



A STUDY ON DIGITAL EYE STRAIN ASSOCIATED WITH EXCESSIVE USE OF DIGITAL GADGETS DURING PANDEMIC

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ABSTRACT

An observational study on changes in refractive error associated with excessive use of digital gadgets during pandemic. Home-isolation and social distancing during the COVID-19 pandemic caused increased use of digital devices, posing a greater risk of developing digital eye strain-related symptoms. Our study included 200 eyes of 100 patients and a self-reported questionnaire which was used to compare the total hours per day, either continuous or intermittent, spent on digital devices during and before lockdown and the association of these durations with digital eye strain and vision related complaints. It showed that 100 patients including both male and female, out of which 58% were males and 42% were females. Majority of gadgets user were found in age group of 11 to 20 (62%), followed by the age group of 21 to 30 (29%) and least used by the age group of 5 to 10 (9%). In this study we also observed that maximum patients used gadgets for about 6 to 8 hours a day (51%), 3 to 5 hours a day (49%), and least use of 1 to 2 hours a day. The results shows that digital gadgets user among them 80% patients having a complaint of headache, 66% patients complaint of squeezing the eyes, 77% patients having an complaint of digital eye strain. Also out of 100 patients in 26% patients don't wearing spectacle, and 30% patients having a history of eye rubbing. Mainly In our study, we found that out of 100 patients 64% patients are myopic astigmatism, 14% are hyperopic astigmatism, 12% are astigmatism, and 10% patients are only myopic. From the our study, we concluded that the excessive use of screens in childhood and adults can have many negative effects and unregulated amounts of screen time may lead to ailments like Asthenopia and increase risk of myopi

KEY WORDS: Covid 19, digital eye strain, asthenopic symptoms, digital devices, refractive error

INTRODUCTION

COVID-19 is a disease caused by a new strain of coronavirus. 'CO' stands for corona, 'VI' for virus, and 'D' for disease. Since the declaration of the lockdown due to COVID-19, the usage of digital devices has gone up across the globe, resulting in a challenge for the visual system of all ages. The sudden

increase in usage of digital devices, and the overall number of hours of screen time logged per day have been due to a shift of professional and social activities to a web-based platform after the advent of the novel coronavirus. This includes online conference calls, meetings, webinars, online classes and assignments done on digital devices, work from home, personal and



social video calls, online shopping, leisure, and entertainment.¹

According to the American Optometric Association, as little as two hours of continuous digital device usage per day is enough to bring about the development of an array of eye and vision related problems, and is referred to as digital eye strain¹. Prolonged usage of these devices is not only a stressor on the visual system but also causes musculoskeletal strain and circadian disturbances, and these make up the umbrella diagnosis of computer vision syndrome (though the terms digital eye strain and computer vision syndrome are often used interchangeably throughout the literature). Digital eye strain is a manifestation of evaporative dry eye caused by decreased and incomplete blink rate leading to ocular surface compromise, and asthenopic symptoms caused by a visual system in a constant state of accommodation and convergence. Other environmental factors, such as poor ergonomics, improper lighting, glare, decreased humidity in air-conditioned rooms, are all contributing factors for worsening of these symptoms. Uncorrected refractive errors, contact-lens wearers, people with a history of ocular illnesses, diabetics, female gender, and autoimmune diseases are at risk for the development of more and severe symptoms than their age-matched counterparts². The other component is the strain on the ocular muscles, both internal and external. The constant near work demands the eye to always be in a state of accommodation, while the accompanying required convergence taxes the extra ocular muscles. When this state is maintained for extensive periods of time, the fluidity of the visual motor system is fatigued and causes eye strain and headache³. Blurring of vision and double vision can be explained by eye fatigue, dry eye symptoms, or an inability of accommodation to relax, causing difficulty in focusing at varied distances. Increased sensitivity to light, glare, and colored halos around bright light are caused due to a disparity in the air-tear film refractive interface.

Our study highlighted the drastic increase in use of digital devices after the initiation of the COVID-19

lockdown, and along with it, number hours a day usage across all age groups, association of asthenopic symptoms and refractive error changes. Awareness about prevention of digital eye strain should be stressed, and going forward, measures to bring these adverse effects to a minimum should be explored.

