Comparison of visual acuity and ocular symptoms among computer users and non-users in young adults in Lucknow

Sabiha Fatima¹, Tanwir Alam¹, Ausaf Ahmad²

¹Department of Physiology, Integral Institute of Medical Sciences and Research, Integral University, Lucknow, Uttar Pradesh, India, ²Department of Community Medicine, Integral Institute of Medical Sciences and Research, Integral University, Lucknow, Uttar Pradesh, India

Correspondence to: Ausaf Ahmad, E-mail: ausafahmad86@gmail.com

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ABSTRACT

Background: The multitude of ocular health problems has raised in recent times due to increased use of computers.

Aims and Objectives: This study aims to compare the visual acuity and ocular symptoms between computer users and non-users among young adults in Lucknow.

Materials and Methods: This case-control study was conducted on 370 students after obtaining Ethical Committee approval. Samples were collected using convenience sampling as per inclusion and exclusion criteria. In a validated self-administered questionnaire, demographic information, computer usage patterns, and accompanying visual symptoms were documented. Values of parameter were collected using Snellen’s chart.

Statistical Package for the Social Sciences, 16.0 version was used for data analysis. Two sample t test will be used to relate between the quantitative variables.

Results: A total of 370 study subjects were included in this study. About, majority of the participants (54%) were males, the participants were males accounting for a total of 54%. The age of the participants ranged from 15 to 40 years with a mean of 26.86 years. Average uses of screen time by computer user and non-user were 2.30 ± 0.90 and 10.60 ± 0.75, respectively. About 39% students suffering with eye strain which was major ocular symptom in the study followed by 30.8% watery eye.

Conclusion: This study concludes that the use of a computer for an extended period of time without any physical activity can lead to eyesight problems and lower efficiency.

KEY WORDS: Computer User; Visual Acuity; Ocular Symptoms; Snellen’s Chart

INTRODUCTION

Computers have become more widely used for both professional and personal purposes since the early 20th century. Use of technology for instruction in schools and institutions has led to extreme change in the field of education.[1] Nowadays, extreme and extensive computer usage resulting in gain in computer-related health complications. Past 30 years, computer technology increases eight-fold. It has become almost required at home as well as office. It is undeniable that computers have greatly benefited society, making working conditions easier, and allowing for quick output.[2] However, it does associate with health-related problems, Gupta et al. (2014) reported that the eye disorders affect 70–75% of computer workers, making them the most common health issue. Visual issues and eye irritation are reported by up to 90% of computer users when performing tasks that demand repeated motions over a lengthy period of time. Multiple eye problems seem that it creates from long duration working before computer. People vision is accountable for obtaining and handing out the visual data. Irritation, allergic conjunctivitis, blurred vision, eye pains, glaucoma, and refractive errors are examples of eye conditions that build a noticeable pattern, specifically of anything undesired that has been related to prolonged sitting in front of computers.[3-6]
According to a national survey published by an ophthalmologist, more than 14% of patients had vision-related problems. The rate of symptoms of eye straining was in a range of 25–93%, who were long-term computer users. The widespread use of computers at universities for teaching and learning requires an examination of the disorder’s impact on the population of students studied. Therefore, objective of this present study is to compare the visual acuity and ocular symptoms among computer users and non-users in young adults in Lucknow.

MATERIALS AND METHODS

A case-control study design was employed from January 2018 to June 2019 in Department of Physiology, and Department of Ophthalmology, Integral Institute of Medical Sciences and Research, Integral University, Lucknow, Uttar Pradesh, India. A total of 370 students studying in Integral University Lucknow, Uttar Pradesh, India, the participants in this study were recruited using a convenient sampling approach, regardless of their age, gender, nationality, or course or discipline.

We were able to certify the students as computer users and identify them as cases based on screen time evaluation. On the one hand, the control group was made up of the remaining students.

We estimated that the minimum sample size required for this study was 370 participants using an alpha level of 0.05 and the survey sample size determination table published by Bartlett et al. 2022

Exclusion Criteria

The following criteria were excluded from the study:
- In the past 1 year, who has been diagnosed with any type of eye condition that affects visual acuity
- <18 years of age and greater than 35 years of age
- Suffering from eye diseases or any other
- Taking drugs that affect vision
- Not giving consent.

However, students having refractive errors were included in the study.

Study Tool

The researcher develops a questionnaire. The questionnaire is divided into three sections that address student demographics, computer-related characteristics, and computer-related visual symptoms. Snellen chart was used for measuring visual acuity from 6 m in a well-brighter room. Both eyes were tested 3 times, most appropriate measurement taken. Those with low vision were assessed further by an ophthalmologist to determine the diagnosis and correct treatment. If the study participants’ visual acuity was <“6/12,” they were judged to have poor vision. Before obtaining their consent, participants were informed about the study’s goal and objectives.

Ethical Approval

The study was approved from the Institutional Ethical Committee of the University.

Statistical Analysis

The data were processed and entered into a database using Excel software (Microsoft Office Excel 2010). The data were analyzed using the Statistical Package for the Social Sciences 16.0 version. The quantitative variables will be compared using a two-sample t test. P < 0.05 was used as the significant level.

RESULTS

This study included a total of 370 study participants, all of whom completed the questionnaire completely (response rate 100%). The respondents were separated into two groups based on whether or not they use computers. Males made up the majority of the participants, representing for 54% of the total. The participants’ ages ranged from 15 to 40 years old, with a mean of 26.86.

