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Ocular Symptomatology On Continued Usage Of Electronic Gadgets In It Professionals

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ABSTRACT

Aim: To prepare the profile of prevalence of ocular symptoms and their impact of the ergonomic structure of Electronic Visual Display Unit in work productivity among IT professionals in Tamil Nadu.

Materials and Methods: An Online survey was conducted among IT professionals in Tamil Nadu. A total number of 150 people having a minimum exposure to computer of at least for 3 hours a day for more than 3 years was recruited in the study. Design – Cross sectional study. A convenient sampling was done to select subjects for the study. Participants were requested to fill the Questionnaire according to their ocular symptoms and ergonomic structure of their company. Data were collected by the questionnaire through email among computer users in Tamil Nadu.

Results: A total of 150 subjects participated in the study. 71 (47.3%) were females and 79 (52.7%) were males. The mean age of study participants is 28.1. The symptoms most experienced by the study participants are Headache (38.7%), Eyestrain (37.3%) and Blurred vision (34%). Factors like Seating position, viewing distance, level of top of the screen, spectacle usage, habit of voluntary blinking were independently associated with computer vision syndrome.

Conclusion: Working on Electronic Gadgets has brought about numerous lifestyle changes. There have been both positive and negative impacts as a consequence. The increase use of Gadgets has resulted in adverse health effects for individuals. Therefore, eliminating use of gadgets in impossible, whereas controlling it to appropriate levels will be useful.

Keywords: *Computer vision syndrome, Computer users, Electronic Visual Display Unit..*

Abbreviations: *EVDU – Electronic Visual Display Unit, IT – Information Technology, CVS – Computer Vision Syndrome.*

1. INTRODUCTION

When the first IBM personal computer was manufactured in 1981, the company did not foresee the possible potential health hazards the users may consequently experience[9]. India has been in the limelight in cyber world with information technology (IT) industry developing into a major service provider. There are approximately 6 computers/1000 population with an installation of 18 million personal computers (PCs) and their number increasing all the time. The IT professionals have a high risk on experiencing Digital eye Strain due to excessive work demands and prolonged exposure to the computer screen[6]. This has also made way to a new genre of occupational health problem, i.e. of computer related health problems[1].

According to the National Institute of Occupational safety and Health, digital eye syndrome affects 90% people who spend more than 3 hours a day on computer. Statistics show that there are ten million visits to the ophthalmologists every year and 16 new patients every month for computer vision syndrome.

Use of computers is generally emboldened; this is to keep up with the fast-moving world of technology, research and science. Researchers have now come to an agreement that Digital Eye Strain could actually be harmful, if not properly managed[5]. Studies have long shown that the computer screen is a very different visual environment from the printed page or hard copy. Monitor is made up of tiny dots or "pixels," hence computer screen are difficult to focus steadily. Poor definition of these images, compared with the clarity of a printed page, causes the eyes to work harder. This forces our eye muscles to refocus continuously, subconsciously while we look at the computer screen. This effort leads to focus thousands times in a typical workday. Thus Over time period it creates the various symptoms which is known collectively as eyestrain[7].

Eye muscles works 3 times harder and blinking rate is reduced for people who use computers for more than 3 hours a day[2]. The digital eye strain is not a dangerous condition, it may lead to eye strain. Blehm et al have categorized the symptoms related to computer vision syndrome into four symptoms- 1) asthenopic symptom – which defines eye strain, ocular tiredness and soreness of eyes 2) ocular surface related problems- watering of eyes, irritation and dryness of eye (Burning and red eyes) 3) visual problems - includes blurred vision, Poor accommodation, diplopia and changes in colour perception 4) Non ocular symptoms like pain in the neck, backache and shoulder pain. Non-ocular symptoms can occur due to improper working

conditions and poor work habit [3].

Symptoms like these have gradual deterioration in the quality of life of individual and their work productivity[2]. The discomfort associated with computer usage has not yet been proven to result in permanent damage, but will have a reduction in work accuracy. Work productivity is reduced as much as 40% in this condition. Work that is physically fatiguing may result in lowered work productivity, increased error rate and reduced job satisfaction[5]. Factors contributing to computer vision syndrome generally classified as: Personal factors-Poor seating position, Improper viewing distances, Improper viewing angle, ocular diseases, medical diseases, ageing, environmental and Computer factors-poor lighting, imbalanced of light between the computer screen and the surrounding, poor resolution, poor contrast, glare of the display and slow refresh rate[8].

