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ORIGINAL RESEARCH

Compliance with Lid Hygiene in Patients with Meibomian Gland Dysfunction

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Purpose: To evaluate the level and predictor of compliance with lid hygiene of the patients with meibomian gland dysfunction (MGD) by a specially designed and validated questionnaire.

Patients and Methods: A cross-sectional, descriptive study was conducted among patients with symptomatic meibomian gland dysfunction visiting at Ramathibodi Hospital from April 2019 to December 2020. Dry eye symptom, fluorescein tear breakup time (TBUT), ocular surface staining, lid morphology, meibum quality, and meibum expressibility were evaluated. All patients were instructed to perform lid hygiene two times daily. Eight weeks after receiving the instruction, the patients were asked to complete a newly developed seven-item questionnaire to assess compliance. The associated factors limiting treatment adherence were evaluated. Proper statistical analyses were used to determine the relationships between compliance and non-compliance and a group of relevant baseline variables. $P < 0.05$ was considered to be statistically significant.

Results: A total of 77 patients were recruited into the study. Sixty-three patients (81.8%) were female. The mean age was 66.71 ± 8.17 years old (42–87 years). Good compliance with lid hygiene was reported by 42 patients (54.6%). Patient demographic factors or the number of concurrent systemic or ophthalmic drugs were not significantly different between the compliance and non-compliance groups. Some clinical signs, including the higher scores of meibomian gland expressibility and moderate to severe ocular surface staining, were significantly positively associated with lid hygiene compliance ($\chi^2 = 10.13$, $P = 0.001$ and $\chi^2 = 10.48$, $P = 0.001$, respectively). A lack of time was the most notable reason for non-compliance.

Conclusion: Approximately half of the patients with symptomatic MGD had good compliance with lid hygiene by the specific questionnaire. Appropriate patient education and optimization methods of lid hygiene may promote patient compliance.

Keywords: lid hygiene, meibomian gland dysfunction, compliance, adherence

Introduction

Meibomian gland dysfunction (MGD) is a chronic, diffuse abnormality of the meibomian glands, commonly characterized by terminal duct obstruction and/or qualitative/quantitative changes in glandular secretion.[1] It appears to be a frequent ophthalmic condition, particularly in Asians, with prevalence in the general population varying from 31% to 70% and is considered to be a major contributor of evaporative dry eye, which is the most common subtype of dry eye disease.[1–4] Although several treatment modalities are available, lid hygiene, consisting of eyelid warming, massaging, and cleaning, is the cornerstone of MGD treatment.[5] Lid hygiene has been shown to decrease dry eye symptoms, reestablish tear film stability, improve meibomian gland secretion, increase tear film lipid layer thickness, and reverse meibomian gland dropout.[5,6] However, similar to long-term treatment adherence for other chronic asymptomatic conditions, the compliance with everyday lid hygiene could be a demanding task for many MGD patients.[5] Multiple new treatment modalities, ie, the thermal pulsatile system or Lipiflow® (TearScience ®, Morrisville, NC), intense pulse light therapy(IPL), or Quantum Molecular Resonance-based electrotherapy (QMR-ET) might help improve treatment result and fixed this problem.[7–10] There have been few studies primarily evaluating the compliance with lid hygiene in patients with MGD, despite the recognition of this issue in MGD treatment.[6,11–14] Several methods have recently been

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utilized for the assessment of compliance, including indirect measures such as self-report, electronic drug monitoring, pill counts, and pharmacy refill records; and direct measures, including detection of drugs or drug metabolites in plasma and examination of the intended effect.[15] As lid hygiene regimens do not involve medications, the assessment can only rely on self-report or examination of an intended effect. Nonetheless, the use of intended effects as the measure of lid hygiene compliance may not be appropriate because there might be a weak link between the prescribed regimen and the desired outcomes.[16] Additionally, most MGD patients tend to receive combination therapy, and multiple factors could be related to the therapeutic results.[5] Therefore, self-report obtained through a questionnaire, which is the most preferred strategy for assessing compliance behavior, has been mainly used in previous studies.[6,11–14] However, there were no standardized questions, so either a follow-up single question or a telephone 1- or 2-item questionnaire was administered to determine patient compliance.[11,13] Although single-item questionnaires have been found to be valid ways to analyze patient compliance,[17] they still overestimate treatment compliance compared with multiple questions.[15] A simple self-report form was applied in one study. The patients were instructed to sign the form every day if they performed the lid hygiene.[13] Nonetheless, the possibility of having distrustful answers might be a major disadvantage.[18] In another study investigating the efficacy of lid hygiene using a specialized commercial product, the compliance was evaluated via a product questionnaire at the follow-up visits.[14] Nevertheless, details of the product questionnaire were unavailable in that study. This study aimed to assess levels and predictors of compliance with lid hygiene among patients with MGD in real life, using a specifically designed and validated seven-item questionnaire, and to identify reasons for non-compliance.

