so after those who are having poor knowledge we provided a patient information leaflet and suggested them to follow the tips for 28 day period. After 28 day period 75% of the computers users gained knowledge.

Funding Support

The authors declare that they have no funding support for this study.

Conflict of Interest

The authors declare that there is no conflict of interest.

REFERENCES

[1] Asma. Anupama Pulla, Nanduri Samyuktha, Soumya Kasubagula, Aishwarya Kataih, Devender Banoth, and Harshitha Addagatla. A cross sectional study to assess the prevalence and associated factors of computer vision syndrome among engineering students of Hyderabad, Telangana. *International Journal of Community Medicine and Public Health*, 6(1):308–313, 2018.

[2] S Chandrasekhara Reddy, C K Low, Y P Lim, L L Low, F Mardina, and M P Nursaleha. Computer vision syndrome: a study of knowledge and practices in university students. *Nepalese Journal of Ophthalmology*, 5(2):161–168, 2013.

[3] S Mani, L M Menon, S Harishankar, and A Mathew. The prevalence of computer vision syndrome among information technology students in a rural engineering college. *International Journal of Current Research*, 8(12):43845–43848, 2016.

[4] Sankaranethralaya.org. Computer vision syndrome clinics, 2021. Accessed on: 05 Aug 2021.

[5] J Bali, N Navin, and B R Thakur. Computer vision syndrome: a study of the knowledge, attitudes and practices in Indian ophthalmologists. *Indian Journal of Ophthalmology*, 55(4):289–294, 2007.

[6] S H Venkatesh, A T Girish, P K Shashikala, S Mannava, and R Rajarathnam. A study of computer vision syndrome at the workplace-prevalence and causative factors. *Eye*, 157:53–59, 2016.

[7] Mayoclinic.org. Home Remedies: Eyestrain and discomfort, 2019. Accessed on: 05 Aug 2021.

[8] Abiy Maru Alemayehu and Mogess Maru Alemayehu. Pathophysiologic Mechanisms of Computer Vision Syndrome and its Prevention: Review. *World Journal of Ophthalmology and Vision Research*, 2(5), 2019.

Cite this article: Bygari Sathyanarayana Reddy, Amasa Anusha, Nallasiddu Sushma, Singareddypalli Nagabushanachari Yogesh, Leela Prasad Babu K, Chinnikrishnaiah V, Swarnalatha D. **Estimation of Risk Factors for Computer Vision Syndrome and Impact of Clinical Pharmacist**. Int. J. of Clin. Pharm. Med. Sci. 2021; 1(4): 152-158.