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Impact of 20-20-20 Rule and Daily Reminders in Relieving Digital Eye Strain

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ABSTRACT

Aim: To assess the impact of taking proper breaks and the role of reminders in enhancing compliance while working on digital devices in reducing the digital eye strain.

Methodology: This was a questionnaire-based prospective study determining the role of taking proper breaks and the role of daily reminders in enhancing patient compliance and in-turn reducing digital eye strains. The study examines compliance variations with the 20-20 rule in two distinct groups, Group-I (Subjects who got daily reminders) and Group-II (Subjects who did not get any reminders). The occurrence of symptoms related to digital eye strains were also compared between the subjects in the two groups and from baseline.

Results: A significant proportion of respondents were not aware of the 20-20 rule and do not actively implement it. Taking visual breaks reduce digital eye strain as both Group-1 and Group-2 generally have lower symptom prevalence compared to the Baseline group. However, Group-2 tends to have higher symptom prevalence compared to Group-1 indicating that reminders may play an important role in reduction in symptoms of digital eye strain.

Conclusion: The 20-20-20 rule is a simple and effective technique to help prevent Computer Vision Syndrome and reduce the risk of Digital Eye Strain caused by prolonged computer use or digital device use. However, a lack of knowledge regarding the 20-20-20 rule prevails and it is important to spread awareness about the importance of visual breaks during digital work. Since getting proper reminders can enhance the compliance, incorporation of reminders in digital devices can be useful for people who often suffer from DES due to lack of proper breaks.

Keywords: Digital Eye Strain, Computer Vision Syndrome, Dry Eyes, 20-20 Rule, Visual Breaks

INTRODUCTION

According to the American Optometric Association, extended use of desktops, laptops, mobile phones, tablets, e-readers, and storage devices can cause a variety of eye and vision-related issues known as "digital eye strain" [1]. Electronic display has become an integral aspect of daily life in the ultramodern world, whether it is at work, home, during downtime, or while travelling. These visual display terminal devices are now widely used. There would be no global mindfulness without computers. The computer has taken the place of the heart in modern work environments. We have now transitioned from the crude instruments of the stone age into a new era, the computer age, which is entirely dependent on formulators [2].

Children today are virtually connected to technology. They spend a significant chunk of their day staring at computers,

smartphones, and other digital devices, whether for educational or other purposes [3]. The LED shields on laptops, smartphones, and other digital devices generate blue light [4]. Many researchers and eye doctors are worried about the increased blue light exposure from computers and other digital devices might make age-related eye diseases like macular degeneration more likely to affect unborn children [5].

In the past fifteen years, information technology has advanced significantly. A prevalent complaint among mature people who frequently use laptops, mobile Internet, and other eye-straining devices is computer vision syndrome (CVS) which have been identified as the ocular health issue affecting computer or screen addicts most frequently. Other signs of computer vision pattern include painful eyes, seeing a greenish tint, weariness, headaches, burning, light sensitivity, contact lens discomfort, double vision, and sporadic near- and far-sightedness blur [6].

Headaches, blurred vision, neck pain, weariness, eye strain, dry, itchy eyes, double vision, polyopia, and trouble focusing the eyes are all symptoms of CVS. Vision issues associated with video display terminals (VDT) are at least as serious an ocular health issue as well as a musculoskeletal illness [7].

Most studies show that 50–90% of VDT workers experience visual symptoms, and a study by a group of optometrists found that VDT visual problems are the primary cause of ten million primary eye exams performed each year [8]. This is a serious public health concern. Computer workers frequently experience vision problems, which cause hand discomfort and reduce productivity.

According to the AOA, approximately 10 million eye exams are conducted each year for reasons relating to computer vision pattern, as per a survey of optometrists [9].

The eyes unconsciously try to rest by moving their focus to a spot behind the screen, but this continuous movement between the screen and the relaxation spot leads to eyestrain and tiredness. Reduced blinking frequency, which can exacerbate dry, itchy eyes, is another unintended consequence. When using a computer, the blink rate is typically reduced to only approximately 10 to 12 blinks per nanosecond, as opposed to the regular blink rate of 15 or more [10].

Dr. Leonard Press, an optometrist and the AOA's Vision & Learning Specialist, warned that spending too much time in front of a computer screen can cause eye discomfort, fatigue, blurred vision, and headaches. However, there are some particular practices that can relieve or at least minimize the occurrence of these issues in adults [11].

Taking proper rest between the work schedule and maintaining a proper blink rate can be tried to alleviate the problems related to screen usage [12]. 20-20-20 rule is well known to layman these days. You probably spend a significant amount of time staring at displays, whether they be on your smartphone, television, computer at home or at work, or other digital gadgets and it is well known that eye strain can develop from prolonged screen viewing but the 20-20-20 rule has proven to be useful for minimizing the occurrence of these issues [13]. Keeping this in mind, our study aims to assess the role of 20-20-20 rule in minimizing the ocular strain caused due to digital device use amongst college students.

With advent in digital technology in the current date, the incidence of computer vision syndrome and symptoms related to digital eye strain are also increasing. It has been well established that taking proper breaks can minimize these symptoms.

We believe that many computer users are not well aware about the importance of proper breaks and how often these breaks should be taken. If computer users are educated about the frequency of breaks while using screens along with the right way to utilize those breaks, chances are that they can include taking breaks in their schedule consciously and make an effort to reduce the symptoms associated with continuous

screen time.

We hypothesise that educating the users about the 20-20 rule as well as reminding them to take those breaks can minimize the digital eye strain and symptoms related to it. There are some literatures that have assessed the impact of taking breaks between the screen schedule, but to our knowledge, very few studies have checked if reminding subjects to take those breaks can improve the outcomes and reduce the symptoms associated with screen usage.