Three hundred and seventy people, 46% female and 54% male, were divided into two groups: Non-computer users and computer users. There are 62 female participants and 78 male participants among non-computer users, while there are 108 female participants and 122 male participants among computer users. Visual acuity and anthropometric variables were describing in mean and standard deviation as shown in Table 1.

Figure 1 shows that 70% of computer users have a history of eye disease, while 30% of non-computer users have a history of eye disease. About 64.7% computer users have a history of eye defects and 37.3% non-computer users with history of eye defects. The number of participants using glasses in Figure 1 also has 88.9% computer users using glasses and 11.1% non-computer users using glasses. In Figure 1 also have the participants were divided into groups based on how they responded to the computer vision syndrome, 85.1% of computer user has computer vision syndrome and 14.9% non-computer users have computer vision syndrome. Only about 10% non-computer user wearing eye glass.

The distribution of visual acuity in both eyes of non-computer users and computer users is depicted in Figure 2. The abnormal visual acuity of “2/6,” “3/6,” and “4/6” indicated a significant difference between computer users and non-computer users, although the normal visual acuity of “6/6” is higher in non-computer users.
Figure 3 represents the various ocular symptoms found in computer users. Eye strain was reported to be the most common ocular symptom in the study (39.1%), followed by watery eyes (30.8%) and blurred vision, that is, 22.3%. Above 33% of computer user have not any ocular symptoms. Dryness (9.2%) and redness (13.1%) also have major ocular symptoms in computer users.

DISCUSSION

The primary goal of this study was to document the differences in visual perception between computer users and non-users. Furthermore, we also aimed to see if there were any differences in ocular symptoms between computer users and non-users among university students included in our study sample size. First, presented that all inclusive ophthalmic investigations that were more precise than interview schedule concerning the diagnosis of the ocular symptoms.

According to a study conducted in Malaysia and Indonesia, visual acuity diminishes in direct proportion to age. Malaysian study reported that the reduction of visual activity was not associated by age factor. In contrast, outcome of some studies showed that visual acuity impairment will increases with growing age.\[^{12-15}\] According to the findings, there was no statistically significant difference between computer users and non-users. Similar finding stated by Abdelaziz et al.\[^{16}\] found no statistically significant difference between computer users and non-users.\[^{16}\] This could be due to the fact that the sample size in this study had a small age range, mean age of 26.86 years with range from 15 to 40 years old. Three hundred and seventy participants, who were 46% female and 54% male, were divided into non-computer users and computer users at random and we found no statistically significant association between computer user and gender. A consistent finding reported by Abdelaziz et al.\[^{16}\]

In addition, Seybert highlighted the differences in regular ICT use across men and women in different European Union member states. Men, on the other hand, are more frequent users of computers and the internet than women in nearly all European countries and across all age groups, and many more men than women work in computing professions across the European Union. According to the Tomte, the overall picture of the situation in terms of gender and ICT has been that men have been dominating and women have been left behind.\[^{17,18}\] Moreover, a visual acuity of “<6/18” but equal to or better than “3/60,” or a corresponding visual field loss of <20° in the better eye with the best possible correction, is considered low vision. Visual acuity of “<3/60,” on the other hand,
causes blindness or a matching field loss of <10° in the eye with the best chance of change.\textsuperscript{[11]} Visual acuity impairment affects an estimated 1.6 billion individuals worldwide, and the number is growing.\textsuperscript{[19]} The outcomes of the examination into computer usage patterns further confirmed the link between computer usage and visual acuity; personnel with daily computer users had less ideal acuity than those with weekly or occasional use. The amount of time spent on a daily basis was also found to be a factor in having poor sharpness. According to the findings, as the daily duration of computer exposure increases, the percentage of computer users with visual dysfunctions increases, which is consistent with a prior study by Abdelaziz \textit{et al.}\textsuperscript{[14]} who confirmed that reduction in visual acuity depend on duration of computer usage. In the present study, eye strain was shown to be the most common ocular symptom among computer users, followed by watery eyes. According to some studies, the majority of subjects with visual defects caused by computer use complain of burning dry eyes, eyes becoming sore when at the computer, difficulty in color vision, and physical ailments including shoulder and neck pain and overall physical fatigue while at the computer, which is consistent with the findings of other scholars.\textsuperscript{[20-23]} Regular breaks at regular intervals might lessen the accommodation procedure of the eyes, resulting in less eye strain. Only a few students knew this, and there was a statistically significant link between taking a rest and regular blinking while using the computer, as shown in the present study. Short in-between work-breaks and following the rule of “20/20/20,” that is, looking at anything 20 feet away for 20 s after 20 min of computer use, can assist to enhance eye health, according to the Anshel \textit{et al.}\textsuperscript{[22]}

However, our study includes small groups of computer users and non-computer users and they are taken from particular

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure2.png}
\caption{Percent distribution of computer users and non-computer users according to the visual acuity distribution of the left (L) and right (R) eye}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure3.png}
\caption{Percentage distribution of ocular symptoms present in computer users}
\end{figure}
region. A more large prospective study with larger case population yield better results.

**CONCLUSION**

Computer use causes eye strain, which can lead to vision problems. Duration of computer uses and eye illness is correlated with visual defects. Untreated eye illnesses put computer users at an increased risk of developing vision problems, with a significant proportion of them developing vision problems. Major reason for poor vision and lower productivity depend on long period of computer uses.

**REFERENCES**


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