Aspects of the design of the computer Electronic visual display such as screen resolution, contrast, image refresh rates and flicker, type of illumination, screen glare, as well as working distances and angles may contribute to worker symptoms[1]. Good supervisory relationships at work and better workstation ergonomics were found to be associated with less severe symptoms (Faucett and Rempel 1994)[5]. In a study done in India it was observed that 75.5% and 59.4% respondents had musculoskeletal discomfort and computer vision syndrome, respectively[1].Therefore, steps should be taken to reduce the potentials causes to elicit stress related ocular and physical discomfort in the workplace. Hence the present study is planned to assess the ocular symptoms like blurring, eye strain, double vision, headache, dry irritated eyes, watering of eyes, redness of eyes and Non ocular symptoms due to prolonged screening time in IT professionals in Tamil Nadu. The findings of the study can be utilized in making policy decisions in working time and will also re-emphasize the importance of ergonomics in workplace for better quality of life of their workers.

2. MATERIALS AND METHODS

The study aimed to profile the prevalence of ocular symptoms and assess the impact of the ergonomic structure of Electronic Visual Display Units on work productivity among IT professionals in Tamil Nadu. A cross-sectional study was conducted over six months, from January to July 2021, involving 150 participants selected through convenience sampling. Participation in this study was purely voluntary. A Questionnaire which was developed from the University of Gondar was sent to the participant's mail id and the participant was asked to fill. This questionnaire will take about 5 minutes to complete.

A total of 150 participants were included in this study based on the sample size estimation. Participants were selected by convenience sampling method. All participants were assured that their responses would not affect their employment status.

The inclusion criteria specified that participants must be computer users aged between 25 and 35, working on a computer for at least three hours daily for more than three years, and willing to provide consent. Conversely, individuals under 25 or over 35, contact lens users, those undergoing treatment for thyroid disorders, or suffering from ocular inflammatory conditions such as conjunctivitis or glaucoma, as well as those with fundus pathologies, were excluded from the study. The required sample size was calculated using a formula for single population proportions, resulting in a total of 150 samples after accounting for expected dropout rates. Data analysis, focusing on the intensity of ocular symptoms associated with prolonged electronic device usage, was performed using SPSS software version 16.0.

3. RESULT

Socio-Demographic Characteristic of It Professionals

The current study included 150 participants (Figure 1), out of which 71 (47.3%) were females and 79 (52.7%) were males. The mean age of study participants is 28.1

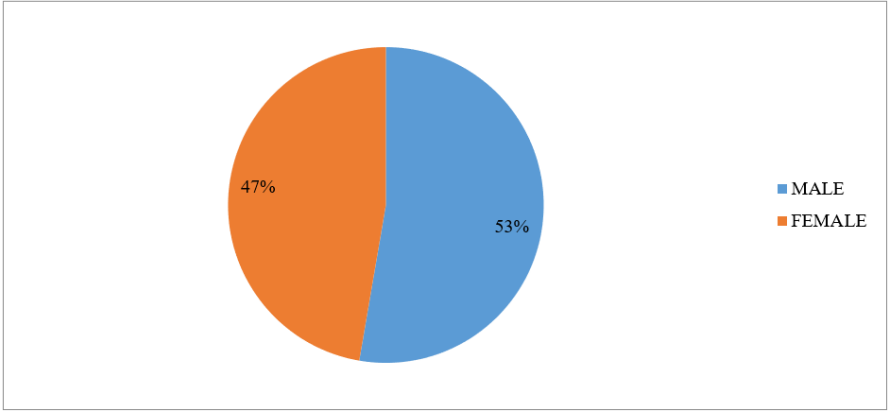

Figure 1: Depicts the male and female respondents

Prevalence of Ocular Symptoms

The symptoms most experienced by the study participants (Figure 2) are Headache (38.7%), Eyestrain (37.3%) and Blurred vision (34%).

Overall, 38.8% (58 participants) had Headache, 37.3% (56 participants) had Eyestrain, 34% (51 participants) had Blurred Vision, 27.3% (41 participants) had Irritation and Burning sensation, 21% (32 participants) had Dryness of eyes, 16.7% (25 participants) had Watery eyes, 12.7% (19 participants) had Redness of eyes and 6.7% (10 participants) had Double Vision.