MATERIALS & METHODS

This was a prospective, interventional study performed on digital screen users, who presented to the eye OPD of Apollo Hospital, New Delhi with the symptoms of digital eye strain aimed to assess the impact of taking proper breaks while working on digital devices in reducing the digital eye strain and to determine whether reminding subjects to take proper breaks during the work hours improves subject compliance. The study was conducted between January 2023 to June 2023 and a total of 50 subjects were included in the study out of which 25 subjects were in group 1& 25 subjects were enrolled in group 2.

Patients presenting of the eye OPD of apollo hospital new Delhi with complaint related to digital eye strain and have a >6 hrs routine work schedule on digital devices such as laptops mobiles computers and tablets etc.

Subjects using digital devices for more than 6hrs /day and have symptoms of digital eye Strain within the age group of 20-30 years were included in this study. Unwilling patients, subject using digital devices for less than 6 hr /day, subjects with other ongoing ocular pathology, subjects having any ongoing systemic pathology or medication were excluded.

A self-structured 16 item questionnaire was used for collecting the data in this study. The first 6 questions in the questionnaire were about awareness and practice and rest of the 10 questions were symptoms related. 2 questions regarding post one week compliance was also included.

Subjects passing the inclusion criteria were included in this study after obtaining a written consent from them. All the included subjects underwent a comprehensive eye examination of re-assure their eligibility in the study. All the subjects were made to fill the self-structured questionnaire to assess their knowledge about 20-20 rule, to understand their break pattern during work and to register symptoms faced by them. After getting the questionnaire filled from the subjects, they were educated about the 20-20 rule, the importance of taking proper breaks between work and the right way to take visual breaks. First 25 subjects who agreed to get daily reminders over mobile phone to takes visual breaks were included group 1. Next 25 subjects or the subjects who did not want reminders were included in group 2 and did not receive any reminders to take breaks during the study period. The subjects in both groups were made to follow the 20-20 rule for 1 week. After one week, all the subjects were made to fill the questionnaire again. Response regarding compliance related questions was also taken from the participants of both the groups.

STATISTICAL ANALYSIS

The data was entered in an excel sheet. Descriptive analysis of the data was done with SPSS and representation was done with the help of charts, graphs and tables.

RESULT

The average age of the enrolled subjects was 25.18 years. Out of the 50 subjects enrolled in this study, 28 were males (56 %) and 22 were females (44%) **(Table 1, Figure 1)**.

Table 1: Gender distribution of subjects

Gender	N	%
Male	28	56%
Female	22	44%

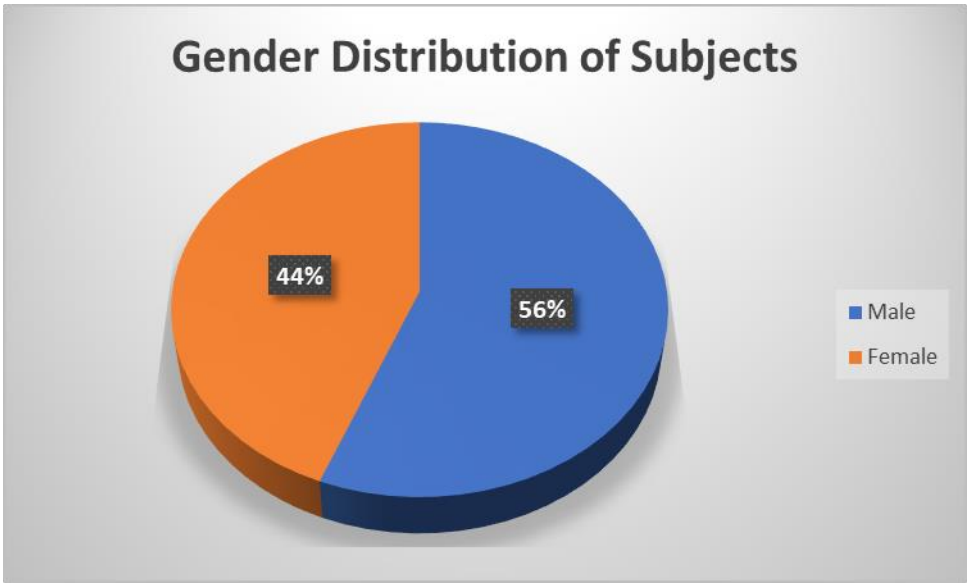

Figure 1: Distribution of subjects in the study

On analyzing the responses of subjects regarding the awareness of 20-20 rule and practice of taking breaks amongst the subjects, the following inferences were made **(Table 2)**.

Table 2: Subject responses regarding awareness and practice of 20-20 rule.

Question	Yes	No
Have you ever heard about 20-20 rule?	28%	74%
Do you use 20-20 rule?	26%	72%
Do you take breaks between work?	32%	68%
Do you close your eyes while taking visual breaks?	38%	62%
Do you look away at a distance of 20 ft. while taking visual breaks?	28%	72%
How often do you take these breaks?	Every 20 minutes 52%	Randomly 48%

The first question aimed to determine the respondents' awareness of the 20-20 rule, which suggests that only a minority (28%) were familiar with it **(Figure 2)**.

