Original Research Article

A study of the impact of e-learning on the health of school going adolescents in Bareilly city: A cross-sectional study

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ARTICLE INFO

ABSTRACT

Background: E-learning has played a major role during corona pandemic and lockdown. Gadget use and increased screen time can lead to neuropsychological and physiological problems in many children. Some of the E-learning associated health hazards can be prevented by taking few preventive measures. Therefore an endeavour has been taken up to conduct a cross-sectional study on the consequences of e-learning on the health of school going adolescents in Bareilly city of Uttar Pradesh.

Objectives: To find the effects of e-learning on the health of school going adolescents.
And to suggest the recommendations for the prevention and control of e-learning associated health problems.

Materials and Methods: Selection of study participants was done via multistage sampling. A pretested semi-structured interview schedule consisting of both open and closed ended questions was prepared. Statistical analysis was done using SPSS (version 23.0) for windows.

Result: Various health related issues were associated with e-learning like headache, body-ache, vision problems, etc.

Interpretation: E-learning was found to be more common in males, socioeconomic class 1, Hindu religion and among students belonging to higher classes (class 8th to 10th). There were some health issues found among children pursuing e-learning like headache, body-ache, vision problems, etc.

Conclusion: E-learning health hazards can be prevented and controlled through strategic planning and implementation of health education.

1. Introduction

"Tell me and I forget, teach me and I may remember, involve me and I learn." - Benjamin Franklin

E-learning is a system of learning and teaching through an electronic media, especially the internet. Information and communication technology in education generally refers to anything that involves technology in education. This includes devices such as computers, tablets, smartphones and interactive whiteboards, but also software such as educational games and digital learning tools and all educational applications that can be found on internet. E-learning and digitalisation in education have a great impact on school students as it helps teachers and students to share accountability for learning and achievements.[1] E-learning is an effective method of learning.[2] It is flexible and satisfactory as well.[3,4]

E-learning has played a major role during corona pandemic and lockdown. Online classes and dedication of teachers did not let even a pandemic to cause break

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in the education of students. On the contrary, pandemic has certainly effected everyone's normal routine lifestyle. Gadget use and increased screen time can lead to neuropsychological and physiological problems in many children.[5] Increased screen time can lead to eye problems, obesity, headache, backache, anxiety, disturbed sleep etc in children.[6–9]

Some of the e-learning associated health hazards can be prevented by taking few preventive measures such as use of anti-glare gadget screens and glasses, eye exercises, controlled screen time practise, sitting in correct posture while attending online classes, stretching exercises, yoga and meditation etc.

E-learning or digital mode of learning has outgrown during COVID 19 times and very meagre research and studies have been carried out in this region of the country in terms of its impact. Therefore, an endeavour has been taken up to conduct a cross-sectional study on the consequences of e-learning on the health of school going adolescents in Bareilly city of Uttar Pradesh.

2. Aim and Objectives

2.1. Aim

To evaluate the impact of e-learning on the health of school going adolescents in Bareilly city.

2.2. Objectives

1. To find the effects of e-learning on the health of school going adolescents.
2. To suggest the recommendations for the prevention and control of e-learning associated health problems.

3. Material and Methods

A cross-sectional study was conducted among the school going children and adolescents in Bareilly city during covid-19 pandemic. The eligible study participants were the school going children and adolescents aged 10-19 years who were enrolled in the school at the time of study and not likely supposed to take transfer during the study period.[10] Students who were known cases of diseases and disorders where avoided for the study.

Sample size was estimated by the formula $4pq/l^2$, where: p = anticipated proportion of health effect of e-learning (13.1%)[10]; q = 100 – p; l = Absolute error (5%). Therefore, N = $4pq / l^2$ = (4 x 13.1 x 86.9) / 25 = 182.12 i.e. 200 approximately. So, the calculated sample size for our study was 200.

Multistage sampling technique was used for all the study units until the required sample size was attained. Semi-structured schedule containing both open and close ended questions was used as the "study tool"

3.1. Methodology

Selection of study participants was done via multistage sampling that was applied in Bareilly city. 10% of 70 wards in urban areas i.e. 7 wards were selected by lottery method. In each selected ward, all schools were listed. 10% of schools in each ward were selected which came out as round off 1 school in each ward i.e. 7 schools had been selected. Further selection of classes, sections and students was random until the required sample size was attained.

A pretested semi-structured interview schedule consisting of both open and closed ended questions was prepared.

3.2. Data collection

Data was collected after taking clearance from the Institutional Ethical Committee. All participants were explained about the objectives of the study and an informed written consent was obtained.

3.3. Data processing and analysis

Data clearing, coding and recoding was done appropriately. After collection of data, statistical analysis was done using SPSS (version 23.0) for windows. The impact of e-learning on the health and development of students was assessed by comparing the data. The results were displayed with the help of tables and figures according to the aim and objectives of the study.

4. Results

For the study assessment, 200 children were evaluated who were enrolled in e-learning. Various socio-demographic strata of the city were covered to understand well about the impact of e-learning among adolescents.

