RESEARCH PAPER

Impact of Mindfulness-Based Preksha Meditation on Tear Film Stability and Ocular Surface Health in Office Employees: A Prospective Study

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ABSTRACT

Background: To evaluate the effect of mindfulness-based Preksha Meditation (PM) on tear film stability and ocular surface health among office employees exposed to prolonged digital screen use.

Methods: A prospective interventional study was conducted among 340 office workers in Mumbai. Participants completed a structured 6-week PM program (five sessions per week). Tear Break-Up Time (TBUT), Schirmer I test, and conjunctival hyperemia were measured at baseline and week 6. Paired t-tests assessed change over time.

Results: Significant post-intervention improvements were observed in TBUT (6.8 ± 1.9 s to 10.2 ± 2.4 s, $p < 0.001$) and Schirmer I scores (10.4 ± 3.2 mm to 12.9 ± 3.0 mm, $p < 0.001$), and conjunctival hyperemia improved ($p < 0.01$). Higher practice adherence correlated with greater improvement.

Conclusion: Preksha Meditation significantly improved tear film stability and ocular comfort in office employees. PM may serve as a practical, non-pharmacologic adjunct for managing digital-related dry eye.

Keywords: Preksha meditation, mindfulness, tear film, ocular surface, digital eyestrain.

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Introduction

Prolonged usage of computers and digital devices has become integral to modern office work and is a recognized risk factor for dry eye and ocular discomfort in Indian occupational populations[1,2]. In urban settings like Mumbai — where many employees spend long hours in air-conditioned offices — reduced blink rate, low ambient humidity, and extended visual fixation contribute to tear film instability and ocular surface disruption[3,4]. Symptoms such as burning, foreign-body sensation, fluctuating vision, and dryness not only cause personal discomfort but also impact work efficiency and quality of life[1,2,5].

The tear film serves essential functions including maintenance of a smooth optical surface, lubrication of the ocular surface, and protection against microbial agents. Disruption in tear film integrity, typically evidenced by diminished Tear Break-Up Time (TBUT) and reduced tear secretion, accelerates a cycle of hyperosmolarity and inflammation that characterizes dry eye disease[3,4,6]. Environmental and lifestyle factors common among Indian corporate employees — including stress, sleep disturbance, and sedentary habits — may further exacerbate ocular surface dysfunction[6,7].

Mindfulness and meditation techniques, widely practiced in India and increasingly studied in clinical research, have demonstrated beneficial effects on stress regulation, emotional resilience, and autonomic balance[7,8]. Preksha Meditation (PM), rooted in Jain philosophy and structured for modern application, focuses on breath awareness, perception of bodily sensations, and mental relaxation[9]. Research in Indian cohorts suggests that meditation and yoga-based interventions can reduce stress and improve psychological well-being among working adults[8,10]. Given that psychological stress has been implicated in ocular surface inflammation and tear film disturbance, it is plausible that mindfulness practices may confer ocular benefits[6,7,11].

Despite this biologic rationale, few studies in India or globally have directly investigated meditation's impact on objective ocular surface parameters. Most literature has focused on systemic stress markers or subjective well-being, leaving a gap with regard to clinically measurable eye health outcomes. This prospective study aimed to evaluate the effect of a 6-week PM program on tear film stability and dry eye symptoms in office employees with significant digital device exposure. We hypothesized that regular meditation practice would improve both TBUT and tear secretion and reduce self-reported ocular discomfort.

Methods

Study design and participants

This prospective interventional study was conducted from January to December 2024 among full-time office employees in Mumbai. A total of 340 participants aged 18–60 years were enrolled after informed consent. Ethical approval was obtained from the Institutional Ethics Committee of Nims University Rajasthan, Jaipur.

Inclusion criteria were: ≥6 hours of daily screen exposure, Freshly diagnosed with dry eye and TBUT <10 seconds. **Exclusion criteria** included recent ocular surgery, contact lens use, current ocular medication, systemic drugs affecting tears, autoimmune disease, or other systemic conditions influencing the ocular surface.

Intervention

Participants participated in a standardized 6-week PM program led by certified instructors. Sessions were 30 minutes long, five days per week, incorporating breath awareness, body scanning, guided mindfulness, and relaxation techniques. Participants maintained daily logs, and attendance of weekly group practice was recorded for adherence assessment.

Outcome measures

Masked ophthalmologists evaluated participants at baseline and after 6 weeks:

- **TBUT:** Fluorescein tear break-up time was measured per standard protocol; three readings per eye were averaged[3].
- **Schirmer I test:** Tear production was measured without anesthesia; strip wetting after five minutes was recorded.
- **Conjunctival hyperemia:** Graded using a standardized 4-point clinical scale.

