

Prevalence of Digital Eye Strain in the Gaming Community of Pakistan during First Countrywide COVID Lockdown

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Abstract

Objective: This cross-sectional study was conducted to explore the prevalence of Digital Eye Strain (DES) signs and symptoms among the video gamers in Pakistan, during the period of 1st countrywide COVID lockdown (March 2020 to September 2020) imposed by the government.

Method: This survey was circulated via Google Forms on major social media gaming forums in Pakistan. Non-probability convenient sampling technique was used to collect data via an anonymous questionnaire regarding the signs and symptoms of DES and the gaming routines of the participants. Data was analyzed using SPSS 24.

Results: There were 201 (89.7%) males and 23 (10.3%) females with a mean age of 20.72 ± 3.78 years and mean gaming of 12.59 ± 11.40 hours per week. Out of all the signs and symptoms, tired eyes (50.2%) was the most common, followed by neck and/or shoulder pain (39.9%), headache (33.5%) and watery eyes (29.1%). The symptom considered the most disturbing was Neck and/or Shoulder pain (18.3%). 112 (50%) participants had a reduced visual acuity as well, and among them, the incidence during the lockdown was of 22 (19.6%) responders. Only the people showing four or more than four signs and symptoms were considered Digital Eye Strain positive.

Conclusion: Signs and Symptoms of DES were more common among participants who did video gaming for increased hours than with those who did less, and the difference was significant (p value = 0.03). Distance from the screen had an insignificant effect on the signs and symptoms.

Keywords: Digital Eye Strain (DES), Video game, Video gamers, COVID Lockdown

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Introduction

Since the step of government to impose lockdowns due to covid pandemic initiated, there was a surge in screen time for everyone globally, not only due to

e-learning but also because public found substitute of outdoor sports and entertainment in using electronic gadgets¹. Video Gaming encompasses a major part among all other leisure activities at home² and is one of the leading causes of vision related problems and physical distress.³

Digital Eye Strain (DES) is defined as a range of disorders related to vision, that outcomes from extended screen time, and is considered a major health problem since more than 2 decades.⁴ Computer Vision Syndrome (CVS) mostly describes this same condition.⁴ The signs and symptoms prevalent among the affected are, but not limited to blurred or double vision, dry or watery eyes, tired, burning, or itching eyes, frequent eye rubbing and redness in eyes, increased sensitivity to light or

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poor vision in dark, feeling that you cannot keep your eyes open, headache, neck and/or shoulder pain, poor vision in dark, difficulty concentrating.⁵⁻⁷

These signs and symptoms are thought to increment with increasing gaming hours and/or having a less distance between the eyes and the display screen, and can be reduced if breaks are taken in between the gaming sessions³. Furthermore, the High Energy Visible-light (HEV), especially from the blue/violet spectrum, is radiated from the screens of TVs, monitors, mobile phones, VR (virtual reality) Headsets or other handheld consoles and is believed to have an increased ocular penetration with proven damaging effects like Macular Degeneration.⁸ Moreover, decreased visual acuity is also linked with prolonged gaming periods.⁹

Literature review showed that although majority of the researches had been done regarding the association of vision related difficulties and excessive screen usage, yet very few were centered towards gaming. Hardly any work has been done regarding it in Pakistan. Our study aims to investigate the prevalence of DES and its major causative factors among gamers in Pakistan, and to find a relationship between distance from video displays and gaming hours with the frequency of DES signs and symptoms among these gamers.

Material and Method

This cross-sectional study was initiated after the ethical approval from CMH Lahore Medical College, Lahore, from March 2020 till September 2020. According to Raosoft, sample size was 224 with 95% confidence level¹⁰. Non-probability convenient sampling technique was used to collect data. The questionnaire used was from Hoya Vision USA regarding DES signs and symptoms⁷ and was circulated throughout the country-wide gaming communities via social media groups on Facebook and WhatsApp, using Google Forms link. The questionnaire was divided into 5 sections. The first, second and third sections consisted of the purpose of the questionnaire, declaration of consent and bio data of the participants, respectively. It also asked whether the signs and symptoms improved in any manner. Fourth and fifth sections consisted of 10 questions on video gaming habits of participants and 8 questions about different visual signs and symptoms observed by the participants, respectively. The responses were compiled using Microsoft Excel and the data was analyzed with IBM SPSS 24. Descriptive statistics in terms of fre-

quency and percentages were used to describe qualitative variables like platform of gaming used and usage of blue light filter/glasses. Mean along with standard deviation was calculated for quantitative variables for example age, distance from screen, average gaming hours and so on. While qualitative variables were presented as frequency and percentages. Chi-square was used to determine association between variables and p-value less than 0.05 was taken significant.