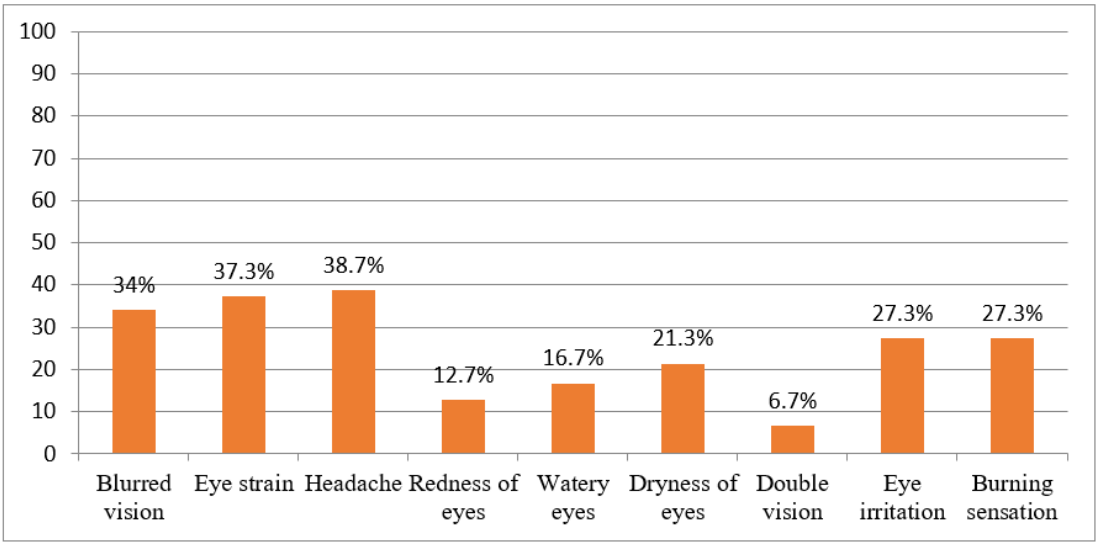

Figure 2: Depicts the percentage of prevalence of ocular symptoms

Associate Factors of Computer Vision Syndrome

Out of 150 participants, the seating position of 108 participants (72%) are appropriate i.e. the face of the operator is just in the level to the computer screen. 42 participants (28%) seating position is inappropriate (Figure 3).

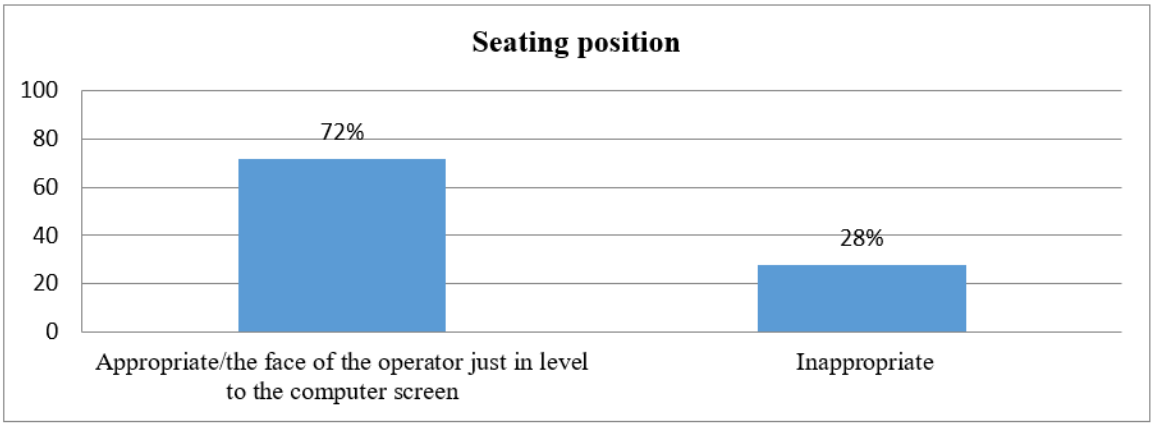

Figure 3: depicts the percentage of appropriate and inappropriate seating position

Out of 150 participants (Figure 4), the viewing distance of less than or equal to 50cm were 65.3% (98 participants). 34.7% viewing distance (52 participants) was more than 50 cm.

