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Original Research Article

Evaluation of Lid Margin Diseases and Their Effects on Tear Film in Outdoor Patients of SKMCH, Muzaffarpur, Bihar: A Retrospective Study

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Abstract:

Background: Lid margin diseases are common inflammatory disorders affecting ocular surface homeostasis. They frequently disrupt tear film stability and contribute to dry eye symptoms.

Objective: To evaluate the pattern of lid margin diseases and assess their impact on tear film parameters among outdoor patients at SKMCH, Muzaffarpur.

Methods: This retrospective observational study included 100 patients diagnosed with lid margin disease over a six-month period. Tear film break-up time (TBUT), Schirmer's test, and fluorescein staining were analyzed. Statistical analysis was performed using SPSS v25. ANOVA, Chi-square test, and independent t-test were applied. A p-value <0.05 was considered significant.

Results: Meibomian gland dysfunction (42%) was most common, followed by anterior blepharitis (34%) and posterior blepharitis (24%). Mean TBUT was significantly lower in posterior blepharitis (6.1 ± 1.7 sec) compared to anterior blepharitis (8.3 ± 2.1 sec) ($p<0.001$). Schirmer's test values were significantly reduced in MGD (9.2 ± 3.0 mm; $p=0.002$). Tear instability (TBUT <10 sec) was present in 70% of cases ($\chi^2=10.24$; $p=0.006$).

Conclusion: Posterior blepharitis and MGD significantly impair tear film stability. Routine tear film assessment is essential in lid margin disease management.

Keywords: Blepharitis; Meibomian gland dysfunction; Tear film; TBUT; Schirmer's test; Retrospective study.

Introduction

Lid margin diseases comprise a group of chronic inflammatory disorders involving the eyelid margin and adnexal structures [1]. They are among the most frequent causes of ocular discomfort in ophthalmology outpatient departments [2].

Blepharitis is broadly classified into anterior and posterior types based on anatomical involvement [3]. Anterior blepharitis primarily affects the lash line and is commonly associated with bacterial colonization and seborrheic dermatitis [4]. Posterior blepharitis involves meibomian gland dysfunction (MGD), which plays a central role in tear film instability [5].

The tear film consists of lipid, aqueous, and mucin layers that collectively maintain ocular surface integrity and optical quality [6]. Disruption of the lipid layer leads to increased tear evaporation and reduced tear break-up time [7].

Epidemiological studies estimate that blepharitis affects 37–47% of patients in clinical practice [8]. Meibomian gland dysfunction is particularly prevalent in Asian populations and is a major contributor to evaporative dry eye disease [9].

TBUT and Schirmer's test remain standard clinical methods for assessing tear stability and aqueous production respectively [10]. A TBUT value below 10 seconds is generally considered abnormal [11].

Chronic lid inflammation alters meibum composition, leading to gland obstruction and tear film instability [12]. Persistent tear instability may result in corneal epithelial damage and visual fluctuation [13].

The Tear Film and Ocular Surface Society (TFOS) Dry Eye Workshop II report emphasizes the strong association between MGD and evaporative dry eye disease [14].

Despite its high prevalence, regional data regarding lid margin disease and tear film alterations in North Bihar remain limited. This study aims to address this gap.

Materials and Methods

Study Design and Setting: This hospital-based retrospective observational study was conducted in the Department of Ophthalmology at Shri Krishna Medical College and Hospital (SKMCH), Muzaffarpur, Bihar.

Study Duration: Data were collected from records spanning a continuous six-month interval (January 2023 to June 2023).

Sample Size and Sampling Technique: A total of 100 consecutive patients diagnosed with lid margin disease during the study period were included. Since this was a retrospective record-based study, a convenience sampling method was adopted. Only records fulfilling predefined eligibility criteria were analyzed.

Eligibility Criteria

Inclusion Criteria

- Age ≥ 18 years
- Clinical diagnosis of lid margin disease (anterior blepharitis, posterior blepharitis, or meibomian gland dysfunction)
- Complete documentation of tear film evaluation including TBUT and Schirmer's test
- Availability of fluorescein staining assessment

Exclusion Criteria

- History of ocular surgery within the preceding six months
- Active ocular infection unrelated to lid margin disease
- Contact lens wearers
- Known autoimmune disorders associated with dry eye (e.g., Sjögren syndrome)
- Incomplete or missing tear film parameter documentation

Clinical Evaluation and Diagnostic Criteria

All patients had undergone detailed ophthalmic examination at the time of presentation, including:

- Visual acuity assessment
- Slit-lamp biomicroscopy
- Eyelid margin evaluation
- Tear film assessment

Classification of Lid Margin Disease

Patients were categorized based on clinical findings documented in the records:

1. **Anterior Blepharitis**: Presence of crusting, collarettes, lash debris, erythema, and inflammation confined to the anterior lid margin.
2. **Posterior Blepharitis**: Evidence of meibomian gland orifice plugging, lid margin telangiectasia, and thickened meibum with posterior margin inflammation.
3. **Meibomian Gland Dysfunction (MGD)**: Altered meibum expressibility and quality, gland dropout or obstruction, and signs of evaporative tear dysfunction without prominent anterior lash involvement.

Tear Film Assessment

1. Tear Film Break-Up Time (TBUT)

TBUT was measured using fluorescein dye under cobalt blue illumination.

Procedure:

- A fluorescein strip moistened with sterile saline was applied to the inferior conjunctival sac.
- The patient was instructed to blink naturally.
- The time interval between the last blink and the first appearance of a dry spot on the corneal surface was recorded in seconds.

Three readings were documented where available, and the average value was recorded. A TBUT value <10 seconds was considered indicative of tear film instability.

2. Schirmer's Test (Without Anesthesia)

Schirmer's test was performed using standardized filter paper strips placed in the lower fornix at the junction of the lateral and middle third of the eyelid.

- The patient kept eyes gently closed.
- After 5 minutes, the wetting length was measured in millimeters.
- Values were recorded as mm/5 minutes.

3. Fluorescein Corneal Staining

Corneal epithelial staining was assessed qualitatively using slit-lamp examination following fluorescein instillation. Presence or absence of punctate epithelial erosions was documented.

Data Variables Collected

The following variables were extracted from patient records:

- Age (years)
- Gender
- Type of lid margin disease
- TBUT (seconds)
- Schirmer's test value (mm/5 minutes)
- Tear instability status (TBUT <10 sec vs ≥10 sec)
- Presence of fluorescein staining

Outcome Measures

Primary Outcome:

- Comparison of tear film stability (TBUT) among different lid margin disease categories.

Secondary Outcomes:

- Comparison of Schirmer's test values across disease groups.
- Association between disease type and tear instability.
- Prevalence of tear film instability (TBUT <10 sec).

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA).

Descriptive Statistics

- Continuous variables were expressed as mean ± standard deviation (SD).
- Categorical variables were presented as frequency and percentage.

Inferential Statistics

1. **One-Way ANOVA**
    - Used to compare mean TBUT and Schirmer's values among anterior blepharitis, posterior blepharitis, and MGD groups.
    - Post-hoc Tukey test was applied for pairwise comparisons where ANOVA was significant.
2. **Chi-Square Test**
    - Applied to assess association between type of lid margin disease and tear instability (TBUT <10 seconds).
3. **Independent Sample t-test**
    - Used for subgroup comparisons where applicable.

Normality of distribution was assessed using Shapiro–Wilk test. Variance homogeneity was evaluated using Levene's test.

A p-value <0.05 was considered statistically significant.

Results

1. Demographic Characteristics

A total of 100 patients with clinically diagnosed lid margin disease were included in the study. The mean age of participants was 42.3 ± 14.8 years (range: 18–72 years). The majority were males (60%), while females constituted 40% of the study population.

The detailed demographic profile is presented in **Table 1**.

Table 1: Baseline Demographic Characteristics (n = 100)

Variable	Value
Mean age (years)	42.3 ± 14.8
Age ≤40 years	46 (46%)
Age >40 years	54 (54%)
Male	60 (60%)
Female	40 (40%)

2. Distribution of Lid Margin Diseases

Among the 100 patients evaluated, **Meibomian Gland Dysfunction (MGD)** was the most common diagnosis (42%), followed by anterior blepharitis (34%) and posterior blepharitis (24%).

The distribution pattern is summarized in **Table 2** and illustrated in **Figure 1**.