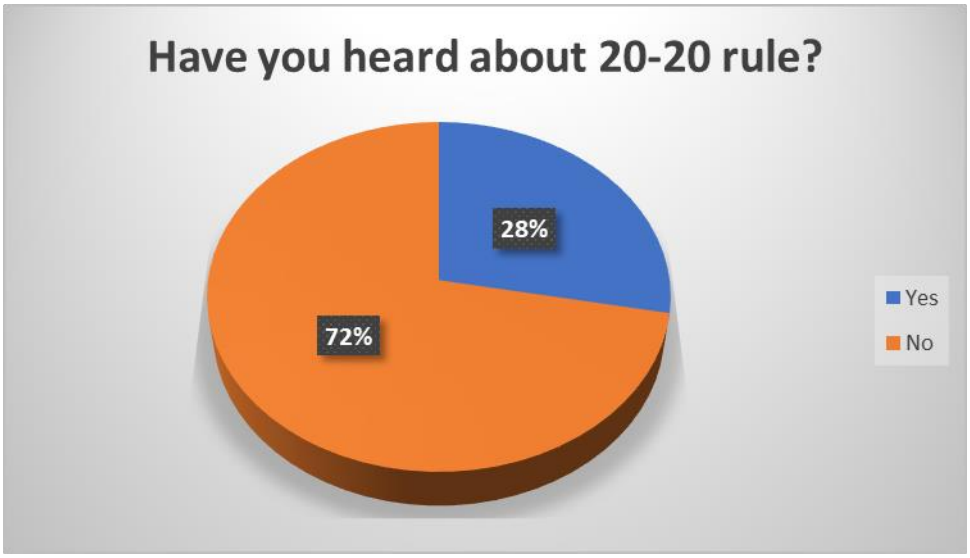

Figure 2: Awareness of 20-20 rule in subjects.

The second question aimed to find out whether the respondents actively implement the 20-20 rule. The results indicate that a small proportion (26%) of the participants are actually using the 20-20 rule **(Figure 3)**.

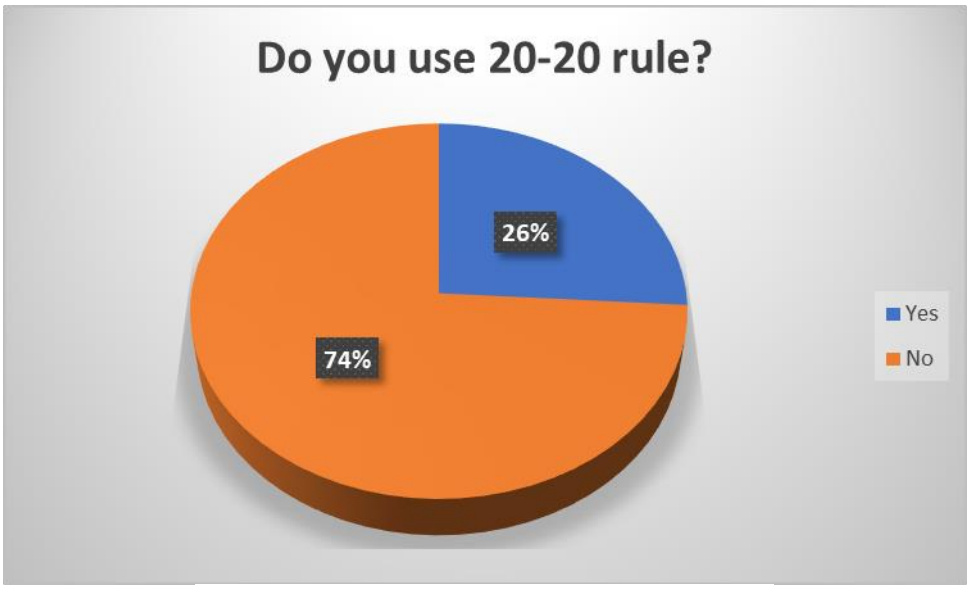

Figure 3: Implementation of 20-20 rule in subjects.

Next question inquired about whether the respondents' taking breaks during their work routine. The results suggest that slightly more than a third (32%) of the participants did take breaks **(Figure 4)**.

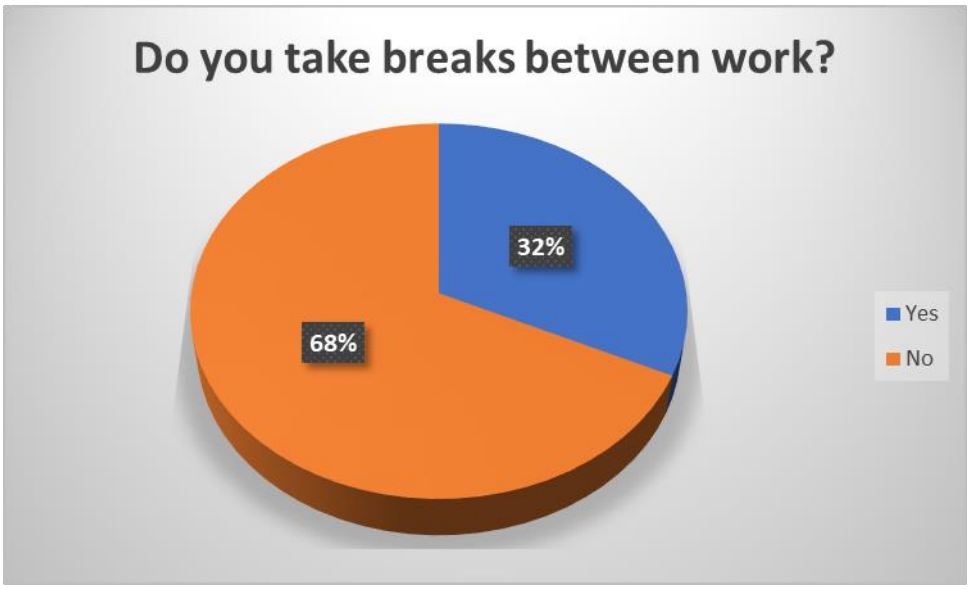

Figure 4: Subject's taking breaks between work

On being questioned related to whether respondents close their eyes while taking visual breaks. A significant portion (38%) of the participants indicated that they do close their eyes during breaks **(Figure 5)**.