Materials and Methods

Study Design

This single-center cross-sectional study was conducted at the Department of Ophthalmology, Ramathibodi Hospital, Bangkok, Thailand, between April 2019 and December 2020. The study protocol and consent form were reviewed and approved by the Institutional Review Board/Ethics Committee of Faculty of Medicine Ramathibodi Hospital, Mahidol University (MURA2019/1200). The study adhered to the tenets of the Declaration of Helsinki. Written informed consent was obtained from all participants before enrollment.

Study Questionnaire

Based on the various tools used for measuring the patient's adherence to prescribed medications,[19,20] we developed a new seven-item questionnaire to assess lid hygiene compliance (Table 1). Eight weeks after receiving instructions of lid hygiene, a single independent interviewer (WU) assessed the real-life patient's compliance. Before administering the

Table 1 Seven-Item Questionnaire Lid Hygiene Compliance Scale

No	Question	Answer	
		Yes	No
1	Have you ever forgotten to perform lid hygiene?		
2	Did you perform lid hygiene over the past 3 days?		
3	When your symptoms settled, have you continued performing lid hygiene?		
4	When you did not feel better, have you stopped performing lid hygiene?		
5	Have you performed lid hygiene every day for 7 consecutive days?		
6	When you traveled, did you still perform lid hygiene regularly?		
7	Do you think the lid hygiene regimen recommended by the hospital is simple and practical?		
Total scores			

questionnaire, the interviewer reiterated that all responses were completely anonymous and their treating ophthalmologist would not be able to access any information given to the interviewer. A blame-free environment was created as much as possible to make patients feel comfortable providing honest responses and revealing non-compliance. If any patients had specific concerns that the interviewer could not answer, they were encouraged to discuss these problems with their cornea specialist. Response choices were "yes" or "no". Ideally, five questions (questions 2, 3, 5–7) must have been answered positively and 2 (question 1, 4) negatively to receive one score for each question. The total score was the sum of all the scores and ranged from 0 to 7, with scores of 7 reflecting high adherence, 6 or 5 reflecting medium adherence, and ≤4 reflecting low adherence. In this study, patients were considered well compliant when they had medium to high adherence to their lid hygiene (a score of 5–7). Patients with poor compliance (total scores of ≤4) were asked about the most crucial reason or factor limiting their adherence.

The validity and reliability of the questionnaire were examined by the index of Item-Objective Congruence (IOC) and internal consistency methods using Cronbach's Alpha Coefficient, respectively. Four cornea specialists were asked to judge each item whether it really measures the expected attribute to determine content validity. All items had the IOC greater than 0.5, indicating the qualified items. A pilot test was performed on 15 subjects to ensure comprehension of the questions, and there were no significant inconsistencies in test scores over different parts of the questionnaire. The Cronbach's alpha values were above 0.75 (0.76–1.00), indicating the high reliability of the questionnaire.[21] Therefore, this questionnaire was created and considered valid and reliable based on an index of item objective congruence from four specialists (>0.75) and a pilot of 15 subjects (Cronbach alpha, 0.83–1.00).

Study Population

The amount of study population was calculated based on the sample size calculation formula.[22]

$$N = \frac{Z^2_{1-\alpha/2} * p(1-p)}{d^2}$$

N = number of sample size, Alpha (α) = 0.05, Z = 1.959964

p = likely proportion of sample size, d = error

According to the formula, we assumed that the proportion of good compliance was 0.55 (reference from the previous study),[12] and the acceptance of error was 0.11. A sample size of 78 patients was required. Then, the patients with symptomatic MGD were recruited from general ophthalmology outpatient and cornea clinics during the study period. Eligible participants were at least 18 years old, diagnosed with MGD stage 2 to 4 by a cornea specialist (KL, PP, NC, VC, MN), according to the 2011 Tear Film and Ocular Surface Society (TFOS) International Workshop on MGD.[1] The subjects had not been trained in lid hygiene. Other inclusion criteria were an absence of active ocular surface inflammation, physical ability to follow the regimen, and willingness to attend a scheduled follow-up visit and undergo study assessments. Patients with MGD stage 1 were excluded from the study because they had no symptoms. Thus, they might not seek medical assistance and be less likely to adhere to their treatment.[6] Patients with exacerbated inflammatory ocular surface were not suitable for lid hygiene until the inflammation was well controlled.[5,6] Additional exclusion criteria comprised ocular surgeries or trauma within the previous six months, active ocular infection, other anatomical or functional eyelid or eyelash abnormalities such as mucosal keratinization or trichiasis, dermatologic disorders affecting eyelids, hypersensitivity to any composition of substances used in the regimen, monocular participants, and pregnancy, potential of becoming pregnant, or breastfeeding during the study.

