

Determine Augmented Risk Association Between Health Problems and Screen Exposure to Electronic Gadgets in University Students, Islamabad During COVID-19 Pandemic

Aroob Fatima¹, Sadaf Konain Ansari^{2,*}, Hamza Waqar¹, Ahsan Jameel¹

¹Fazaia Medical College, Air University, Islamabad, Pakistan

²Medical education, M. Islam Medical and Dental College, Gujranwala, Pakistan

Email address:

aroobfatimaansari@gmail.com (A. Fatima), sdf_ansari@yahoo.com (S. K. Ansari), hamzasher7797@gmail.com (H. Waqar), ahsanjameel5@gmail.com (A. Jameel)

*Corresponding author

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Abstract: Now a day, frequency of health problems like myopia, headache, insomnia, dry-itchy eyes and wrist/neck or back pain due to bad posture in young people is increasing day by day. Therefore, this study determine the level of augmented risk association between screen-time exposure on electronic gadgets and development of ophthalmic, postural, psychological and neurological health harms in air university (AU) students of Islamabad, Pakistan in context of South Asian culture. A cross-sectional quantitative study design was selected for a period of 11 months to collect data using an online questionnaire. After that data was analyzed on SPSS 23 to check percentages, frequencies, means, standard deviation and chi-square test. High risk of development of back-pain, redness or burning sensation in eyes, difficulty in decision making and depression was found significant association with usage of electronic gadgets of more than 6 hours per day in students ($p < 0.05$). In what manner does the electronic-device was close or far from students' eye also showed strong relationship with forgetfulness and dementia ($p < 0.05$). Therefore, students who are continuously exposed to gadgets 'screens presented with various ill health problems which in later life turns into more bigger physical and psychological issues that increases the disease burden of Pakistan.

Keywords: Internet, Smartphones, Mental Health, Social Media, Video Games, COVID-19, Pandemics

1. Introduction

As we all know, we are living in era of technology and university students spend a lot of time on different electronic gadgets for educational and entertainment purposes [1]. A lot of students had experience of forceful increase in gadgets' usage since closure of university due to pandemic caused by COVID-19 [2]. Screen-time that undergraduates regularly spend to web-based classes, study group-meetings and social events held on Google™ and Zoom™ has been multifaceted by social platforms and gaming due to COVID-19 pandemic [3].

Now a day, frequency of health problems like myopia, headache, insomnia, dry-itchy eyes and wrist/neck or back pain due to bad posture in young people is increasing day by day [4]. It was evident that excess electronic-gadgets used

can have harmful impacts on mental wellbeing, decrease attention times, disturb sleep patterns and become a reason of eye strain [5]. Therefore, this study determine the level of augmented risk association between screen-time exposure on electronic gadgets and development of ophthalmic, postural, psychological and neurological health harms in air university (AU) students of Islamabad, Pakistan in context of South Asian culture. For this purpose a transposition hypothesis was made that there was a substantial association exists between them, hence, an objective was built i.e. to compare the screen time and frequency of augmented risk association of health problems related to duration; distance and posture with screen exposure between students of medical and non-medical departments of Air University (AU) in COVID-19 pandemic.

2. Methodology

Study design: A cross-sectional quantitative study design was used [6].

Study duration and population: This study was conducted for a period of 11 months from November 2019 to September 2020 in air university, Islamabad, Pakistan. A total of 367 students participated voluntarily through google form invitation link, however, only 179 students from different departments of AU who do not suffer from any of these ill-health issues before, and they are under the range of aged 18 to 25 years were asked to complete the questionnaire and submit their responses without disclosing their identity.

Data analysis: The protocol was approved by the institutional research ethics board (IRB), and data was collected through self-administered online questionnaire that includes participants' demographic details, present health status, personal and family medical history, life-style routines and screen-time exposure. Information collected was used in SPSS version 23 for analysis. Descriptive analysis was done through percentages, frequencies, means and standard deviation whereas risk association of health problems with screen time exposure was measured through chi-square test. A two-tailed p-value of less than 0.05 was considered as significant.