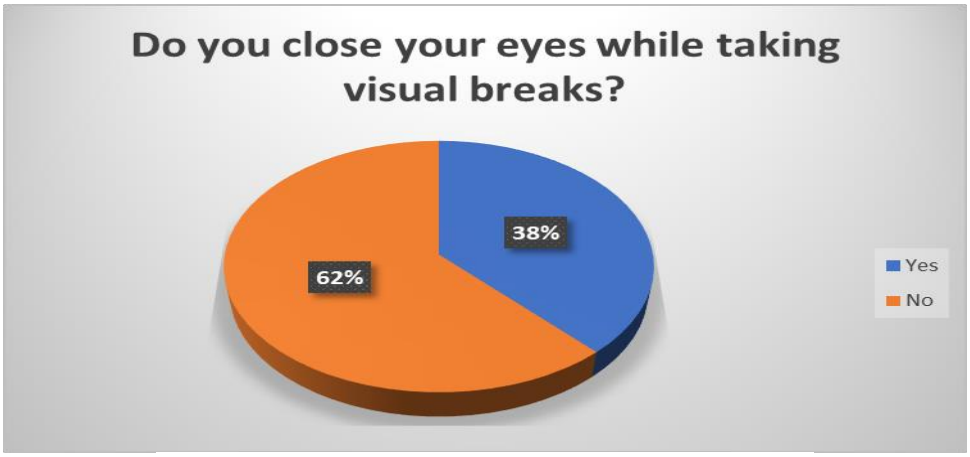

Figure 5: Subjects closing eyes while taking visual breaks.

On being questioned specifically whether respondents look away at a distance of 20 feet while taking visual breaks. The data shows that only 28% of the participants follow this practice **(Figure 6)**.

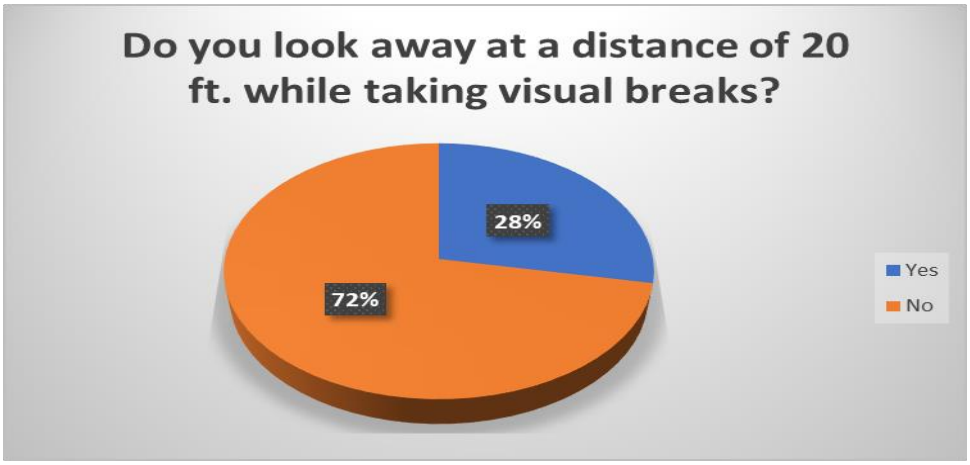

Figure 6: Subjects looking at a distance of 20ft. while taking visual breaks.

On being asked about how often do you take these breaks, aimed to gauge how frequently respondents take breaks during work. Interestingly, 52% of the participants confirmed that they do take breaks **(Figure 7)**.

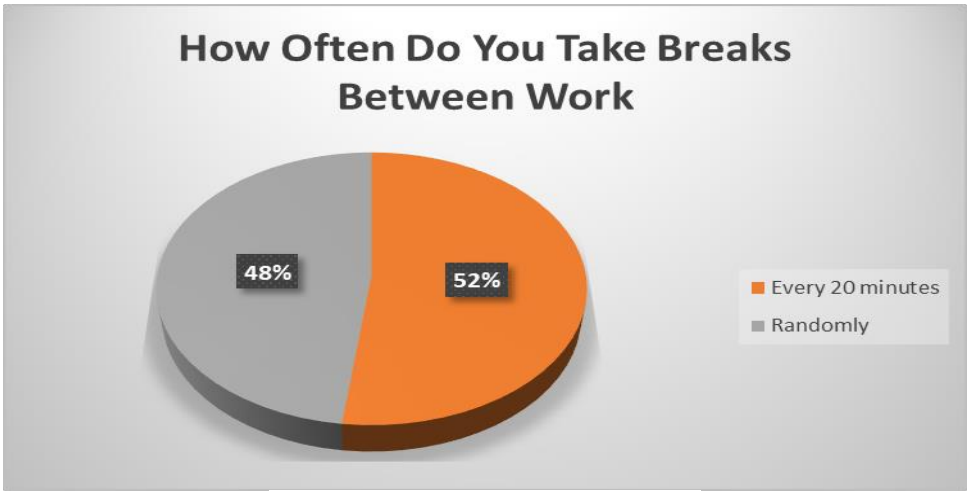

Figure 7: Frequency of taking breaks.

Table 3 summarizes inferences and comparison regarding symptoms faced by subjects when they presented to OPD and in Group 1: Subjects getting daily reminders and Group 2: Subjects who didn't get any reminders.

Table 3: Comparison of occurrence of ocular symptoms among the subjects.

Symptoms	Baseline	Group-1	Group-2
Itching	72%	36%	43%
Gritty	70%	32%	41%
Eye pain	68%	32%	46%
Redness	60%	32%	44%
Headache	68%	32%	47%
Dryness	70%	36%	44%
Blurred Vision	46%	24%	39%
Light sensitivity	62%	32%	40%
Double Vision	36%	18%	20%
Eye Fatigue	72%	36%	52%

Itching: Group-1 has a 36% prevalence, and Group-2 has a 43% prevalence, while the Baseline has a higher prevalence of 72% (**Figure 8)**.