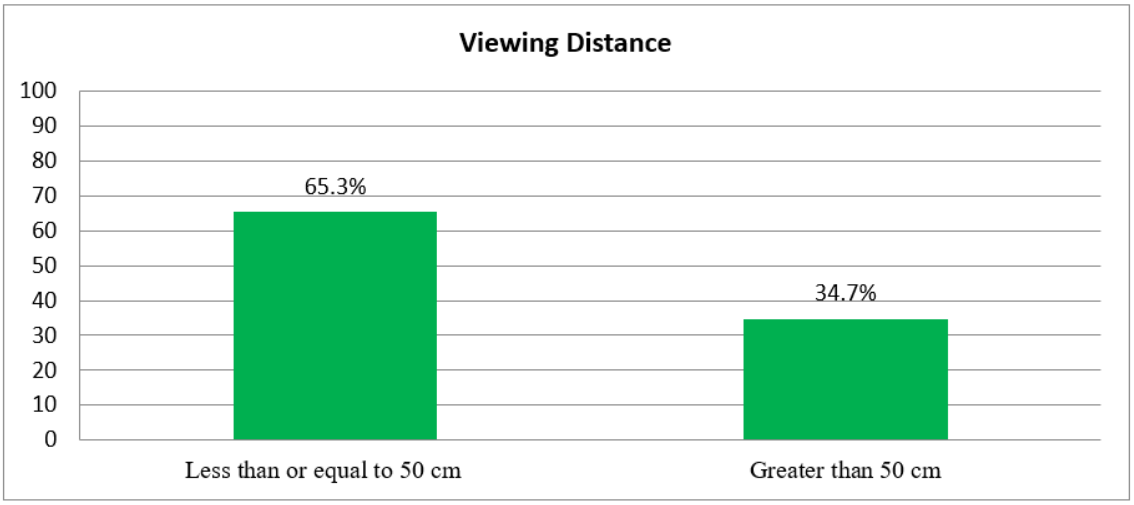

Figure 4: Depicts the viewing distance of participants

Out of 150 participants (Figure 5), the level of top of the screen was above eyes level for 24 participants (16%). The level of top of the screen was at the level of eyes in 94 participants (62.7%). The level of top of the screen was below the level of eyes in 32 participants (21.3%).

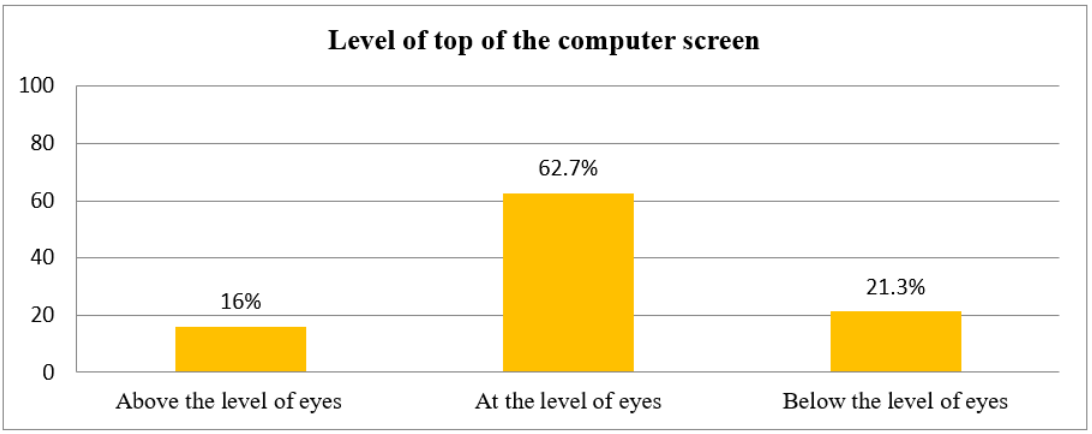

Figure 5: Depicts the level of top the screen for participants.

Out of 150 participants, the duration of computer use (Figure 6) of less than 5 years was 29.3% (44 participants). Duration of computer use of 5 years was of 50% (50 participants). Duration of computer use of more than 5 years was of 20.7% (31 participants).

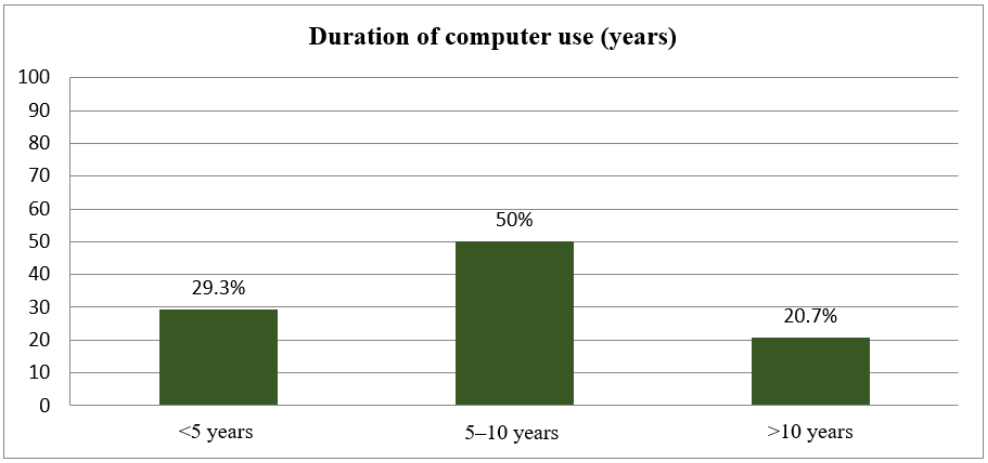

Figure 6: Depicts the duration of computer use for participants

Out of 150 participants, working time on computer per day (Figure 7) for less than 3 hours per day is 1.3% (2 participants). Working time on computer per day for 3 to 6 hours per day is 31.3% (47 participants). Working time on computer per day for more than 6 hours per day is 67.3% (101 participants).