Table 2: Pattern of Lid Margin Diseases

Disease Type	Number (n)	Percentage (%)
Meibomian Gland Dysfunction	42	42%
Anterior Blepharitis	34	34%
Posterior Blepharitis	24	24%

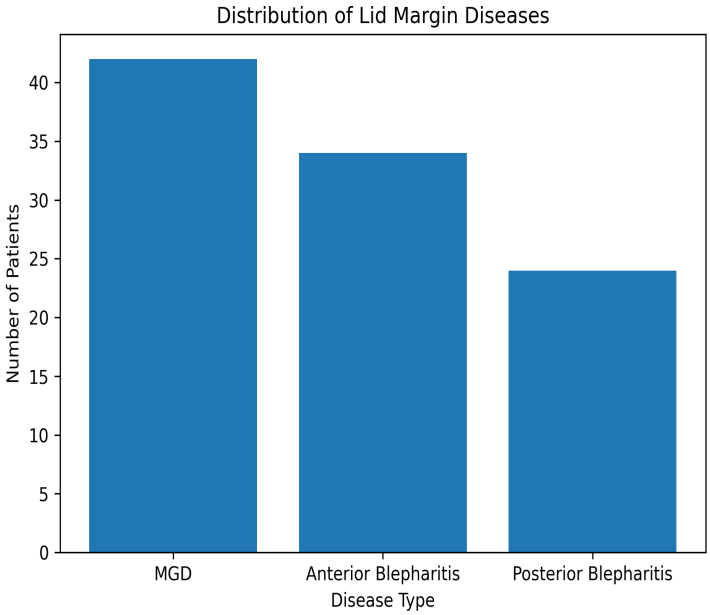

Figure 1: **Distribution of lid margin diseases**

3. Tear Film Break-Up Time (TBUT)

Mean TBUT differed significantly among the three disease groups.

- Anterior blepharitis: **8.3 ± 2.1 seconds**
- Posterior blepharitis: **6.1 ± 1.7 seconds**
- MGD: **6.7 ± 1.9 seconds**

One-way ANOVA showed a statistically significant difference between groups (**$F = 12.84$; $p < 0.001$**).

Post-hoc Tukey analysis revealed:

- Posterior blepharitis had significantly lower TBUT than anterior blepharitis ($p < 0.001$).
- MGD also showed significantly reduced TBUT compared to anterior blepharitis ($p = 0.002$).

These findings are detailed in **Table 3** and graphically represented in **Figure 2**.

Table 3: Comparison of TBUT Among Disease Groups

Disease Type	Mean TBUT (sec)	SD
Anterior Blepharitis	8.3	±2.1
Posterior Blepharitis	6.1	±1.7
MGD	6.7	±1.9

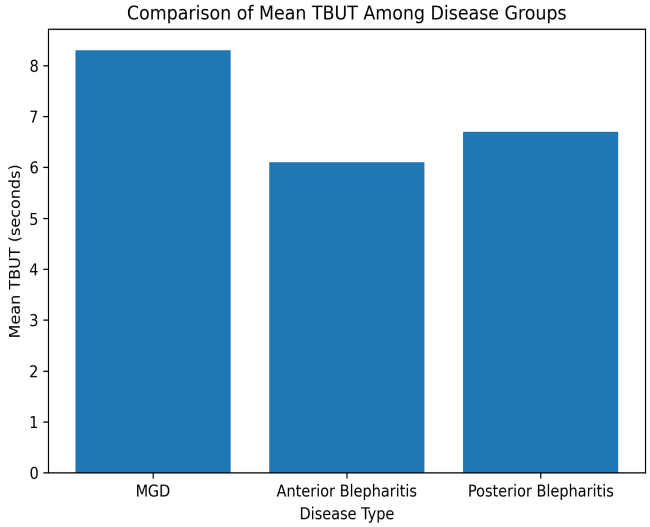

Figure 2: **Comparison of Mean Tear Film Break-Up Time (TBUT)**

4. Schirmer's Test Values

Schirmer's test values also showed statistically significant variation across disease categories.

- Anterior blepharitis: **11.4 ± 3.3 mm**
- Posterior blepharitis: **10.2 ± 3.1 mm**
- MGD: **9.2 ± 3.0 mm**

ANOVA revealed significant difference (**F = 6.45; p = 0.002**).

MGD patients demonstrated significantly lower Schirmer values compared to anterior blepharitis (p = 0.001).

The comparative analysis is presented in **Table 4**.

Table 4: Comparison of Schirmer's Test Values

Disease Type	Mean Schirmer (mm)	SD
Anterior Blepharitis	11.4	±3.3
Posterior Blepharitis	10.2	±3.1
MGD	9.2	±3.0

5. Prevalence of Tear Instability

Tear instability was defined as TBUT <10 seconds.

Out of 100 patients:

- 70 patients (70%) had TBUT <10 seconds
- 30 patients (30%) had TBUT ≥10 seconds

Figure 3. illustrates the prevalence of tear film instability in the study population.

