Section: Ophthalmology

Original Research Article

ASSESSING THE EFFICACY OF 20-20-20 RULE IN ELIMINATING THE SYMPTOMS OF DIGITAL EYE STRAIN IN SUBJECTS WITH PROLONGED SCREEN EXPOSURE

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Received : 18/10/2025
Received in revised form : 06/12/2025
Accepted : 23/12/2025

Keywords:
Digital eye strain, Screen time, Eye health, Symptom relief, Visual ergonomics, 20-20-20 rule.

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DOI: 10.47009/jamp.2026.8.1.35

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (1); 177-180

ABSTRACT

Background: The 20-20-20 rule is simple and widely popular strategy for DES (digital eye strain (aimed to relieve strain and promote relaxation). Despite being widely recommended, literature data is scarce concerning 20-20-20 rule efficacy requiring further research. The present study was aimed to assess the efficacy of 20-20-20 rule in eliminating the symptoms of digital eye strain in subjects with prolonged screen exposure. **Materials and Methods:** The study assessed 536 subjects in the age range of 18-60 years that visited the Ophthalmology Outpatient Department of a of the Institute within the defined study period and reported >4 hours of daily use of screen. Subjects were advised to follow 20-20-20 rule taking break for 20 seconds every 20 minutes and to focus on an object minimum 20 feet away. Data were gathered using questionnaire at baseline, after 2 and 4 weeks. The questionnaire assessed demographic data, screen use, and asthenopic symptoms along with relief from symptoms and rule adherence assessed at follow-up. **Result:** The mean screen time in study subjects was 6.32 hours with major device used was mobile phone by 78% subjects. At 4 weeks assessment, symptom relief was recorded in 59% subjects with significant improvement in tired eye, burning sensation, and headache with p=0.001, <0.01, and <0.01 respectively. A significant proportion of study subjects reported distance looking as helpful with p<0.001. However, symptoms persisted in 41% subjects despite 20-20-20 rule adherence requiring further treatment. **Conclusion:** The present study concludes that 20-20-20 rule is an effective and simple strategy that decrease the symptoms of dry eye strain. However, outcome can be varying based on individual factors and adherence. Addition of other long-term strategies and preventive measures can further result in better visual health and eye comfort in the digital times.

INTRODUCTION

In the present scenario, rapid increase in digital technology has majorly changed the communication, work, and entertainment engagement resulting in significant increase in screen time which has led to significant increase in DES (digital eye strain) or CVS (computer vision syndrome). These are major healthcare concerns globally. Literature data reports that 70-75% subjects using electronic devices for long time report some ocular discomfort experience indicating 60 million people affected by DES globally every year. Digital reliance continues to increase making it vital to understand long-term effects of prolonged exposure to screen on ocular health and to find effective strategies for eliminating the negative effects.[1]

DEF is presented as collection of asthenopic symptoms including back discomfort, neck discomfort, headache, blurred vision, eye dryness, and/or ocular irritation. Various factors contributing to DES including environmental conditions such as humidity and lightening, poor ergonomic practices, improper viewing distances, glare, and inappropriate screen brightness. Also, preexisting conditions as visual impairments or refractive errors can increase and worsen the symptoms and underscore the vital role of workplace adjustments and proper vision care. The increase in prevalence of DES focus on the urgent need for efficacious preventive measures to

ISSN (O): 2687-5365; ISSN (P): 2753-6556

decrease ocular strain resulting from extended use of screen.[2]

Existing literature data reports that primary mechanism in DES is reduced rate of eye blinking while prolonged use of screen. Under normal context, a person blink nearly 22 times every minute, whereas, this is reduced to 7 blinks per minute in subjects while focusing on the screen leading to poor tear distribution across the ocular surface resulting in symptoms as foreign body sensation, burning, and eye dryness. Excessive exposure to the screen has been strongly linked to increase in visual discomfort further focusing on need for effective and practical strategy development for minimization of this strain.[3]

One such widely accepted and popular strategy is the 20-20-20 rule which is a preventive and simple measure for digital eye strain management. The rule instructs to take a 20-second break every 20 minutes of screen use and focus on an object at least 20 feet away aimed to provide relief to the eye from sustained near work also aimed to relieve strain and promote relaxation. For an individual that works on screen for 8 hours every day, adherence to the rule include taking 24 breaks leading to nearly 8 minutes of daily distant focusing. Despite being widely recommended, literature data is scarce concerning 20-20-20 rule efficacy requiring further research.4 Hence, the present study was aimed to assess the efficacy of 20-20-20 rule in eliminating the symptoms of digital eye strain in subjects with prolonged screen exposure.

MATERIALS AND METHODS

The present observational prospective study was aimed to assess the efficacy of 20-20-20 rule in eliminating the symptoms of digital eye strain in subjects with prolonged screen exposure. The study was done at Department of Ophthalmology, Atal Bihari Vajpayee Government Medical College, Vidisha, Madhya Pradesh. Verbal and written informed consent were taken from all the subjects before study participation.

