Knowledge, Awareness of computer vision syndrome and its prevalence among Undergraduate medical students

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Abstract
Background: Now-a-days, many undergraduate medical students are using technology, such as computers, tablets and cell phones, due to improvements in the educational system and equipment used in hospitals. This study was conducted with aiming the knowledge, awareness of computer vision syndrome and its prevalence among undergraduate medical students. The research is a cross-sectional study conducted on undergraduate medical students of Saveetha Medical College, Chennai. The questionnaire was prepared and distributed through Google forms among undergraduate medical students, and their answers are registered and gathered. The data obtained is analyzed using the Microsoft excel. The results showed computer vision syndrome is seen in medical undergraduate students who use digital screens for more than 2 to 3 hours. Eyestrain fatigue, Headache are the major ocular symptoms seen in students and 44.90% of students experience pain in the shoulder as non-ocular symptoms. We also studied the possible risk factors of computer vision syndrome, and considered the protective measures taken by the students. The study reveals that computer vision syndrome was 91% prevalent among medical students.
Keywords: Computer vision syndrome symptoms- ocular& non-ocular; Digital screen; Eye strain& Fatigue Headache; Mobile phones; Prevalence; Shoulder pain.

Introduction: Computer vision syndrome is a condition resulting from the focusing of the eyes on a computer or other display device for prolonged, uninterrupted periods of time and the eye muscles being unable to recover from the constant tension necessary to keep the focus on a close object[1-3]. We can see how important computers, iPads, cell phones are placing in today's life because of which we gape into it. This allows us to observe the rise of people with ocular and non-ocular symptoms

As per the United States National Institute for Occupational Safety and Health, computer vision syndrome affects about 90% of people who spend three or more hours a day on a computer[4].Its keenly noted that use of computer by medical students is also expanding. Learning material is becoming more electronic, portable document format (PDF) assisted lectures are being taken for better understanding, computers are being used in many of the

8560

Eur. Chem. Bull. 2023,12(issue 8),8560-8567

hospital diagnostic tests as well as internet usage has also increased with regard to study material, surgical videos, communication, file transfer.

Materials And Methods

This research was conducted with the aim to study about the knowledge, awareness of computer vision syndrome and its prevalence among undergraduate medical students. During the months of February-2020 to April-2020, the questionnaire was distributed to medical college students by using google form. The study includes all undergraduate students who worked on laptops on a regular basis, using smart phones and tablets before beginning the research. Students with history of refractive surgery and any other ocular surgery, students on eye drops for any ocular conditions at time of study were excluded. A total of 500 students were then registered using the above-mentioned inclusion and exclusion criteria, out of which 224 use glasses for their refractive errors. The questionnaire framework includes simple demographic data such as gender, age and year of study, hours of digital screen used every day, amount of rests in the use of the digital screen and the protective measures they take.

Data Collection

Step I:

A semi-structured questionnaire with study subject and peer study expert was prepared and validated and modified with reference to study objectives.

Step II:

The semi-structured questionnaire was distributed via Google Forms to medical students who meet the eligibility criteria.

Step III:

Data was collected from students including profile of personal background details, computer vision condition symptoms & signs.

Data Analysis: Microsoft-Excel 2007 Software was used to tabulate all the responses. Graphical representations were produced where required.

Results

Among the medical students the present study was conducted. The total number of students enrolled is 500.

Table 1: Year of study of the subjects.

YEAR OF STUDY	TOTAL	%
1ST YEAR	82	16.40%
2ND YEAR	100	20.00%
3RD YEAR	199	39.80%
4TH YEAR	119	23.80%

Many of the students are shown to be from 3rd year MBBS

Table 2a: Details of age of the members actively involved.

AGE (in years)	TOTAL	%
17-18	52	**10.40%**
19-20	244	**48.80%**
21-22	190	**38.00%**
23-25	14	**2.80%**

8561

Eur. Chem. Bull. 2023,12(issue 8),8560-8567

Table 2b: Details of gender of the members actively involved.

GENDER	TOTAL	% Total
Male	240	**48.00%**
Female	260	**52.00%**

Females and students aged 19-20 are the majority of those in the research

Table 3: Average hours spent on the digital screen.

HOURS SPENT	TOTAL	%
>1	16	3.20%
1-2HOURS	46	9.20%
2-3HOURS	124	24.80%
3-4HOURS	155	31.00%
4-6HOURS	107	21.40%
>6	52	10.40%
	p-VALUE	**0.0061294**

It has been shown that most students use computers in between 3-4 hours a day, followed by 2-3 hours a day.

Table 4: Most frequently used devices by medical students.