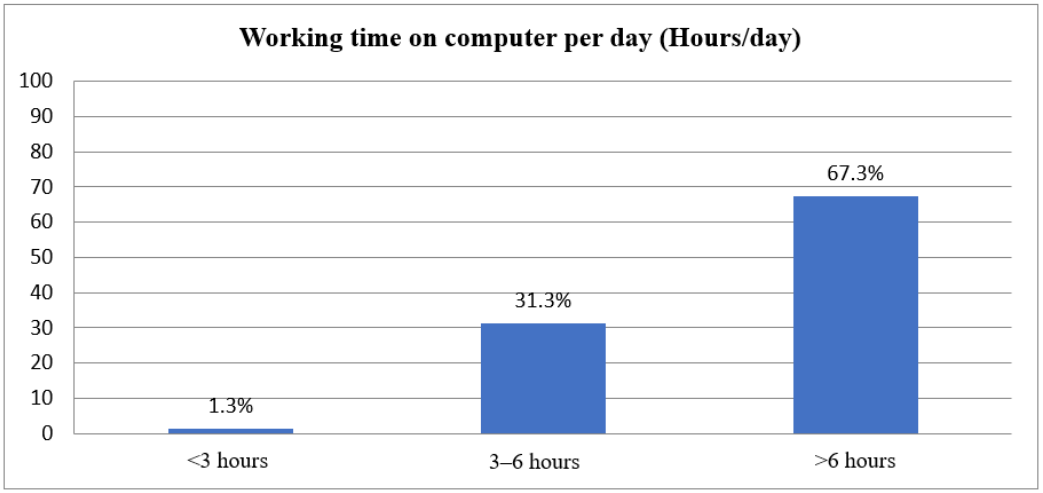

Figure 7: Depicts duration of working time on computer for participants

Out of 150 participants (Figure 8), 92.7% (139 participants) of them takes break while using computer. 7.3% (11 participants) are not taking breaks while using computer.

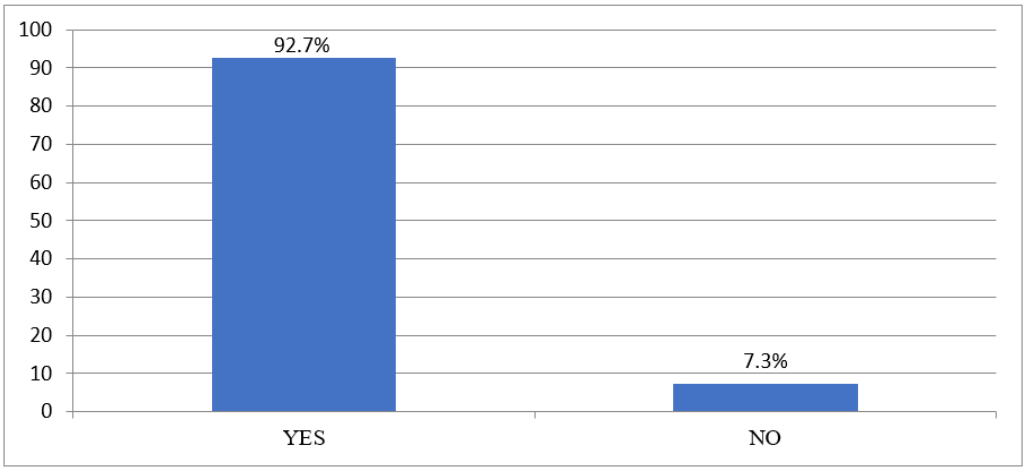

Figure 8: Depicts the habit of taking breaks while computer use

Out of 150 participants (Figure 9), 42% (63 participants) of them takes break for less than 20 minutes after work. 52.7% (79 participants) of them takes break for more than 20 minutes. 5.3% (8 participants) have not answered because they might have not taken breaks.

