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Original Article

Screen-Induced Transient Myopia (SITM) in Medical Students during Exam Seasons: A Prospective Study

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Abstract:

Background: *Screen-induced transient myopia (SITM) represents a short-lived blurring of distance vision following sustained near work. Despite its clinical relevance, little is known about its occurrence and predictors during academically intense periods among medical students. This study examined the prevalence, correlates, and predictors of SITM across pre-exam, exam, and post-exam phases in a cohort of undergraduate medical students.*

Materials & Methods: *A prospective cohort design with repeated measures was employed among 409 students. Data were collected through a structured online questionnaire covering screen-use behaviors, ergonomic factors, and ocular symptoms. SITM was defined as blurred distance vision that intensified during the exam period. Analyses included chi-square tests for associations and logistic regression to identify independent predictors.*

Results: *SITM was highly prevalent during exams and significantly associated with vision changes, visual discomfort, prolonged near work, closer viewing distances, and increased screen use relative to baseline. Logistic regression identified visual discomfort (OR = 6.30, p < .001), prolonged near work difficulty (OR = 3.11, p < .001), and screen time change (OR=1.46, p=.016) as the strongest predictors. SITM was also linked to self-reported academic impact.*

Conclusion: *SITM is a frequent, functionally relevant issue among medical students during exams. Preventive strategies should emphasize behavioral modifications and institutional support to mitigate risks.*

Keywords: Screen-induced transient myopia, Digital eye strain, Medical students, Near work, Academic performance.

Introduction:

Near work-induced transient myopia (NITM) refers to a short-lived myopic shift that occurs after prolonged near work, typically attributed to accommodative after-effects and hysteresis.[1-2] Although transient, NITM has been associated with long-term refractive error trajectories in some populations, highlighting its clinical significance.[3] Mechanistically, NITM is linked to

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accommodative lag, hysteresis, and accommodative fatigue; myopic individuals may exhibit larger accommodative lags than emmetropes, potentially increasing susceptibility to transient distance blur following sustained near tasks.[4-6] Hysteresis can slow visual recovery after near work and prolong distance blur, while repeated near work exposure may contribute to progressive myopia development in vulnerable individuals.[2,3,6] Interventions that target accommodation (e.g., accommodative exercises or biofeedback-based training) and optical approaches (e.g., dual-focus or multifocal contact lenses) have shown promise for reducing accommodative stress and improving near–far adaptability, although their practicality and uptake in exam-heavy student populations require further evaluation.[7-11] Broader myopia-control evidence also supports optical and pharmacologic strategies (e.g., progressive addition lenses combined with low-dose atropine), although these primarily target longer-term progression rather than transient blur.[12]

During academic exam periods, medical students are particularly vulnerable because of extended bouts of uninterrupted screen use, infrequent breaks, and suboptimal ergonomic environments. Accumulating evidence links high digital screen time and intensive near work with myopia-related symptoms and digital eye strain (DES), including difficulty refocusing at distance after sustained near tasks.[3,13,14] Exam-season observations further indicate that screen exposure may increase substantially and can be accompanied by ocular discomfort and visual disturbances.[15,16] Environmental and behavioral factors-such as poor lighting, prolonged continuous sessions, and non-ergonomic posture-may exacerbate accommodative load and intensify transient blur, with potential downstream effects on concentration and well-being.[4,6,17]

In this context, the term Screen-Induced Transient Myopia (SITM) can be conceptualized as an exam-period, screen-dominant manifestation of NITM, characterized by time-limited and reversible distance blur that worsens with intense near work dose and improves with recovery periods.[1-3] Preventive strategies such as the “20-20-20” rule and other micro-break approaches have gained popularity; experimental findings suggest that short breaks may reduce binocular stress and DES symptoms, although effect sizes and adherence vary across settings.[14,17] Additional modifiable factors-break frequency and duration, viewing distance, ambient lighting, posture, and blue-light filter use-are frequently recommended, and greater viewing distance and structured rest may reduce accommodative stress and transient symptoms; however, evidence for some commonly adopted measures (notably blue-light filters) remains mixed.[13-15,18]

