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Impact of online teaching on health of university students during Covid 19 pandemic crisis

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Abstract
Covid 19 pandemic led to a series of lockdowns in India since March, 2020 in India. Schools and colleges were shut down and e-teaching is the only way of education. Despite of several benefits of e-learning at educational front, increased screen time and use of ICT tools may affect health of students adversely. To explore any of such possibility, a survey has been conducted on students of higher education of five universities of India. The objective of research is to study the effect of online teaching on students' health. Five universities were selected for collecting data and a questionnaire was sent to the students. Total 275 students had responded and filled the questionnaire. The data were collected in the month of May and June. It was found that almost 67 per cent students had no experience of online classes before pandemic condition. Forty two per cent students reported that they started feeling eye strain between 1-2 hours of online teaching. Neck pain and back pain were felt by 52 per cent and 44 per cent students respectively. Students also reported various visual problems like headache, watery eyes, visual tiredness etc. due to online teaching. Hence, it can be concluded that students would have adverse impact on their visual health and they can have musculoskeletal disorders due to increased screen time and long static posture. Ergonomic interventions are needed to improve health condition during online teaching.

Keywords: Online teaching, Covid 19, lockdowns in India

Introduction
Covid 19 pandemic is spreading at an alarming rate in India and the situation is getting precarious. This pandemic led to a series of lockdowns in India since March, 2020 in India. Schools and colleges were shut down and e-teaching is the only way of education. Though ICT tools have proliferated in school education and higher education, but the pandemic showed the way to e-teaching and learning mandatory. Despite of several benefits of e-learning at educational front, increased screen time and use of ICT tools may affect health of students adversely. To explore any of such possibility, a survey has been conducted on students of higher education of five universities of India. The objective of research is to study the effect of online teaching on students' health.

Research Methodology: Five universities were selected for collecting data and a questionnaire was sent to the students. Total 275 students had responded and filled the questionnaire. The data were collected in the month of May and June.

Results and Discussion: Majority of the students were female (91.6%). This may be due to the fact that the questionnaires were largely filled by community science students in all universities. Age distribution of the students showed that almost half of the students were in the age group of 21 to 24 years while little less than half of the students belonged to the age group of 17-20 years. Only 4 per cent students were above 24 years. Seventy three per cent students were pursuing under graduation followed by almost 26 per cent postgraduate students. 67 per cent students answered that they did not have any experience of online teaching before Covid 19 pandemic. Forty per cent students reported that they have been attending online classes since 1-2 months followed by 2-3 months (34.2%). The lockdown was declared in March. Hence, the data shows that majority of the students had started attending online classes after lockdown period. Total screen time per day was reported 4-6 hours by maximum 44.36 per cent students and 1-3 hours by almost 42 per cent students. A few students (4%) reported their screen time more than 10 hours per day.

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Table 1: Personal profile of the students

Gender	F	%
Male	23	8.4
Female	252	91.6
Age	**F**	**%**
17-20	124	45.09
21-24	141	51.27
25-28	10	3.64
Degree	**F**	**%**
Undergraduate	201	73.1
Postgraduate	72	26.2
Doctorate	2	0.7

Table 2: Information regarding online class and total screen time

Any experience of online study before the Covid 19	F	%
Yes	90	32.7
No	185	67.3
Attending Class since	**F**	**%**
Less than one month	39	14.2
1 to 2 months	111	40.4
2 to 3 months	94	34.2
3 to 4 months	28	10.2
> 4 months	3	1.1
Total screen time/day	**F**	**%**
1-3	115	41.82
4-6	122	44.36
7-9	26	9.45
10-12	10	3.65
13-15	1	0.36
16-18	1	0.36
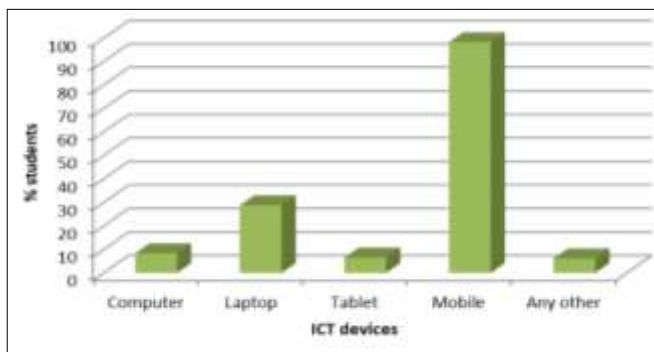
Graph 1: ICT device used by students for their online classes

Table 3: Information regarding ICT devices used by students

ICT devices used for online study		
Computer	23	8.36
Laptop	79	28.72
Tablet	18	6.54
Mobile	270	98.18
Any other	17	6.18
Hours spent in online classes		
Less than 2 hours	105	38.2
2-4 hours	139	50.5
4-6 hours	29	10.5
More than 6 hours	2	0.7
Hours spent using ICT devices other than online classes	**F**	**%**
Less than 1hours	30	10.9
1 to 2 hours	109	39.6
2 to 3 hours	79	28.7
3 to 4 hours	28	10.2
More than 4 hours	29	10.5
Purposes for using ICT tools	**F**	**%**
Preparing assignments	81	29.5
Self Study	109	39.6
Searching research material	36	13.1
Recreational activities	15	5.5
Social networking	34	12.4