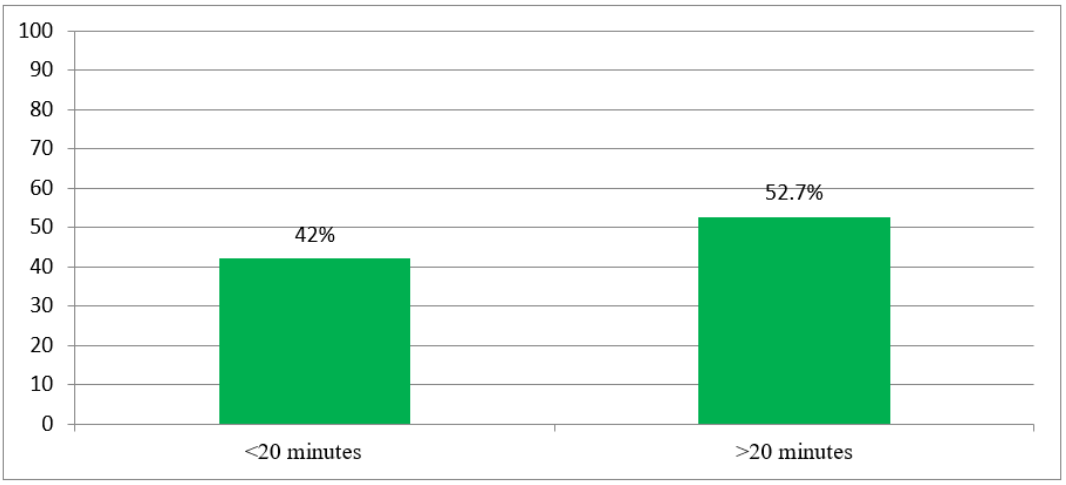

Figure 9: Depicts the amount of time taken for breaks

Out of 150 participants (Figure 10), 44.7% (67 participants) uses spectacles and the rest 55.3% (83 participants) does not use spectacles.

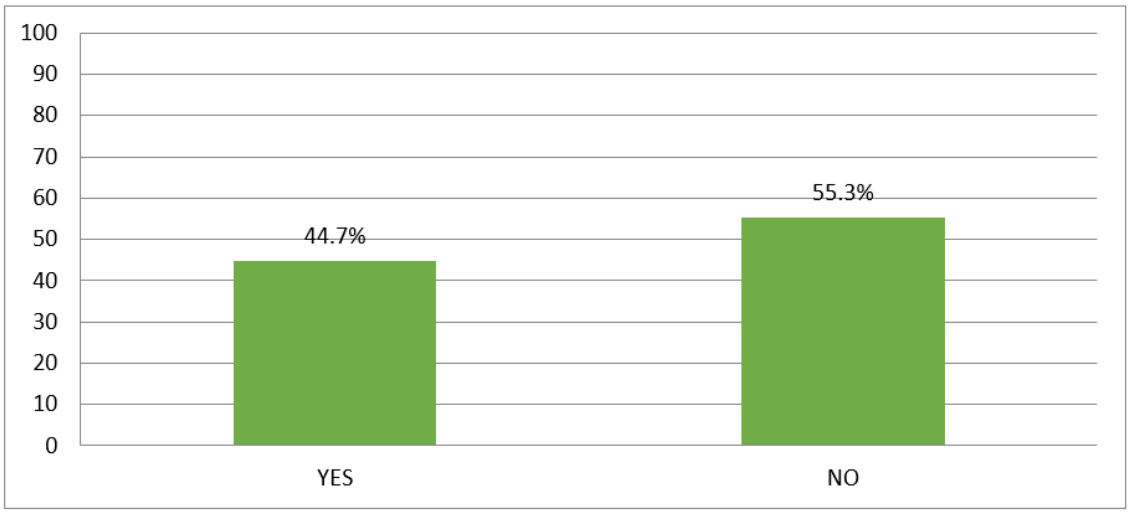

Figure 10: Depicts about the spectacle use of participants

49.3 % (74 participants) uses spectacles for computer use. 50 % (75 participants) uses spectacles for vision purpose. Remaining 0.7% (1 participant) use spectacles for other purposes (Figure 11).

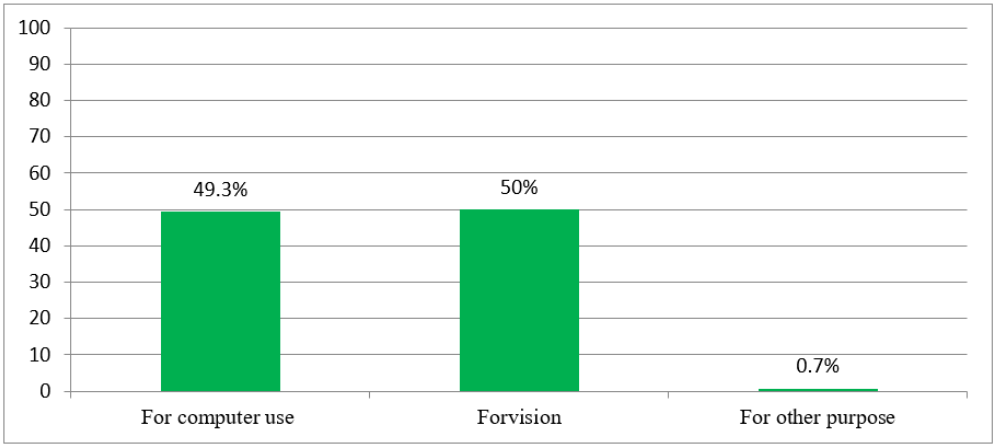

Figure 11: Depicts about purpose of spectacle use.