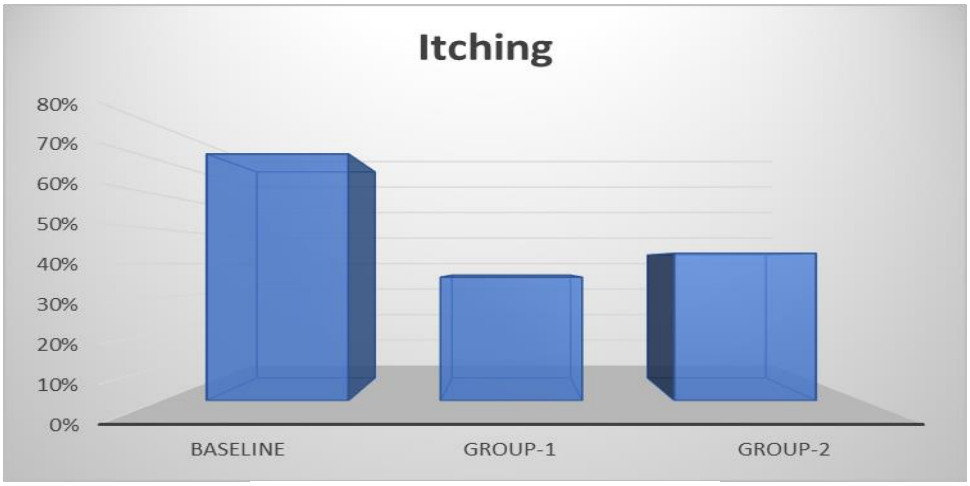

Figure 8: Incidence of itching in subjects.

Gritty Sensation: Group-1 had a 32% prevalence, and Group-2 had a 41% prevalence, while the Baseline had a higher prevalence of 70% **(figure 9).**

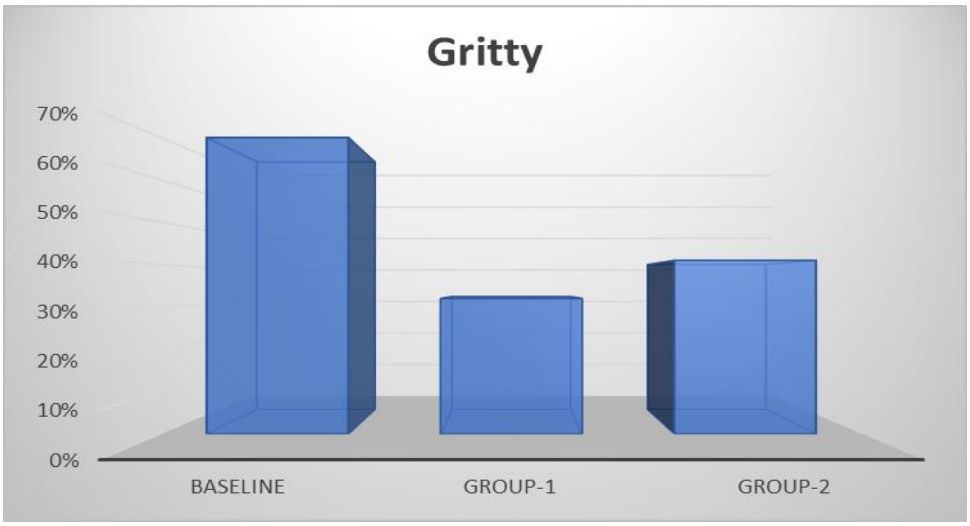

Figure 9: Incidence of gritty in subjects.

Eye Pain: Group-1 has a 32% prevalence, and Group-2 has a higher prevalence of 46%, while the Baseline has a prevalence of 68% **(Figure 10).**

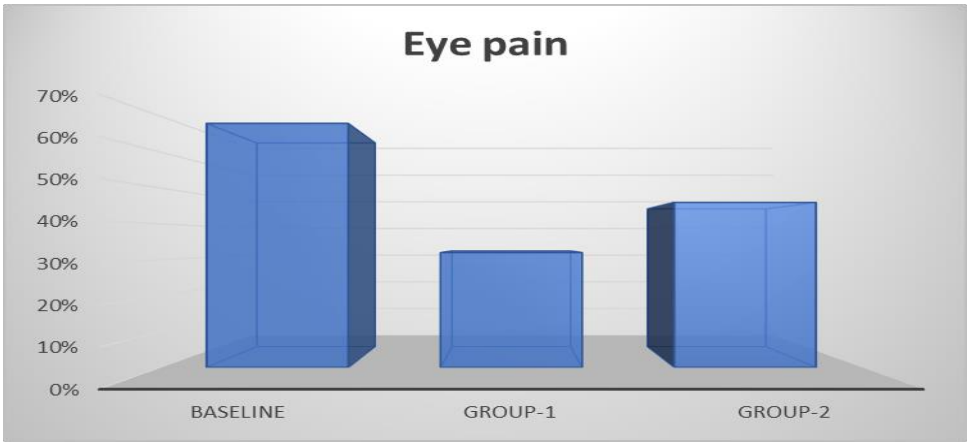

Figure 10: Incidence of eye pain in subjects.

Redness: Group-1 has a 32% prevalence, and Group-2 has a higher prevalence of 44%, while the Baseline has a prevalence of 60% **(figure 11).**

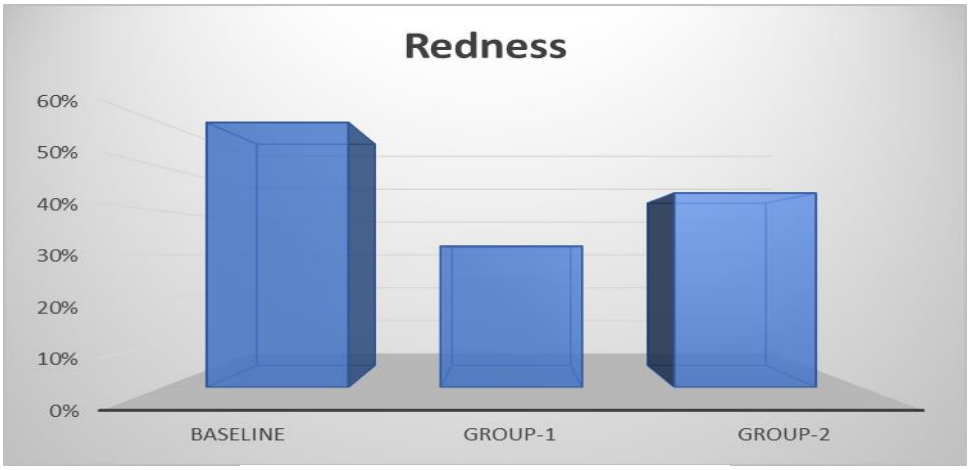

Figure 11: Incidence of redness in subjects.

