INTRODUCTION

Technological revolution has made the smart phones integral part of daily living with 84% of world population using it by the end of 2018. There's a steady global increase in Internet usage with 0.3% penetration in 1993 compared to 40.4% in 2014.1

Visual display terminals syndrome (VDT) is a constellation of symptoms of ocular as well as extracocular, associated with prolonged use of visual display terminals. An average person spends over 4 hours a day on their device.

A study reported two cases of transient monocular vision loss associated with smartphone use.2 Excessive use also led to acute acquired comitant esotropia in adolescents.3 A study including paediatric dry eye disease (DED) reported that the rate and mean time spent using smartphones were greater in DED than the non DED group.4 Some studies reported the adverse effects of blue light emitted from smartphones on corneal epithelial cells causing deterioration of tear film and increased inflammatory markers and reactive oxygen species production on the ocular surface.

MATERIALS AND METHODS

A prospective, nonrandomized, pilot clinical study to evaluate the effects of smartphone usage on subjective symptoms and changes in the tear film and ocular surface.


PLACE OF STUDY – Department of Ophthalmology, ASRAM

INCLUSION CRITERIA-

Fifty healthy medical students
1. Willing to give consent
2. No H/o usage of any topical or systemic drugs
3. No H/o previous ocular surgeries

EXCLUSION CRITERIA–

1. H/o usage of treatment for ocular dryness
2. Pregnant

The study was conducted in accordance with the Declaration of Helsinki.

Written informed consent was obtained from all the subjects The protocol was approved by the Institutional Ethical Review Board.

METHODS–

For all the subjects
1. Same smartphone with a 5.8 inch light emitting diode (LED)

RESULTS:

All parameters showed no significant difference at baseline. Scores of OSDI were increased and FBUT decreased significantly after one hour usage of smartphone.

CONCLUSION:

Smartphone use aggravates subjective ocular symptoms and induces tear film instability causing Digital eye strain.

KEYWORDS : Smartphones, Fbut, Digital Eye Strain.
from CVS and 1 million new cases are estimated to occur annually. Computer vision syndrome \{CVS\} or Visual display terminal \{VDT\} constitutes an array of clinical symptoms related to prolonged, repetitive and uninterrupted viewing and usage of VDTs and it's peripherals. Almost 60 million people around the world suffer from CVS and 1 million new cases are estimated to occur annually. \\

DISCUSSION

Computer vision syndrome \{CVS\} or Visual display terminal syndrome \{VDT\} constitutes an array of clinical symptoms related to prolonged, repetitive and uninterrupted viewing and usage of VDTs and it's peripherals. Almost 60 million people around the world suffer from CVS and 1 million new cases are estimated to occur annually. Visual display terminals demand prolonged near vision task with increased prevalence of asthenopia between 55% to 81% in VDT users. Compulsive sustained accommodative effort leads to increased innervation and onset of subjective visual fatigue which is temporary and is associated with near work induced transient myopia and development of permanent myopic changes among adult and early onset myopes. Low relative humidity <40%, high temperature and air draft are associated with increased evaporation and disruption of the precorneal tear film producing hyperosmolarity and ocular discomfort.

In this study we investigated the influence of excessive smartphone usage on the tear film and ocular surface. The OSDI scores indicating dry eye severity significantly increased whereas as FBUT decreased after smartphone usage. We report after 1 hour higher total OSDI symptom, visual function and trigger scores with dry eye like symptoms such as irritation, burning and dryness with excessive smartphone use.

Uchino et al observed short tear break up time and increased corneal fluorescein staining despite normal lacrimation function in VDT users. Excessive evaporation of the tear fluid due to prolonged blinking intervals while gazing is considered as a causative factor in VDT associated dry eye. Blinks are mandatory to maintain the physiologic milieu of tear on ocular surface along with its mechanical tear smearing action. Adequate functioning demands both appropriate frequency and completion of blinking action.

High cognitive demand and attention to a visual task associated with VDT use causes increased number of partial blinks or blink clusters or flurries leading to spontaneous blink rate alteration. Nakomori et al observed maximum blink interval increased with VDT use. \(^5\) Chu et al has observed no significant change in blink rates between VDT and hard copy text presentation. However significant increase in incomplete blinks of 7.02% associated with VDT use compared to 4.33% with hard copy. This has been linked to the drying effect on ocular surface and lid wiper epitheliopathy. \(^6\)

Wu et al has reported meibomian gland dysfunction in dry eye with VDT users correlated with working time of >4 hours per day. They also reported Inverse correlation with FBUT, positive correlation with fluorescein staining and No correlation with Schirmer volumes. \(^7\) The severity of the symptoms after smartphone usage can be attributed to the smaller screen size and closer viewing distance. The optimal viewing distance for a mobile device is 36.2 centimetres which is shorter than the typical distance for reading books i.e 40 cm. This requires greater accommodation and convergence. Focusing on a shorter than the typical distance for reading books i.e 40 cm. This requires greater accommodation and convergence.

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Liquid Crystal Display and Light Emitting Diode screens emanate large amount of blue light which causes excessive ROS production and damages photoreceptors, corneal and retinal pigment epithelial cells. Over exposure to blue light leads to oxidative damage, apoptosis and inflammation of the ocular surface resulting in dry eye.

CONCLUSION

Excessive smartphone use aggravated subjective ocular symptoms and asthenopia with compromised tear film stability causing Digital eye strain. In clinical practice, increased awareness of the tear film and ocular surface changes under smartphone use may enable clear understanding of the causes of ocular discomfort and management of ocular problems associated with excessive smartphone use.

Simple solution to Digital eye strain is 20-20-20 rule. Look 20 feet away for 20 seconds every day for every 20 minutes Learning to live with technology without surrendering to it maybe one of the biggest challenges we face in digital era.

REFERENCES

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