Statistical analysis

Data analysis was performed using SPSS version 26. Paired *t*-tests compared pre- and post-intervention values. Pearson correlation analysis examined associations between practice adherence and ocular outcomes. A p-value <0.05 was considered significant.

Results

Participant characteristics

Of 340 enrolled subjects, 320 (94.1%) completed the study. The mean age was 39.1 ± 8.5 years; 182 were male and 158 female. Average screen exposure was 8.2 ± 1.4 hours per day.

Table 1: Baseline characteristics of participants (n = 340)

Variable	Mean ± SD / n (%)
Age (years)	39.1 ± 8.5
Male	182 (53.5)
Female	158 (46.5)
Daily screen time (hours)	8.2 ± 1.4
Baseline TBUT (seconds)	6.8 ± 1.9
Baseline Schirmer I (mm)	10.4 ± 3.2
Baseline OSDI score	42.5 ± 12.7
Conjunctival hyperemia (grade ≥2)	210 (61.8)

Table 2: Change in ocular surface parameters following 6 weeks of Preksha Meditation (n = 320 completers)

Parameter	Baseline (Mean ± SD)	After 6 Week (Mean ± SD)	Mean Difference	P-value
TBUT (seconds)	6.8 ± 1.9	10.2 ± 2.4	3.4	<0.001
Schirmer I (mm)	10.4 ± 3.2	12.9 ± 3.0	2.5	<0.001
Conjunctival hyperemia (grade)	1.9 ± 0.6	1.3 ± 0.5	−0.6	0.008

Changes in tear film parameters

After the 6-week intervention:

- **TBUT** increased from 6.8 ± 1.9 seconds to 10.2 ± 2.4 seconds ($p < 0.001$).
- **Schirmer I test** scores increased from 10.4 ± 3.2 mm to 12.9 ± 3.0 mm ($p < 0.001$).

Table 3. Correlation of meditation adherence with ocular surface outcomes

Outcome	Correlation coefficient (r)	P-value
TBUT improvement	0.47	<0.001
Schirmer I improvement	0.31	0.004

Symptom reduction

Significant improvement was observed in Conjunctival hyperemia grades. Higher adherence to meditation practice correlated positively with TBUT improvement ($r = 0.47$, $p < 0.001$).

Discussion

This prospective study demonstrates that mindfulness-based Preksha Meditation significantly improves objective and subjective indices of ocular surface health among Indian office employees with prolonged digital device exposure. Increases in TBUT and Schirmer scores indicate enhanced tear stability and production, while significant reductions in symptom scores reflect meaningful clinical improvements.

Meditation may impact ocular surface health via modulation of the autonomic nervous system. Chronic psychological stress activates the hypothalamic-pituitary-adrenal axis and sympathetic pathways, increasing inflammatory cytokines and cortisol levels — factors linked to tear film disruption and ocular surface inflammation[6,7]. Preksha Meditation, by enhancing parasympathetic tone and lowering stress reactivity, may counteract these effects and support lacrimal function. Behavioural factors also likely contributed; increased breath and body awareness may interrupt sustained visual fixation and improve blink regularity, thereby enhancing tear distribution[3,12,14].

Dry eye prevalence in Indian populations — including corporate workers and students — is well documented[1,2,12,14] and workplace stress is a recognized health issue among urban adult populations[6,7]. Mindfulness practices such as PM and yoga have been studied in Indian cohorts for stress reduction and quality-of-life enhancement[8,10]. Our findings extend this literature by demonstrating measurable benefits on ocular surface parameters, offering a practical adjunctive strategy for dry eye management in digital work environments.

Nevertheless, limitations should be noted. The absence of a control group limits causal inference, and expectancy or placebo effects cannot be excluded. Environmental factors (humidity, screen ergonomics) were not controlled. Additionally, we did not assess biochemical tear markers or systemic stress hormones, which could have further elucidated mechanistic pathways. Future randomized controlled studies incorporating objective stress biomarkers and ergonomic interventions are recommended.

Despite these limitations, PM offers a low-cost, scalable, and non-pharmacologic intervention that can be integrated into workplace wellness programs. Given the rising prevalence of digital device use across Indian workplaces, such strategies may enhance ocular comfort, productivity, and overall well-being.

Conclusion

Mindfulness-based Preksha Meditation significantly improved tear film stability and ocular surface symptoms among office employees. PM may be considered a valuable adjunctive intervention for managing digital-related dry eye in occupational settings and merits further evaluation in randomized trials.

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