Figure 1 depicts the various socio-demographic factors associated with e-learning in the study subjects. The children studied are representative of the total study population. Male students are more in number than female students. E-learning is more prevalent in higher socio-economic class, secondary and higher secondary students.

In Figure 2, various health related problems associated with e-learning are displayed. Among 200 study subjects, it was found that 46% students had headache, 65% had body-ache, 58% had vision problems, 54.50% had dullness, 45% showed altered behavior, 22.50% were having sad mood. Anxiety was present in 50.50% cases, 57% had deranged BMI, 41% had poor online test scores while disturbed sleep was found among 24% study population.

Table 1 summarises the association of socio-demographic factors (gender, age, religion, socio-economic class and type of family) with the e-learning related health problems i.e. fitness, headache, body-ache and visual complaints. Headache, body-ache and vision problems are

Table 1: Association of socio-demographic factors with health problems

		Fitness			Headache			Bodyache			Visual complaints		
		Dull	Active	P value	Yes	No	P value	Yes	No	P value	Yes	No	P value
Gender	Male	65 52%	60 48%	0.35	92 73.6%	33 26.4%	0.001*	114 91.2%	11 8.8%	0.001*	102 81.6%	23 18.4%	0.001*
	Female	44 58.7%	31 41.3%		0 0.0%	75 100%		16 21.3%	59 78.7%		14 18.75%	61 81.3%	
Age	Less than 15 years	58 59.8%	39 40.2%	0.145	48 49.5%	49 50.5%	0.337	69 71.1%	28 28.9%	0.078	63 64.9%	34 35.1%	0.053
	More than 15 years	51 49.5%	52 50.5%		44 42.7%	59 57.3%		61 59.2%	42 40.8%		53 51.5%	50 48.5%	
Religion	Hindu	67 54.0%	57 46.0%	0.789	52 41.9%	72 58.1%	0.089	75 60.5%	49 39.5%	0.268	67 54.0%	57 46.0%	0.478
	Muslim	18 54.5%	15 45.5%		16 48.5%	17 51.5%		22 66.7%	11 33.3%		19 57.6%	14 42.4%	
	Christian	6 46.2%	7 53.8%		8 61.5%	5 38.5%		10 66.7%	3 33.3%		9 69.2%	4 30.8%	
	Sikh	14 56.0%	11 44.0%		11 44.0%	14 56.0%		18 72.0%	7 28.0%		17 68.0%	8 32.0%	
	Others	4 80.0%	1 20.0%		5 100.0%	0 0.0%		5 100.0%	0 0.0%		4 80.0%	1 20.0%	
Socio-economic status	1	9 50.0%	9 50.0%	0.358	9 50.0%	9 50.0%	0.792	15 83.3%	3 16.7%	0.186	14	4	0.399
	2	23 65.7%	12 34.3%		18 51.4%	17 48.6%		22 62.9%	13 37.1%		21 60.0%	14 40.0%	
	3	29 55.8%	23 44.2%		22 42.3%	30 57.7%		31 59.6%	21 40.4%		29 55.8%	23 44.2%	
	4	16 42.1%	22 57.9%		15 39.5%	23 60.5%		21 55.3%	17 44.7%		19 50.0%	19 50.0%	
	5	32 56.1%	25 43.9%		28 39.5%	29 60.5%		41 71.9%	16 28.1%		33 57.9%	24 42.1%	
Family type	Joint	70 58.8%	49 41.2%	0.137	57 47.9%	62 52.1%	0.514	76 63.9%	43 36.1%	0.683	64 53.8%	55 46.2%	0.143
	Nuclear	39 48.1%	42 51.9%		35 43.2%	46 56.8%		54 66.7%	27 33.3%		52 64.2%	29 35.8%	

(*) p-value = 0.001

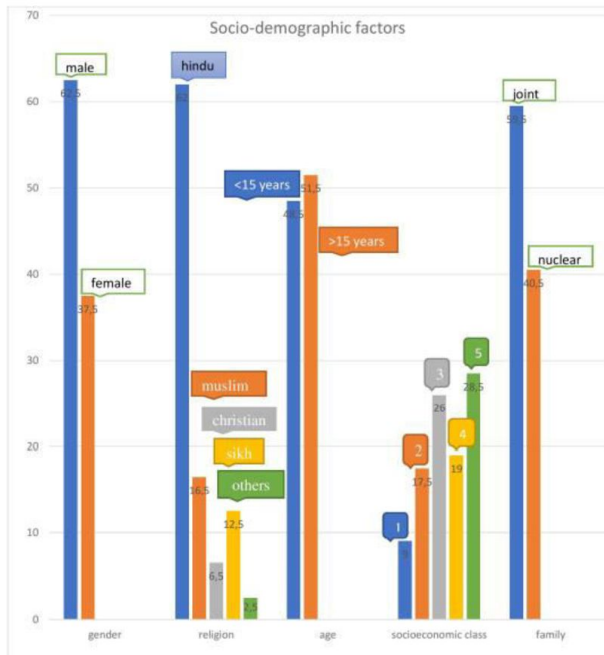Since the p-value is less than 0.05, it is highly statistically significant.