Results

There were 201 (89.7%) males and 23 (10.3%) females with a mean age of 20.72 ± 3.78 years. Mean gaming

Table 1: Demographic Data and Characteristics of Participants

Parameters	Frequency	Percentage
Total Participants	224	100
Gender		
Male	201	89.7
Female	23	10.3
Occupation Status		
Student	204	91.1
Employed	16	7.1
Part Time Employed	4	1.8
Do you wear glasses/lenses while gaming?		
Glasses	86	38.4
Lenses	1	0.4
Sometimes Glasses, Sometimes Lenses	3	1.4
No	134	59.8
Do you use blue light filter or wear blue light glasses/specialized computer glasses?		
Yes	42	18.8
No	182	81.3
Do you experience any of the Signs & Symptoms of DES?		
Yes	202	90.2
No	22	9.8
If yes, do these symptoms decrease when you spend less time gaming/take breaks? (Out of 210 'Yes' responses)		
Yes	139	66.2
No	71	33.8

Table 2: Table 2: Average Gaming Hours per Week and Average Distance from the Display

Parameters	Mean
Gaming Hours per week	12.59 ± 11.40
Distance from the display in feet (top 3 platforms)	
PC/Laptop	2.53 ± 1.80
Console on TV	5.44 ± 3.63
Mobile Phone	1.09 ± 0.44

Table 3: Relationship of Gaming Hours/Week and Distance from Screen with Digital Eye Strain (DES) Positivity (anyone with 4 or more Signs and Symptoms was Considered DES positive)

Variable	Digital Eye Strain		P-Value
	Positive	Negative	
Gaming Hours			
≤ 10 Hours per week	24	74	0.03
10 < x ≤ 20 Hours per week	17	39	
20 < x ≤ 30 Hours per week	7	26	
>30 Hours per week	18	19	
Distance from the display in feet			
≤ 2 Feet	31	92	0.48
2 < x ≤ 4 Feet	21	40	
4 < x ≤ 6 Feet	8	16	
>6 Feet	6	10	

hours before the lockdown were 6.6 ± 7.4 hours per week and they increased to mean gaming of 12.59 ± 11.40 hours per week as the lockdown started. Most (91.1%) of the participants were students and others consisted of employed and part time employed (Table 1).

For the platform used primarily for gaming, 38.6% of the responders depended on a PC/Laptop, 28.7% had Mobile Phones, and 22.4% preferred consoles on TV. Other (10.3%) of the platforms included VR headsets, handheld consoles e.g Switch and physical VR gaming e.g HTC Vive. The average distance from the displays of 3 most common platforms is given in (Table-2). Furthermore, only 18.8% of the participants preferred to use a blue light filter or specialized computer glasses to protect their eyes from the excessive HEV exposure. The prevalence of DES signs and symptoms was reported by 202 (90.2%) participants, and 139 (68.8%) of them experienced decrease in signs and symptoms as they reduced their screen time. Out of all the signs and symptoms, Tired Eyes (50.2%) was the most common, followed by Neck and/or Shoulder Pain (39.9%), Headache (33.5%) and Watery Eyes (29.1%). The symptom considered the most disturbing was Neck and/or Shoulder pain (18.3%) and was difficult to deal with by the affected. 112 (50%) participants had a reduced visual acuity, and among them, the incidence during the lockdown was of 22 (19.6%) responders. To test whether there was any relationship between total gaming hours per week and distance of eyes from the screen with increase in the frequency of signs and symptoms, the data was divided into 4 groups each, as shown in (Table 3). Those with 4 or more than 4 DES signs and symptoms

were considered DES Positive. Using a Chi-squared test and $p=0.05$ as a reference, it was found that the increase in gaming hours significantly increased the frequency of signs and symptoms among gamers ($p<0.05$) however, the distance from the screen did not have a statistically significant relationship ($p>0.05$).