Headache: Group-1 has a 32% prevalence, and Group-2 has a higher prevalence of 47%, while the Baseline has a prevalence of 68% **(figure 12).**

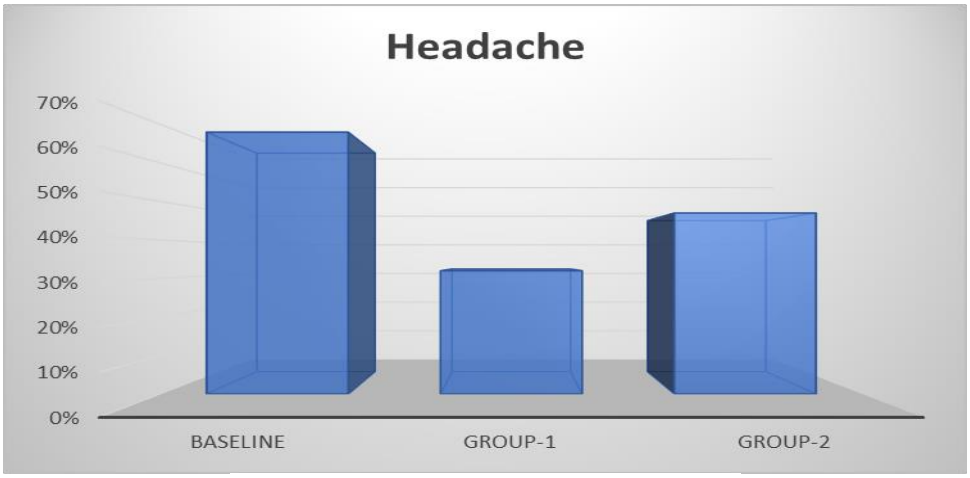

Figure 12: Incidence of headache in subjects.

Dryness: Group-1 has a 36% prevalence, and Group-2 has a higher prevalence of 44%, while the Baseline has a prevalence of 70% **(figure 13).**

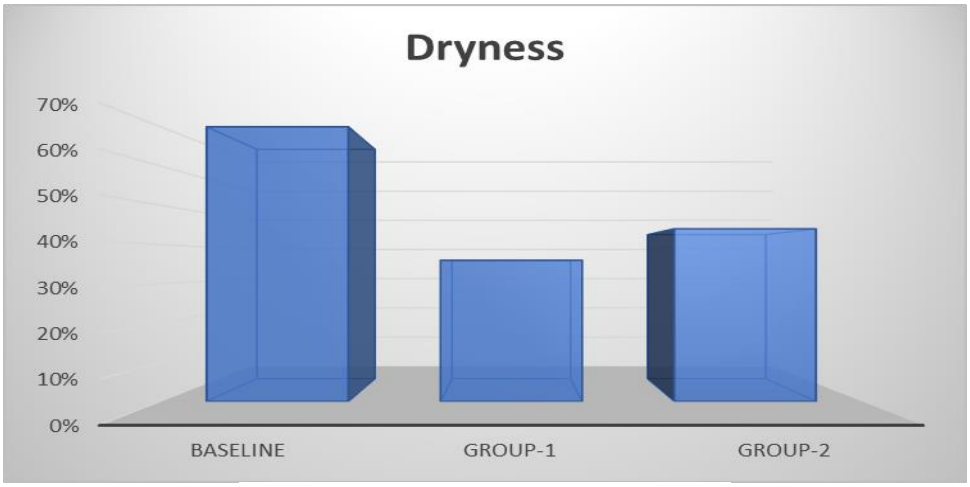

Figure 13: Incidence of dryness in subjects.

Blurred Vision: Group-1 has a 24% prevalence, and Group-2 has a higher prevalence of 39%, while the Baseline has a prevalence of 46% **(figure 14).**

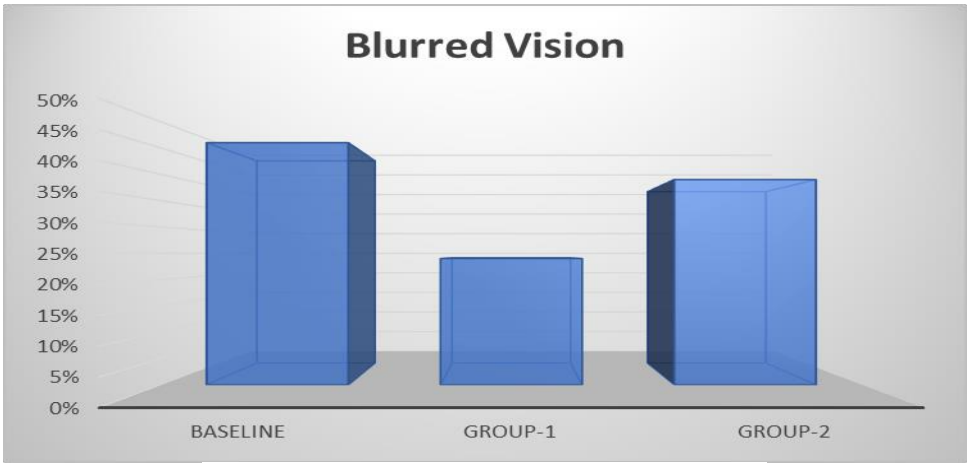

Figure 14: Incidence of blurred vision in subjects.