Data presented in Table 4 illustrate that majority (98.18%) of the students were using mobile for online study. Only almost 29 per cent students were using laptop for the purpose of online study. Half of the students were spending 2-4 hours per day for online study while almost 38 per cent were spending less than 2 hours for online study. Further, students were asked to give information about the time they spent in using ICT devices for other purposes. Half of the students were using ICT devices for other purposes than online classes for less than 2 hours. 10.5 per cent students reported that they used ICT devices for more than 4 hours except online classes. Other purposes for using ICT devices cited by students were self-study (39.6%), preparing assignments (29.5%), searching research materials (13.1%), social networking (12.4%) and recreational activities (5.5%).

Table 4: Information regarding various factors related to online classes

Proper place to study during online classes in your home	F	%
Yes	147	53.5
No	94	34.2
Not always	34	12.4
Study table and chair at your home for online classes	**F**	**%**
Yes	173	62.9
No	102	37.1
Proper illumination in the room	**F**	**%**
Yes	140	50.9
No	42	15.3
Sometimes	93	33.8
Wear spectacles	**F**	**%**
Yes	189	68.7
No	86	31.3
The screen of electronic device is below the horizontal eye level	**F**	**%**
Yes	190	69.1
No	85	30.9
Posture while using electronic device	**F**	**%**
Sitting	230	83.6
Standing	5	1.8
Forward bending	25	9.0
Backward bending	8	2.9
Laying	7	2.5
Distance from screen while using ICT device	**F**	**%**
Less than 20 inches	123	44.7
20-30 inches	132	48
More than 30 inches	20	7.3

Students were inquired whether they have proper place for attending online classes in their homes or not. It was found that 53.5 per cent had proper place in their home for attending online classes while 34 per cent did not have proper place. Other almost 12 per cent students stated that they did not have proper place to attend online classes always. Almost 63 per cent students had study table and chair in their home for attending online classes while rest 37 per cent did not have study table and chair in their home.

Surprisingly, 69 per cent students were wearing spectacles which may add visual discomfort. 69 per cent students responded that they put the screen of electronic device below the horizontal eye level while 31 per cent denied about it. The electronic device should be within optimal viewing zone. If the screen of electronic device will be too low, it will cause neck flexion. User may end up having neck pain.

Majority of the students (83.6%) were attending online classes in sitting posture. Almost 45 per cent students used to keep the distance of device screen from eyes less than 20 inches while more than half of the students kept this distance 20 -30 inches or more than that. The recommended distance from screen to eyes is 20 -30 inches. If the students are keeping screen distance less than 20 inches, it may be harmful for their visual health.

Table 5: Eye strain amongst students

Feeling eye strain	F	%
After less than one hour	86	31.3
After one to two hours	115	41.8
After two to three hours	49	17.8
After three to four hours	13	4.7
After more than four hours	12	4.4

It can be analyzed from the data presented in Table 5 that maximum students, i.e. almost 42 per cent started feeling eye strain after attending online class for one to two hours while 31 per cent reported that they felt eye strain within one hour of attending online class. These findings are pointer to the fact that online classes may have adverse impact on visual health of students if necessary precautions were not taken such as giving rest pause, following 20-20-20 rules, proper distance of screen from eyes etc.

It was found in a study that out of 576 students, 17.9% (103 students) experienced eyestrain at the end of the day after working on the digital devices [1].

Table 6: Preventing eye strain during or after using electronic devices

Ways to prevent eye strain during or after using electronic devices	F	%
Rest Pause	26	9.5
20-20-20 rule	19	6.9
Closing eyes for few minutes	87	31.6
Wash your eyes	54	19.6
Using screen guard	11	4.0
Decreasing brightness of the device	63	22.9
Any other	15	5.5

Students informed about various ways which they used to adopt for preventing eye strain while attending online classes. Closing eyes for few minutes was reported by maximum (31.6%) students followed by decreasing brightness of the device (almost 23%) and washing their eyes (19.6%). Very few of them i.e. only 4 per cent were using screen guard and almost 7 per cent were following 20-20-20 rule. It may be inferred from the data that students were not aware about 20-20-20 rule of using ICT devices.

Table 7: Health problems during Covid 19

Health problems	F	%
Back pain	123	44.7
Neck pain	143	52.0
Shoulder pain	78	28.4
Wrist pain	25	9.1
Arm pain	38	13.8
Finger pain	37	13.5
Knee pain	9	3.3
Lower leg pain	16	5.8
Buttock pain	11	4.0
No pain	80	29.1

Twenty nine per cent students reported that they had no pain. More than half of the students (52%) felt neck pain followed by back pain (44.7%) and shoulder pain (28.4%). A few of them reported pain in other body parts such as wrist, arm, finger, knee, leg and buttock. Students may adopt poor posture or static posture for more than one hour. These may be the reasons to perceive pain in different body parts. The results are in fine tune with the statement that the most common health-related complaints involve the neck, shoulders and back among computer users [2].