3. Results

Demographic particulars of AU students were

Table 2. Eyes' health problem among air university students on average screen time exposure less than 2 hr/day. (N=179).

| S. no. | Variables | Frequency n=(%) | Mean (SD) | p-value |
|--------|-------------------------------------------------|-----------------|--------------|---------|
| 1 | Blurred vision at near only | 15 (8.4) | 1.78 (0.211) | |
| 2 | Blurred vision at distance only | 66 (37.0) | 1.78 (0.048) | 0.332 |
| 3 | Blurred vision at both near and far | 17 (10.0) | 1.7 (0.17) | |
| 4 | Burning sensation in eyes | 43 (24.0) | 1.79 (0.074) | 0.684 |
| 5 | Double vision | 19 (11.0) | 1.72 (0.156) | 0.841 |
| 6 | Pain in or around the eyes | 68 (38.0) | 1.78 (0.046) | 0.339 |
| 7 | Dry eyes | 37 (21.0) | 1.76 (0.083) | 0.680 |
| 8 | Watering of eyes | 65 (36.3) | 1.79 (0.049) | 0.983 |
| 9 | Eye redness | 41 (23.0) | 1.78 (0.077) | 0.546 |
| 10 | Eye fatigue | 89 (50.0) | 1.78 (0.035) | 0.919 |
| 11 | Sensitivity to bright light | 29 (16.2) | 1.79 (0.110) | 0.174 |
| 12 | Difficulty in focusing near objects from far | 19 (11.0) | 1.72 (0.156) | |
| 13 | Moving objects in surrounding become irritating | 25 (14.0) | 1.78 (0.127) | 0.483 |
| 14 | Twitching of eyelids | 37 (22.0) | 1.68 (0.076) | 0.878 |

Table 3. Physical and Psychological health problems of AU students on average screen time more than 4-6 hr/day. (N=179).

| S. no. | Covariates | Frequency n=(%) | Mean, SD | p-value |
|--------|--------------------------------|-----------------|--------------|---------|
| 1 | Frequent headaches | 85 (48.0) | 1.77 (0.036) | 0.566 |
| 2 | Inability to fall asleep | 98 (55.0) | 1.78 (0.032) | 0.107 |
| 3 | Mood swings | 61 (34.1) | 1.78 (0.052) | 0.339 |
| 4 | Depression Episodes | 41 (23.0) | 1.78 (0.077) | 0.757 |
| 5 | Dizziness | 47 (26.3) | 1.78 (0.067) | 0.332 |
| 6 | Disorientation | 23 (13.0) | 1.76 (0.136) | 0.582 |
| 7 | Difficulty in making decisions | 27 (15.1) | 1.78 (0.118) | 0.518 |
| 8 | Wrist pain | 38 (21.2) | 1.79 (0.084) | 0.021 |
| 9 | Neck pain | 69 (39.0) | 1.76 (0.045) | 0.142 |
| 10 | Backache | 59 (33.0) | 1.78 (0.054) | 0.307 |
| 11 | Dementia / Forgetfulness | 35 (20.0) | 1.75 (0.087) | 0.972 |
| 12 | Distractions of mind | 72 (40.2) | 1.79 (0.044) | 0.514 |

demonstrated in table 1 with sample size of 179.

Table 1. Demographic details of participants (N=179).

| Variables | Categories | Frequency (n) | Percentage (%) |
|-----------------|--------------|---------------|----------------|
| Gender | Males | 60 | 33.5 |
| | Females | 119 | 66.5 |
| Age | 18-25 | 67 | 38.1 |
| | 21-25 | 109 | 61.9 |
| Marital status | Married | 1 | 0.6 |
| | Unmarried | 178 | 99.4 |
| Type of Student | Day scholars | 105 | 58.7 |
| | Hostellites | 74 | 41.3 |
| Department | Medicine | 139 | 77.65 |
| | Non-medical | 40 | 22.35 |

Besides, 12.8% of medical and 13.3% of non-medical departments complained difficulty in making decisions after being exposed to screen ($p<0.023$). Similarly, 34.5% of medical and 13.3% of non-medical departments complained back pain after being exposed to screen ($p<0.014$).

Whereas 16% males and 83% females was found burning sensation and redness in their eyes ($p<0.006$) and 22.9% students' experiencing episodes of depression ($p<0.011$). Further, table-2 shows participants' eye-health issues after using electronic gadgets on average screen time. Though, it was evident ($p>0.05$) that students eye problem were not actually associated with the usage of electronic-screen device's exposure less than 2 hrs per day.

Added to that, table 3 discloses that after spending 4 hrs or more per day 55% of students (98) were found difficulty to have good sleep or fall asleep ($p=0.107$) that refute any association with the use of electronic gadget.