MATERIALS AND METHODOLOGY

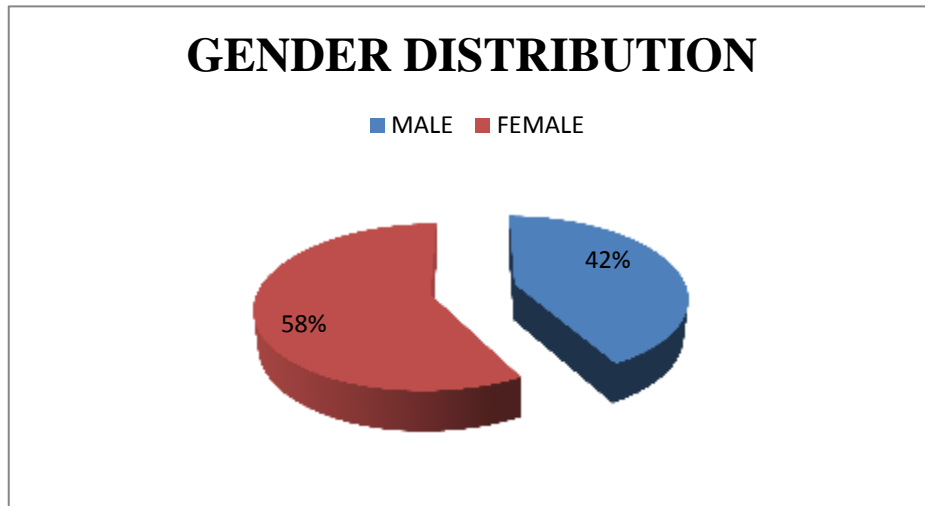
Our study included 200 eyes of 100 patients who were digital gadget users. The study was done within a period of several months from October 2020 to July 2021, at K.P. Sanghvi Eye Hospital, Surat.

Patient's demographic data and careful history was obtained with a particular attention to patient's symptoms, any systemic disorders or any previous ocular surgery. Afterwards patient's general examination of ocular adnexa on slit-lamp was done. Visual Acuity was taken Snellen's visual acuity chart. Refractive error was tested by autorefractometer, retinoscopy and subjective refraction with the help of trial set both monocularly and binocularly. Also the study was conducted with the help of questionnaire to be filled by patients, which stated the use of digital gadgets in detail. The responses of patient were collected. The questionnaire includes factors such as how much amount of time they spend in gadgets, do they have developed any ocular symptoms or postural problem due to excessive use of gadgets, distance at which digital gadgets are being used, family history, visual problems and asthenopic Symptoms of the patient. Our study Inclusion criteria included all patients within age group 8 to 30 years with no gender preference, it included patients with all types of refractive error. Patients excluded were those with any ocular abnormalities, any other previous surgery done in eye and any ongoing ocular infections.