DEVICE	NUMBER	%
Desktop	30	6.00%
Laptop	72	14.40%
Mobile phone	346	69.20%
Tab/iPad	52	10.40%
	p-VALUE	**0.1406864**

Mobile phones have been found to be used most commonly by medical undergraduate students.

Table 5: Computer vision syndrome Symptoms – Ocular

SYMPTOMS	NUMBER	% Total
Headache	298	31.37%
Blurred Vision	98	10.32%
Eye strain and Fatigue	309	32.53%
Eye Redness & Irritation	83	8.74%
Dry Eyes	80	8.42%
Double Vision	24	2.53%
Difficulty in refocusing the eyes	58	6.11%
	p-VALUE	**0.34022238**

The most frequent presenting symptoms were eye pain and fatigue (32.53%) accompanied by headache (31.37%) among medical students.

8562

Eur. Chem. Bull. 2023,12(issue 8),8560-8567

Table 5(A): Relation Between ocular symptoms and hours of digital screen spending.

HOURS	TOTAL	%	SINGLE SYMPTOMS	%	MULTIPLE SYMPTOMS	%	NO SYMPYOMS	%
>1	16	3.20%	4	0.80%	12	2.40%	0	0%
1-2hours	46	9.20%	20	9.20%	24	4%	2	0.40%
2-3hours	124	24.80%	46	9.20%	70	14.00%	8	1.60%
3-4hours	155	31.00%	52	10.40%	103	20.60%	0	0%
4-6hours	107	21.40%	16	3.20%	89	17.80%	2	0.40%
>6	52	10.40%	14	2.80%	36	7.20%	2	0.40%

Table 5(B): Relation Between ocular symptoms and Device used interrupted or continuous.

CONTINOUS/INTERRUPTED	TOTAL	%	SINGLE SYMPTOMS	%	MULTIPLE SYMPTOMS	%	NO SYMPTOMS	%
Continuous	289	57.8%	80	16.00%	199	39.80%	10	2.00%
Interrupted	211	42.2%	80	16.00%	127	25.40%	4	0.80%

Table 5(C): Relation Between ocular symptoms and Device use is daytime or nighttime.

DAY/NIGHT	TOTAL	%	SINGLE SYMPTOMS	%	MULTIPLE SYMPTOMS	%	NO SYMPTOMS	%
Day	180	36%	46	9.20%	128	25.60%	6	1.20%
Night	320	64%	114	22.80%	198	39.60%	8	1.60%

Table 6: Computer vision syndrome Symptoms – Non-Ocular

SYMPTOMS	NUMBER	% Total
Joint pain in my fingers and wrists	97	**17.35%**
In ability to hold objects	45	**8.05%**
Difficulty to write using the pen	43	**7.69%**
Shoulder Pain	251	**44.90%**
Numbness of fingers	123	**22.00%**
	p-VALUE	0.5386042

In the present research it was found that the most prominent signs of non-ocular Computer vision syndrome were shoulder pain (44.90%)

8563

Eur. Chem. Bull. 2023,12(issue 8),8560-8567

Table 6 (A): Relation Between non-ocular symptoms and hours of digital screen spending.

CONTINUOUS/INTERRUPTED	TOTAL	%	SINGLE SYMPTOMS	%	MULTIPLE SYMPTOMS	%	NO SYMPTOMS	%
Continuous	289	58%	182	36.40%	101	20.20%	6	1.20%
Interrupted	211	42%	152	30.40%	53	10.60%	6	1.20%

Table 6 (B): Relation Between non-ocular symptoms and Device used interrupted or continuous

| HOURS	TOTAL	%	SINGLE SYMPTOMS	%	MULTIPLE SYMPTOMS	%	NO SYMPTOMS	%
>1	16	3.20%	16	3.20%	0	0.00%	0	0%
1-2hours	46	9.20%	36	7.20%	8	1.6%	2	0.40%
2-3hours	124	24.80%	88	17.60%	30	6.00%	6	1.20%
3-4hours	155	31.00%	101	20.20%	52	10.40%	2	0.4%
4-6hours	107	21.40%	57	11.40%	48	9.60%	2	0.40%
>6	52	10.40%	36	7.20%	16	3.20%	0	0.00%

Table 6 (C): Relation Between non-ocular symptoms and Device use is daytime or nighttime.

