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A Study To Assess The Ocular Symptoms Associated With Prolonged Use Of Electronic Devices Among 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 India.*

Materials And Methods: *An online survey was conducted among IT professionals in India. A total of 1500 people having a minimum exposure to computer of at least for 3 hours a day for more than 3 years were recruited in the study. This was a cross-sectional study, and convenient sampling was done to select subjects. 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 India.*

Results: *A total of 1500 subjects participated in the study. 710 (47.3%) were females and 790 (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, with both positive and negative impacts. The increased use of Gadgets has resulted in adverse health effects for individuals. Therefore, eliminating the use of gadgets is impossible, whereas controlling it to appropriate levels will be useful.*

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

INTRODUCTION

The digital revolution has fundamentally reshaped the global landscape of work, with Information Technology (IT) emerging as a cornerstone of modern economies, particularly in India, a burgeoning hub for technological services and innovation [1,2]. The intense reliance on Electronic Visual Display Units (EVDUs) by IT professionals in Chennai, who often spend extended periods interacting with computer screens, has brought forth a new set of health concerns [3,4,5]. Among these, ocular discomfort and visual disturbances, collectively known as Computer Vision Syndrome (CVS) or digital eye strain, have become increasingly prevalent [5,6]. Unlike traditional occupational hazards, the insidious onset of CVS, stemming from prolonged near work, screen flicker, glare, and suboptimal ergonomic practices, poses a significant yet often underestimated challenge to the well-being and productivity of this critical workforce [7,8]. This study, conducted in the dynamic IT sector of India, seeks to comprehensively evaluate the prevalence of various ocular symptoms reported by IT professionals engaging in substantial daily usage of electronic gadgets. Furthermore, it aims to analyze the correlation between these symptoms and the ergonomic configurations of their workstations, thereby providing valuable insights into the specific ocular health challenges faced by this demographic in this geographical context. Understanding these factors is crucial for developing targeted interventions and promoting healthier work environments within the rapidly expanding IT industry in the region.

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 India. A cross-sectional study was conducted over six months, from January to July 2021, involving 1500 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 it. This questionnaire was expected to take about 5 minutes to complete. A total of 1500 participants were included in this study based on the sample size estimation. Participants were selected by a 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 1500 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 21.0.

RESULTS

SOCIO-DEMOGRAPHIC CHARACTERISTIC OF IT PROFESSIONALS

The current study included 1500 participants, out of which 710 (47.3%) were females and 790 (52.7%) were males. The mean age of study participants is 28.1.

PREVALENCE OF OCULAR SYMPTOMS

The symptoms most experienced by the study participants are Headache (38.7%), Eyestrain (37.3%) and Blurred vision (34%). Overall, 38.8% (582 participants) had Headache, 37.3% (560 participants) had Eyestrain, 34% (510 participants) had Blurred Vision, 27.3% (410 participants) had Irritation and Burning sensation, 21% (320 participants) had Dryness of eyes, 16.7% (250 participants) had Watery eyes, 12.7% (190 participants) had Redness of eyes and 6.7% (100 participants) had Double Vision.

ASSOCIATED FACTORS OF COMPUTER VISION SYNDROME

The percentage of appropriate and inappropriate seating position:

Out of 1500 participants, the seating position of 1080 participants (72%) was appropriate, i.e., the face of the operator is just at the level of the computer screen. 420 participants (28%) had an inappropriate seating position.

1. **The viewing distance of participants:**

Out of 1500 participants, the viewing distance of less than or equal to 50cm was observed in 65.3% (980 participants). 34.7% (520 participants) had a viewing distance of more than 50 cm.

2. **The level of top the screen for participants.**

Out of 1500 participants, the level of the top of the screen was above eye level for 240 participants (16%). The level of the top of the screen was at the level of eyes in 940 participants (62.7%). The level of the top of the screen was below the level of eyes in 320 participants (21.3%).

3. **The duration of computer use for participants:**

Out of 1500 participants, the duration of computer use of less than 5 years was 29.3% (440 participants). Duration of computer use of 5 years was 50% (500 participants). Duration of computer use of more than 5 years was 20.7% (310 participants).

4. **The duration of working time on computer for participants**

Out of 1500 participants, working time on computer per day for less than 3 hours per day was 1.3% (20 participants). Working time on computer per day for 3 to 6 hours per day was 31.3% (470 participants). Working time on computer per day for more than 6 hours per day was 67.3% (1010 participants).

5. **The habit of taking breaks while computer use:**

Out of 1500 participants, 92.7% (1390 participants) of them take a break while using a computer. 7.3% (110 participants) do not take breaks while using a computer.

6. **The amount of time taken for breaks:**

Out of 1500 participants, 42% (630 participants) of them take a break for less than 20 minutes after work. 52.7% (790 participants) of them take a break for more than 20 minutes. 5.3% (80 participants) have not answered because they might not have taken breaks.

7. **The spectacle use of participants:**

Out of 1500 participants, 44.7% (670 participants) use spectacles, and the rest 55.3% (830 participants) do not use spectacles.