Study Protocol

The patient information regarding demographics data, past ocular and medical history, and the number of systemic and topical medications were surveyed and collected. Education levels were classified into four classes; no education, primary education, secondary education/vocational certificate/vocational diploma, and bachelor's degree/higher bachelor's degree. Then, enrolled patients underwent a subjective evaluation of MGD-related symptoms,[1,23,24] including ocular fatigue, foreign body sensation, dryness, discomfort, itching, photophobia, burning, fluctuating/blur vision, and soreness, to re-confirm that the patients still had symptomatic MGD before receiving instructions for lid hygiene. Subsequently,

basic ocular surface examinations were carried out in the following manner: fluorescein tear breakup time (TBUT), ocular surface fluorescein staining (Oxford scale),[25] and meibomian gland expression. Ocular surface staining was divided into two categories: grade 0 to 3; absent to mild staining and grade 3 to 5; moderate to severe staining. Meibomian gland secretion was assessed using firm digital pressure. Five glands in the center of the upper tarsus were expressed using a thumb to grade the meibum expressibility semi-quantitatively. A scale of 0 to 3 based on the number of glands expressible was used as follows: 0, all glands; 1, three to four glands; 2, one to two glands; 3, no glands.[1] Meibum quality was evaluated on a scale of 0 to 3 as well: 0, clear; 1, cloudy; 2, cloudy with particulate matter (granular); 3, inspissated, like toothpaste.[26]

After the initial clinical evaluation, all patients were given a detailed instruction brochure and were instructed in lid hygiene by the same instructor team. The sequence of self-treatment regimen was as follows: (1) lid warming: warm the eyelids using either warm towel compresses/warm eye masks/a heated rice bag delivered approximately 40–42°C heat applied to the skin of closed eyelids or a commercial warm moist air device (Blephasteam®, Spectrum Thea Pharmaceuticals LTD, Macclesfield, UK) for 10 minutes; (2) lid massaging: apply traction on the lateral canthus to immobilize the upper and lower eyelids, followed by downward (for upper eyelids) or upward (for lower eyelids) mild compression of the eyelids with the finger of the opposite hand beginning at the nasal canthus and moving laterally toward the lateral canthus; (3) lid cleansing: scrub the eyelid margin with moistened cotton buds and dilute infant shampoo or commercial specifically formulated lid scrubs/wipes.[5] Lid hygiene must be performed twice daily, in the morning and at night.

In addition to receiving instructions, patients were briefly told about the pathophysiology, the natural history, and the need for long-term treatment of MGD using simple and clear language. They are also reassured that they would notice an improvement in their symptoms if they complied with the instructions. Patients were allowed to continue their eye drops, including artificial tears as usual. Eight weeks after receiving complete instructions, a new seven-item questionnaire was used to assess the patient's compliance.

Statistical Analysis

Statistical analyses were conducted using STATA version 16 (Stata Corp, College Station, TX, USA). The data from the worse eye, defined as having higher meiboscores of each patient, were used for analysis. For continuous data, normally distributed variables were presented as mean and standard deviation (SD); non-normally distributed variables were presented as median and range. Frequency and percentage were used for categorical data. Pearson chi-square (χ^2) test, *t*-test, Fisher's exact test, and Wilcoxon rank-sum test were used to evaluate the relationships between compliance and non-compliance and a group of relevant baseline variables. $P < 0.05$ was considered to be statistically significant. Factors that were significant at $p < 0.10$ in univariate analysis were considered for multivariate analysis. Multiple logistic regression was used to predict factors associated with compliance. P values <0.05 were considered statistically significant.