Although, only 38 (21.2%) were reported a significant ($p=0.021$) association between worst wrist-pain and average screen time exposure more than 6 hrs per day to their electronic-devices. It was also evident that 70% of the

respondents use electronic gadgets with eyes at distance of less than 25cm. The figure 1 represents the augmented risk associations between health-problem such as; blurring of vision, eye-redness, trouble in focusing near object from far, frequent headache, neck-pain, dementia and forgetfulness ($p<0.05$) and distance from gadgets after spending more than 8 hours per day.

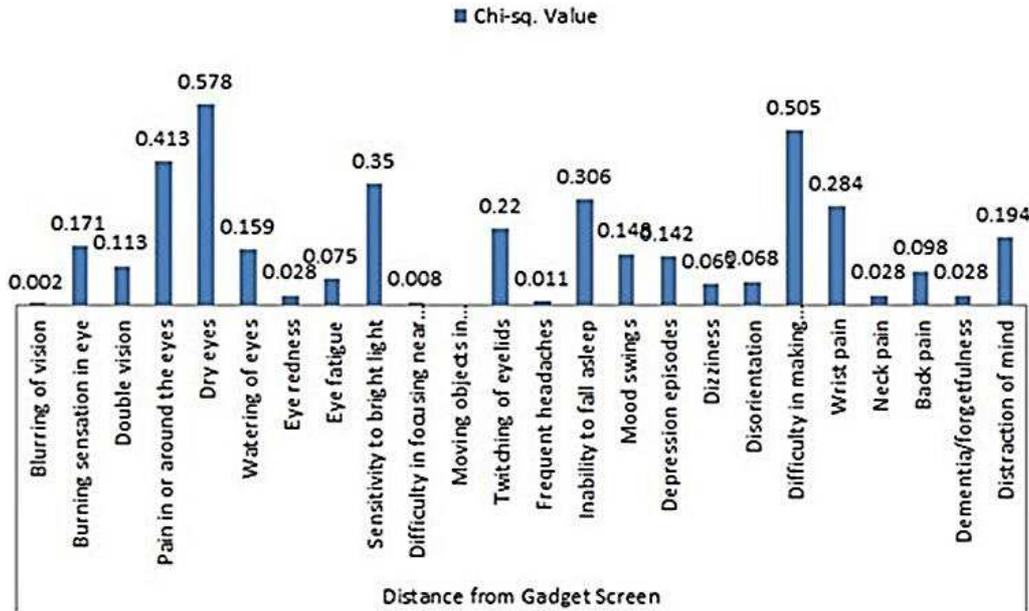


Figure 1. Screen distance association with time spends more than 6-8 hours per day.

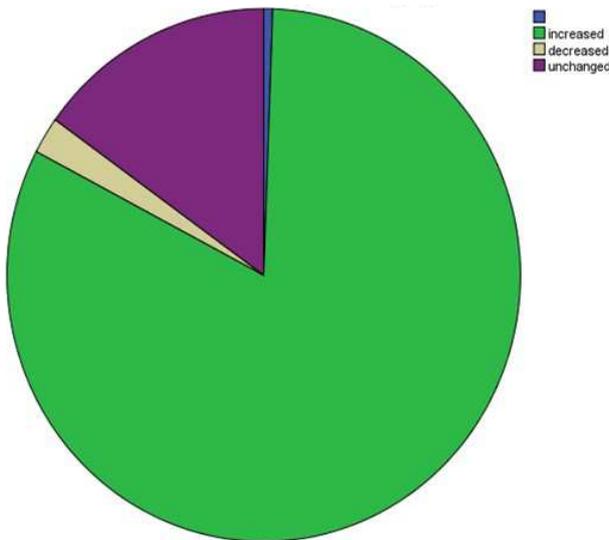


Figure 2. Ophthalmic and general health problem in corona pandemic due to online teaching and studying.

However, percentage brightness of gadget screen had a high significant relationship with double vision ($p<0.000$), and sensitivity to bright light ($p<0.044$). Additionally, it was found that student's posture issues had strong connection with gadgets used after spending more than 6 hours per day. Also another risk association was found between electronic gadgets

usage with watering of eyes ($p<0.029$), and moving object in surrounding turn into irritating ($p<0.049$) respectively. Air university undergraduates who used gadgets for long duration showed a strong association of increasing age with burning sensation of eyes ($p<0.011$), depression episodes ($p<0.048$), and dementia or forgetfulness ($p<0.017$) correspondingly. On the other hand, COVID-19 pandemic resultant into double the risk of increased health problems associated with exposure to electronic screen due to continuously home-based online classes and exams in 80% of AU students. Figure 2 represents the situation of increasing health problem during pandemic time of COVID-19.