8. **Purpose of spectacle use:**

49.3% (740 participants) use spectacles for computer use. 50% (750 participants) use spectacles for vision purposes. The remaining 0.7% (10 participants) use spectacles for other purposes.

9. **The habit of voluntary blinking and systemic disorders:**

Out of 1500 participants, 3.3% (50 participants) have the habit of voluntary blinking. The remaining 97.7% (1450 participants) do not have the habit of voluntary blinking. 98.7% (1480 participants) do not have a systemic disorder. 0.7% (10 participants) has diabetic mellitus. 0.7% (10 participants) has hypertension.

10. **Adjusting contrast of computer screen, glare on computer screen, and anti-glare on computer screen.** Out of 1500 participants, 67.3% (1010 participants) adjust the contrast of the computer with the surrounding brightness. 32.7% (490 participants) do not adjust the contrast of the computer. 39.3% (590 participants) have glare on the computer screen. 60.7% (910 participants) do not have glare on the computer screen. 27.3% (410 participants) use anti-glare on their computer screen. 72.3% (1090 participants) do not use anti-glare on their computer screen.

DISCUSSION

This study aimed to investigate the prevalence of ocular symptoms and associated factors of Computer Vision Syndrome among a significant cohort of software professionals, a group particularly vulnerable to such visual issues due to their occupational demands. Our findings, based on a sample of 1500 participants (47.3% female, 52.7% male, mean age 28.1), reveal that headache (38.7%), eyestrain (37.3%), and blurred vision (34%) were the most commonly reported ocular symptoms. These results resonate with previous research in the field. For instance, a study by Swati Iyer (2020) in Nagpur, although conducted with a smaller sample of 60 software professionals, similarly highlighted eyestrain (72%) and headache (61%) as primary complaints. A notable difference emerged in workstation ergonomics; 62.7% of our participants maintained their computer screen at eye level, compared to a higher 81.67% in Iyer's study. Furthermore, our study reported a higher incidence of spectacle use for computer tasks (49.3%) compared to Iyer's (41.67%), which might contribute to the comparatively lower prevalence of ocular symptoms in our sample. Broader international comparisons also support our findings. Ranasinghe et al. (2016) in Sri Lanka, in a substantial study of 2210 computer workers, identified headache (45.7%), dry eyes (31.1%), and periorbital pain (28.7%) as frequent symptoms. Similarly, Megwas and Aguboshim (2009) in Nigeria observed headache (41.8%), pain (31.6%), and eyestrain (26.7%) as leading visual symptoms among Visual Display Terminal users. A significant proportion of our participants (67.3%) reported working more than 6 hours per day on computers. This extended exposure aligns with findings from other studies; for example, one comparative study noted that 41.7% of participants worked 6 to 10 hours daily, and 36.9% exceeded 10 hours. Our data also indicated that 67.3% of participants actively adjusted their computer screen contrast to match ambient brightness, consistent with Smita Agarwal et al.'s (2013) study in Uttar Pradesh, where 63.9% of computer users did the same. Our participants also demonstrated a higher tendency to take breaks during computer use (92.7%) compared to the 70.5% reported in Agarwal's study. Regarding viewing distance, 34.7% of our participants maintained a distance greater than 50 cm, a finding corroborated by Stella C et al.'s (2007) Nigerian study, which found 26.2% of subjects viewing from less than 25 inches (63.5 cm). The higher symptom rates in the Nigerian study could be attributed to shorter viewing distances. While KP Mashige (2013) reported that 88% of 87

computer users worked 5 to 6 hours daily, and 12% worked 6 to 7 hours, our study found 31.3% working 3 to 6 hours and 67.3% exceeding 6 hours. Our findings on anti-glare screen usage are consistent with other research. Saurabh R Shrivastava (2020) in Mumbai found that 71% of 200 software professionals did not use anti-glare screens, closely matching our 72.7%. Furthermore, comparisons with Natnael Lakachew's (2015) study on bank workers in Ethiopia showed similar ergonomic trends: 34.8% of their 304 participants had inappropriate seating, versus our 28%, and 65.2% had appropriate seating, compared to our 72%. Lakachew's study also noted that 29.3% had a habit of frequent blinking, while 96.7% did not, aligning with our findings of 3.3% voluntary blinking and 96.7% non-blinking. Lastly, 34.5% of Lakachew's participants experienced glare, which is comparable to our 39.3% reporting glare on their computer screens.

CONCLUSION

Working on Electronic Gadgets has brought about numerous lifestyle changes. There have been both positive and negative impacts as a consequence. The increased use of Gadgets has resulted in adverse health effects for individuals. Therefore, eliminating the 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 breaks for more than 20 minutes, and wearing eyeglasses 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 better to sit appropriately with the face just towards the computer screen and adjust the chair legs to be parallel with the computer screen. It is better to maintain an appropriate viewing distance from the computer, which could be greater than 50 cm. It is recommended to take frequent breaks within 20 minutes while using computers.

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