Light Sensitivity: Group-1 has a 32% prevalence, and Group-2 has a higher prevalence of 40%, while the Baseline has a prevalence of 62% **(figure 15).**

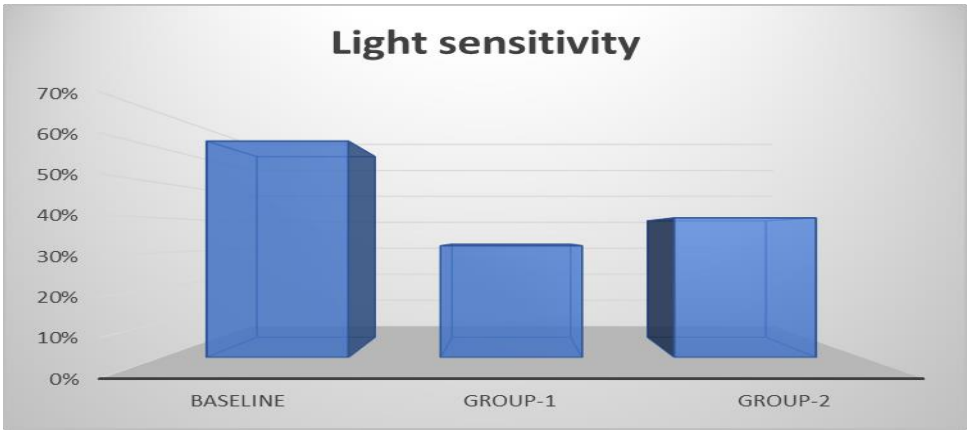

Figure 15: Incidence of light sensitivity in subjects.

Double Vision: Group-1 has an 18% prevalence, and Group-2 has a prevalence of 20%, while the Baseline has a prevalence of 36% **(figure 16).**

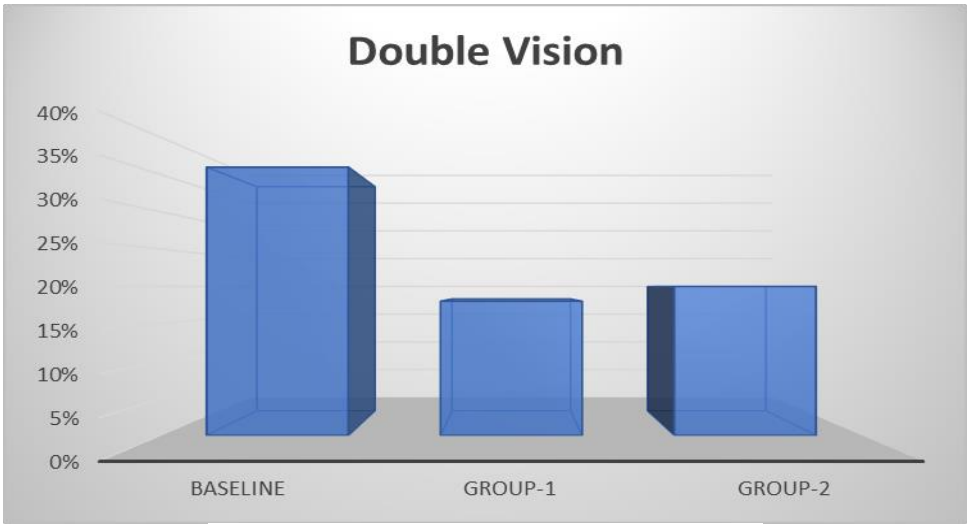

Figure 16: Incidence of double vision in subjects.

Eye Fatigue: Group-1 has a 36% prevalence, and Group-2 has a higher prevalence of 52%, while the Baseline has a prevalence of 72% **(Figure 17).**

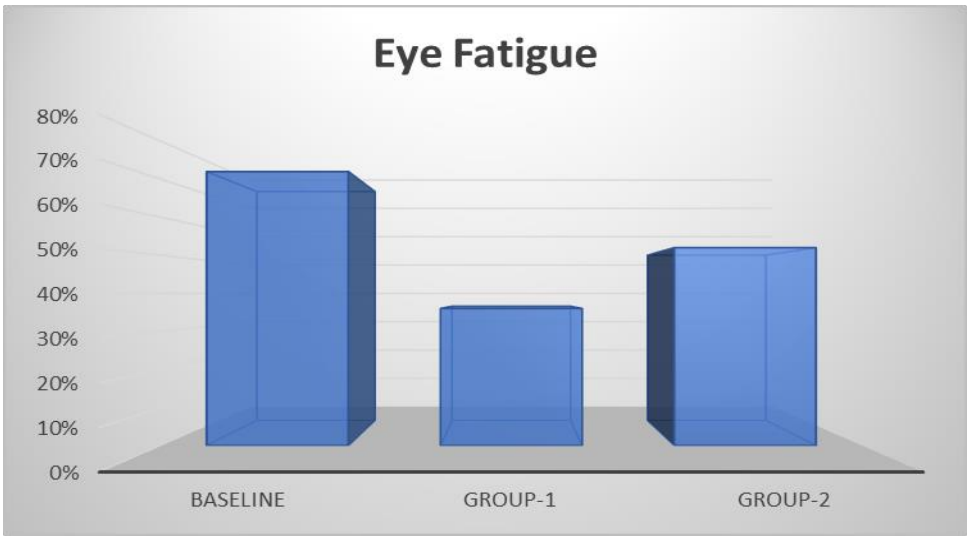

Figure 17: Incidence of eye fatigue in subjects.

From the data, it seems that both Group-1 and Group-2 generally have lower symptom prevalence compared to the Baseline group. However, Group-2 tends to have higher symptom prevalence compared to Group-1. Additional context about the study and the groups' characteristics is needed to draw more specific conclusions or interpretations from the data.