DAY/NIGHT	TOTAL	%	SINGLE SYMPTOMS	%	MULTIPLE SYMPTOMS	%	NO SYMPTOMS	%
Day	180	36%	127	25.40%	45	9.00%	8	1.60%
Night	320	64%	197	39.40%	119	23.80%	4	0.80%
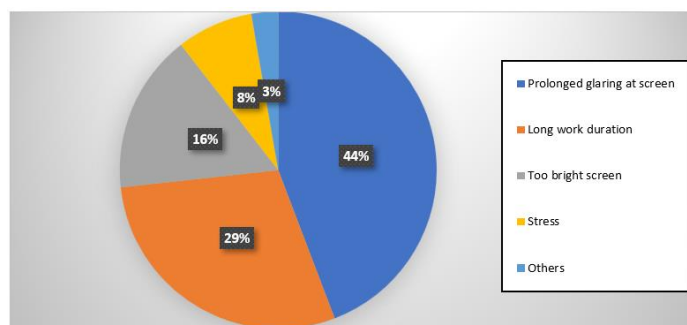
Figure 1: Risk factors of Computer Vision Syndrome

Different risk factors associated with computer vision syndrome have been identified. It is observed that the most observed risk factor was prolonged glaring at screen (44.20 %).
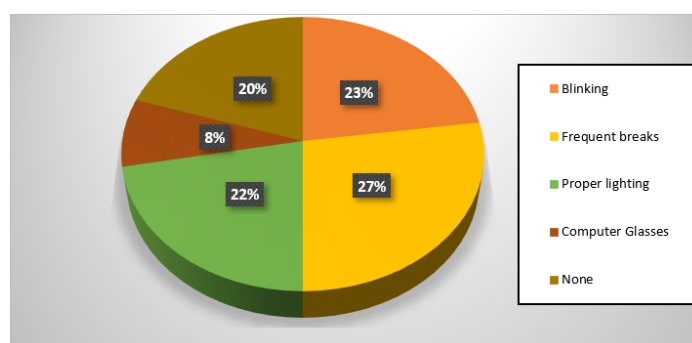
Figure 2: Protective measures taken by students against Computer vision syndrome;
It was observed that 27% of students take regular breaks to prevent symptoms of computer vision syndrome.

PREVALENCE
The prevalence of computer vision syndrome amongst medical student was 91%.

Computer vision syndrome symptoms	TOTAL
People with only ocular symptoms	32
people with only non-ocular symptoms	24
people with both ocular and non-ocular symptoms	399
No symptoms	45

p-VALUE-0.04972573
It was found that out of 500 students 399 participants were found to suffer from computer vision syndrome with both ocular and non-ocular symptoms, which suggests computer vision syndrome is more common among undergraduate medical students. The chi-square value for prevalence computer vision syndrome is **7.827**, with a p-value of **0.04972.**

Discussion
Our research showed that nearly every student who spends more than 3 hours on computers or cell phones was affected by computer vision syndrome. In Finland Sjogren Rouka et al[5]., 2001; had stated that after computer use 91.85% computer users reported one or more problems. Study conducted by Logaraj M et al[6]. ,2014; 78.6 percent of medical students had reported computer vision syndrome in Chennai. Studies of Malaysian university students and

8565

Eur. Chem. Bull. 2023,12(issue 8),8560-8567

computer users in Nigeria reported a strong prevalence of computer vision syndrome of about 89.9% and 74% respectively [7,8]. Increased Computer vision syndrome prevalence indicates the growth in device dependence among undergraduate medical students in the form of cell smart phones or ipad's. Symptoms play a key role in deciding whether or not the individual has computer vision syndrome. In our results it was observed that eye stain & fatigue was 32.53%, followed by headache at 31.37%. Pain in the shoulder at 44.90% followed by joint pain in the fingers and wrists at 17.35%. Research conducted by Venkatesh et al[9]., 2016; discovered eye strain (53.9%) accompanied by headache (38.5%) as troubling symptoms. Study conducted by Arora et al[10].,2009; on software specialists who reported headache almost in 91% of subjects as the most common symptom Highly important correlation between the duration of computer work (hours per day) and the development of computer vision syndrome has been identified in the present research Similar results have been observed in Logaraj M etal[6].,2014; Das S et al[11].,2016; and Zairina AR et al[12],.2011.

Conclusion

The current research was carried out on undergraduate medical students. The prevalence among medical students of computer vision syndrome was 91%. It has been observed that the duration of computer use and symptoms are significantly associated with this. Symptoms increased with extended computer work hours and other similar technologies. The conclusion of the above study was that computer vision syndrome is not only seen in students of engineering or software employs it is also more prevalent in students of medical undergraduates. Considering the prevalence of computer vision syndrome in medical students, it is important to incorporate this subject in the curriculum, enough awareness and correct procedures if followed would definitely benefit the students.

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8566

Eur. Chem. Bull. 2023,12(issue 8),8560-8567

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8567

Eur. Chem. Bull. 2023,12(issue 8),8560-8567