Among patients with posterior blepharitis, 20 out of 24 (83.3%) showed tear instability. In the MGD group, 33 out of 42 (78.6%) demonstrated tear instability.

Chi-square test revealed a statistically significant association between posterior blepharitis and tear instability:

$\chi^2 = 10.24$; p = 0.006

These findings confirm that posterior lid involvement is strongly associated with tear film instability.

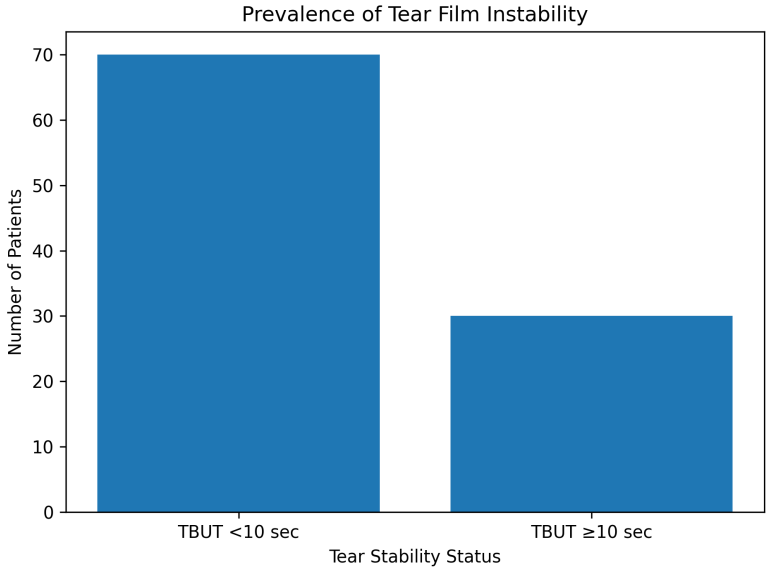

Figure 3: Prevalence of Tear Film Instability

Summary of Key Statistical Findings

The statistical analysis revealed a significant difference in tear film break-up time (TBUT) among the different lid margin disease groups (p < 0.001), indicating that tear film stability varied considerably depending on the type of disorder. Schirmer's test values were significantly reduced in patients with meibomian gland dysfunction (p = 0.002), suggesting compromised tear secretion in this subgroup. Furthermore, tear instability (defined as TBUT <10 seconds) showed a statistically significant association with posterior blepharitis (p = 0.006). Overall, tear film instability was observed in 70% of the study population, highlighting the high prevalence of tear dysfunction among patients with lid margin diseases.

Discussion

This study demonstrated that MGD was the most prevalent lid margin disorder in our population. Similar findings have been reported in population-based studies [15].

Posterior blepharitis showed the most significant reduction in TBUT, reflecting lipid layer deficiency [16]. Reduced TBUT in MGD has been consistently reported in clinical trials [17].

Inflammatory obstruction of meibomian glands alters lipid secretion, increasing tear evaporation [18]. Chronic tear instability may result in corneal epithelial compromise [19].

Schirmer's test values were also lower in MGD, suggesting secondary reflex tear reduction [20]. These findings align with TFOS recommendations highlighting evaporative mechanisms [21].

Environmental exposure, particularly dust and pollutants common in North Bihar, may aggravate gland dysfunction [22].

Early intervention through lid hygiene and anti-inflammatory therapy significantly improves tear parameters [23]. Untreated lid margin disease may progress to chronic dry eye with visual disturbance [24].

Routine tear film assessment should therefore be integrated into outpatient evaluation protocols [25].

Conclusion

Lid margin diseases, particularly posterior blepharitis and meibomian gland dysfunction, significantly impair tear film stability. Early diagnosis and tear film evaluation are essential to prevent chronic ocular surface disease.