Out of 150 participants (Figure 12), 3.3% (5 participants) have the habit of voluntary blinking. Remaining 97.7% (145 participants) do not have the habit of voluntary blinking.

98.7% (148 participants) do not have systemic disorder. 0.7% (1 participant) has diabetic mellitus. 0.7% (1 participant) has hypertension.

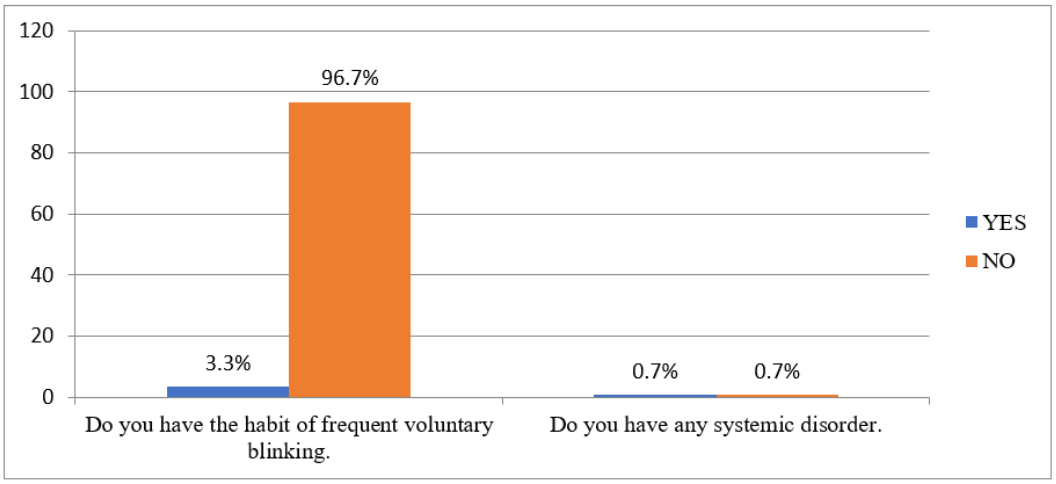

Figure 12: Depicts the habit of voluntary blinking and systemic disorders

Out of 150 participants (Figure 13), 67.3% (101 participants) adjusts the contrast of computer with the surrounding brightness. 32.7% (49 participants) do not adjust the contrast of the computer.

39.3% (59 participants) has glare on computer screen. 60.7% (91 participants) do not have glare on the computer screen.

27.3% (41 participants) uses anti-glare on their computer screen. 72.3% (109 participants) do not use anti-glare on their computer screen.

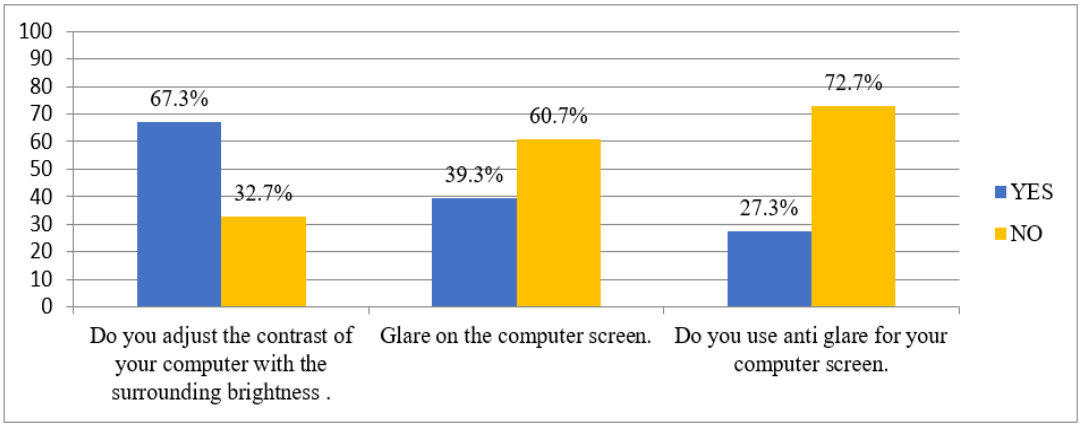

Figure 13: Depicts adjusting contrast of computer screen, glare on computer screen, and anti-glare on computer screen.

4. DISCUSSION

The present study was aimed to assess the prevalence of ocular symptoms and identify the associated factors of Computer vision syndrome among software professionals. This study population was chosen because they are part of a group of professionals who are at a greater risk of developing computer-related visual problems. This study included 150 participants, out of which 71 (47.3%) were females and 79 (52.7%) were males. The mean age of study participants is 28.1. From the total of 150 participants, Headache (38.7%) was the most experienced symptoms followed by Eye strain (37.3%) and Blurred Vision (34%) among all the other ocular symptoms.