Students using computer excessively at home or school might have several health concerns such as musculoskeletal disorders, visual problems, ICT related injuries etc. [3] Computer-related health problems occur among university students and more than half of the participants reported either musculoskeletal disorders, visual symptoms or sleep disorder. Extensive smart phone use was found associated with sleep disorders [4].

Table 8: Visuals problems of students

Visual problems during this period of online classes	F	%
Headache	152	55.27
Dry eyes	72	26.18
Blurred vision	79	28.72
Visual Tiredness	137	49.8
Need to interrupt work	83	30.18
Burning sensation into eyes	82	29.82
Watery Eyes	140	50.9
Any other	40	14.54
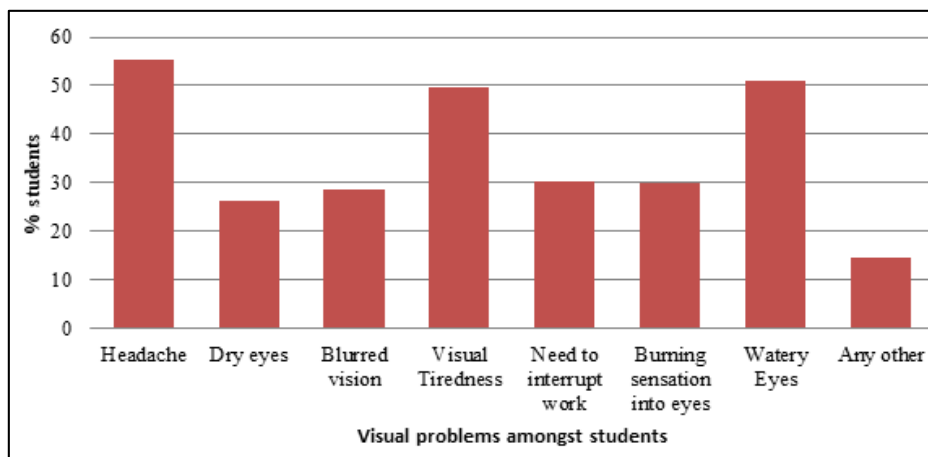
Graph 2: Visual problems during the period of online classes

This graph shows problems faced by students after attending online sessions. It can be inferred from the data that students were facing various types of visual problems and headache was reported by maximum students (55.27%). Half of students felt visual tiredness and watery eyes. Other visual problems reported by students were burning sensation into eyes, blurred eyes, dry eyes, need to interrupt and so on. Symptoms can be correlated to Computer Vision Syndrome.

A person who exceeds 2 hrs of computer use a day is at risk of CVS. Computer Vision Syndrome is caused by staring at a computer screen for long periods of time without taking a break. Symptoms of CVS include eye irritation, such as red, itchy, watery or dry eyes; eye fatigue, including heaviness of the eyelids or forehead; and difficulty in focusing the eyes [5].

Table 9: Perception of mental stress by students

Perceived mental stress while attending online class	F	%
Yes	96	34.9
No	179	65.1
Level of perceiving mental stress	**F**	**%**
Low	20	20.8
Medium	60	62.5
High	16	16.7

The researcher tried to find out if students felt any kind of mental stress while attending online classes. Only 35 per cent students gave affirmative response and 65 per cent denied about any kind of mental stress. Out of them, 62.5 per cent felt medium level of mental stress while almost 17 per cent felt high level of mental stress.

Table 10: Perception of comfort level amongst students while attending online classes

S. No.	Perception of comfort level while attending online classes	F	%
1	Highly uncomfortable	17	6.2
2	Uncomfortable	31	11.3
3	Moderately uncomfortable	148	53.8
4	Comfortable	63	22.9
5	Highly comfortable	16	5.8

Almost 54 per cent students perceived online classes moderately uncomfortable while 17.5 per cent found it uncomfortable or highly uncomfortable. Though, almost 29 per cent students perceived online classes comfortable or highly comfortable.

Conclusion
The use of ICT in education induces some health problems to students. The health problems reported by students were visual health problems, musculoskeletal diseases and psychological stress also. As universities extensively use information and communication technology for on line teaching, the safe practice regarding use of ICT devices should be addressed. Moreover, the culture of reporting injuries and relevant issues should be encouraged among the students. Ergonomic guidelines for using safe use of ICT devices may reduce health problems such as proper distance of screen from eyes, proper height below or at horizontal eye level, appropriate illumination level, rest pauses, proper posture during study etc. Hence, before conducting online teaching classes, students should be trained how to use ICT devices with minimum safety measures.

Future scope of the study
- Research on impact of online teaching on school students can also be conducted.
- Further, the study can be more specific on effect of illumination level and position of screen on health of students.

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