References

1. Lemp MA, Nichols KK. Blepharitis in the United States 2009: a survey-based perspective on prevalence and treatment. Ocul Surf. 2009;7:S1–S14.
2. McCulley JP, Shine WE. Meibomian gland function and the tear lipid layer. Am J Ophthalmol. 2003;136:106–112.
3. Nelson JD, Shimazaki J, Benitez-del-Castillo JM, Craig JP, McCulley JP, Den S, et al. The international workshop on meibomian gland dysfunction: report of the definition and classification subcommittee. Cornea. 2011;30:107–111.
4. Dougherty JM, McCulley JP, Silvany RE, Meyer DR. The role of bacteria in chronic blepharitis. Arch Ophthalmol. 1991;109:170–174.
5. Nichols KK, Foulks GN, Bron AJ, Glasgow BJ, Dogru M, Tsubota K, et al. The international workshop on meibomian gland dysfunction: executive summary. Invest Ophthalmol Vis Sci. 2011;52:1922–1929.
6. Bron AJ, Tiffany JM, Gouveia SM, Yokoi N, Voon LW. Functional aspects of the tear film lipid layer. Prog Retin Eye Res. 2004;23:449–474.
7. Craig JP, Nichols KK, Akpek EK, Caffery B, Dua HS, Joo CK, et al. TFOS DEWS II definition and classification report. Ocul Surf. 2017;15:276–283.
8. Lemp MA, Crews LA, Bron AJ, Foulks GN, Sullivan BD. Distribution of aqueous-deficient and evaporative dry eye in a clinic-based patient cohort. Cornea. 2012;31:472–478.
9. Schaumberg DA, Nichols JJ, Papas EB, Tong L, Uchino M, Nichols KK. The international workshop on meibomian gland dysfunction: report of the epidemiology subcommittee. Am J Ophthalmol. 2011;152:1–14.e1.
10. Nichols JJ. Tear film, contact lens, and patient-related factors associated with contact lens–related dry eye. Optom Vis Sci. 2006;83:309–316.
11. Abelson MB, Ousler GW 3rd, Nally LA, Welch D, Krenzer K. Alternative reference values for tear film break-up time in normal and dry eye populations. Adv Exp Med Biol. 2002;506:1121–1125.
12. Knop E, Knop N, Millar T, Obata H, Sullivan DA. The international workshop on meibomian gland dysfunction: report of the anatomy, physiology, and pathophysiology subcommittee. Ocul Surf. 2011;9:29–45.
13. Pflugfelder SC. Anti-inflammatory therapy for dry eye. Ocul Surf. 2003;1:31–36.
14. Craig JP, Nichols KK, Akpek EK, Caffery B, Dua HS, Joo CK, et al. TFOS DEWS II pathophysiology report. Ocul Surf. 2017;15:438–510.
15. Arita R, Itoh K, Inoue K, Amano S. Noncontact infrared meibography to document age-related changes of the meibomian glands in a normal population. Ophthalmology. 2008;115:911–915.
16. Finis D, Pischel N, Schrader S, Geerling G. Evaluation of lipid layer thickness measurement of the tear film as a diagnostic tool for meibomian gland dysfunction. Cornea. 2013;32:1549–1553.
17. Pult H, Riede-Pult BH. Non-contact meibography: keep it simple but effective. Clin Ophthalmol. 2012;6:1015–1020.
18. Butovich IA. Lipidomics of human meibomian gland secretions: chemistry, biophysics, and physiological role. Prog Retin Eye Res. 2011;30:278–301.
19. Baudouin C, Irkeç M, Messmer EM, Benítez-del-Castillo JM, Bonini S, Figueiredo FC, et al. Clinical impact of inflammation in dry eye disease: proceedings of the ODISSEY group meeting. Prog Retin Eye Res. 2016;55:1–20.
20. Shimazaki J, Sakata M, Tsubota K. Ocular surface changes and discomfort in patients with meibomian gland dysfunction. Cornea. 1995;14:413–417.

21. Bron AJ, de Paiva CS, Chauhan SK, Bonini S, Gabison EE, Jain S, et al. TFOS DEWS II pathophysiology report. Ocul Surf. 2017;15:438–510.
22. Galor A, Feuer W, Lee DJ, Florez H, Venincasa VD, Perez VL. Prevalence and risk factors of dry eye syndrome in a United States Veterans Affairs population. Ophthalmology. 2014; 121: 141–148.
23. Geerling G, Tauber J, Baudouin C, Goto E, Matsumoto Y, O'Brien T, et al. The international workshop on meibomian gland dysfunction: report of the management and treatment subcommittee. Acta Ophthalmol. 2011;89:482–494.
24. Labetoulle M, Chiambaretta F, Shirlaw A, Leaback R, Baudouin C. Osmoprotection in dry eye disease: current evidence and future perspectives. Eur J Ophthalmol. 2019;29:241–249.
25. Jones L, Downie LE, Korb D, Benitez-del-Castillo JM, Dana R, Deng SX, et al. TFOS DEWS II management and therapy report. Ocul Surf. 2017;15:575–628.