The study assessed 536 subjects in the age range of 18-60 years that visited the Ophthalmology Outpatient Department of a of the Institute within the defined study period and reported >4 hours of daily use of screen. The subjects were assessed for 4 weeks after reinforcing the 20-20-20 rule. Data were gathered using a preformed structured questionnaire and subjects were recalled at 2 and 4 weeks after introducing 20-20-20 rule to assess them on the questionnaire. The study assessed patients, students, nurses, and doctors visiting the Institute and reported >4 hours of daily screen usage.

The inclusion criteria for the study were subjects aged 18-60 years with daily use of digital screen as tablets, smartphones, and/or computers for >4 hours duration, and were willing for recall and study participation. The exclusion criteria for the study were subjects with significant ocular disease as cataract or glaucoma that could hinder eye strain related outcomes, presence of uncorrected refractive errors previous, prior history of refractive surgery, current use of contact lenses. And not willing to participate or follow 20-20-20 rule.

At baseline, questionnaire was given to all the included subjects and they were asked to fill the questionnaire that assessed demographic data as name, age, gender, and address, details of screen use including type of device most frequently and average daily screen time (in hours), asthenopic symptoms as sensitivity to bright light, eye strain, ocular surface irritation, headache, blurred vision, dry eyes, and/or ocular discomfort.

After the subjects filled the baseline questionnaire, 20-20-20 rule was instructed as after every 20 minutes of screen use, take a 20-second break and focus on an object at least 20 feet away. For adherence, subjects were advised to set reminders on their phones or use the mobile applications or phones that were designed specifically for this purpose.

At follow-up assessment of 2 and 4 weeks, at 2 weeks, same questionnaire as baseline was given to the study subjects with additional questions on any changes in asthenopic symptoms and adherence level. At 4 weeks assessment, subjects again completed the questionnaire to assess if there is any improvement in the symptoms, if they worsened, or if they were unchanged. Also, adherence to 20-20-20 rule was reassessed.

To measure the adherence, the subjects were asked How frequently were you able to follow the 20-20-20 rule with responses being a) Rarely (<10% of the times), b) Frequently (50–89% of the time), c) Occasionally (10–49% of the time), and d) Always (≥90% of the time). Subjects were also asked if they used the reminders as mobile phone apps or alarms for help in maintaining the adherence.

Statistical analysis of the gathered data was done using chi-square test, Fisher's exact test, Mann Whitney U test, and SPSS (Statistical Package for the Social Sciences) software version 24.0 (IBM Corp., Armonk. NY, USA) using ANOVA and student's t-test. The significance level was considered at a p-value of <0.05.

RESULTS

The present observational prospective study was aimed to assess the efficacy of 20-20-20 rule in eliminating the symptoms of digital eye strain in subjects with prolonged screen exposure. The study assessed 536 subjects in the age range of 18-60 years that reported >4 hours of daily use of screen. The mean screen time in study subjects was 6.32 hours and mean age was 43.91 years with major device used was mobile phone by 78% (n=418) subjects and computer was used by 118 subjects. There were majority of students in study with 302 subjects followed by 86 doctors, 20 chartered accountants, 12

ISSN (O): 2687-5365; ISSN (P): 2753-6556

teachers, and least were nurses with 16 nurses. For breaks between the usage, 502 subjects reported taking breaks which was significantly higher compared to 34 subjects not taking any break with p<0.01 [Table 1].

It was seen that for association of various DES symptoms to the screen time, the most commonly reported symptom was headache reported by 302 subjects and was significantly associated with the prolonged screen use with p=0.03 followed by irritated burning eyes reported by 248 subjects, however, it had no significant association to prolonged screen use with p=0.244. Dry eyes were reported by 220 study subjects and had a strong association to digital eyestrain and screen use with p=0.003. Blurred vision reported by 82 study and had no significant association to prolonged screen use with p=1.0 [Table 2].

The study results showed that for efficacy of 20-20-20 rule and looking at distance in relieving DES symptoms in study subjects, 316 subjects had reported that using 20-20-20 rule helped in relieving the symptoms of digital eye strain, whereas, 220 subjects reported no help of 20-20-20 rule in relieving the symptoms of digital eye strain which was a statistically significant difference with p=0.003. For assessing the fact if looking at distance helped in relieving DES symptoms in study subjects, 418 subjects reported it to be efficacious which was significantly higher compared to 118 subjects that reported it to be non-efficacious in relieving the symptoms of DES with p<0.001 [Table 3].

On assessing the efficacy of various interventions in relieving specific symptoms of DES in study subjects, no relief in any symptom was reported by 88 subjects, however, it had a significant deviation from the neutral outcome depicting efficacy of 20-20-20 rule. A significant proportion reported relief from tired eye as reported by 260 subjects with p=0.001. Similar significant proportion reported relief from irritation, headache, dry eyes, and burning eye sensation as reported by 184, 208, 136, and 180 subjects with the respective p-values of <0.01, <0.01, 0.01, and <0.01 respectively [Table 4].