Despite growing attention to DES, there remains a lack of prospective data isolating the transient distance blur that intensifies specifically during exam periods (i.e., SITM). Existing research is predominantly cross-sectional or aggregates multiple DES symptoms, limiting inference about within-person changes and the reversible myopic shifts characteristic of SITM.[3,13,14] Therefore, within-subject longitudinal studies spanning pre-exam, peak-exam, and post-exam phases are needed to estimate SITM prevalence and severity, identify behavioral and environmental correlates (e.g., screen time, break patterns, posture, lighting), and assess functional impacts on well-being and perceived academic performance.[13-15] Practice surveys also suggest heterogeneity in myopia-management counseling and uptake, underscoring the value of context-specific preventive guidance for student populations.[19] This study contributes by focusing on modifiable behaviors relevant to near work stress, providing empirical insight into the real-world effectiveness of micro-break and ergonomic practices in academic settings, and extending the NITM paradigm by testing whether SITM burden tracks exam-related near work dose and remits after the exam period.[1-3,6,17]

This study was done to determine the incidence and time-course of Screen-Induced Transient Myopia (SITM) during an examination period and to identify its behavioral and environmental predictors among medical students.

Materials and Methods:

We conducted a multicenter, prospective cohort study with three repeated measurements-pre-exam baseline (T0; 3-4 weeks before exams), peak-exam week (T1), and post-exam follow-up (T2; 2-3 weeks after exams)-to capture within-person change in Screen-Induced Transient Myopia (SITM) across the academic cycle and minimize recall bias; reporting followed STROBE guidance for observational cohort studies Data were collected in Sylhet, Bangladesh across five medical colleges (Jalalabad Ragib-Rabeya Medical College; Sylhet M.A.G Osmani Medical College; Sylhet Women's Medical College; North East Medical College; Parkview Medical College) during a single examination term in 2025 (spanning T0-T2 over approximately 6-10 weeks). Participants were undergraduate medical students (Years 1-5) with ≥2 hours/day academic screen use; exclusion criteria included known ocular pathology, prior ocular surgery, and systemic/cycloplegic medications affecting accommodation. Consecutive volunteer sampling was implemented via class announcements and online invitations; an a priori repeated-measures power analysis (α=0.05, 1-β=0.80, small–to-moderate effect) indicated ≈370 participants, so we targeted ≈410 to allow attrition and enrolled 409 students.[20] Ethical clearance was granted by the Ethical Review Committee, Jalalabad Ragib-Rabeya Medical College & Hospital, Sylhet (memo no. JRRMC/756/ Journal-3490; dated 30 August 2025); participation was voluntary and electronic informed consent was obtained, with procedures aligned to the Declaration of Helsinki.[21] Measures were collected using a structured, self-administered online questionnaire covering screen behaviors (daily hours, longest continuous session, break frequency/duration, academic vs recreational use), ergonomics/environment (viewing distance, posture, ambient lighting, blue-light filter use), SITM symptoms (distance blur during/after extended screen-based near work and phase-wise variation T0-T2), and functional outcomes (perceived academic impact and well-being), informed by prior NITM/DES literature.[1-3,13-14] Internal consistency of multi-item composites was assessed using Cronbach's α and a 10–15% subsample repeated baseline within one week to evaluate short-term test-retest reliability. SITM was operationalized as self-reported blurred distance vision during/after prolonged screen use that intensified at T1 relative to T0, with students reporting distance blur "often" (or more) at T1 classified as SITM-positive; phase-wise SITM at T0-T2 was recorded to assess remission after exams.[1-2,14] Prespecified covariates included age, sex, year of study, prior refractive diagnosis/correction, change in screen time from baseline, viewing distance category, ergonomic factors (lighting, posture, blue-light filter use), and site. Identical surveys were distributed at T0, T1, and T2 using secure site-specific links with automated reminders (48-72 h), range checks, and required key fields; data were encrypted at rest and de-identified before analysis. Analyses were conducted in R and SPSS 20 using descriptive statistics (means/SDs; frequencies/percentages), bivariate tests (χ^2; t-tests or non-parametric equivalents), and multivariable binary logistic regression to estimate independent predictors of SITM at T1 (adjusting for prespecified covariates including age, sex, refractive status, change in screen time, viewing distance, visual discomfort, prolonged near-work difficulty, and site), with standard diagnostics for model fit and multi-collinearity. Model discrimination was evaluated using receiver operating characteristic (ROC) curve analysis, reporting the area under the curve (AUC) with 95% confidence interval. To leverage repeated measures, a generalized linear mixed model (logit link) was fitted for phase-specific SITM (T0-T2) with a participant-level random intercept and fixed effects for phase and site to test whether odds increased at T1 and remitted at T2 relative to T0; statistical significance was set at two-sided $p<0.05$. Missingness patterns were inspected; complete-case analysis was used when item-level missingness was ≤5%, and multiple imputation by chained equations was planned as a sensitivity analysis if any variable exceeded this threshold, with conclusions compared against complete-case results.