Fig. 1: It depicts various socio-demographic factor associated with e-learning in the study subjects
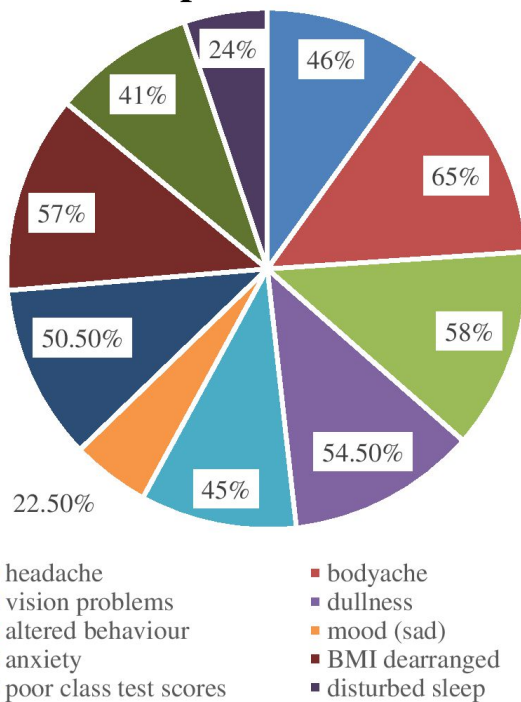

Fig. 2: It depicts various health related problems associated with e-learning

statistically significant observations found in the study.

5. Discussion

In the indexed study, e-learning was found to be more common in male students, socioeconomic class 1, Hindu religion and among students belonging to higher classes (class 8th to 10th). Socio-economic has a major role in education, especially e-learning as gadgets and internet connection are mandatory for e-learning and these are still a luxury rather than necessity in some part of the society. The execution of web-based advancing likewise contains obstructions, like the occasionally unsound web association. According to the research study of I. P. Widyanto, et al. (2018); a few understudies will be unable to take part in web-based advancing without a hitch, this is because of the inaccessibility of a legitimate web association. With the goal that they don't participate in direct learning and answer to discussions during internet getting the hang of utilizing the WhatsApp application.[11] The research article by Roby Zulkarnain Noer, et al. (2020) mentions some obstructions felt by students which were absence of concentration in learning, now and again unsound web connectivity, trouble in examining with gatherings, and trouble understanding the material overall.[12]

There were some health issues found among children pursuing e-learning like headache, body-ache, vision problems, unfit, dullness, disturbed sleep, altered behavior, deranged BMI, anxiety and depression. Addiction to internet and screen time was also present in few students. Several other studies conducted by Jha AK, et al. (2020); Lanka C, et al. (2020) and Lissak G, et al. (2018) have also found the association of visual complaints with online learning.[5,6,8] The studies show the incidence of myopia among children which matches with our study. Headache and body-ache were quite common complaints among many students which was also seen in the studies of Jha AK, et al. (2020) and Lanka C, et al. (2020).[5,6] Disturbed sleep pattern was found among few students which has been found in studies carried out by Jha AK, et al. (2020); Lissak G, et al. (2018) and Hale L, et al. (2014).[5,8,9] Few study participants have also gained weight and complaint about dullness which has been observed in other studies done by Fang K, et al. (2019) and Lissak G, et al. (2018).[7,8] Some parents also gave the history of recent change in mood and behavior of their children which shows similarity of reports found in the studies of Jha AK, et al. (2020) and Lissak G, et al. (2018).[5,8] The reasons could be many varying from nutritional deficiencies, vitamin-A deficiency, increased screen time, mishandling of electronic devices, studying in diminished light or incorrect postures, munching unhealthy snacks while attending lectures, decreased physical activities, nil or low sunlight exposure, minimized or absence of meeting people outside the home etc.

6. Conclusion

E-learning is the future but everything has pros and cons, henceforth it should be implemented with adequate precautions. E-learning has influence on several health parameters such as concentration, mood, behaviour, fitness, headache, body-ache, vision problems, academic performances, BMI, sleep cycle, anxiety etc. E-learning associated health hazards can be prevented and controlled through strategic planning and implementation of health education which is the cornerstone to avoid its detrimental effects. Health education should be imparted to all the e-learners including the use of anti-glare gadget screens and glasses, eye exercises, controlled screen time practise, sitting in correct posture while attending online classes, stretching exercises, yoga and meditation, awareness about the concept of balanced diet and its significance in health; live demonstration to students in school meetings would be effective. Healthy e-learners are a boon for better tomorrow.

7. Author Contributorship Statement

1. **Dr. Akanksha Sinha** conceived of the research study, made the protocol and presented in the institute to collect institutional ethical clearance certificate, wrote the study manuscript, drafted the study tool i.e. schedule, statistically analysed the data and interpreted the result.
2. **Vedant Khatri** helped in the data collection, entry of the data in Microsoft excel spreadsheet along with the coding and decoding of data.
3. **Dr. Ranjeeta Kumari** guided throughout the research study, helped in proof reading and finalisation of the manuscript.

8. Source of Funding

None.

9. Conflict of Interest

None.

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