Table 1: Digital device use and breaks taken in the study subjects

S. No	Parameter	Number (n)
1.	Digital device used	
a.	Computer	118
b.	Mobile phone	418
c.	Total	536
2.	Breaks between usage	
a.	Yes	502
b.	No	34
c.	p-value	<0.01

Table 2: Association of various DES symptoms to the screen time

S. No	Symptoms	No (n)	Yes (n)	p-value
1.	Headache	234	302	0.03
2.	Irritated burning eyes	288	248	0.244
3.	Dry eyes	316	220	0.003
4.	Blurred vision	454	82	1.0

Table 3: Efficacy of 20-20-20 rule and looking at distance in relieving DES symptoms in study subjects

S. No	20-20-20 rule efficacy	Number (n)	p-value
1.	Helped in relieving symptoms		
a.	Yes	316	0.003
b.	No	220	
2.	Looking at distance helped		
a.	Yes	418	<0.001
b.	No	118	

Table 4: Efficacy of various interventions in relieving specific symptoms of DES in study subjects

S. No	Symptom relieved	Number (n)	p-value
1.	No relief	88	<0.01
2.	Tired eye	260	0.001
3.	Irritation	184	<0.01
4.	Headache	208	<0.01
5.	Dry eyes	136	0.01
6.	Burning eye sensation	180	<0.01

DISCUSSION

The present study assessed 536 subjects in the age range of 18-60 years that reported >4 hours of daily use of screen. The mean screen time in study subjects was 6.32 hours and mean age was 43.91 years with major device used was mobile phone by 78% (n=418) subjects and computer was used by 118 subjects. There were majority of students in study with 302 subjects followed by 86 doctors, 20 chartered accountants, 12 teachers, and least were nurses with 16 nurses. For breaks between the usage, 502 subjects

ISSN (O): 2687-5365; ISSN (P): 2753-6556

reported taking breaks which was significantly higher compared to 34 subjects not taking any break with p<0.01. These data were comparable to the previous studies of Yadav P et al,[5] in 2025 and Datta S et al,[6] in 2023 where authors assessed subjects with DES and demographics and DES data comparable to the present study were also reported by the authors.

The study results showed that for association of various DES symptoms to the screen time, the most commonly reported symptom was headache reported by 302 subjects and was significantly associated with the prolonged screen use with p=0.03 followed by irritated burning eyes reported by 248 subjects, however, it had no significant association to prolonged screen use with p=0.244. Dry eyes were reported by 220 study subjects and had a strong association to digital eyestrain and screen use with p=0.003. Blurred vision reported by 82 study and had no significant association to prolonged screen use with p=1.0. These results were consistent with the findings of Akinbinu TR et al,[7] in 2014 and Rosenfield M,[8] in 2011 where results reported by the authors for association of various DES symptoms to the screen time were similar to the results of the present study.

It was seen that for efficacy of 20-20-20 rule and looking at distance in relieving DES symptoms in study subjects, 316 subjects had reported that using 20-20-20 rule helped in relieving the symptoms of digital eye strain, whereas, 220 subjects reported no help of 20-20-20 rule in relieving the symptoms of digital eye strain which was a statistically significant difference with p=0.003. For assessing the fact if looking at distance helped in relieving DES symptoms in study subjects, 418 subjects reported it to be efficacious which was significantly higher compared to 118 subjects that reported it to be non-efficacious in relieving the symptoms of DES with p<0.001. These findings were in agreement with the results of Almudhaiyan TM et al,[9] in 2023 and Boulet C,[10] in 2016 where results for efficacy of 20-20-20 rule and looking at distance in relieving DES symptoms similar to the present study were also reported by the authors in their studies.

Concerning the assessment of the efficacy of various interventions in relieving specific symptoms of DES in study subjects, no relief in any symptom was reported by 88 subjects, however, it had a significant deviation from the neutral outcome depicting efficacy of 20-20-20 rule. A significant proportion reported relief from tired eye as reported by 260 subjects with p=0.001. Similar significant proportion reported relief from irritation, headache, dry eyes, and burning eye sensation as reported by 184, 208, 136, and 180 subjects with the respective p-values of <0.01, <0.01, 0.01, and <0.01 respectively. These results were in line with the findings of Bahkir FA et al,[11] in 2020 and Portello JK et al,[12] in 2012 where results reported by the author for efficacy of various interventions in relieving specific symptoms of DES were similar to the present study.

CONCLUSION

Within its limitations, the present study concludes that20-20-20 rule is an effective and simple strategy that decrease the symptoms of dry eye strain. However, outcome can be varying based on individual factors and adherence. Addition of other long-term strategies and preventive measures can further result in better visual health and eye comfort in the digital times.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556