Figure 1: Frequency of Signs & Symptoms of DES (Multiple Response)

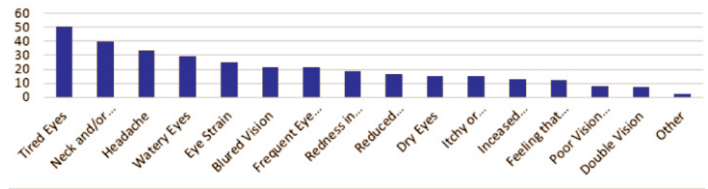


Figure 1: Frequency of Sign and Symptoms of DES

Discussion

Due to the advancement in technology, people are now more absorbed in playing video games to an extent that it has become a huge industry and a great source of income for many young adults. However, excessive screen times and exposure to radiations have adverse effects on the health. The widespread use of digital screens in devices used throughout the day have led to the emergence of "digital eye strain" as a new clinical syndrome that affects every individual who spends a large period fixated on multiple screens, for work or leisure.¹¹ Due to excessive leisure time staying home during the lockdown, the average gaming hours increased among the Pakistani gaming community, according to our survey, and so did it increase in other countries like Canada.¹²

In our study, 89.7% participants were males and 10.3% were females which is similar to a literature review article by Chen KH, Oliffe JL, Kelly MT which showed majority of video gamers were males¹³ but slightly different from a study conducted nationally in Rawalpindi where 30.6% video gamers were females.⁸ The most common symptom of tired eyes (50.2%) in our study is similar to a study conducted in South Korea,³ however the next symptom in their study was blurred vision whereas our study showed shoulder/neck pain and headache as the most common symptoms after tired eyes.

The most disturbing symptom in our study was neck/shoulder pain which shows video gaming not only has ocular symptoms but as well as effects on physical health as well, which has also been indicated in a South Korean study³ which showed that in the physical discomfort domain, the score for neck discomfort after

the gaming session was the highest (before gaming 0.44 ± 0.81 and after gaming 1.92 ± 1.21 , both values are significant), followed by the scores for shoulder discomfort, headache, and back discomfort. It was also seen that DES symptoms improved in 66.2% of the participants when less time was spent in gaming or breaks were taken in between. Ophthalmologists should set a certain time range for screen time after which DES symptoms may develop. Regular exercise should also be advised to promote a healthy lifestyle.

Due to the lockdown and using video gaming as a source of income, many young people have prolonged screen times and are developing ocular as well as extra ocular symptoms. Increased computer-related activities are an independent risk factor for Neck/Shoulder Pain (NSP) and Lower Back Pain (LBP) in adolescence. It is possible, even obvious, that with these modern leisure activities adolescents are confronted with a new health risk. NSP and LBP are signs of physical and mental loading^{14,15}. Neck/shoulder pain can lead to severe postural health problems later in their lives that will not only affect their health but worsen their quality of life as well. In the study of Alabdulwahab et al.¹⁶ a significant relationship was found between the Smartphone Addiction Scale (SAS) and the Neck Disability Index (NDI). In their study, Hakala et al. examined adolescents in Finland and reported that more than 2–3 hours of computer use per day increases the risk of NSP.¹⁷ Silva et al. stated that musculoskeletal complaints were more frequent in individuals with who used electronic devices more frequently and the pain in the cervical and thoracolumbar area increases when the duration of these devices' usage increased to more than 4 hours per day¹⁸.

Conclusion

The survey helped to establish that there are significant ocular or vision related effects on the gamers as they spend more time gaming, however, the distance from the screen did not significantly affect the visual signs and symptoms. Gamers may need to rest in between the gaming sessions to reduce the side effects and ocular fatigue.

Conflict of interest:

None

References

1. Wong CW, Tsai A, Jonas JB, Ohno-Matsui K, Chen J, Ang M, et al. Digital Screen Time During the COVID-19 Pandemic: Risk for a Further Myopia Boom? *Am J Ophthalmol.* 2021 Mar;223:333-337. doi: 10.1016/j.ajo.2020.07.034. Epub 2020 Jul 30. PMID: 32738229; PMCID: PMC7390728.
2. Wittek, C.T., Finserås, T.R., Pallesen, S. et al. Prevalence and Predictors of Video Game Addiction: A Study Based on a National Representative Sample of Gamers. *Int J Ment Health Addiction* 14, 672–686 (2016). <https://doi.org/10.1007/s11469-015-9592-8>
3. Lee JW, Cho HG, Moon BY, Kim SY, Yu DS. Effects of prolonged continuous computer gaming on physical and ocular symptoms and binocular vision functions in young healthy individuals. *PeerJ.* 2019 Jun 4;7: e7050. doi: 10.7717/peerj.7050. PMID: 31198647; PMCID: PMC6555390.
4. Sheppard AL, Wolffsohn JS. Digital eye strain: prevalence, measurement and amelioration. *BMJ Open Ophthalmology* 2018;3:e000146. doi: 10.1136/bmjophth-2018-000146
5. Computer vision syndrome (Digital eye strain) [Internet]. Aoa.org. Available from: <https://www.aoa.org/healthy-eyes/eye-and-vision-conditions/computer-vision-syndrome>
6. Eyestrain - Symptoms and causes [Internet]. Mayo Clinic. Available from: <https://www.mayoclinic.org/diseases-conditions/eyestrain/symptoms-causes/syc-20372397>
7. Gosling D. Screen time lies and digital eye strain truths: how current are your questions? [Internet]. Blog. hoyavision.com. 2017. Available from: <https://blog.hoyavision.com/eye-care-professionals/-digital-eye-strain-ask-right-questions>
8. Maroof S, Mashhadi F, Azam N, Haider K, Arshad N, Zulfiqar S et al. Relationship of Screen Hours with Digital Eye Strain: A Cross Sectional Survey from Teenagers. *Pak Armed Forces Medical Journal.* 2019; 69(2):182-86.
9. Rechichi C, De Mojà G, Aragona P. Video Game Vision Syndrome: A New Clinical Picture in Children? *J Pediatr Ophthalmol Strabismus.* 2017 Nov 1;54(6): 346-355. doi: 10.3928/01913913-20170510-01. Epub 2017 Aug 29. PMID: 28850642.
10. Sample Size Calculator by Raosoft, Inc. [Internet]. Raosoft.com. Available from: <http://www.raosoft.com/samplesize.html>
11. Mylona, I., Deres, E. S., Dere, G. S., Tsinopoulos, I., & Glynatsis, M. (2020). The Impact of Internet and Videogaming Addiction on Adolescent Vision: A Review of the Literature. *Frontiers in public health*, 8, 63. <https://doi.org/10.3389/fpubh.2020.00063>

12. Colley RC, Bushnik T, Langlois K. Exercise and screen time during the COVID-19 pandemic. *Health Rep.* 2020 Jul 15;31(6):3-11. doi: 10.25318/82-003-x 202000600001-eng. PMID: 32672923.
13. Chen, K. H., Oliffè, J. L., & Kelly, M. T. (2018). Internet Gaming Disorder: An Emergent Health Issue for Men. *American journal of men's health*, 12(4), 1151–1159. <https://doi.org/10.1177/1557988318766950>
14. Paula T. Hakala, Arja H. Rimpelä, Lea A. Saarni, Jouko J. Salminen, Frequent computer-related activities increase the risk of neck–shoulder and low back pain in adolescents, *European Journal of Public Health*, Volume 16, Issue 5, October 2006, Pages 536–541, <https://doi.org/10.1093/eurpub/ckl025>
15. Barr M, Copeland-Stewart A. Playing Video Games During the COVID-19 Pandemic and Effects on Players' Well-Being. *Games and Culture* 2022;17(1) 122–139
16. AlAbdulwahab SS, Kachanathu SJ, AlMotairi MS. Smartphone use addiction can cause neck disability. *Musculoskeletal Care.* 2017;15(1):10-12. doi: 10.1002/msc.1170.
17. Hakala PT, Rimpelä AH, Saarni LA, Salminen JJ. Frequent computer-related activities increase the risk of neck-shoulder and low back pain in adolescents. *Eur J Public Health.* 2006;16(5):536-41. doi: 10.1093/eurpub/ckl025.
18. Silva GR, Pitangui AC, Xavier MK, Correia-Júnior MA, De Araújo RC. Prevalence of musculoskeletal pain in adolescents and association with computer and videogame use. *J Pediatr (Rio J).* 2016;92(2):188-96. doi: 10.1016/j.jped.2015.06.006.

Authors Contribution

IM: Conceptualization of Project

FI: Data Collection

US: Literature Search

FY: Statistical Analysis

RKA: Drafting, Revision

MF, FI: Writing of Manuscript