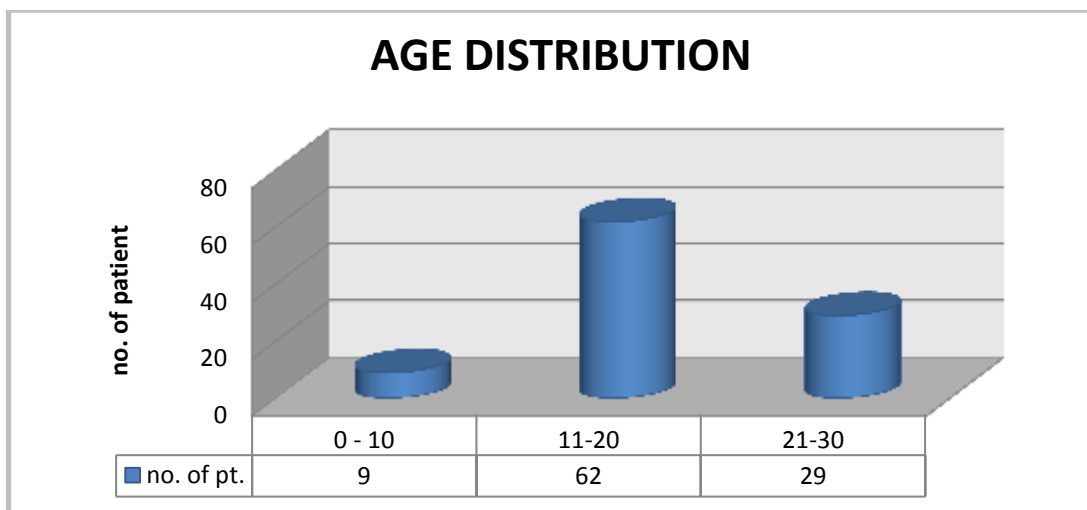
RESULT

Our study shows that out of 100 patients 58 % were male and 42% were females.

Chart 1 : Gender Distribution



Our study shows that out of 100 patients 8-10 years of age group included 9 patients , 11 to 20 years age group included 62 patients and 21 to 30 years of age group included 29 patients .

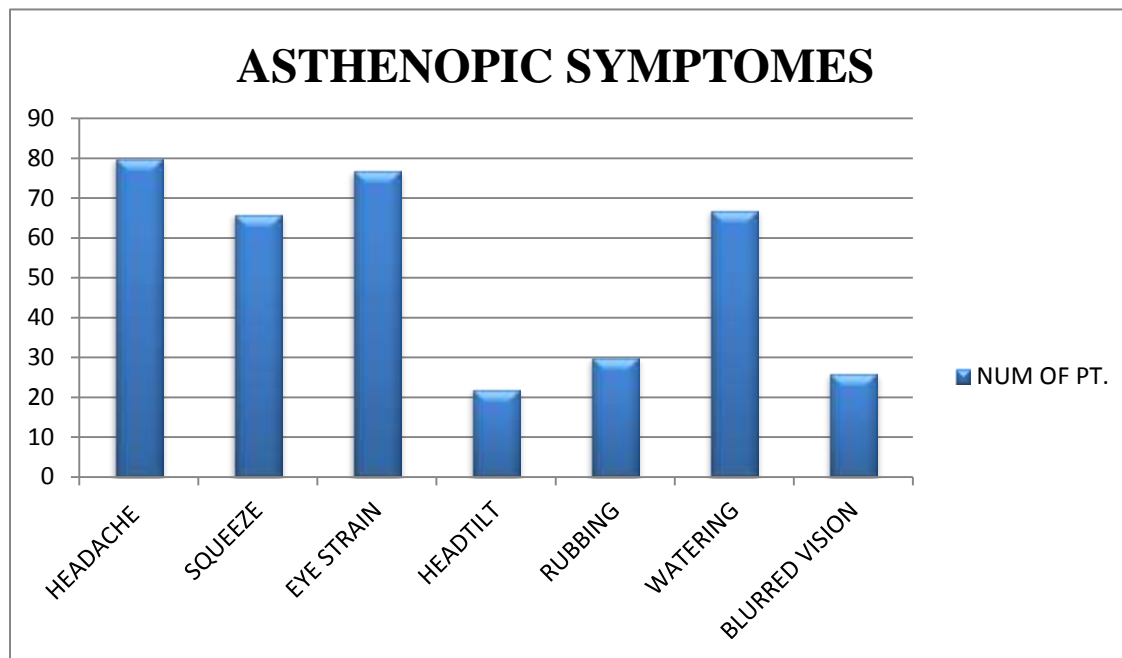


In our study, we observed that majority of patients had an asthenopic symptoms like, around 80% patients were complaining about headache which can be due to constant and long hours work on gadgets, around 66% patients squeeze the eyes, around 77% patients had eye strain, around 22% patients did head tilt, around 30% patients did eye rubbing, around 67% patients complained regarding watering, around 27% patients complained of blurring of vision.