Results:

A total of 409 medical students participated in the study. The mean age was 21.6 years (SD = 1.76; range 18–30). The sample consisted of 58.9% females and 41.1% males, with more than half (55.2%) reporting a previous refractive error diagnosis. In terms of year of study, the largest groups were first-year (31.0%) and second-year students (25.9%), followed by fourth-year (19.8%) and a smaller proportion of third-year students (5.6%).

Patterns of digital device use during the exam period showed that nearly two-thirds (61.1%) maintained a screen distance of 30–50 cm, while 28.6% viewed screens at <30 cm, and 10.3% at >50 cm. Average daily screen exposure was high: 30.8% reported 0–2 hours, 30.3% reported 2–4 hours, 22.5% reported 4–6 hours, 10.3% reported 6–8 hours, and 6.1% reported more than 8 hours (Table 1).

Table 1: Participant Characteristics (N = 409)

Variable	Category	Frequency (%)
Gender	Male	168 (41.1)
	Female	241 (58.9)
Refractive Diagnosis	Yes	226 (55.2)
	No	183 (44.8)
Year of Study	1st year	127 (31.0)
	2nd year	106 (25.9)
	3rd year	23 (5.6)
	4th year	81 (19.8)
Daily Screen Hours (Exam period)	0–2 hours	126 (30.8)
	2–4 hours	124 (30.3)
	4–6 hours	92 (22.5)
	6–8 hours	42 (10.3)
	>8 hours	25 (6.1)
Screen Distance	<30 cm	117 (28.6)
	30–50 cm	250 (61.1)
	>50 cm	42 (10.3)

Chi-square tests were conducted to examine associations between SITM and various behavioral, ergonomic, and functional factors. Results showed several statistically significant relationships (Table 2). SITM was strongly associated with vision changes during the exam season ($\chi^2 = 37.42$, df = 2, $p < .001$), visual discomfort during screen use ($\chi^2 = 70.39$, df = 1, $p < .001$), and vision difficulties after prolonged near work ($\chi^2 = 49.87$, df = 1, $p < .001$). These findings suggest that SITM co-occurs with broader visual strain symptoms, reinforcing its relevance as part of the digital eye strain spectrum.

In addition, SITM was significantly associated with corrective lens use during screen time ($\chi^2 = 23.94$, df = 2, $p < .001$), changes in screen time compared with baseline ($\chi^2 = 24.67$, df = 2, $p < .001$), and screen viewing distance ($\chi^2 = 10.64$, df = 2, $p = .005$). Importantly, SITM was also linked to self-reported academic impact ($\chi^2 = 22.21$, df = 2, $p < .001$), as well as with corrective actions attempted ($\chi^2 = 13.31$, df = 1, $p < .001$), suggestions for reducing SITM ($\chi^2 = 15.15$, df = 4, $p = .004$), and willingness to participate in SITM-related programs ($\chi^2 = 4.48$, df = 1, $p = .034$). Moreover, support for institutional guidelines on screen-time management was significantly related to SITM experience ($\chi^2 = 7.03$, df = 2, $p = .030$).

Table 2: Significant Chi-square Associations with SITM (N = 409)

Association	χ²	df	p-value
SITM vs Vision Changes (Exam Season)	37.422	2	<0.001
SITM vs Corrective Lenses (Screen)	23.937	2	<0.001
SITM vs Visual Discomfort (Screen)	70.392	1	<0.001
SITM vs Vision Difficulty (Prolonged)	49.874	1	<0.001
SITM vs Screen Time Change (Pre-Exam)	24.673	2	<0.001
SITM vs Screen Distance	10.636	2	0.005
SITM vs Academic Impact	22.205	2	<0.001
SITM vs Corrective Actions Tried	13.305	1	<0.001
SITM vs SITM Reduction Suggestions	15.147	4	0.004
SITM vs Willingness to Participate Program	4.483	1	0.034
SITM vs Institutional Guidelines Support	7.027	2	0.030

By contrast, several variables showed no significant association with SITM (Table 3). These included gender ($p = 0.479$), study posture ($p = 0.152$), study lighting ($p = 0.266$), use of blue-light filters ($p = 0.082$), and non-screen nearwork hours ($p = 0.496$). Likewise, break frequency ($p = 0.377$), break length ($p = 0.879$), and average session duration without breaks ($p = 0.916$) were not significantly associated with SITM. Interestingly, daily screen hours during exams approached significance ($\chi^2 = 9.70$, df = 4, $p = 0.046$), but this relationship was weaker compared to screen-use patterns (e.g., changes relative to baseline).