In a similar to our study conducted by **Swati Iyer** (2020) among software professionals in Nagpur. Among 60 participants 72% had complaints of eyestrain and 61% of headache was reported. In our study 62.7% of the participant's computer screen was at the eye level and in this study 81.67% of participants computer screen was at the eye level. 41.67% of participants wears glasses on computer use and in our study 49.3% of participants wear glasses for computer use[2]. Usage of spectacle on

computer use is relatively higher (49.3%) than their study (41.67%). This can be the reason for higher prevalence of ocular symptoms in their study than ours.Similarly, in the study conducted by **Ranasinghe, P., et al**. (2016) among Sri Lankan computer workers, Among 2210 participants , most common symptom reported was headache (45.7%), followed by dry eyes (31.1%) and pain in and around the eyes (28.7%).[10]

Also, **Megwas and Aguboshim** (2009) found that among 146 participants, headache (41.8%), pain (31.6%) and eye strain (26.7%) were the most common visual symptoms among Visual Display Terminal users in Nigeria. In our study working hours of participants per day for more than 6 hours were 67.3% and in this study 41.7% of the participants work on computer for 6 to 10 hours per day and 36.9% of participants work on computer for more than 10 hours per day.[11] In our study 67.3% of the participants adjusts the contrast of their computer screen according to the surrounding brightness. This is in par with the study done by **Smita Agarwal et al** (2013) in Uttar Pradesh on Computer users. In their study 63.9% of the participants adjusts the contrast of their computer screen according to the surrounding brightness. 70.5% of the participants takes break during computer use and in our study 92.7% of the participants takes breaks during computer use. [12]

The viewing distance from screen was more than 50 cm for 34.7% of the participants in our study. This is in concordance with a study done by Stella **C et al** in 2007 among computer users in Nigeria, where 26.2% of the subjects had a viewing distance less than 25 inches (63.5 cm). In their study 42.7%, 45.7% and, 28.2% of the respondent's experience eyestrain, blurred distance vision and, headache respectively (ranging from moderate to severe cases.[13] The subjects had high symptoms than in our study due viewing distance being less than 25 inches. In a study done by **KP Mashige** (2013) in computer users, Among 87 participants 88% of participants used computer for 5 to 6 hours per day, while 12% used computers for 6 to7 hours per day. And in our study 31.3% of participants used computer for 3 to 6 hours per day and 67.3% of participants used computer for more than 6 hours per day.[14] In a study done by **Saurabh R Shrivastava**, (2020) in software professionals in Mumbai, among 200 participants 71% of the participants have not used anti-glare on their computer screen. And in our study 72.7% of the participants did not use anti-glare on their computer screen.[1] In a similar study done by **Natnael Lakachew**, (2015) in Bank workers in Ethiopia, Among 304 participant's 34.8% of the participant's seating position was not appropriate and 65.2% of the participant's seating position was appropriate and in our study 28% of participants seating position was not appropriate and 72% of the participant's seating position was appropriate. In the same study 29.3% of participants had a habit of frequent blinking and 96.7% of the participants did not have the habit of frequent blinking and in our study 3.3% of the participants had the habit of voluntary blinking and 96.7% of the participants did not have the habit of voluntary blinking. In the same study 34.5% of participants had glare on their computer screen and rest 65.5% of the participants did not face glare on the computer screen and in our study 39.3% of the participants faced glare on their computer screen 60.7% of the participants did not face glare on their computer screen.[15]

5. CONCLUSION

Working on Electronic Gadgets has brought about numerous lifestyle changes. There have been both positive and negative impacts as a consequence. The increase use of Gadgets has resulted in adverse health effects for individuals. Therefore, eliminating use of gadgets is impossible, whereas controlling it to appropriate levels will be useful. The most experienced symptoms from our study were Headache, Eye Strain and Blurred Vision. Inappropriate sitting position, working on the computer without taking frequent break for more than 20 minutes and wearing of eye glasses were independently associated factors with computer vision syndrome.

Based on the results of this study, the following will be recommended:

For computer users the following ergonomics is recommended: It is bette r to sit appropriately with face just towards to the computer screen and adjust the chair legs to be parallel with the computer screen. It is better to maintain appropriate viewing distance from the computer which could be greater than 50 cm. It is recommended to take frequent break within 20 minutes while using computers.

Ethical Considerations

The study was approved by Institutional Human Ethical Committee, Sri Ramachandra Institute of Higher Education and Research, India, REF: CSP/21/MAY/94/333

Authorship Statement:

Mrs. R. Poornima - Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization

E. Johannah Subiksha- Roles/Writing - original draft; Writing - review & editing.

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Informed Consent

Not Applicable

Disclosure of Interest

The authors declare that they have no competing interest.

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