Results

Eighty-two eligible patients were enrolled in this study. Seventy-seven (94%) of 82 patients were completed with all inclusion criteria and included in the study. Two and three of the patients were excluded due to physical inability to do lid hygiene and active ocular surface inflammation, respectively. Most of the consecutively enrolled patients were female (63/77; 81.8%). The mean age was 66.7 ± 8.2 years (range, 42–87 years). Sixty-six patients (85.7%) had completed secondary school or higher (no education = 2, primary education = 9, secondary education/vocational certificate/vocational diploma = 21, and bachelor's degree/higher bachelor's degree = 45). Nearly half (32/77; 41.6%) were retired or unemployed. Almost all patients who had a job (45/77) worked in an office (Table 2). The majority of patients (81.8%) were taking at least one chronic systemic medication. The median number of systemic drugs used per patient was 4 (range, 0–16). The median number of ophthalmic prescriptions per patient was 2 (range, 1–5). A small proportion of patients (10.4%) had glaucoma requiring anti-glaucoma agents. Baseline ocular surface and meibomian gland characteristics are summarized in Table 2.

Table 2 Patient Demographic and Baseline Characteristics of the Study Population (N = 77)

Parameters	Results
Age (years) (mean ± SD)	66.7 ± 8.2
Sex (male: female)	14 (18.2%): 63 (81.8%)
Education	
- No education or primary	11 (14.3%)
- Secondary or higher	66 (85.7%)
Occupation	
- Retirees or the unemployed	32 (41.6%)
- Government/state enterprise officers	21 (27.3%)
- The self - employed, retail merchants, or company heads	12 (15.6%)
- Company employees	5 (6.5%)
- Agriculturists	3 (3.9%)
- Others	4 (5.2%)
Number of systemic drugs used (mean ± SD)	4.1 ± 3.5
Number of topical ophthalmic drugs used (mean ± SD)	2.0 ± 0.9
Fluorescein tear breakup time (seconds) (mean ± SD)	5.0 ± 2.7
Ocular surface fluorescein staining (Oxford scale)	
- Grade 0 - II (absent to mild staining)	63(81.7%)
- Grade III–V (moderate to severe staining)	14(18.3%)
Meibum quality*	
- Grade 1: cloudy	15 (19.5%)
- Grade 2: cloudy with debris (granular)	41 (53.3%)
- Grade 3: thick, like toothpaste	21 (27.3%)
Meibum expressibility* (number of glands expressible from five glands)	
- Grade 1: three to four glands	33 (42.9%)
- Grade 2: one to two glands	40 (52.0%)
- Grade 3: no glands	4 (5.2%)

Note: *No patient with meibum quality and expressibility of grade 0.

Overall, 2, 40, and 35 patients (2.6%, 51.9%, 45.5%) had high adherence (score = 7), medium adherence (scores 5 to 6), and low adherence (scores ≤4) respectively. Four patients had a score of zero. The number of patients classified as being compliant (scores 5 to 7) was 42 patients (54.6%). By univariate analysis, there was no significant difference between compliance and non-compliance groups regarding age, sex, education, employment status, number of concurrent medications, systemic or ophthalmic drugs, history of glaucoma, fluorescein TBUT and meibum quality (Table 3). Only the ocular surface staining scores and meibomian gland expressibility were significantly positively associated with lid hygiene compliance ($\chi^2 = 10.13$, P = 0.001 and $\chi^2 = 10.48$, $P = 0.001$, respectively). However, after multivariate analysis, only the higher ocular surface staining scores were significantly positively associated with lid hygiene compliance (Odds ratio (OR) = 14.12, 95% confident interval (CI)=1.67–118.80, P < 0.05) (Table 3). Diverse reasons for poor compliance are presented in Table 4. A lack of time was the most notable reason for non-compliance in this study (18/35, 51.4%).

Discussion

Although lid hygiene is a routinely recommended first-line therapy for MGD, the variability among clinicians on what to use and the nature of instructions given to patients for lid hygiene could result in the lack of standardization of the

Table 3 Univariate and Multivariate Analysis of Patient Demographic and Baseline Characteristics Comparing Between Good and Poor Compliance Measured by the Newly Developed Questionnaire