4. Discussion

The present study determines the level of augmented risk association between health problems and screen exposure on different electronic gadgets in university students (AU). There was a total of 179 participants out of which highest are females ($n=119$, 66.5%) compared to male ($n=60$, 33.5%) participants respectively. The age of participants ranged from 18-to-25-years with mean age-22-years ($SD=4.69$). The results of this study support the hypothesis that there was a strong risk association of augmented health problem among students using electronic gadgets.

Regarding the sample size and gender distribution; of this

study was similar to a cross-sectional study that was conducted among 316 medical students in a private university in Malaysia in 2013, where total number of sample was 300 out of which female numbers was 204 (68%) and male was 96 (32%) respectively. However, they did not consider age as demographic variable in their study [7]. Another descriptive cross-sectional study was conducted in 2020, at Liaquat College of Medicine and Dentistry, Karachi, Pakistan, where MBBS and BDS students of all sessional-years participated in the study with a sample size of 382 and revealing the similar gender demographic outcome in which large number of participation was from female 64.1% (n=245) compared to male 35.9% (n=137) correspondingly [8]. This signifies that sample size in the present study was standardized. Moreover, when looking into a recent longitudinal multimodal study that was designed to follow the experiences of undergraduate students from Dartmouth College USA throughout their academic tenure about Covid-19 infection and the use of gadgets impact on health [9]. The sample size in that study was N=217 imprecise to this present study sample size N=179 and endorsed that the sample size of present study was acceptable for a good research to conduct and also support the anxiety ($p<0.001$) and depression ($p<0.03$) amplified the risk in relation to screen-time exposure during COVID-19.

Moreover, a study conducted in Saudi Arabia in 2018 using an online Google survey form, which was distributed through social media to 2435 participants to find out the prevalence of neck pain ($P<0.05$) and its relationship with usage of e-devices [10] showed that around 70% of respondents had an increased complaint of neck pain that also strengthen the findings of the present study revealing increased risk of health-issues (neck-pain) association with screen-time ($p<0.028$).

Besides, the psychological outcomes of the present study validating the results of an older research that was carried out in Iran, where the data was collected from 380 undergraduate medical students and results of that old study showed prevalence of poor sleep quality ($p<0.001$) in about 61.7% [11]. Coexisting psychological symptoms such as stress, loneliness and depression were significantly ($p<0.05$) found among 200 students of another study piloted in urban area of Dharwad city, India in 2018 [12] that also validated and reinforce the outcomes of the present study. Similarly, a cross-sectional study at Kilimanjaro Christian Medical University College (KCMUCo) in 2020, reveals a significant students addiction to internet with screen-time exposure more than 5 hours per day ($p<0.004$) [13] the results supported the conclusions of this present study with screen-time exposure between 4-6 hours per day (wrist pain $p<0.021$).

Further, the results of this study validating the conclusions of another research conducted at Georgia Southern University in 2014 that showed a significant association of health-related-behaviour with technology usage [14]. Similarly a research results from the Duke-National University of Singapore Medical School, disclosed that there was a strong association of increased technological devices screen-time activities with aggravating impact of myopia prevalence in COVID-19

pandemic time [15]. The outcomes of this study recognized the results of present study which determine the risk during COVID-19 and association of gadgets screen exposure with eye health related problem ($p<0.075$). Similarly, outcomes of the present study approved and endorsed the results of an old cross sectional study steered in Iran in which 21.49% students were at a higher risk of developing behavioural problem, addiction and 17.30% had symptoms of stress [16].

5. Conclusions

After screen exposure, most frequent complaint of students were eye fatigue and more than 80% of the participants reported clear increase in frequency of ophthalmic and other health problems due to online studying during corona pandemic. Students when continuously exposed to gadgets 'screens were presented with various ill health problems which in later life turns into bigger physical and psychological issues that increases the disease burden of Pakistan.

6. Suggestion

Administration and government should create awareness at school / university level among students about effects of excessive screen exposure, bad posture for long duration with gadgets and using screen very close to their eyes that are harmful for their physical and mental health through posters, seminars and pamphlets.

For future purpose a multicentre high education level research with large sample size should be priority in generalizing the outcomes of this study.

Declaration of Interest

Fazaia Medical College, Islamabad (FMC) did not impact the design and interpretation of information collected for writing. All the authors do not have any possible conflicts of interest.

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