Table 3: Non-Significant Chi-square Associations with SITM (N = 409)

Association	χ^2	**df**	**p-value**
SITM vs Gender	0.501	1	0.479
SITM vs Study Posture	3.770	2	0.152
SITM vs Study Lighting	2.646	2	0.266
SITM vs Blue-Light Filter Use	5.006	2	0.082
SITM vs Daily Screen Hours (Exam)	9.699	4	0.046
SITM vs Daily Nearwork Hours (Non-Screen)	2.385	3	0.496
SITM vs Avg. Session (No Break)	0.512	3	0.916
SITM vs Break Frequency	3.099	3	0.377
SITM vs Break Length	0.258	2	0.879

A binary logistic regression model was fitted to identify independent predictors of SITM during the exam phase (Table 4). The model included variables reflecting visual strain, screen-use behaviors, and ergonomic factors. The analysis revealed that visual discomfort during screen use was the strongest predictor: students who reported discomfort were over six times more likely to experience SITM compared with those without discomfort (OR = 6.30, p < .001). Similarly, students who reported vision difficulties after prolonged near work were more than three times more likely to experience SITM (OR = 3.11, p < .001). Model discrimination is summarized using ROC analysis (Figure 1).

Table 4: Logistic Regression Predictors of SITM (N = 409)

Predictor	**Estimate**	**Std. Error**	**z Value**	**p-value**	**Odds Ratio**
(Intercept)	-1.913	0.632	-3.025	0.002**	0.148
Screen Distance	-0.271	0.206	-1.311	0.190	0.763
Screen Time Change (Pre-Exam)	0.375	0.155	2.420	0.016*	1.455
Corrective Lenses (Screen)	0.267	0.143	1.863	0.062	1.306
Visual Discomfort (Screen)	1.840	0.350	5.253	<0.001**	6.296
Vision Difficulty (Prolonged)	1.134	0.252	4.506	<0.001**	3.108
Recreational Screen Use (Exam)	0.322	0.199	1.616	0.106	1.380
Daily Screen Hours (Exam)	0.157	0.112	1.405	0.160	1.170

*Note: *p < 0.05; *p < 0.01.

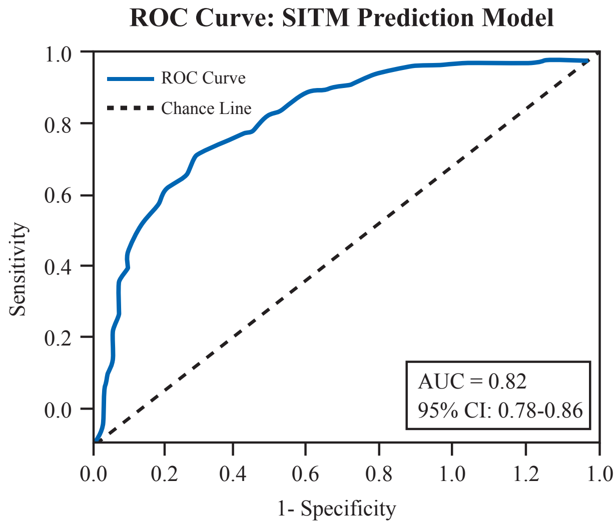

Figure 1: Receiver operating characteristic (ROC) curve for the multivariable logistic regression model predicting SITM during the peak-exam phase (T1).

Changes in screen time compared with baseline were also a significant predictor, with each unit increase associated with a 45% higher likelihood of SITM (OR = 1.46, p = 0.016). Use of corrective lenses during screen work approached statistical significance (OR = 1.31, p = 0.062), suggesting a potential but less consistent association.

By contrast, screen distance (p = 0.190), daily screen hours during exams (p = 0.160), and frequency of recreational screen use during exams (p = 0.106) were not statistically significant predictors after adjustment.