Variables	Good Compliance (N=42)	Poor Compliance (N=35)	Univariate Analysis *P*-value	Multivariate Analysis *P*-value
Mean age (years)	67.5 ± 1.3	65.7 ± 1.4	0.345[a]	
Female sex	35 (83.3%)	28 (80.0%)	0.706[b]	
Secondary or higher education	36 (85.7%)	30 (85.7%)	1.00[c]	
Retirees or the unemployed	15(35.7%)	17(48.5%)	0.473[b]	
Mean number of oral drugs	4.7 ± 3.5	3.4 ± 3.4	0.068[d]	0.198
Mean number of topical ophthalmic drugs	2.2 ± 0.2	1.8 ± 0.1	0.095[a]	0.478
History of glaucoma	4 (9.5%)	4 (11.4%)	1.00[c]	
Mean fluorescein TBUT (seconds)	4.8 ± 2.9	5.2 ± 2.5	0.414[d]	
Ocular surface staining (≥3; moderate to severe)	13(30.9%)	1(2.8%)	0.001[b]	0.015
Meibum quality scores of ≥2	33 (78.6%)	29 (82.9%)	0.636[b]	
Meibum expressibility scores of ≥2	31 (73.8%)	13 (37.1%)	0.001[b]	0.474

Note: [a]Two-sided *t*-test, [b]Chi-square test, [c]Fisher exact test, [d]Two-sample Wilcoxon rank-sum test.
Abbreviation: TBUT, tear breakup time.

Table 4 Reasons of Poor Compliance with Lid Hygiene (N = 35)

Reasons	N (%)
Patient-Centered Factor	**25 (71.5%)**
Lack of time	18 (51.4)
Do not comprehend the disease and the necessity of the recommended treatment	2 (5.7)
Too many concerns about other systemic conditions	2 (5.7)
Simply forget to do lid hygiene	2 (5.7)
Intermittent shoulder pain	1 (2.9)
Procedure-related factor	**10 (28.5%)**
Complexity of the regimen	4 (11.4)
Inconvenience of preparing things required for lid hygiene	3 (8.6)
Difficulty in remembering the steps of the regimen	2 (5.7)
Feel discomfort after lid hygiene	1 (2.9)

technique and the uncertainty about patient compliance. This study aimed to investigate the compliance of the patients with MGD after they were given the same detailed instruction leaflet, verbally instructed and demonstrated the technique by the single instructor team to perform lid hygiene.

Overall, the compliance rate of lid hygiene in the current study was 54.6%. This rate was slightly lower than those of other prior studies (range, 55–67%).[6,12,27] This might be explained by the differences in lid hygiene technique and regimen between studies along with various methods and criteria used to access the compliance. We proposed that using

a specifically designed seven-item questionnaire in our study should improve the reliability of the compliance rate. More importantly, five of the seven questions had high sensitivity to determine good compliance; meanwhile, three had high specificity to define poor compliance (Table 5). As question 1 had 100% specificity, it might be a valid question when a clinician needs to detect patients with poor compliance correctly. Question 5 had a relatively high positive likelihood ratio and low negative likelihood ratio when compared with the others. Therefore, this question could be the most reasonable screening question to estimate patient compliance, especially when patient overload does not allow a clinician ample time to spend with patients in real-life practice.

In addition, we found that demographic factors including age, sex, education, employment status, and the number of systemic or topical ophthalmic drugs did not influence therapy compliance. The literature review by Jin et al demonstrated that general demographic factors might not be good predictors of therapeutic compliance because some of them are related to patients' various cultural, socioeconomic, and psychological backgrounds. Hence, they may not be genuinely independent factors affecting compliance.[28] Previous studies showed that older age might be associated with poorer compliance in lid hygiene. Conversely, no significant relationships between the other demographic factors, including sex, race, ethnicity, and patient compliance were observed.[12,27,29] Similar to the previous study,[12] our study revealed that history of glaucoma did not appear to be a variable influencing the compliance. Although the presence of disease symptoms has generally been associated with better compliance,[30,31] no consistent evidence demonstrated that patients with greater disease severity based on clinical signs would correlate with having better compliance.[32–34] One previous study reported that the patients with lid margin disease who self-reported dry eye symptom were more likely to be compliant with lid hygiene than those who did not.[12] In this study, we included only patients with symptomatic MGD. Hence, the compliance rate might be lowered if patients with asymptomatic MGD were also recruited into the study. Interestingly, we found that higher severity of some clinical signs of dry eye and MGD, including ocular surface staining and meibomian gland expressibility, were significantly positively associated with good lid hygiene compliance. It possibly implies that more severe clinical signs of MGD could lead to worse symptoms, contributing to better compliance. The results of a recent study support our hypothesis, showing that MGD patients with severe symptoms had worse meibomian gland characteristics, including meibum quality, meibomian gland expressibility, and meiboscore.[30] Nonetheless, further investigations to assure this association are warranted.