Table 4: Average compliance in subjects who got reminders vs the subjects who did not get daily reminders.

	Group-I	Group-II
Average compliance (in days)	5.28 Days	4.2 Days

Table 5: Percentage of subjects who forgot to follow the 20-20 rules in group-I and Group-II.

	Group-I	Group-II
Forgot to follow 20-20 rule between the days	28%	60%

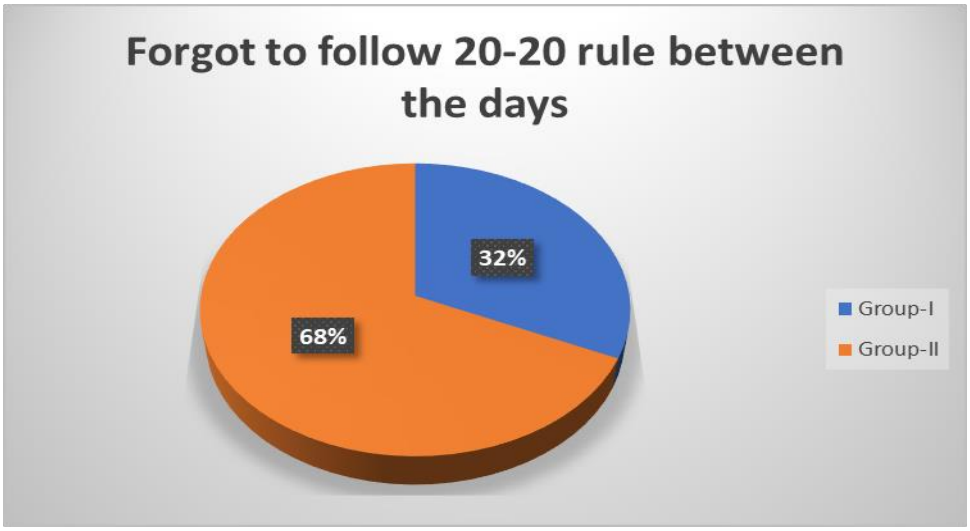

Figure 18: Comparison of subjects who forgot to use 20-20 rule between the days in group-I and group-II

DISCUSSION

The purpose of the study was to determine the effectiveness of taking proper visual breaks and daily reminders to take breaks on digital eye strain.

Our data indicates that a significant proportion of respondents are not aware of the 20-20 rule and do not actively implement it. While there is a fair number of individuals taking breaks during work, fewer adhere to the practice of looking away at a distance of 20 feet or closing their eyes during these breaks. Making the patients aware about proper visual break practices can significantly reduce digital eye strain prevalence.

From the data, it seems that both Group-1 and Group-2 generally have lower symptom prevalence compared to the Baseline group. However, Group-2 tends to have higher symptom prevalence compared to Group-1 indicating that reminders may play an important role in reduction in symptoms of digital eye strain. The data suggests a discrepancy in compliance with the 20-20 rule between the two groups, highlighting the importance of reminders in getting better compliance.

The 20-20-20 rule doesn't only apply to computer use but can also be extended to other digital devices like smartphones and tablets. Integrating this rule into the daily routine can significantly reduce eye strain and discomfort caused by prolonged screen time and promote better eye health. Additionally, regular eye check-ups with an eye care professional are important to monitor and address any potential eye issues.

The increasing use of digital devices in educational settings has raised concerns about the prevalence of CVS and DES among schoolchildren. The findings of this research can contribute to the development of evidence-based guidelines and interventions to protect digital device users from the detrimental impacts of digital eye strain.

The existing literature have explored various studies and surveys highlighting the rising incidence of visual discomfort and eye-related issues resulting from the extended use of computers, tablets, and smartphones in educational settings [14-18]. Factors such as excessive screen time, improper viewing distances, poor lighting conditions, and inadequate ergonomic setups could be some of the contributing factors. Understanding these factors is essential for developing targeted preventive strategies.

It is important to highlight the impact of CVS and DES on students' academic performance. Studies have shown that visual discomfort and eye strain can affect reading speed, comprehension, and concentration, leading to decreased productivity and

learning difficulties. These findings emphasize the need for proactive measures to protect students' visual health and academic success [19].

Early intervention is crucial in preventing the onset and progression of CVS and DES. We would like to emphasize the benefits of incorporating eye health education and awareness programs in schools, teaching students and teachers about proper screen usage habits, and encouraging regular eye breaks during digital activities [20].

We believe that it is important to focus on providing specific ergonomic recommendations for schools to reduce the risk of CVS and DES. This includes proper screen positioning, appropriate chair and desk height, and the use of adjustable furniture to accommodate varying student heights [21].

The present study with other analogous studies justifies that there's a lack of knowledge on forestalment of computer vision pattern among the subjects. This can be planned through structure tutoring programme for scholars on forestalment of computer vision pattern to gain acceptable knowledge. The results of this study punctuate the effectiveness of tutoring strategy on forestalment of computer vision pattern.

The sample size and short durations of the study were two major limitations of this study. A Larger sample size and longer duration could have yielded a better and more reliable data. Lack of objective data was another major limitation of our study. Another limitation of this study was that compliance of subjects was not monitored. Monitoring the subjects for compliance could have yielded a more reliable data.

CONCLUSION

The 20-20-20 rule is a simple and effective technique to help prevent Computer Vision Syndrome (CVS) and reduce the risk of Digital Eye Strain (DES) caused by prolonged computer use or digital device use. However, a lack of knowledge regarding the 20-20-20 rule prevails and it is important to spread awareness about the importance of visual breaks during digital work. Since getting proper reminders can enhance the compliance, incorporation of reminders in digital devices can be useful for people who often suffer from DES due to lack of proper breaks.

Declaration by Authors

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