Discussion:

This prospective study revealed that screen-induced transient myopia (SITM) was frequently reported by medical students during exam periods and was closely linked to visual discomfort, prolonged near work, and increased screen use relative to baseline-not merely total daily screen time. The relationship between SITM, visual strain during screen tasks, and blurred distance vision after extended near work aligns with established evidence on accommodative lag and hysteresis as mechanisms underlying transient myopic shifts.[1,2,6] Our findings add to this literature by showing that these disturbances peak during academically intensive periods, consistent with systematic reviews highlighting ocular vulnerability during sustained digital exposure.[3,14]

Notably, changes in behavior-particularly longer uninterrupted sessions and higher-than-usual screen hours-appeared more relevant to SITM than absolute duration alone. This is consistent with longitudinal and mechanistic evidence suggesting that near-work dose, intensity, and accommodative demand shape transient blur and recovery dynamics.[2,3,6] Ergonomic factors such as posture, lighting, and blue-light filter use were not significant predictors in our model, aligning with mixed evidence regarding the protective value of such measures.[14,15,18] Functionally, SITM was associated with perceived academic impact, suggesting that visual strain may reduce study efficiency and concentration.[13,14]

Given that visual discomfort was the strongest predictor (more than six fold increased risk), interventions should focus on behavioral strategies-such as scheduled breaks, managing continuous screen bouts, and cultivating ergonomic awareness-rather than solely aiming to limit screen hours. Although the effectiveness of the "20-20-20 rule" remains contested,[14,17] the willingness of students to engage in visual health programs suggests institutional readiness to adopt preventive measures. Strengths of this study include its prospective design with repeated measures, enhancing causal inference by tracking SITM across pre-, during-, and post-exam phases.[22] The robust sample size also adds confidence to the findings. Nonetheless, limitations include reliance on self-reported symptoms rather than objective measurements (e.g., dynamic refractive testing) and being situated at a single institution, which may limit generalizability. Unmeasured confounders like sleep or stress may also influence SITM prevalence.

Surprisingly, in relation to longer screen time hours than customary (rather than longer duration), the responsibility of reducing observed dexterities can be explored to have played a bigger role in SITM development, according to our results. This is in line with longitudinal evidence that the incremental load of the near work has higher strain to the visual system compared to pure total use-congruent with the idea of behavior change, rather than simply length that does.[16] Ergonomic factors like posture, lighting, and blue-light filters showed no significant impact, consistent with mixed evidence on their protective value. Functionally, SITM was associated with academic impact, indicating that visual strain extends beyond ocular discomfort and likely affects study efficiency and concentration. This finding underscores the importance of recognizing SITM as both a visual and functional health issue in academic environments.

In conclusion, SITM emerges as a prevalent and impactful symptom among medical students during exams. It is motivated more by subjective visual unpleasant in the first place, except when screen use is protracted by proximity, and by comparative screen use increases, and not absolute increases. The future studies need to entail objective ocular examinations, prospective prevention interventions in controlled studies and to explore expanded educational and psychiatric impact of SITM. SITM is an issue that still constitutes a health and educational academic priority in medical schooling.

Conclusion:

This paper sheds light on the importance of screen-induced transient myopia (SITM) as a more common and practically significant problem among medical students when they are in exam mode. Subjective visual discomfort, blurred distance vision following a long period of monotonic work, and increased screen exposure compared to baseline were found to be strongly related to SITM whereas the absolute screen hours and other ergonomic issues such as posture or lighting played a minor role in prediction. Notably, self-reported academic impact was also found to be associated with SITM which highlights how SITM is applicable in the field of ocular health and not only.

Findings indicate that treatment must focus on behavioral changes to be made such as continuous bout length, viewing distance, and encouraging systematic study periods among others. Having institutional programs, which are visually-based health education and preventive guidelines, can be widely accepted, as students are ready to take part in the supportive programs.

Further studies are advised to include objective optical tests in combination with self-reported scores, investigate and determine the efficacy of specific interventions in difficult conditions, and investigate the qualities of wider educational and psychological outcomes of SITM. Preventing SITM at any given stage is not just an eye care health concern but is a crucial requirement in maintaining the well-being and respective academic costs of the student at high-stakes levels of education.

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Conflict of interest:

There is no conflict of interest.

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