In patients with poor lid hygiene compliance, we used opened-end questions to explore the main reasons for non-compliance. Broadly, the causes of poor compliance in this study were categorized into two themes: patient-centered factors and procedure-related factors (Table 4). Almost three-fourths of all reasons were related to patient-centered factors, whereas the rest were associated with procedure-related factors. Regarding patient-centered factors, a lack of time was the most common reason, followed by uncomprehending the disease and the necessity of the recommended treatment; too many concerns about other systemic conditions; and simply forgetting to do lid hygiene. To the best of our knowledge, only a few studies specifically mentioned the reasons for poor compliance with lid hygiene.[12,35] Similarly, patient-centered factors, such as forgetfulness and carelessness, were the major causes of poor compliance in those

Table 5 Sensitivity, Specificity, Positive Likelihood Ratio, and Negative Likelihood Ratio of Each Questionnaire Item

Questions	Sensitivity (95% CI*)	Specificity (95% CI*)	Positive Likelihood Ratio (95% CI*)	Negative Likelihood Ratio (95% CI*)
Q1	28.57% (15.72, 44.58)	100% (90.00, 100)	∞	0.71 (0.60, 0.87)
Q2	92.85% (80.51, 98.50)	57.14% (39.35, 73.67)	2.17 (1.46, 3.21)	0.13 (0.04, 0.39)
Q3	95.24% (83.84, 99.42)	28.57% (14.64, 46.30)	1.33 (1.07, 1.66)	0.17 (0.39, 0.71)
Q4	97.62% (87.43, 99.94)	54.29% (36.65, 71.17)	2.14 (1.48, 3.07)	0.04 (0.01, 0.31)
Q5	85.71% (71.46, 94.57)	88.57% (73.26, 96.78)	7.50 (2.96, 19.00)	0.16 (0.08, 0.34)
Q6	45.24% (29.85, 61.33)	85.71% (69.74, 95.19)	3.17 (1.32, 7.61)	0.64 (0.47, 0.87)
Q7	95.23% (83.84, 99.42)	31.43% (16.85, 49.29)	1.39 (1.1, 1.76)	0.15 (0.04, 0.64)

Abbreviation: CI*, confidence interval.

studies. Thus, patient education to increase illness and consequence perceptions and emphasize the importance of proper treatment would enhance patient compliance to long-term lid hygiene.

As for procedure-related factors, complexity of the regimen, inconvenience of preparing things required for lid hygiene, and difficulty in remembering the steps of the regimen were the primary reasons. Theoretically, a straightforward and undemanding technique should provide better lid hygiene compliance. Therefore, the compliance rate would be improved if the lid hygiene protocol is modified appropriately to obtain the simplest effective regimen. Multiple eyelid-warming devices, ie, a steam-based system goggle: Blephasteam® (Spectrum Thea Pharmaceuticals LTD, Macclesfield, UK), heat-generating chemicals system eyemask: EyeGiene® (Eyedetec Medical Inc., Danville, CA, USA), or gel-bead heat delivery system eyemask: TheraPearl® (Bausch & Lomb Inc., New York, USA) might facilitate eyelid warming process and keep more consistent delivery of heat over the time when applying these devices on eyelid.[36,37] One previous research demonstrated the favorable effect of Blephasteam over the conventional method in terms of the better improvement of symptoms.[37] Future studies are required to identify the best ways to perform lid hygiene to optimize patient compliance and treatment outcomes.

This study has some limitations. First, the sample size was small and the study duration was short. This might overestimate the actual long-term compliance. Second, the disadvantages inherent to self-report measures of treatment adherence tend to overestimate compliance compared with other assessment approaches as well.[38] However, the structured questionnaire measure, which is superior to in-person interviews in terms of their correspondence to objective adherence measures,[38] was used in this study. It helped collect and analyze quantitative data, making the study more reliable and accurate. Third, the severity of dry eye symptoms related to MGD was not evaluated. Lastly, there was still a variation in the equipment used for lid warming and lid cleansing, potentially affecting the compliance.

Conclusion

The compliance rate assessed by a specifically designed seven-item questionnaire in this study was 54.6%. Patient-centered factors were significant causes of poor compliance with lid hygiene. Raising patient awareness of MGD and its impact and emphasizing the need to maintain lid hygiene and long-term benefits of therapy, along with appropriate regimen modification, could be strategies for improving patient compliance with lid hygiene.

Informed Consent

Written informed consent was obtained from all patients.

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Disclosure

The authors report no conflicts of interest for this work and have no proprietary or commercial interest in any materials discussed in this article.

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