In A study on digital eye strain symptoms done by Logaraj M^{*}, Madhupriya V, Hegde SK (Department of Community Medicine, SRM Medical College Hospital and Research Centre, Kattankulathur, Kancheepuram, Tamil Nadu, India)⁴. About 13.9% of

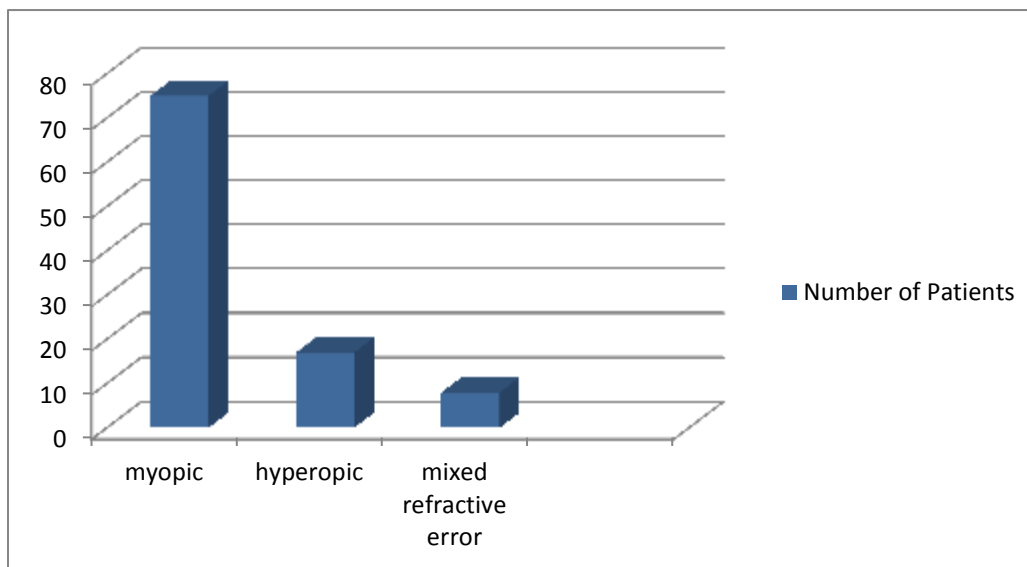
the medical and 23.3% (50/215) of engineering students reported redness. Nearly 32.3% of medical students and 42.8% engineering students reported burning sensation. About 43.3% medical and 45% of engineering students reported headache. Nearly 16.4% of medical students and 31.6% of engineering students reported blurring of vision while it was 13.2% as reported by Talwar et al., Nearly 18.6% of the females and 30% of the males reported dry eyes following computer use, Nearly 61% of the students had reported neck and shoulder pain. Previous studies have also shown that computer users are at increased risk of having such visual symptoms.

Chart 3 : Asthenopic Symptoms



In our study, we observed that out of 100 patients 75% patients are myopic, 17% patients are hyperopic, and 8% patients had astigmatic refractive error.

Chart 4 : Various Refractive Errors Reported In Our Study



CONCLUSION

From our Study, It is concluded that the excessive use of screens in children and adults can have many negative effects like headache, squeezing the eyes, eye strain, head tilt, eye rubbing, watering,

blurring of vision. Also unregulated amounts of screen time may lead to ailments like change in Refractive error.



AREA OF FURTHER RESEARCH

Our study had a small sample size, and the investigation were performed only on healthy Indian subjects. For this reason, we were unable to assess the influence of ethnicity in our research. In addition, we do not know whether the results apply to patients with existing eye problems and diseases, as we examined only normal eyes. We hope to examine the findings for long term effects of use of digital devices in the future.

REFERENCES

1. *Computer vision syndrome (CVS)*. American Optometric Association [Online]. Available from: <http://www.wao.org/x5374.xml> Last cited on 2020 Aug 24
2. Loh K, Redd S. Understanding and preventing computer vision syndrome *Malays Fam Physician*. 2008;3:128–30
3. Bhootra AK. *Basics of Computer Vision Syndrome* New Delhi, India: Jaypee Brothers Medical Publishers, 2014 ISBN 978-93-5152-413-7
4. Logaraj M*, Madhupriya V, Hegde SK (Department of Community Medicine, SRM Medical College Hospital and Research Centre, Kattankulathur, Kancheepuram, Tamil Nadu, India).